

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Station

Docket Number: 50-247-LR and 50-286-LR

ASLBP Number: 07-858-03-LR-BD01

Location: Tarrytown, New York

Date: Monday, November 16, 2015

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UNITED STATES OF AMERICA

U.S. NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of: : Docket No.
 ENTERGY NUCLEAR OPERATIONS, INC. : 50-247-LR
 (Indian Point Nuclear Generating : 50-286-LR
 Station, Units 2 and 3) : ASLBP No.
 _____ : 07-858-03-LR-BD01

Monday, November 16, 2015

Doubletree Tarrytown
Westchester Ballroom
455 South Broadway
Tarrytown, New York

BEFORE:

LAWRENCE G. MCDADE, Chairman
MICHAEL F. KENNEDY, Administrative Judge
RICHARD E. WARDWELL, Administrative Judge

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Entergy's

<u>Exhibit Nos.</u>	<u>Document</u>	<u>ID</u>	<u>Rec'd</u>
R681, R682, R683, R689, R690			4769
681, 682, 683, 689, 690			Withdrawn
R727, R728 and R729			4769
727, 728 and 729			Withdrawn
R31, R184, R186, R195, R529			4770
31, 184, 186, 195, 529			Withdrawn

NRC's

<u>Exhibit Nos.</u>	<u>Document</u>	<u>ID</u>	<u>Rec'd</u>
R101, R104, R105, R118, R147, and R161			4771
101, 104, 105, 118, 147, and 161			Withdrawn
168			4771

New York's

<u>Exhibit Nos.</u>	<u>Document</u>	<u>ID</u>	<u>Rec'd</u>
577, 578, and 579		4773	--
580, 581		4776	--

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

(12:00 p.m.)

1
2
3 CHAIRMAN MCDADE: Okay, we'll now go on
4 the record. We're here in the matter of Entergy
5 Nuclear Operations Inc., Indian Point Nuclear
6 Generating Plant, Units 2 and 3, License Renewal.
7 These are Docket Numbers 50-247-LR and 50-286-LR.

8 My name is Lawrence McDade, an
9 Administrative Judge. With me are Michael Kennedy,
10 and Richard Wardwell, also Administrative Judges with
11 the ASLB, paid. What I would like to do initially is
12 for the record, have counsel indicate who represents
13 who. We'll start at my left, Mr. Turk for NRC.

14 MR. TURK: Thank you, Your Honor. I'm
15 Sherwin Turk with the Office of General Counsel at
16 NRC. To my left is David Roth. And to his left is
17 Brian Harris. And Mr. Harris will be representing the
18 staff with respect to Contention 25 today.

19 CHAIRMAN MCDADE: Okay. For Entergy?

20 MR. BESSETTE: Good morning Your Honor,
21 this is Paul Bessette from Morgan Lewis representing
22 Entergy. On my left is Kathryn Sutton. And on my
23 right is Ray Kuyler.

24 CHAIRMAN MCDADE: Okay, thank you. For
25 New York?

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1 MR. SIPOS: Good afternoon, Your Honor.
2 John Sipos, Assistant Attorney General for the State
3 of New York. On my left, or on your right as you're
4 looking me, is Assistant Attorney General, Lisa Kwong.
5 And on my right is Assistant Attorney General, Mihir
6 Desai.

7 CHAIRMAN MCDADE: And Riverkeeper?

8 MS. BRANCATO: Yes, good afternoon, Your
9 Honor. Deborah Brancato, Staff Attorney for
10 Riverkeeper.

11 CHAIRMAN MCDADE: And with you Ms.
12 Brancato?

13 MS. BRANCATO: This is Riverkeeper's
14 expert, Dr. Joram Hopenfeld.

15 CHAIRMAN MCDADE: Thank you. Let's get
16 started with the witnesses. And we'll just go from
17 you know, your right to left.

18 MR. LOTT: My name is Randy Lott. I'm a
19 consulting engineer with Westinghouse Electric,
20 appearing on behalf of Entergy as an expert witness.

21 MR. COX: My name is Alan Cox. I'm a
22 Consultant for License Renewal for Entergy.

23 MR. AZEVEDO: My name is Nelson Azevedo.
24 I'm an Engineering Supervisor of the plant.

25 MR. DOLANSKY: My name is Bob Dolansky.

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1 I work at Indian Point for Entergy.

2 CHAIRMAN MCDADE: Okay, we have some
3 Entergy people in the second row. Let's get them to
4 identify themselves before we move to NRC.

5 MR. STROSNIDER: I'm Jack Strosnider. I'm
6 a Consultant for Entergy on License Renewal.

7 MR. GRIESBACH: I'm Tim Griesbach. I'm
8 Senior Associate with Structural Integrity Associates.
9 And I'm a Consultant, expert witness for Entergy.

10 MR. GRAY: I'm Mark Gray. I'm a Principal
11 Engineer from Westinghouse on behalf of Entergy.

12 MR. GORDON: I'm Barry Gordon. Associate
13 with Structural Integrity and I'm an expert witness
14 for Entergy.

15 CHAIRMAN MCDADE: Dr. Hiser?

16 DR. HISER: I'm Allen Hiser, Senior Level
17 Advisor for License Renewal Aging Management at the
18 NRC.

19 MR. POEHLER: Jeffrey Poehler, Senior
20 Materials Engineer for the NRC.

21 MR. LAHEY: Richard Lahey, Professor
22 Emeritus from RPI.

23 CHAIRMAN MCDADE: Okay. And Dr.
24 Hopenfeld, you're not going to be testifying on 25.
25 But why don't you introduce yourself at this point?

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1 DR. HOPENFELD: I am Joram Hopenfeld. I'm
2 a Consultant for Riverkeeper.

3 CHAIRMAN MCDADE: Okay. At this --

4 MR. STEVENS: Your Honor, Gary Stevens,
5 Senior Materials Engineer with the NRC.

6 CHAIRMAN MCDADE: I'm sorry, Mr. Stevens.
7 At this point, would all the witnesses please rise,
8 including Dr. Hopenfeld? What we want to do is to
9 swear you. The testimony you give will be under oath.
10 Will you please raise your right hands?

11 Will you swear or affirm subject to the
12 penalties for perjury that the testimony you'll give
13 at this hearing will be the truth, the whole truth,
14 and nothing but the truth?

15 (Chorus of I do.)

16 CHAIRMAN MCDADE: Okay. Please be seated.

17 Now we're going to be having documents
18 presented during the course of this hearing. Most of
19 which are public documents that are already in the
20 public domain. Available to the public on the
21 electronic hearing docket through the NRC. There are
22 also certain documents that are non-public which
23 contain proprietary information.

24 When a document is called up, Mr. Welkie
25 will bring up the public document. If for some reason

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1 any witness needs to refer to the non-public document,
2 they need to so state. At that point we will put the
3 non-public document up only for counsel and the
4 witnesses. It will not be available to the public.

5 If not only referring to the document in
6 order for reference, but also if you need to testify
7 with regard to specifics of the non-public documents.
8 Don't just do it okay, because that's going to have to
9 be done at a closed session. And what we would ask
10 you to do is to the degree possible, avoid discussing
11 proprietary information.

12 And in many instances, if not all
13 instances, you'll be able to discuss it for example,
14 if a cumulative use factor is approaching one or
15 exceeds one that testimony may be sufficient for our
16 purposes. If you feel that you actually need to get
17 into specific proprietary information, please stop and
18 state that. So that we can then defer your answer on
19 that particular question to the end.

20 And the end of a particular session where
21 if necessary we'll take up documents that are
22 proprietary in nature and need to remain non-public.

23 MS. SUTTON: Your Honor, Kathryn Sutton
24 on behalf of Entergy. And I've spoken with Mr.
25 Coldren who's here representing Westinghouse. Given

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1 the logistics and the layout of this room we have
2 concerns that even the proprietary documents that are
3 being shown to the witnesses, can be viewed by members
4 of the public.

5 CHAIRMAN MCDADE: Okay, well I mean,
6 here's the situation. I mean the document itself is
7 proprietary only to the degree that you can actually
8 read it. There's a separation between the witnesses
9 and the individuals who are in the public. That
10 although they would be capable of seeing that there's
11 a document on the screen, it's inconceivable to me
12 that they would be able to read the document.

13 Let's start with these rules. In the
14 event a non-public document comes up, and there is an
15 issue with that regard, to raise the objection at that
16 point in time. And also one thing I did want, that I
17 was remiss, we do have a representative of
18 Westinghouse here that many of the proprietary, most
19 of the proprietary documents are Westinghouse
20 documents. Would the representative from
21 Westinghouse, identify yourself for the record?

22 MR. COLDREN: Yes, Your Honor. Richard
23 Coldren, Electric Property Counsel for Westinghouse.

24 CHAIRMAN MCDADE: Okay. And then we also
25 have representatives of interested Government Agencies

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1 from Connecticut.

2 MR. SNOOK: The Assistant Attorney
3 General, Robert Snook for Connecticut.

4 CHAIRMAN MCDADE: And Westchester County?

5 MR. INZERO: Yes. Good afternoon, Your
6 Honor. Christopher Inzero, Assistant County Attorney
7 for the County of Westchester.

8 CHAIRMAN MCDADE: Okay. Are there any
9 other representatives of interested Government
10 Agencies who have appeared?

11 (No audible response.)

12 CHAIRMAN MCDADE: Okay, apparently not.
13 In the event that we do need to break for a non-public
14 session, only individuals who have signed non-
15 disclosure agreements that are on file can be present
16 in the room. So I would direct that anyone who has
17 not signed a non-disclosure agreement, if they are a
18 representative of a party, they need to do so. Or
19 understand that if we do have a non-public session,
20 it'll be necessary for them to withdraw from the room.

21 MR. TURK: Your Honor, Sherwin Turk.

22 CHAIRMAN MCDADE: Yes, Mr. Turk.

23 MR. TURK: I just note that there is a
24 video camera. I don't know if it's a member of the
25 press or who's filming? But that camera would be able

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1 to zoom in on documents on the screen. So it may be
2 appropriate to have some instructions for the
3 videographer in terms of what they can film or not
4 film.

5 CHAIRMAN McDADE: Well, I mean I believe
6 that they would understand that they would, it would
7 be a breach for them to zoom in on a non-public
8 document. If we do have a non-public document to come
9 up, we will give very specific instructions so that
10 that will not occur. But thank you for raising that,
11 Mr. Turk. I appreciate it.

12 MR. SIPOS: Excuse me Your Honor, John
13 Sipos --

14 CHAIRMAN McDADE: Yes.

15 MR. SIPOS: -- for the State of New York.
16 Good afternoon. There are also some pending motions
17 --

18 CHAIRMAN McDADE: Oh, Yes.

19 MR. SIPOS: And I was just wondering if
20 Your Honor wished to either take those up, or hear
21 additional presentations on those?

22 CHAIRMAN McDADE: Well, I mean we're going
23 to take them up here before we get started on the
24 testimony. And the testimony today is going focus on
25 Contention 25. You know the allegation that there's

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1 an inadequate Aging Management Program for certain
2 reactor vessel internals, perhaps others. We will
3 discuss that here shortly. There is a bit of a
4 carryover with 26 and 38 as well.

5 But before we get started with the
6 specifics on 25, we're going to be asking some general
7 questions having to do with TLAAs and the GALL.

8 We have certain things to take up before
9 we get started. First of all, we received last week
10 certain corrected documents from Entergy. There was
11 no objection. There was Entergy 727, 728, and then
12 revised Entergy 681, 682, 683, 689, 690, and 729. So
13 those documents are admitted.

14 (Whereupon, the above-referred to
15 documents were received into evidence as Entergy
16 Exhibits No. 727, 728, and revised Entergy Exhibits
17 R681, R682, R683, R689, R690, and R729.)

18 The original documents have been revised.
19 The documents are stricken, so that it will only be
20 the revised documents that are part of the record.

21 Other issues with regard to the current
22 status of exhibits. The following exhibits need to be
23 stricken and based on the exhibit list that we have.
24 The reason these are being stricken is because there
25 have been revised documents already submitted.

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1 So it will be the revised document. So
2 for example Entergy 31 will be stricken, and replaced
3 by Entergy R31. And that goes with Entergy 31, 184,
4 186, 195, 529, and NRC 101, 104, 105, 118, 147, and
5 161.

6 (Whereupon, the above-referred to
7 documents were received into evidence as Entergy
8 Exhibits No. R31, R184, R186, R195, and R529.)

9 CHAIRMAN McDADE: We also have an issue
10 Entergy Exhibit list does not indicate that there are
11 both public and non-public exhibits for Entergy
12 616,678, 679, 698, and 699. When at the conclusion of
13 the hearing you submit a revised exhibit list, it
14 should show, reflect that there are both public and
15 non-public versions of those documents filed.

16 The same with the Staff documents, 168,
17 196, and 197.

18 Another is a question, the staff indicated
19 that NRC document 102, and 148 were superseded by 168.
20 Does that mean that the staff is withdrawing 102 and
21 148?

22 MR. ROTH: Yes, Your Honor. The testimony
23 and the superseding documents covers both Contention
24 26 and 38.

25 CHAIRMAN McDADE: Okay, so we receive 168

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1 and strike 102 and 148.

2 (Whereupon, the above-referred to document
3 was received into evidence as NRC Exhibit No. 168.)

4 CHAIRMAN McDADE: There's also an
5 indication Riverkeeper did not file redacted versions
6 161, 162, and 163. Does Riverkeeper intend to file
7 redacted versions of those documents? Those were
8 testimony.

9 MS. BRANCATO: Yes, Your Honor. At the
10 time of the submission, Entergy had not provided
11 redacted versions to which the testimony responded to.
12 So we had not done that at the time, but Riverkeeper
13 would like to file redacted versions.

14 CHAIRMAN McDADE: Okay, and that reflect
15 again on the revised exhibit list that you file at the
16 conclusion of the hearing. That we have the non-
17 public version which we will use in rendering our
18 decision, but there should be a public version filed
19 as well.

20 MS. BRANCATO: Yes.

21 CHAIRMAN McDADE: All right. In New York
22 state exhibits, New York 369 is a multipart public and
23 non-public document. Only the non-public exhibit is
24 multipart. The public version is a single exhibit and
25 does not have an A and B version. And that should be

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1 reflected on the revised.

2 I believe those are all the issues that we
3 have with regard to exhibits. Does anybody have
4 anything further with regard to exhibits, not counting
5 the exhibits that were submitted last Friday by the
6 state of New York?

7 (No audible response.)

8 CHAIRMAN McDADE: Okay, apparently not.
9 We have a couple of motions. We had a motion to
10 remove the proprietary designation on ten documents.
11 It was filed by New York. When we originally
12 addressed this, there was an appeal pending on a
13 similar motion. That appeal has been resolved. In
14 light of the result of that appeal, the motion to
15 remove the proprietary designation for those ten
16 documents is denied.

17 There was a motion filed on Friday, last.
18 It was a motion to admit five documents, New York 577
19 to 581. The first two are demonstrative exhibits
20 prepared by Dr. Lahey, 579 is demonstrative exhibit
21 filed by Dr. Duquette, and submitted by him. Those at
22 this point are marked only for identification. They
23 are not received in evidence. They may or may not be
24 referred to, is my understanding. Is that they
25 basically fall in the same category as the discussion

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1 of a white board that they could refer to, if it is
2 necessary to answer our questions.

3 But if at this point, all they will be is
4 marked for identification.

5 (Whereupon, the above-referred to
6 documents were marked as New York Exhibit Nos. 577,
7 578, 579 for identification.)

8 CHAIRMAN McDADE: The other two we have
9 Exhibit 580 which is a paper that was presented at an
10 International Symposium in August of 2007, having to
11 do with stress corrosion cracking and the immunity to
12 stress corrosion cracking. And may or may not exist
13 with Alloy 690 and its metal welds. And also a
14 discussion that the growth rate for cracking, even if
15 it is not immune, is very low. The mid ten to the
16 ninth millimeters or lower.

17 And there's also a slide presentation from
18 I believe June of 2014, 23 slides discussing the same
19 general area.

20 Question to New York, we received your
21 motion on Friday. We received a reply from Entergy on
22 Sunday. We're here in the later part of 2015, this is
23 a document from 2007 that although on point appears
24 cumulative to other documents that you've submitted.

25 Why should we receive these documents at

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1 this late point, and why is it not unfair to the
2 witnesses from Entergy and the NRC staff to be
3 presented with these documents on the eve of their
4 testimony? Mr. Sipos, or anyone from New York.

5 MR. SIPOS: Yes, John Sipos for the state
6 of New York.

7 Taking the second document first,
8 Document 581, that is an NRC document or is a
9 presentation to NRC from a year ago. And in the
10 preparation for this hearing, Dr. Duquette reviewed
11 that document and found that it would be germane to
12 what he might, may be testifying about and the issues
13 that are at the fore in Contention 38.

14 So it is a document that is not a
15 surprise. It has existed and it ties into the 2014
16 EPRI report that is also at issue in Contention 38.
17 And so in going through the citations and in preparing
18 for it, Dr. Duquette and the state disclosed that
19 document. I believe we disclosed it a week ago and
20 made it available. So the state submits there is
21 little if any prejudice to Entergy or NRC staff
22 regarding that.

23 As to Document, or is it proposed Exhibit
24 580, the Andresen article, there are also citations I
25 believe in the 2014 EPRI report, references to Dr.

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1 Andresen and some of the work that he has done in this
2 area. And again, in reviewing testimony, reviewing
3 the documents and preparing for this hearing, Dr.
4 Duquette believed that it was germane.

5 We did disclose it. We disclosed it a
6 week ago. And it's possible that he may refer to it.
7 So we submit that there is good cause. We would have
8 preferred to have presented them earlier, the state
9 would have. But they were disclosed and the state's
10 position is that there is little if any prejudice.

11 CHAIRMAN McDADE: Okay. From the
12 standpoint of the Board, we've been dealing with you
13 know, with hundreds of pages of testimony and
14 literally thousands, if not tens of thousands of pages
15 of exhibits over a period of years at this point in
16 time. And these documents as I said, were received
17 just simply last Friday.

18 The witnesses who arrive here today,
19 probably would not have been made aware of the
20 existence of these documents or the intended use of
21 these documents by New York until today.

22 At this point we are not going to receive
23 the documents in evidence. If, you know, although I
24 do have to say although we're not receiving them into
25 evidence, they have been submitted. And they have

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1 been read by the Board.

2 (Whereupon, the above-referred to
3 documents were marked as New York Exhibits No. 580 and
4 581 for identification.)

5 So you know, the information that's
6 contained in that, is contained in the minds of the
7 Members of the Board. Even though the documents are
8 not received in evidence and would not be referred to
9 specifically in any initial opinion that the Board
10 would issue.

11 The point made by Entergy in their reply
12 is getting these this late, it just simply, not that
13 these are not potentially relevant documents, but that
14 Dr. Duquette could have brought this to the attention
15 of Counsel for New York and Counsel for Entergy and
16 the Board months, if not years ago.

17 MR. SIPOS: Could I just respond briefly,
18 Your Honor?

19 I take your point about the volume of
20 exhibits. I think there's more than 625 exhibits in
21 Track 2. There have been several thousand documents
22 disclosed, 580 and 581 I think, each are less than 30
23 pages as I said. We disclosed them last week and
24 Contention 38 you know is a few days off.

25 We would again, the state would

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1 respectfully submit that we have tried to be collegial
2 with Entergy on the documents that they have
3 presented. There has been a steady stream of
4 disclosures from Entergy over the past two weeks,
5 including documents that go to cumulative use factors.
6 And we have not objected to those.

7 CHAIRMAN McDADE: Okay. The documents
8 that were submitted by Entergy last week and received,
9 681, 682, 683, 689, 690, 729, these were all revised
10 documents were they not?

11 MR. SIPOS: Yes, they were to correct
12 mistakes or discrepancies in the calculations
13 apparently.

14 CHAIRMAN McDADE: Well, at this point this
15 580 and 581 are not received. And having been late
16 filed, if during the course of the hearing their
17 relevance as opposed to cumulative effect becomes more
18 relevant, the Board might reconsider. But at this
19 point, the Board is you know, upset that at this late
20 in the proceeding we're getting these documents
21 offered into evidence.

22 And given you know, reading through them
23 it doesn't appear that any new ground is reached in
24 them that cannot be discussed by Dr. Duquette and Dr.
25 Lahey in their testimony and through the other

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1 exhibits that have already been received.

2 That said, before we proceed further, from
3 the NRC staff is there any other administrative
4 matters that you wish for the Board to address?

5 MR. HARRIS: No, Your Honor.

6 MR. KUYLER: Not from Entergy, Your Honor.

7 CHAIRMAN McDADE: From New York?

8 MR. SIPOS: No, Your Honor.

9 CHAIRMAN McDADE: Riverkeeper?

10 MS. SUTTON: No, Your Honor, thank you.

11 CHAIRMAN McDADE: Okay, and two other
12 preliminaries. We've got a lot of people here and a
13 lot of people speaking. Most of the testimony that
14 has been received has been submitted jointly by
15 several witnesses. When we ask a question in most
16 instances, it will not be directed to a specific
17 individual, although in some instances it will be.

18 It will be for example, a witness
19 addressed to New York right now, would be to Dr.
20 Lahey, almost by default. Well, not almost. But to
21 the others, would you please in answering a question,
22 before you do, state your name. You can decide which
23 one of you is going to be answering the question. But
24 before you do, just state your name and say that this
25 is Dr. Allen Hiser for the NRC staff. This is Mr.

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1 Alan Cox for Entergy. Just so we have on the record
2 who it is specifically who's making the
3 representation.

4 Likewise, if Counsel makes a statement,
5 again to make it clear for the record, the Court
6 Reporter's got a lot to do, he may not know all of you
7 by face at this point in time, so please just state
8 your name before you begin the statement and we'll
9 move on from there.

10 Okay that said, as I indicated what we
11 wanted to do before we get into a lot of the substance
12 raised by Contention 25 is to discuss generally some
13 issues relating TLAAs and the GALL.

14 Before we do that, Judge Kennedy, do you
15 have anything further to take up before we move on?

16 JUDGE KENNEDY: I do not.

17 CHAIRMAN McDADE: Judge Wardwell?

18 JUDGE WARDWELL: No.

19 CHAIRMAN McDADE: Judge Kennedy.

20 JUDGE KENNEDY: As Judge McDade stated
21 earlier, this is Judge Kennedy, I should follow the
22 Chair's guidance. So this is Judge Kennedy. In
23 looking over the contentions, the Board saw some
24 common threads that went across more than one
25 contention. So we have couple of leading edge issues

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1 that we wanted to address before we got into the meat
2 of any particular contention.

3 You could argue, I drew the short straw.
4 I have the first two overarching issues, which for
5 want of a better characterization we called,
6 compliance with GALL, and TLAAs versus AMPs.

7 We're going to take up the compliance with
8 GALL first. And I have a series of questions that
9 I'll direct to either the staff or to Entergy, at
10 least that's my initial first cut at it.

11 I don't know who the best witness is, as
12 Judge McDade has pointed out. I am under the
13 presumption that the best witness is in the room, but
14 if not, let's identify that and we'll deal with it.
15 And so I will issue a question in the direction of
16 either Entergy or the staff. And I'll leave it to you
17 folks to select the most appropriate person to answer,
18 or persons. Identify yourself, and provide an answer.

19 I'll ask my Board mates, if they have a
20 follow-up questions to the initial question, that they
21 chime in, identifying themselves as we go. And pose
22 any follow-up questions.

23 Our hope is that by addressing some of
24 these issues that go across more than one contention,
25 that we can be a little more efficient as we address

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1 issues during each individual specific contention. I
2 ask you to bear with us. Some of this ground may have
3 been plowed under Track 1, if you all were here with
4 us. But we thought it would be good for a complete
5 record to try to revisit it and see how it all holds
6 together today.

7 And that in particular in the area of
8 compliance with GALL. We did a lot of this under
9 Contention Track 1, but I think we've amplified the
10 questions and I think we're interested in putting
11 together a consistent record at this time.

12 CHAIRMAN McDADE: Judge Kennedy, this is
13 Judge McDade again. There was one other
14 administrative matter that I forgot to raise and I
15 apologize for the interruption.

16 This is going to be a long hearing. We
17 anticipate we're probably going to be going until 6
18 o'clock or so this evening. We will probably be
19 taking one or two breaks during the course of the day.
20 But if any witness, for any reason, needs a break.
21 Don't sit there and suffer in silence. You know, let
22 us know and we can arrange to take a break.

23 The same goes for Counsel, although you
24 know each party, most parties are represented by
25 multiple people, so it may be possible for you know

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1 Counsel to step out and have their colleagues
2 continue. But again, primarily for the witnesses, you
3 know if for any reason you do need a break, let us
4 know. And we will make arrangements for it. Judge
5 Kennedy.

6 JUDGE KENNEDY: Taking a break, drink some
7 water.

8 Let's start with compliance with GALL.
9 Again from my perspective, the adequacy of individual
10 aging management programs is at issue here in these
11 contentions. So I thought it would be useful to just
12 start some general discussion on GALL, compliance with
13 GALL, and a number of side issues that go along with
14 that.

15 It's my belief that in responding to
16 challenges to the adequacy of a particular aging
17 management program, to provide reasonable assurance
18 that the effects of aging will be adequately managed
19 so that the intended functions of components and scope
20 for license renewal will be maintained consistent with
21 the current licensing basis.

22 For the period of extended operation,
23 again embedded in the regs, the commission has
24 concluded that an aging management program that is
25 consistent with GALL provides the requisite assurance,

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1 requisite reasonable assurance.

2 They go on to say that the NRC staff does
3 not take the applicant's word on this, but rather asks
4 them to confirm that a particular program is
5 consistent with GALL. So that's where I'm starting
6 from and I'm going to go through a series of
7 questions. But that's sort of the overarching
8 hypothesis here. Is that, this consistence with GALL
9 is an important issue in trying to deal with the
10 adequacy of any particular aging management program.

11 So let me first direct a question to
12 Entergy, and we'll see how this works. You guys get
13 to select. I'm interested in confirming what version
14 of GALL was used to develop the license renewal
15 application for Indian Point, Units 2 and 3?

16 MR. COX: This is Alan Cox for Entergy.
17 The version of GALL that was in effect when we
18 developed the licensed renewal application at Union
19 Point, was Rev 1.

20 JUDGE KENNEDY: Rev 1 of GALL?

21 MR. COX: Right.

22 JUDGE KENNEDY: So then I guess to the
23 staff, what version of GALL is used to review the
24 application for the Indian Point license renewal?

25 DR. HISER: This is Dr. Allen Hiser for

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1 the NRC. The staff used Revision 1 for the GALL to
2 review the Indian Point application because we issued
3 Revision 2 of GALL in the midst of that review. We
4 then directed requests for additional information to
5 Entergy based on the operating experience that the
6 staff had accumulated in developing Revision 2 of
7 GALL.

8 So at that point, we had Indian Point
9 address the operating experience that supported the
10 changes in GALL Revision 2.

11 JUDGE KENNEDY: And so, do I take that to
12 mean that the, as you use the term "operating
13 experience" in the interim between Rev 1 of GALL and
14 Rev 2 of GALL was important information and needed to
15 be addressed as part of the Indian Point license
16 renewal application?

17 DR. HISER: This is Dr. Allen Hiser again.

18 JUDGE KENNEDY: Sorry, should have
19 directed the question.

20 DR. HISER: And yes, that is correct that
21 the positions were addressed during the review of the
22 license renewal application.

23 JUDGE KENNEDY: Did that affect, Dr.
24 Hiser, did that affect any of the aging management
25 programs that are at issue here in these contentions

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1 in front of us at Track 2?

2 DR. HISER: Yes, I would say that it at
3 least addressed or resulted in changes to the aging
4 management program for reactor vessel internals. It's
5 a very difficult, actually it's a very difficult
6 question to answer because initially in Revision 1 of
7 GALL, there was no AMP for reactor vessel internals.
8 There was a commitment process that was used.

9 JUDGE KENNEDY: All right, thank you. I
10 will probably, I'm sure we're going to get into that
11 as we get into the specific contention.

12 CHAIRMAN McDADE: Just if I could, this is
13 Judge McDade. Dr. Hiser, we've heard that originally
14 it was prepared, the license renewal application,
15 looking at Revision 1 of GALL. Is it the position of
16 the NRC staff that as we sit here today, the license
17 renewal application as amended, is consistent with
18 Revision 2 of GALL? Or is it in anyway inconsistent
19 with Revision 2, or deficient pursuant to Revision 2?

20 DR. HISER: I don't believe that we had
21 done a full accounting of the differences between the
22 license renewal application for Indian Point in
23 Revision 2 of GALL. So from that perspective, I would
24 say that the application is likely a hybrid. Portions
25 that were not, that the staff did not direct requests

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1 for additional information to Entergy would still be
2 consistent with Revision 1.

3 Whether those are entirely consistent with
4 Revision 2, I would expect that they are. But we did
5 not make that comparison. What I can tell you is that
6 the staff's review really is consistent with Revision
7 2 of the GALL report.

8 And so the, and in terms of, the GALL
9 report has certain positions that are advocated for
10 aging management. And what we did with the request
11 for additional information was to ensure that the
12 operating experience that was reflected in GALL
13 Revision 2, was accounted for by the applicant in its
14 application.

15 CHAIRMAN McDADE: Okay, the Commission has
16 determined that if an AMP is consistent with GALL that
17 it is adequate. Is it the staff's position, the
18 Commission position at this point, that in order for
19 an AMP that we are reviewing today in November of 2015
20 that it needs to be consistent with the current
21 emendation of GALL, Revision 2?

22 DR. HISER: Not entirely. I guess what I
23 would say is that the GALL AMPs are not requirements.
24 What is required is adequacy of aging managements, of
25 aging effects for the, in this case, reactor vessel

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1 internals.

2 In general, a plant, an applicant that
3 indicates that it will implement a GALL AMP, after
4 verification by the staff that they in effect are
5 implementing the GALL AMP, there is a presumption that
6 that provides reasonable assurance.

7 Applicants may propose alternatives to the
8 provisions that are in the GALL AMPs. And from that
9 position the staff, in the case of say Indian Point,
10 where the application is prepared with Revision 1.
11 The staff has issued Revision 2. The staff tries to
12 bridge the operating experience and other differences
13 between the two to ensure the adequacy of the proposed
14 aging management by the applicant.

15 CHAIRMAN McDADE: Okay, thank you.

16 JUDGE KENNEDY: So Dr. Hiser, I'm sensing
17 some conscious determination on the part of the staff
18 that as changes are made from GALL Rev 1 to GALL Rev
19 2 that if there was an ongoing, I guess sticking with
20 the Indian Point Units, if there was some issues that
21 were identified in that new information between Rev 1
22 and Rev 2, how did the staff decide which, they'd have
23 to go through all of the new information, all the
24 applicable new information? How did you decide what
25 to focus on?

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1 DR. HISER: Well, the staff issued a
2 Regulatory Issue Summary in 2014. I believe it was
3 2014 that identified the operating experience that
4 formed the basis for changes to Rev 2 of the GALL
5 report. And using that as a basis, we then evaluated
6 license renewal applications that were on file at that
7 point in time. And identified areas where we thought
8 that the applicant needed to provide additional
9 information.

10 And after that review, then we issued REIs
11 to, in this case, Indian Point.

12 JUDGE KENNEDY: Dr. Hiser, just for the
13 record. Is that an exhibit that has been entered for
14 this proceeding? It doesn't sound familiar.

15 DR. HISER: It may have been 2012, and I'd
16 have to --

17 JUDGE KENNEDY: I can give you some time
18 to look that up. We can move forward and you can
19 check on it. I'd be curious to know. I don't
20 remember seeing that in the exhibit list. But it
21 sounds important.

22 MR. COX: Judge Kennedy.

23 JUDGE KENNEDY: Mr. Cox.

24 MR. COX: This is Alan Cox with Entergy.

25 Let me add just a little bit of a clarification. The

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1 regulatory information summary that Dr. Hiser refers
2 to, didn't cover every single change between GALL Rev
3 1 and Rev 2. It did point out the areas that were
4 considered most significant by the staff in Rev 2.
5 And those were the areas that were the focus of the
6 regulatory information summary and of the REIs that
7 followed that.

8 JUDGE KENNEDY: Mr. Cox is it fair to ask
9 you, would it be your opinion that, or your testimony
10 that the important issues identified in that
11 regulatory information summary were addressed as REIs
12 to Entergy and then responded to?

13 MR. COX: I believe that would be correct.

14 JUDGE KENNEDY: Are you aware of any that,
15 it sounds like you are not aware of any that were not
16 responded to?

17 MR. COX: That's correct. I'm not aware
18 of any that were not. I'm not, I don't have all of
19 them committed to memory but I'm not aware of any
20 significant issues that were identified in the
21 regulatory information summary that were not addressed
22 through REIs.

23 JUDGE KENNEDY: If a particular REI wasn't
24 responded to, how would that evidence itself, I guess
25 let's start with Mr. Cox since you were -- would there

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1 be a record of that? Are the responses to REIs
2 tracked in a process that's transparent to the public?

3 MR. COX: The responses to REIs are
4 submitted to the staff as a public document.

5 JUDGE KENNEDY: Again just for the record,
6 and maybe I'll go back to Dr. Hiser, what's the
7 current version, revision level of GALL?

8 DR. HISER: Right now for the document
9 overall, is Revision 2. There are certain issues,
10 certain AMPs where we have supplemented the guidance
11 in GALL through Interim Staff Guidance or LR-ISG
12 documents. Reactor vessel internals is one case that
13 that has occurred.

14 JUDGE KENNEDY: Ultimately we would
15 potentially see, that maybe Dr. Hiser, this isn't too
16 speculative? Are we heading to a Rev 3 of GALL, is
17 that how this seems to be working?

18 DR. HISER: It's another difficult -- this
19 is that one --

20 JUDGE KENNEDY: That's fine. I'm not sure
21 it's that important. I'm just curious if we've, it's
22 been, this proceeding has been going on since 2007 and
23 we've worked our way through at least one revision to
24 GALL. I'm not sure if there weren't two, but it
25 sounds like we started with Rev 1 and we're at Rev 2.

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1 But operating history seems to keep being accumulated.

2 DR. HISER: This is Allen Hiser. The
3 situation that we are with license renewal
4 applications is such that Revision 3 would only apply
5 to a handful of plants. And because we have Revision
6 2 with the supplements, with the ISGs, I don't believe
7 the staff will expend the resources to update that.

8 JUDGE KENNEDY: Understand.

9 MR. KUYLER: Your Honor.

10 JUDGE KENNEDY: Where are we?

11 MR. KUYLER: This is Ray Kuyler for
12 Entergy. Just the Regulatory Issue Summary that we
13 were just talking about is RIS 2011-05. It's Entergy
14 Exhibit 192.

15 JUDGE KENNEDY: I'm sorry, 192?

16 MR. KUYLER: Entergy Exhibit 1-9-2,
17 000192.

18 CHAIRMAN McDADE: Thank you.

19 JUDGE KENNEDY: All right, thank you.

20 Trying to move forward, maybe pick some
21 different topics. Within, in looking at the license
22 renewal application, it appears that the aging
23 management programs are organized into, for want of a
24 better term, "categories". And one of the categories
25 appears to be, "Consistent with GALL". And again,

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1 we're back to that consistent with GALL.

2 What does it mean? I'm going to start
3 with Entergy first. What does it mean to be
4 consistent with GALL? That term is difficult to grasp
5 at least from my perspective. I guess I'll take
6 anybody that wants to start. I think we're going to
7 have some discussion on consistency.

8 MR. COX: This is Alan Cox with Entergy.
9 I'll start with that question. When we say consistent
10 with GALL, we are saying that we are doing, as you all
11 described the program, if we say we're consistent with
12 GALL, our program does the same things that the GALL
13 program recommends.

14 And we would have the same preventive
15 actions, the same detection of aging effects, methods
16 that are defined, the same acceptance criteria would
17 be the same if we were going to say our program was
18 consistent with GALL.

19 If there are exceptions we would say it's
20 consistent with GALL with exceptions and we would
21 identify those exceptions.

22 JUDGE KENNEDY: So do I take that to mean
23 if GALL has a specific acceptance criteria or a
24 specific inspection criteria or methodology, to be
25 consistent with GALL you'd have to use those criteria,

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1 those inspection techniques?

2 MR. COX: Yes, that's correct.

3 JUDGE KENNEDY: So if you substituted
4 something, is that where you get into, you started to
5 use the word enhancement or exception? What would be
6 the process to move off of consistent with GALL?

7 MR. COX: We took an exception to, let's
8 say the acceptance criteria in GALL, we would propose
9 an alternative acceptance criteria along with a
10 technical justification for why that was an
11 appropriate acceptance criteriato effectively manage
12 the effects of aging.

13 JUDGE KENNEDY: And that would be listed
14 as an exception?

15 MR. COX: That would be listed as an
16 exception. The program descriptions in Appendix B of
17 the license renewal application have a section where
18 they identify whether there are exceptions to the
19 program.

20 JUDGE KENNEDY: So maybe to, Mr. Cox is
21 you'd like to answer, what would then be an
22 enhancement be, in the context of consistent with
23 GALL?

24 MR. COX: In the context of consistency
25 with GALL, an enhancement would be a change that if we

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1 had an existing program at Indian Point, and we
2 determined that there was a particular aspect of that
3 program that was not consistent with GALL, an
4 enhancement would be a commitment to make a change in
5 that program to where it is now consistent with GALL.

6 JUDGE KENNEDY: So maybe to the staff,
7 what from your perspective is the impact or import of
8 a licensee declaring their aging management program is
9 consistent with GALL?

10 DR. HISER: This is Dr. Hiser, what
11 consistency with GALL means is that the applicant is
12 implementing the program that is nearly identical to
13 what is in the GALL.

14 JUDGE KENNEDY: I guess that's the thing
15 that, at least the Board is struggling with. That the
16 word consistent has a definition. But when we have
17 this discussion from a technical perspective, the -ly
18 words start to creep in. We're trying to get our arms
19 around how much latitude a licensee may have in,
20 although still being consistent with GALL, could do it
21 differently.

22 In other words is there a, and I guess
23 I'll try and just, Dr. Hiser, is there a delta around
24 consistent such that if the delta gets too large it
25 becomes an exception or an enhancement? I guess I'm

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1 really struggling with how much, I mean it's not
2 verbatim. Is it verbatim compliance with what's in
3 GALL? Is it word for word what's in GALL?

4 DR. HISER: At one level it is. When an
5 applicant identifies an AMP is consistent with GALL.
6 We do an audit or an AMP consistency audit. And we go
7 to the applicant site and we at one level compare
8 their AMP to what's in GALL, word for word.

9 If there are things that are missing then
10 we discuss with the applicant why the difference
11 exists. If it is a significant difference, and I
12 think the delta really is very small, then we would
13 ask them at REI, and pursue them justifying that. And
14 maybe at that point that would be identified as an
15 exception to GALL.

16 JUDGE KENNEDY: And --

17 CHAIRMAN McDADE: Jim, just if a --

18 JUDGE KENNEDY: Go ahead.

19 CHAIRMAN McDADE: This is Judge McDade,
20 just to clarify for myself here, that an applicant
21 submitting an application does not need to have or
22 even reference GALL with their AMP. But if they
23 don't, then they have to demonstrate that the plan
24 that they have will in fact adequately manage the
25 effects of aging.

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1 If in fact they take advantage of the GALL
2 and they not only represent, but demonstrate that
3 their AMP in fact is consistent with all of the
4 parameters of GALL, then there is a presumption that
5 the plan is adequate.

6 On the other hand if they don't address or
7 demonstrate that they are consistent with GALL, then
8 they have to independently demonstrate the adequacy of
9 the aging management. Am I correct in that regard?

10 DR. HISER: This is Allen Hiser, yes I
11 would say that yes, you are correct.

12 CHAIRMAN McDADE: Okay, now when you have
13 a situation here with the hybrid, where submitted
14 under Revision 1, reviewed in part under Revision 2.
15 From our standpoint, it's not just a representation
16 that it's consistent with GALL. Do we need to find
17 that it's consistent with Revision 2 in order to have
18 that presumption of adequacy?

19 If it's not, if we can't find that it's
20 consistent with Revision 2, do we have to aside from
21 GALL, independently evaluate the adequacy of the aging
22 management?

23 DR. HISER: I guess what I would say is
24 that if the determination is made that it is
25 consistent with Revision 2 of GALL, then there's a

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1 presumption that it provides reasonable assurance. If
2 we are unable to find that it is consistent with
3 Revision 2 of GALL, then we would make a sort of on
4 its own merits, evaluation of whether the program is
5 adequate to provide reasonable assurance.

6 So the consistency with GALL is one way to
7 provide a presumption of reasonable assurance. If
8 it's a plant specific program, we do have a more
9 laborious process that we need to go through to
10 demonstrate that it provides reasonable assurance.

11 CHAIRMAN McDADE: And that's what you've
12 done in SER Supplement 2, that in certain instances
13 you've determined that it's consistent with GALL 2.
14 And in other instances you have determined that it,
15 even though not consistent with GALL 2, nevertheless
16 provides adequate assurance of aging management. Is
17 that correct?

18 DR. HISER: Are you speaking specifically
19 for the reactor vessel internals parameters?

20 CHAIRMAN McDADE: Yes.

21 DR. HISER: I guess I'd like to ask Jeff
22 to address that.

23 MR. POEHLER: Mr. Jeffrey Poehler for the
24 NRC. Actually for the reactor internals aging
25 management program submitted by Entergy, we used for

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1 guidance for the staff's review we used the Interim
2 Staff Guidance related to reactor internals,
3 LR-ISG-2011-04. And that --

4 CHAIRMAN McDADE: Sorry, can you repeat
5 the cite?

6 MR. POEHLER: Yes, LR-ISG-2011-04. And
7 basically that Interim Staff Guidance updated the
8 guidance of GALL Revision 2, specifically related to
9 reactor internals. Mostly just to recognize that the
10 approved version of MRP-227-A had been issued in 2012.

11 In practice there's not, there weren't a
12 lot of changes from GALL Rev 2 in that guidance. So
13 but we did use the, so that represented the most up-
14 to-date NRC guidance for reactor vessel internals. So
15 that was what we used when we evaluated the ten
16 elements of the aging management program for reactor
17 internals.

18 JUDGE WARDWELL: This is Judge Wardwell.
19 Considering we opened this door, with Dr. Kennedy's
20 permission, I'd like to explore this a little bit more
21 as an example of the application of GALL.

22 Mr. Cox, when you submitted your
23 application for this license renewal, when dealing
24 with the reactor vessels internals, what did you
25 submit at the time of, in 2007? Because there was no

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1 -- let me ask you this question, there wasn't an AMP
2 in GALL 1 for reactor vessel internals. Is that
3 correct?

4 MR. COX: This is Alan Cox for Entergy.
5 That is correct. There was no AMP. There was
6 direction in the, or guidance, recommendations, in the
7 GALL report that said for reactor vessel internals an
8 applicant should provide a commitment to participate
9 in the industry efforts that were evaluating aging
10 management of the vessel internals.

11 And to implement the resulting programs
12 and guidance that came out of that industry effort as
13 part of, you know to manage the effects of aging on
14 the vessel internals.

15 It was essentially commitment, I believe
16 it was Commitment 30 in Indian Point license renewal
17 commitments that said we would follow that industry
18 work and implement the results of that program.

19 JUDGE WARDWELL: And so then I turn to NRC
20 staff, Dr. Hiser or your partner, you reviewed the
21 commitment then in regards to your initial approval.
22 What happened subsequently when GALL 2 came out, was
23 that you used this internal staff guidance to then
24 measure their commitment with GALL 2? Or how did you
25 review it?

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1 DR. HISER: This is Dr. Hiser. When the
2 main driving force that created a change in GALL and
3 with the Indian Point application, was the industry
4 submittal of MRP-227 Rev 0 report. The staff review
5 of that report and subsequent safety evaluation. And
6 then the industry submittal of MRP-227-A report. That
7 provided for the first time an acceptable aging
8 management program for reactor vessel internals for
9 PWRs.

10 Based on that the staff, actually prior to
11 that issuance, the staff put into GALL Revision 2, an
12 AMP for reactor vessels internals that we believed
13 would be consistent with MRP-227-A. However, that was
14 about a year before 227-A was submitted and based on
15 that, we ended up putting together the LR-ISG that Mr.
16 Poehler described.

17 So that then the AMP for reactor vessel
18 internals was consistent with MRP-227-A.

19 JUDGE WARDWELL: Which in turn was
20 consistent or mirrored what was in Rev 2 in regards to
21 the AMP for vessel internals that was contained
22 therein?

23 DR. HISER: Well at that point when we
24 issued the LR-ISG that Mr. Poehler mentioned, that
25 superseded the reactor vessel internals AMP that was

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1 in Revision 2 of GALL. So that became the staff
2 position on what an acceptable aging management
3 program was for reactor vessel internals, was conveyed
4 through the LR-ISG.

5 JUDGE WARDWELL: But still the, if a plant
6 was doing it new now, they would look at still Rev 2
7 of GALL and that AMP that's in Rev 2 of GALL. And
8 then the guidance is how that AMP is really
9 implemented. Is that correct?

10 DR. HISER: I have to apologize because I
11 get hung up with Revision 2 versus the ISG. The
12 Revision 2 that is the printed book, that version of
13 the AMP is no longer valid. The version that is in
14 the LR-ISG, that is the official staff position.

15 JUDGE WARDWELL: But that, so you're
16 saying if I understand you correctly, GALL 2 at least
17 in reactor vessel internals, the AMP that's contained
18 therein has been modified and replaced by that which
19 is contained in the ISG. Is that what you're saying?

20 DR. HISER: That is correct. And there
21 are several other AMPs that are similar to that, that
22 there are LR-ISG documents that supersede the printed
23 version of GALL Revision 2.

24 CHAIRMAN McDADE: This is Judge McDade.
25 I just want to before we move on, clarify something

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1 for myself here because I'm getting a little beyond.
2 You make reference to MRP-227-A which just so I can
3 find it again, that's NRC document 114 A through F.
4 So when we go later.

5 What is the genesis of that? It's a
6 material and reliability program. How was that
7 generated?

8 DR. HISER: That was generated from an
9 almost decade long industry activity to develop aging
10 management guidance for reactor vessel internals.

11 CHAIRMAN McDADE: So it's an industry
12 generated document?

13 DR. HISER: Yes.

14 CHAIRMAN McDADE: And then how is it used
15 by the NRC in reviewing the adequacy of the plan, of
16 the aging management?

17 DR. HISER: Well it was used by the NRC
18 first, after acceptance of the report through the MRP-
19 227-A designation. We use that as the basis for what
20 we thought, what we consider to be an effective aging
21 management program for reactor vessel internals.

22 MR. COX: Judge McDade. This is Alan Cox.
23 Could I add a clarification here?

24 CHAIRMAN McDADE: Yes.

25 MR. COX: I think it might help to add a,

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1 to give a little bit of a time line to help explain
2 how this evolved. The Rev 1 of GALL report was issued
3 in 2005. Indian Point submitted the initial license
4 renewal application in 2007. I believe about 2009 the
5 initial Rev 0 of the industry document, MRP-227 was
6 issued. That initial version I believe, and Dr. Hiser
7 can correct me if I'm wrong here, but I believe that
8 was the basis for the aging management program that
9 was put into GALL Revision 2.

10 It was a draft, it had not been through
11 formal NRC review yet, but it was the closest thing
12 that we had. So that became Rev 2. After NRC
13 completed their review and accepted MRP-227 it was
14 reissues as MRP-227-A.

15 CHAIRMAN McDADE: That was what, December
16 of 2011?

17 MR. COX: That's right. And then because
18 it now, you know it provided things that were -- there
19 weren't a lot of changes but there were some changes
20 that were different from what Rev 0 had.

21 The NRC issued the ISG to basically bring
22 GALL Rev 2 up to date to what was in MRP-227-A as it
23 was approved. So that was kind of the sequence of
24 events that led to where we are now. So if we were
25 doing a license renewal application today, like we're

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1 doing one on the PWR down in Louisiana, we're looking
2 at the ISG as the latest staff guidance for that
3 particular reactor vessel aging management program.

4 That's a little bit of the history, the
5 time line of how that evolved to where we are today.

6 CHAIRMAN McDADE: Okay, and is that
7 consistent with your recollection, Dr. Hiser?

8 DR. HISER: Yes, that's correct.

9 CHAIRMAN McDADE: Okay, Judge Wardwell.

10 JUDGE WARDWELL: When you've done your
11 final review of, as you did your final review for
12 reactor vessel internals, have you considered the
13 review that's in the ISG as a, consistency with GALL
14 as a consistency with GALL with additions, or
15 enhancements, or as a site specific AMP?

16 DR. HISER: We would consider an AMP that
17 matches what is in the LR-ISG to be the consistent
18 with GALL version.

19 JUDGE WARDWELL: And do you consider
20 their, Entergy's AMP for reactor vessel internals to
21 be one that is GALL 2? Or is a site specific one that
22 you had to compare and evaluate the details of their
23 program to see if it is consistent with GALL 2, which
24 as it's been updated in the ISG?

25 DR. HISER: I would say that it is one

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1 that is consistent with Rev 2, as embodied in the LR-
2 ISG. But we still needed to verify that it was, that
3 the Indian Point program was consistent with what was
4 in the LR-ISG. We didn't just take their word for it
5 that they said we are consistent with GALL. So you
6 know we should, our program is acceptable.

7 JUDGE WARDWELL: Dr. Kennedy, will you
8 move along please with the rest of this program?

9 JUDGE KENNEDY: I'll try to get us moving
10 here again.

11 So does all of that, I guess this all
12 started with the consistent with GALL discussion, and
13 now we get to the reactor vessel internals which as I
14 understand what Judge Wardwell was asking. He's
15 really trying to ask is reactor vessel internals
16 current aging management program that's been approved
17 for Indian Point, viewed as consistent with GALL?

18 And I thought I just heard you say, that
19 it is. Is that what I heard, Dr. Hiser?

20 DR. HISER: This is Dr. Hiser, yes. It is
21 consistent with GALL.

22 JUDGE KENNEDY: So when Entergy writes
23 their next application, they would list their reactor
24 vessel internals as being a program consistent with
25 GALL? And I'll let Dr. Cox, or Mr. Cox answer since

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1 he's writing an application.

2 MR. COX: We would say that, this is Alan
3 Cox for Entergy, we would say that they program was
4 consistent with GALL as modified by ISG 2011-04.

5 JUDGE KENNEDY: Okay.

6 JUDGE WARDWELL: And so you wouldn't
7 consider it a plant specific GALL, it is a GALL, it is
8 an AMP that's consistent with GALL 2?

9 MR. COX: That's correct. For it to be a
10 plant specific AMP, it would be an AMP that is not
11 based on a industry wide guidance document. The ISG,
12 while it's not, it's a revision to GALL, it's not
13 actually GALL Rev 2. It is still a generic industry
14 guidance document. So when you compare, it's not
15 going to be plant specific. Because it's going to be
16 compared to a generic document.

17 MR. HARRIS: Your Honor, this is Brian
18 Harris for the staff. The license renewal interim
19 staff guide I believe that Mr. Poehler was referring
20 to, is NRC Exhibit 214.

21 JUDGE KENNEDY: Thank you.

22 Dr. Hiser, you may have already answered
23 this question but in my opening remarks I indicated
24 that the Commission expects the staff to not take the
25 applicant at their word, but to verify that the

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1 particular aging management program is consistent with
2 GALL. How does the staff perform and document that
3 verification or confirmation process?

4 DR. HISER: This is Dr. Hiser. The staff
5 for AMPs that are consistent with GALL, performs an
6 on-site audit at the applicant's facility. And we
7 compare first of all their program, element by
8 element, to what is in the GALL report. And then we
9 also look at plant specific operating experience and
10 things like that to verify that the AMP appropriately
11 bounds the conditions at the plant.

12 JUDGE KENNEDY: Dr. Hiser, is that audit
13 process also cover AMPs that are not consistent with
14 GALL? I mean is it, it's not, is it limited to a
15 consistent with GALL aging management programs?

16 DR. HISER: In general, it would cover
17 AMPs that are consistent with GALL, and also programs
18 that are consistent with enhancements, or with
19 exceptions.

20 The only case that it would not cover,
21 would be a plant specific AMP.

22 JUDGE KENNEDY: And where is this
23 document? Did you, Dr. Hiser, did you let us know
24 where this document --

25 DR. HISER: It is documented in the

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1 staff's audit reports. For Indian Point they were
2 Exhibits within, that we cited within our testimony.

3 JUDGE KENNEDY: Dr. Hiser, is that
4 evidence itself at all in the Safety Evaluation Report
5 for the Indian Point license renewal application?

6 DR. HISER: Yes, that would be cited
7 within the SER.

8 JUDGE KENNEDY: So it is incorporated by
9 reference. Is that, or is it, I mean is it --

10 DR. HISER: It is, I believe there are
11 critical elements are described in the SER. And then
12 it is referenced within the SER.

13 JUDGE KENNEDY: Thank you. I guess moving
14 away from consistent with GALL, let me try another
15 couple of questions here.

16 Within the Indian Point license renewal
17 application, commitments for future actions are
18 proposed. I guess I'm curious if the Board could hear
19 from Entergy first, how these commitments are
20 monitored and controlled from the licensee's
21 perspective?

22 Entergy first.

23 MR. COX: I'll start, and if any of the
24 plant folks have anything to add, they can add. This
25 is Alan Cox for Entergy. But Entergy has a process

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1 for regulatory commitment management.

2 We would enter those commitments into that
3 system. It's essentially a database. Identify what
4 the commitment is? When it has to be done? Who's
5 responsible for doing it? And then it would be
6 tracked within that database to ensure that, if it
7 gets accomplished as described and by the date by
8 which it was due.

9 JUDGE KENNEDY: So there's an internal
10 plant process to control the regulatory commitments.
11 How are they documented and I'll say tabled with the
12 staff? I mean is the staff aware other than the
13 application, what the level of commitment is and what
14 it is?

15 MR. COX: Well it is, it's submitted with
16 the letter, I mean the commitment is a written letter
17 to the staff. You know so it is provided to them in
18 a letter.

19 Typically we would, if we had an REI that
20 we responded to that resulted in a change to the
21 commitment, we would update that commitment. And
22 typically submit the entire commitment list associated
23 with the license renewal application as an attachment
24 to the letter that responded to that particular REI,
25 or REIs.

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1 JUDGE KENNEDY: So if Entergy completes
2 one of these commitments. In other words they've, at
3 least in the licensee's mind, they've completed the
4 actions that they committed to do. How is that
5 communicated to the staff?

6 MR. COX: It's largely an internal
7 documentation, except for license renewal, there is a
8 provision to notify the NRC when we completed all of
9 the commitments. There's not an individual
10 notification for each commitment. But there is a
11 notification that says we've completed all the
12 commitments, or all the commitments that are due. For
13 instance before the period of extended operation.

14 I wouldn't want to say all, license no
15 commitments because there's a few of them are not due
16 until sometime after the PEO. But there is a
17 notification to the staff before the PEO, that the
18 commitments that are due before the PEO have been
19 completed.

20 JUDGE KENNEDY: And does that notification
21 of the staff contain any details of the completion
22 process? I mean is it literally just a letter that
23 says at this point in time, we've completed all the
24 commitments prior to, you entering the period of
25 extended operation, or some example like that?

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1 MR. COX: I believe it's not much more
2 than that. It would be a list I believe that shows
3 commitments that have been completed.

4 MR. STROSNIDER: This is Jack Strosnider
5 for Entergy. If I could expand on this response just
6 a little bit. I think it's worth noting that the NRC
7 also has an inspection procedure that they implement
8 to verify commitments prior to entering the extended
9 period of operation. And they have inspection
10 procedures during operation where they look at
11 commitments. So they do get at that through the
12 inspection process.

13 The other thing I wanted to note with
14 regard to the capturing, tracking, and enforcement of
15 commitments is that it's my understanding that the
16 staff plans to have a license condition that would
17 require that the commitments be put into the updated
18 final safety analysis report. So they will be
19 incorporated in that report and tracked. And can only
20 be modified under the provisions by which you can
21 change that report, which is 50 59.

22 JUDGE KENNEDY: Okay, thank you, sir.

23 Maybe I'll open it up to the staff and if
24 they themselves have anything to add to this process
25 since they're a part of it?

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1 DR. HISER: This is Dr. Hiser. Actually
2 we have, the normal process that is followed is as Mr.
3 Cox mentioned, applicants or license renewal holders
4 at that point, would send us a letter that indicates
5 they've completed their commitments prior to the plant
6 entering the period of extended operation. We would
7 implement an inspection by the region. It would
8 verify that the completion of each of the commitments.

9 JUDGE KENNEDY: I guess I'm curious about
10 this license condition and about commitments and when
11 that take place. Is that once the renewed licenses
12 are granted? When does that process kick off? Where
13 the commitments are incorporated into something like
14 the UFSAR?

15 DR. HISER: This is Dr. Hiser. Normally,
16 well when the renewed license is issued is when the
17 conditions apply to the plant. If we do not issue a
18 license, there is no license condition because it's
19 out of process at that point.

20 JUDGE KENNEDY: So maybe Dr. Hiser, in the
21 interim between I guess in this case, the extreme
22 interval of when the license application was submitted
23 and all the evolutions of commitments up until today.
24 What is the process for tracking, monitoring
25 commitments before this license condition evolution?

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1 DR. HISER: The process would be that
2 changes made to the application, and commitments are
3 considered a part of the application, would be
4 submitted to the NRC as an amendment to the
5 application.

6 JUDGE KENNEDY: Okay. Mr. Cox, how does
7 that tie into your regulatory commitments? Are we
8 talking about the same thing here? Or is there a
9 subtlety here that may be missing, or I may be
10 missing?

11 MR. COX: This is Alan Cox for Entergy.
12 There is a, I guess you could make a commitment to
13 the, I'm trying to describe the difference between the
14 normal process and license renewal. There's really
15 not a lot of difference.

16 The license renewal application, the fact
17 that that's under review adds another layer if you
18 will, of review. Those commitments as Dr. Hiser
19 indicated are submitted with the application as an
20 amendment to the application. They're also still
21 tracked internally in the database that I described
22 earlier. It's the regulatory commitments, so you
23 really kind of have a twofold process.

24 The one thing I didn't mention earlier, is
25 the internal regulatory commitment management process

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1 is based on an industry guidance that was developed by
2 the Nuclear Energy Institute. I believe it's NEI
3 9904, which is an industry guideline on how to manage
4 regulatory commitments. And that guideline, I believe
5 is endorsed by the NRC staff.

6 CHAIRMAN McDADE: If I could just to
7 clarify in my own mind here, to make sure I understand
8 it correctly. Dr. Hiser, what is the FSAR?

9 DR. HISER: It's the Final Safety Analysis
10 Report.

11 CHAIRMAN McDADE: Okay, and how are the
12 commitments incorporated into the FSAR?

13 DR. HISER: They're incorporated as one of
14 the appendices to the FSAR.

15 CHAIRMAN McDADE: Okay, and how does that
16 FSAR then relate to the ongoing current licensing
17 basis?

18 DR. HISER: That is one part of the
19 current licensing basis.

20 CHAIRMAN McDADE: So these commitments are
21 captured in the FSAR, which then in turn is captured
22 in the CLB, which is the overarching document for the
23 continued operation of the plant. Is that correct?

24 DR. HISER: That is an overarching
25 classification of documents for the plant.

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1 CHAIRMAN McDADE: Okay, thank you. Judge
2 Kennedy.

3 JUDGE KENNEDY: Thank you. I think I'm,
4 I don't know where to direct this. Let's talk a
5 little bit about Appendix A and Appendix B of the
6 application. If I remember correctly, Appendix A
7 contains aging management program descriptions. And
8 there's some discussion -- this is going to get long.
9 Let's see if I can make a question out of this.

10 All this discussion about commitments and
11 stuff made me think about Appendix A and Appendix B.
12 Appendix B, let me ask the question to Mr. Cox.
13 Appendix B contains the descriptions of the Indian
14 Point aging management programs. Is that true?

15 MR. COX: That's correct.

16 JUDGE KENNEDY: And Appendix A to the
17 license renewal application contains?

18 MR. COX: Appendix A also contains
19 descriptions of the programs. In some cases they're
20 not as much detail as in Appendix B. It's a summary
21 level of the program. It's intended to include all
22 the key elements that are necessary to ensure that we
23 have an effective program.

24 In addition, Appendix A also has a
25 discussion of the evaluation that was performed of the

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1 time limited aging analysis for license renewal. And
2 that becomes, that's the Appendix to the FSAR that Dr.
3 Hiser referred to.

4 That will be incorporated into the FSAR.
5 Essentially for Indian Point it was done prior to the
6 entry into the period of extended operation.
7 Typically it's done the next, it's updated, the FSAR,
8 after you receive the renewed license.

9 JUDGE KENNEDY: So the, do I take that to
10 mean the material that's placed in Appendix A is where
11 the long lasting descriptions of the aging management
12 programs are contained?

13 MR. COX: Yes. That would be correct.

14 JUDGE KENNEDY: And that's the material
15 that, is that the material that is under some level of
16 control then? What's the level of control over those
17 descriptions if it makes it to the final safety
18 analysis report?

19 MR. COX: Well the final safety analysis
20 report is indicated as a current licensing basis
21 document. Changes to that can be made under 10 CFR
22 50.59. If it meets those criteria in that part of the
23 regulations.

24 JUDGE KENNEDY: So the 10 CFR 50.59
25 process would be the controls over changes to the

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1 descriptive material of the aging management program?

2 MR. COX: Yes, sir. That's correct.

3 JUDGE KENNEDY: This is a question that I
4 struggle with all the time. It's unclear to me, and
5 I guess I'll start with the NRC staff. Why there's a
6 difference between, there appears to be in reading in
7 particular the Indian Point license renewal
8 application, a difference between what's in Appendix
9 A and what's in Appendix B. And I've always wondered
10 why they weren't just a mirror of each other.

11 I guess could you help enlighten the Board
12 as to why that would be the case? Or what's the
13 rationale and how does the staff determine that what's
14 in Appendix A is acceptable?

15 DR. HISER: This is Dr. Hiser. Appendix
16 A is the UFSAR supplement that the applicant proposes
17 to describe the aging management programs and TLAA
18 resolutions. So that becomes a part of the current
19 licensing basis.

20 Appendix B provides a description of the
21 AMPs, which for AMPs consistent with GALL tends to be
22 a very short summary. If there are exceptions, if
23 there are enhancements, then those are described in
24 Appendix B.

25 Appendix B is more the information that

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1 the staff reviews as a part of its assessment of the
2 adequacy of the AMP.

3 Appendix A, the UFSAR supplement, is what
4 will go into the UFSAR and provides the licensing
5 basis description of the AMP that then is controlled
6 through the 50.59 process.

7 JUDGE KENNEDY: And I think that's the
8 nexus of my problem. Is how do you determine what
9 goes in the Appendix A documentation, which appears at
10 least to me, to be under a level of control that's
11 regulatory driven? And there's a lot of precedence on
12 how it is to be handled, and it's transparent best as
13 anything can be.

14 So I struggle with how the staff
15 determines what goes where. And if you could help
16 enlighten us it would help me a bunch.

17 DR. HISER: What goes into Appendix A, and
18 into the UFSAR is what staff believes sufficient
19 information to provide adequate control of the AMP.
20 So we look for sufficient description of the program
21 and the essential elements of the program such that
22 50.59 would be an effective way to control changes to
23 that.

24 JUDGE KENNEDY: Does that have any
25 synergism with the GALL description? I'm trying to

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1 see you know a pathway from GALL which from one
2 argument, if you did verbatim compliance with GALL,
3 you'd have reasonable assurance. And then there's the
4 Appendix B description which could capture that.

5 And then Appendix A which puts that, some
6 subset of that information, or all of it, under a
7 level of control. I'm trying to really get
8 comfortable with how that, determinations are made.
9 And we end up with Appendix A that has a measure of,
10 I perceive to be a good strong measure of controls on
11 the information?

12 DR. HISER: As I said, Appendix B is what
13 we review within the application. And the Commission
14 determined that for AMPs, that applicant AMPs that are
15 consistent with GALL, that the applicant could provide
16 a very short description of what is in the AMP.

17 The staff then performs an audit to verify
18 that AMPs identified as consistent with GALL, we
19 verify that they are in fact consistent, or identify
20 discrepancies.

21 Appendix A is just intended to provide
22 enough information that the applicant, or at that
23 point, license renewal holder, could not make
24 significant changes to the program that could affect
25 the effectiveness of the program. So it's to provide

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1 a measure of controls over that.

2 So they really are different purposes I
3 guess is what I'm trying to say.

4 JUDGE KENNEDY: I don't want to put words
5 in your mouth, but I heard you use the word
6 effectiveness of the aging management program. Is
7 that a level of the criteria that's being used to
8 determine the sufficiency of material in Appendix A?

9 DR. HISER: Well, when I said
10 effectiveness, I guess I did not mean in a, sort of in
11 detail by detail way. But more in an overall sense
12 that the effectiveness of the program would not be
13 compromised by changes.

14 JUDGE KENNEDY: You can see what I'm, well
15 maybe you can't. What I'm trying to get at is, I want
16 to get to the answer of the question, is there
17 sufficient, how do I convince myself there's
18 sufficient material in Appendix A that all the right
19 stuff is under a measure of control? That I at least
20 perceive to be adequate? And I'm trying to figure out
21 how the staff determines that?

22 DR. HISER: Well, in part we do that by
23 looking at prior applications, the level of detail
24 that's provided in Appendix A. We also just make an
25 engineering assessment of what is sufficient level of

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1 detail. The applicant could put the entire ten
2 element program into their FSAR. But we don't believe
3 that that's necessary to do. We believe that would be
4 excessive.

5 JUDGE KENNEDY: Would I expect to find all
6 the critically characteristics that have been
7 displayed in Appendix B carried forward into Appendix
8 A?

9 DR. HISER: I believe that our intent is
10 to capture the things that we believe are critical in
11 Appendix A.

12 JUDGE KENNEDY: From the material that's
13 in Appendix B?

14 DR. HISER: Correct. Or in general about
15 the program. Because again, Appendix B may not, it
16 may be very, some overarching summary description. So
17 we may actually have more detail in Appendix A in some
18 cases.

19 JUDGE KENNEDY: Okay.

20 MR. COX: Judge Kennedy. This is Alan
21 Cox. I might add just a little bit to that. It might
22 be helpful to look at the specifics for this
23 particular program. If you look at Appendix A, it
24 refers you to the MRP-227-A. There's not a lot of
25 discussion in there but it does tie you to that

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1 program.

2 If you go to the GALL report description
3 in Appendix B, you would have, you go to the GALL
4 report, or the ISG program that's referenced from
5 Appendix B, you would find a lot of MRP information
6 that's broken out into the individual ten elements of
7 the program.

8 So I guess the differences there, it's all
9 incorporated in Appendix A as a reference to MRP-227-
10 A. You go to Appendix B, that's broken out and
11 spelled out in more detail. But there's nothing new,
12 there's nothing in Appendix B that's not covered under
13 MRP-227-A, which is what Appendix A ties the Indian
14 Point program to.

15 MR. STROSNIDER: This is Jack Strosnider
16 for Entergy. I'd like to add a little bit to this
17 too. And maybe if I can describe the overall
18 framework for you.

19 I think you need to recognize first the
20 hierarchy of documents. So you have the updated final
21 safety analysis report which is as Dr. Hiser
22 indicated, includes that information that the NRC
23 staff concludes is appropriate to show, demonstrate
24 reasonable assurance.

25 But you can imagine to implement that,

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1 there's a whole lot of lower tier documents all the
2 way down to plant operating procedures. And it's not
3 practical or necessary to put all of those in the
4 updated FSAR.

5 That said, part of your question if I
6 understood it was related to control of, what controls
7 is over all these documents then. And one of the
8 things I wanted to point out when we mentioned 50.59
9 earlier, is that the nuclear plant, when they go to
10 make a change in a procedure, even some of these lower
11 tier documents, they can't just unilaterally make that
12 change without first looking at it to see if it needs
13 to be evaluated under 50.59.

14 So if it could potentially, if a change in
15 a low level procedure, an implementation procedure,
16 could change something that's as described in the
17 updated final safety analysis report, then they need
18 to put it through 50.59 evaluation.

19 So all the way down to those implemented
20 procedures, there is a strong level of control in
21 terms of how they can be changed, and how they're
22 managed.

23 JUDGE KENNEDY: And I think that's what I
24 was concerned about. Depending on what level of
25 detail you put in Appendix A, governs how broad the

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1 50.59 process could be in terms of level of control.
2 Now if what Mr. Cox is saying is something like MRP-
3 227-A is incorporated by reference, that adds a lot of
4 detail to Appendix A. And I guess I'm going to ask
5 Mr. Cox if that's what he intended to say?

6 MR. COX: Yes, that's exactly what I was
7 intending to say.

8 JUDGE KENNEDY: Okay, that helps a bunch.
9 I mean I think that clears some of my concern up.
10 Because sometimes you look at, if I look at these
11 Appendix A write-ups, they seem somewhat devoid of
12 detail. But if the intent is to incorporate by
13 reference, or if the actual practice is incorporation
14 by reference, I see this as a much broader set of
15 controls.

16 And I'm trying to look at it more say from
17 New York State's perspective, who has concerns about
18 how transparent this is to the public. And that to me
19 goes right to the heart of what's in Appendix A.
20 That's where it all starts. At least from my
21 perspective.

22 MR. STROSNIDER: This is Jack Strosnider
23 for Entergy. So I'm looking at Appendix A and it
24 starts off saying, this program relies on
25 implementation of MRP-227-A. It's called out

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1 specifically here that that's what the program is
2 based on.

3 JUDGE KENNEDY: That helps. Thank you.
4 And with that, I don't have any additional questions
5 on GALL. So I'll either turn it over to my colleagues
6 if they have any follow-up questions.

7 CHAIRMAN McDADE: I don't, not on this
8 overarching issue.

9 JUDGE KENNEDY: And then on behalf of all
10 assembled, I'm wondering if it's time for a break? I
11 have no idea what time it is, so.

12 CHAIRMAN McDADE: It's about 1:30. Would
13 a ten minute break be adequate? Does anyone require
14 more than ten minutes?

15 JUDGE KENNEDY: I think a ten minute break
16 would be great.

17 CHAIRMAN McDADE: Okay, why don't we break
18 now? We'll be back in ten minutes at 1:40.

19 (Whereupon, the above-entitled matter went
20 off the record at 1:29 p.m. and resumed at 1:43 p.m.)

21 CHAIRMAN MCDADADE: Okay, we're back on the
22 record. Okay, first of all, let me ask do any counsel
23 have any matters to take up before we get back to
24 taking testimony?

25 MR. HARRIS: This is Brian Harris for the

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1 staff. No, Your Honor.

2 MR. KUYLER: Ray Kuyler for Entergy. No,
3 Your Honor.

4 CHAIRMAN MCDADE: Mr. Sipos?

5 MR. SIPOS: John Sipos, State of New York.
6 Not at this time.

7 MS. BRANCATO: And Deborah Brancato for
8 Riverkeeper. No, Your Honor. Thank you.

9 JUDGE KENNEDY: Okay. Dr. Hiser, you have
10 some clarification?

11 DR. HISER: I have clarifications. One of
12 them may make it more difficult to understand but it's
13 more consistent with the record I guess.

14 Initially the AMP that was submitted by
15 the Applicant was submitted July 2010 as a plant-
16 specific AMP.

17 JUDGE WARDWELL: Now, is this all AMPs or
18 you're referring to the reactor vessels?

19 DR. HISER: Only reactor vessel internals,
20 and what I will say for the next little bit is only
21 for the reactor vessel internals program. So that
22 program was submitted as a plant-specific program.
23 Had ten elements. At that point GALL Revision 2 had
24 not been issued, so that's why it was a plant-specific
25 program.

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1 JUDGE WARDWELL: And that's because GALL
2 1 didn't contain any AMP in it for reactor vessel
3 internals. Is that correct?

4 DR. HISER: That is correct.

5 JUDGE WARDWELL: Thank you.

6 DR. HISER: Yes. Let's see. Subsequent
7 to that, we issued our Revision 2. Then through a
8 letter, let's see, the Exhibit Number is NYS 496,
9 which is Entergy Letter NL-12-037, they revised that
10 plant-specific AMP, and although they did not say it
11 was consistent with the LR-ISG, the staff realized
12 that it, in effect, was consistent.

13 MR. POEHLER: Jeffrey Poehler of the
14 staff. Yes, well, in February 2012 the LR-ISG had not
15 even been issued yet, but GALL Rev. 2 had been issued
16 but the Applicant did not cite GALL Rev. 2 because it
17 still referred to it as a plant-specific program but
18 one that was, that they did claim consistency with the
19 guidance in MRP-227-A.

20 JUDGE WARDWELL: Again, you said this
21 letter was NL-12-037?

22 MR. POEHLER: Correct.

23 JUDGE WARDWELL: Thank you.

24 DR. HISER: This is Allen Hiser again.
25 Earlier I answered a question about how we evaluate

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1 AMPs that are consistent with GALL and cited an audit
2 and then an audit report that summarizes the results
3 of the audit.

4 Because of the sequencing, the timely
5 sequencing of the AMP for reactor vessel internals for
6 Indian Point, there is no AMP consistency audit
7 report. Instead, the staff's evaluation is provided
8 in SER, Supplement 2.

9 There is an audit report that describes
10 the staff's evaluation of some of the applicant action
11 items and that is summarized in an audit report, so
12 there is a report for that. I do not have the exhibit
13 number for that right now but we could find that.

14 MR. POEHLER: It was NRC Exhibit 216, 2-1-
15 6.

16 JUDGE WARDWELL: And that's for this
17 modified audit report, is that correct?

18 MR. POEHLER: Right, and that audit
19 report, it was limited in scope to some calculations
20 that supported some of the plant-specific action items
21 so it wasn't an overall, was not an overall audit of
22 the program compliance, just limited, narrow aspects.

23 JUDGE WARDWELL: And, Dr. Hiser, could you
24 get me the locations, the citing within the various
25 sections in case there's more than one in the SER

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1 where this is described for the reactor vessels
2 internals? You don't have to do it now but get it for
3 us later.

4 DR. HISER: We'll do that. I guess the
5 other thing that I wanted to clarify was regarding the
6 Appendix A descriptions of AMPs.

7 We have in the SRP-LR document, NUREG-
8 1800, Rev. 2, we have descriptions of the AMPs that
9 the staff uses as examples for what should be in
10 Appendix A of the applications. So those are examples
11 of what the staff considers to be sufficient
12 information to assure adequate controls over the AMP.

13 When the staff reviews the application, we
14 compare what is in SRP-LR with Appendix A from the
15 application to ascertain that the application is
16 sufficient.

17 JUDGE KENNEDY: Dr. Hiser, that makes me
18 think of a question. So that's the standard review
19 plan for license renewal that you're referencing?

20 DR. HISER: That's correct.

21 JUDGE KENNEDY: For these descriptive
22 summaries?

23 DR. HISER: That's correct. And in the
24 case of this program, that SRP-LR discussion would be
25 in the LR-ISG for the reactor vessel internals

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1 program.

2 JUDGE KENNEDY: Okay. I guess what comes
3 to mind is as GALL has evolved from Rev. 0 to Rev. 1
4 to Rev. 2, has the standard review plan document
5 changed accordingly and, if not, how do I interpret
6 the value of that summary material for AMPs that have
7 undergone significant change over time?

8 DR. HISER: I have not done a comparison
9 from Rev. 0, Rev. 1, Rev. 2. I know for the reactor
10 vessel internals program, the FSAR supplement in Rev.
11 1 was a description of the commitment in effect, that
12 the plant would participate in industry programs and
13 then would implement the program that came out of
14 those industry activities. Clearly then the LR-ISG
15 provided a more robust description of the program.

16 JUDGE KENNEDY: All right, thank you.

17 CHAIRMAN MCDADADE: Okay, and let me just to
18 make sure, as time sequence goes here, you're
19 referring to the aging management audit report. That
20 report is dated August of 2015, or is that, it says a
21 submission date on it. Your index indicates October
22 of 2014 but the report itself has a date of August
23 2015. I'm just trying to figure out for time sequence
24 of where it fits in. Is it from October 2014 or
25 August of 2015?

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1 MR. POEHLER: This is Jeffrey Poehler from
2 the staff. Are you referring to the Exhibit 216, NRC
3 216 for the audit report?

4 CHAIRMAN MCDADE: Yes.

5 MR. POEHLER: Yes, the audit itself was
6 actually performed in 2013 I believe and --

7 CHAIRMAN MCDADE: Okay, it's indicated
8 April of 2013 for the dates of the audit.

9 MR. POEHLER: Right, and I think the
10 actual audit report was possibly not issued until
11 sometime in 2014 but I can't remember the exact dates
12 but it was prior to the supplemental safety evaluation
13 report being published.

14 CHAIRMAN MCDADE: Okay. Okay, and that
15 would have been October of 2014, approximately?

16 MR. POEHLER: Correct.

17 CHAIRMAN MCDADE: Okay, thank you.

18 JUDGE KENNEDY: R2 of the overarching
19 questions. This is Judge Kennedy. Again, I drew the
20 short straw.

21 We'd like to entertain some discussion
22 over time-limited aging analyses. Again, the
23 testimony and the exhibits for a couple of these
24 contentions, time-limited aging analyses seem to play
25 a role and it occurred to us that it would be useful

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1 to have some general discussion before we start the
2 contention-specific questions.

3 Again, I'll try to address it, hopefully
4 to a person this time but, if not, we'll try starting
5 with organizational affiliations and work our way to
6 specifics.

7 Time-limited aging analysis, as I
8 mentioned, play a role in the testimony for this Track
9 2 hearing and, for that reason, since it goes across
10 a couple of contentions, we thought we'd start with
11 it.

12 Let's start at the highest level and maybe
13 start with Entergy. Could you describe for us what a
14 time-limited aging analysis is in regard to the
15 license renewal process?

16 MR. COX: This is Alan Cox for Entergy.
17 I could describe that. In general terms, there are
18 some places in the testimony, I'm looking at the NRC
19 staff testimony here, where they give a detailed
20 discussion of it out of the --

21 JUDGE KENNEDY: Are you looking at the
22 response to Question 16?

23 MR. COX: I am.

24 JUDGE KENNEDY: If possible, Mr. Welkie,
25 could you put up Page 23 from NRC 197, and hopefully

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1 it's not all redacted because it should be regulation.
2 I was going to use that later, Mr. Cox, so we might as
3 well put it up. Sorry, did I give you the wrong page
4 number?

5 MR. COX: Question 16.

6 JUDGE KENNEDY: Yes.

7 MR. POEHLER: Your Honor, Page 23?

8 JUDGE KENNEDY: Yes, that's correct.
9 That's it right there.

10 MR. POEHLER: That's it. Would you like
11 to use this in answering the TLA question, Mr. Cox?

12 MR. COX: Sure. This is Alan Cox with
13 Entergy. As it says here on the screen, a TLAA is an
14 analysis that meets these six criteria that are listed
15 here.

16 The first is it has to involve system
17 structures or components that are within the scope of
18 license renewal. The second considers the effects of
19 aging. The third, it involves time-limited
20 assumptions defined by the current operating term, for
21 example, 40 years. The fourth is the analysis was
22 determined to be relevant by the licensee in making a
23 safety determination.

24 Criteria five involves conclusions or
25 provides the basis for conclusions related to the

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1 capability of the SSC, system, structure, or
2 component, to perform its intended function as
3 identified in 10 CFR 54.4 bravo. And lastly, it has
4 to be contained or incorporated by reference in the
5 plant's current licensing basis.

6 JUDGE KENNEDY: Now let's look at a couple
7 of these. Can we leave that up there, Mr. Welkie?

8 Looking at Number 3 in this list here of
9 characteristics of a time-limited aging, "involved
10 time-limited assumptions." Mr. Cox, what is that
11 referring to and if you would have an example it would
12 be useful.

13 MR. COX: Most of the TLAAs are involved
14 in these contentions and the Track 2 contentions are
15 involving fatigue analyses.

16 Fatigue analyses are based on a number of
17 cycles. The numbers of cycles that are used in those
18 analyses are estimates or assumptions that are
19 considered to be based on what numbers would be
20 anticipated to be incurred by the plant during a 40-
21 year period of operation. That becomes the tie.
22 That's the assumption. It assumes a certain number of
23 cycles that is based on a 40-year operating period.

24 JUDGE KENNEDY: And the Bullet Number 6,
25 "are contained or incorporated by reference in the

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1 current licensing basis." If I turn that around, if
2 it isn't currently in the current licensing basis,
3 that makes it not a TLAA? Are there none?

4 MR. COX: Yes, that's correct. That's the
5 way I would read that sixth criteria.

6 JUDGE KENNEDY: So do I take that further?
7 Does that mean that TLAAs are not performed as part of
8 license renewal? They're contained somewhere else?

9 MR. COX: Let me try to clarify that a
10 little bit. The TLAA is an existing analysis so it
11 would not be performed for a license renewal. The
12 license renewal rule requires an evaluation of the
13 TLAAs, which is what's discussed in the next paragraph
14 here of this page.

15 So the TLAA itself is an existing
16 analysis. The evaluation is required for license
17 renewal, which may involve a revision of that analysis
18 to extend the time period for which it's applicable.

19 JUDGE KENNEDY: Let's go through these
20 little I, little two I, little, I, ii, and iii. So a
21 TLAA fits in one of those bins, I, ii, or iii? Is
22 that the way I should think of this?

23 MR. COX: The evaluation of TLAAs has to
24 be, has to demonstrate that you meet one of those
25 three options.

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1 JUDGE KENNEDY: And you only meet one of
2 them? Are they mutually exclusive? So if a TLAA fits
3 in Bucket 1, you're done?

4 MR. COX: I think in general that's true.
5 There is, you know, some variations. For example, we
6 could say that if we do a fatigue analysis that says
7 a component was good for 40 years or for 60 years,
8 maybe looked at the additional 20 years of operation
9 in that same analysis, maybe based on the number of
10 transients that we're experiencing, we are not going
11 to exceed that assumed number in 60 years.

12 We could look at that and say, well, that
13 TLAA is valid for the period of extended operation in
14 accordance with the single I there.

15 What we do, we actually take it a little
16 bit further than that. Because those are estimates,
17 projections are not actionable. I mean, it's not
18 truly based on a calendar. When you get to the end of
19 60 years, you don't know that you've met those
20 assumptions. It depends on how fast, you know, it
21 depends on the rate of accrual of the transient.

22 So we have credited, for the fatigue
23 TLAAs, we also credit, or in lieu of single I, we
24 credit triple I. We credit the fatigue monitoring
25 program, primarily as a way to monitor the number of

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1 transients that are occurring as you operate the plant
2 to make sure that we don't exceed those numbers that
3 were assumed at the end of the, for the end of the
4 period of extended operation.

5 JUDGE KENNEDY: So using that example, I
6 guess when I first looked at this I came away with the
7 sense that if it fell into the first bucket, that
8 aging management wouldn't be part of the process.

9 MR. COX: I think, in general, in the
10 purest sense of the word, that would be true but, like
11 I said, this case, it's not, you know, the number of
12 transients is not strictly a function of how long you
13 operate the plant. It's an estimate based on what's
14 expected during a typical operating cycle.

15 And because there are variations from
16 plant to plant as far as how well the plant is
17 operated and how many transients you incur, we've
18 credited the program to monitor those occurrences to
19 make sure the assumptions remain valid for the 60-year
20 period.

21 JUDGE KENNEDY: And you use the example of
22 metal fatigue I guess, and so this is the cumulative
23 usage factor calculation. Is that what falls into
24 this?

25 MR. COX: Yes, that's correct.

1 JUDGE KENNEDY: And so I thought I heard
2 you say that even though it maybe would be valid for
3 the period of extended operation, you really, the
4 application considers it more of a third bullet?

5 MR. COX: That's correct.

6 JUDGE KENNEDY: So it's actually, even
7 though it's projected to remain valid for the period
8 of extended operation, it is within an aging
9 management program. Is that the way I should take
10 that?

11 MR. COX: That's correct. For the fatigue
12 analyses, that is true. It's a little bit of a hybrid
13 because it is, it's not purely based on the number of
14 years but it is based on the number of transients that
15 are experienced.

16 JUDGE KENNEDY: What does it mean to be
17 projected to the end of the period of extended
18 operation and what's a good example of that type of
19 TLAA, or time-limited aging analysis?

20 MR. COX: I guess if we used fatigue
21 analysis as an example, if we had an analysis that
22 said you're going to -- Let's just pick a number.
23 Let's say you could have 100 heat-ups and cool-downs
24 in the analysis and your TLAA or your CUF would still
25 be valid at the end of the period of extended

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1 operation.

2 If you determined that 100 was a valid
3 number that you would not expect to exceed after 60
4 years of operation, you could say that was a single I.

5 If you saw, based on your operating
6 history, that you're probably going to go up to 120
7 heat-ups and cool-downs at the end of 60 years, then
8 you would redo that analysis to use 120 cycles instead
9 of 100 and you could say that you have projected the
10 analysis to the end of the period of extended
11 operation.

12 JUDGE WARDWELL: That doesn't make much
13 sense to me. It sounds like both were projections.
14 I don't see how you get a single I. Aren't you still
15 projecting? You just made a different assumption in
16 your projection.

17 DR. HISER: This is Dr. Hiser. I guess
18 the difference is in the first one your projection
19 validates the current analysis of record, so it
20 validates the adequacy of the COB analysis.

21 If the projection, as Mr. Cox mentioned,
22 indicates that the value will go higher, so your
23 assumptions are no longer valid, then double I
24 indicates that you would have to reevaluate that
25 analysis to demonstrate that it still is accurate.

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1 JUDGE WARDWELL: Explain to me again how
2 with fatigue a TLAA could possibly fall within I
3 because it seemed to me we'll be always projecting, as
4 Mr. Cox said, the number of transients, not the time
5 of years.

6 It's not important, the time of years.
7 It's the number of transients. So it's a rate of
8 transients really and it's always a projection.
9 You'll never know truth until you experience it.

10 MR. COX: Judge Wardwell, let me try that.
11 I mean, you're right. They both involve projections
12 but in the first case, the single I, you're not
13 revising the analysis to incorporate a different
14 projection. You've done the work outside of the
15 analysis to project the number of transients and,
16 based on that projection, that analysis remains valid
17 without revision.

18 But if you read the words, it says "the
19 analysis is projected." That's not to say, you know,
20 on single I analysis remains valid based on your
21 projection of the transients but you're not changing
22 the analysis.

23 In the second one, you're actually doing
24 a projection of the analysis to use a different number
25 based on projection of the number of cycles.

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1 JUDGE WARDWELL: So the analysis you're
2 referring to is not the calculation that was done in
3 the TLAA but the analysis of the TLAA? Is that what
4 you were saying?

5 MR. COX: The analysis that's done in the
6 TLAA is looking at, in my first example it would say
7 100 heat-ups and cool-downs. That's in the analysis.

8 JUDGE WARDWELL: Okay, where did this 100
9 come from? We're going to have to jump me right back
10 down because as soon as you start saying that I got to
11 know where did -- Okay, here we are. You're preparing
12 your license renewal application --

13 MR. COX: The 100 is a --

14 JUDGE WARDWELL: -- and you've done TLAA's,
15 okay, for fatigue all along, correct?

16 CHAIRMAN MCDADE: Okay, if I could
17 interrupt here because I'm getting more confused
18 rather than, you know, more clear on this.

19 JUDGE WARDWELL: So you interrupting is
20 going to help us?

21 CHAIRMAN MCDADE: No.

22 JUDGE WARDWELL: We need help.

23 CHAIRMAN MCDADE: For Mr. Cox, as you
24 answer the question -- Correct my misinformation and
25 my misconception here. I had viewed I as the

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1 situation where you anticipated there'd be 100
2 transients.

3 ii is a situation where you look at it and
4 you determine in the period of extended operation
5 there won't be 100 transients but there'll be 200
6 transients. So you now have to project given the
7 increased number of transients in the period of
8 extended operation. Have I just --

9 MR. COX: Yes, let me start that.

10 CHAIRMAN MCDADE: Explain how I got so far
11 off the path.

12 MR. COX: The TLAAs that we're talking
13 about, if we talked about the first one on the -- You
14 know, and the 100 number, Judge Wardwell, is a
15 hypothetical number. That's what I just made up.

16 So assuming that the analysis evaluated
17 100 transient, that analysis was done probably during
18 the initial plant design, so that was done 35 years
19 ago and it's an assumption.

20 So we look at the projection of cycles
21 based on operating history and we say at the end of 60
22 years I'm still going to be less than 100. That
23 original analysis does not change. It's still valid
24 for the period of extended operation.

25 JUDGE WARDWELL: Hold right here. So what

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1 you said is at this point your analysis that you
2 conducted during the design or even subsequently
3 during operations up to this point, up to the original
4 licensing date, that's the end of your license,
5 current license, you had always used 100.

6 And at this point in time, if you look
7 forward to license renewal and determine that it was
8 still going to be less than 100, then it would be an
9 I.

10 MR. COX: That's correct.

11 JUDGE WARDWELL: Okay, great. Now, I'll
12 move ahead. Yes, good.

13 So now, under ii, all you did is now at
14 that same point in time while you're preparing your
15 license application, you now say, oh, gee, it's going
16 to go up to 160. That would be a double I.

17 MR. COX: Right, that would require a
18 revision or a projection of that analysis. That
19 original analysis is no longer going to remain valid
20 for the 60-year period. It's going to have to be
21 revised. We're going to have to calculate a new
22 cumulative usage factor and we're going to have to
23 show that it still remains less than one.

24 JUDGE WARDWELL: And if it does, if this
25 wasn't a fatigue example, you would be off the hook

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1 from doing aging management, right? Either I or
2 double I took place.

3 MR. COX: Right, you would essentially
4 have an analysis that says for this 60-year period
5 this particular aging effect is not an aging effect
6 requiring management.

7 JUDGE WARDWELL: But with fatigue that's
8 a special case where you actually are doing it because
9 you just don't know how many transients. It's always
10 going to be an unknown. It's not based on years.
11 It's just based on how many of these you happen to
12 have and it could be a wrong projection.

13 MR. COX: That's correct.

14 MR. STROSNIDER: This is Jack Strosnider
15 for Entergy. I'd just like to suggest that this
16 conversation, to me, demonstrates exactly why it makes
17 sense to manage fatigue through an aging management
18 program, which is what Entergy is doing, meaning that
19 they will be looking at the number of cycles and
20 making sure that it meets their analysis.

21 So they have chosen Option 3 and it makes
22 sense for the reasons that you're talking about. The
23 simple example, if I could --

24 JUDGE WARDWELL: So let me interject
25 because we're interested in questioning and, as your

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1 colleague just spoke, Mr. Cox, why have these i's and
2 double i's and triple i's, why don't we just jump to
3 aging management for everything we do?

4 MR. STROSNIDER: This is Jack Strosnider
5 for Entergy. If I could just finish my comment there.
6 The example I was going to give, which is not related
7 to these contentions, but consider, if you will, a
8 piece of equipment that's qualified for a 20-year life
9 and then it has to be replaced.

10 That doesn't fall in the, I guess in the
11 scope of license renewal perhaps, but if you have
12 something like that, you can't look at it and say this
13 is going to be good for 60 years. I know that I have
14 to do something earlier, but.

15 JUDGE WARDWELL: Mr. Cox, would you have
16 a comment on why would we bother with i and double i?

17 MR. COX: Well, again, I think in this
18 case, in the case of fatigue analyses, it's important
19 to recognize that it's not strictly based on the
20 calendar.

21 If you had another kind of analysis --
22 Let's say you had a corrosion rate that you knew was
23 going to be a constant every year for 60 years and in
24 that case you could say if I apply that corrosion rate
25 for 60 years I still meet the acceptance criteria. I

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1 projected the analysis. It still shows I have
2 adequate minimum wall thickness. So in that case, the
3 single i or the double i would be applicable.

4 JUDGE WARDWELL: Have any of the pieces of
5 equipment or system structures or components that do
6 qualify for license renewal been screened out based on
7 TLAA's, i.e., as falling under i or double i knowledge?

8 MR. COX: Yes, that's not quite the same
9 as screened out. In screened out, we would consider
10 that to be where you apply the criteria of whether
11 it's active or passive or long-lived or short-lived.

12 But as far as TLAA's go, there are TLAA's
13 described in the license renewal application that have
14 been demonstrated acceptable in accordance with the
15 single i or the double i.

16 JUDGE WARDWELL: That's a better way to
17 word it than the screening. Thank you.

18 MR. COX: Embrittlement TLAA's on the
19 reactor vessel is a good example. Those are typically
20 projected. You reevaluate, recalculate the fluence
21 expected at the end of 60 years and you show that the
22 associated embrittlement analyses are going to be
23 valid at 60 years in accordance with the double i.

24 JUDGE WARDWELL: Thank you.

25 CHAIRMAN MCDADE: And those are items such

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1 as, like, the upper support plate assembly, the upper
2 core plate, the core barrel. Is that what you're
3 talking about?

4 MR. COX: No, what I was talking about in
5 that last example is the actual reactor vessel itself,
6 not the internals but the reactor vessel that's
7 subject to the upper-shelf energy requirements in 10
8 CFR, what is it, 50.60?

9 CHAIRMAN MCDADE: Okay, but what about the
10 reactor vessel internals? There are reactor vessel
11 internals that have been --

12 JUDGE WARDWELL: Get to that.

13 CHAIRMAN MCDADE: Going to get to that?
14 Okay.

15 MR. COX: Yes. Those --

16 CHAIRMAN MCDADE: Judge Wardwell is going
17 to get to that, so let me defer.

18 JUDGE WARDWELL: In excruciating detail
19 I'm afraid, though I am looking forward to it. The
20 audience, I think, is even more excited than me.

21 JUDGE KENNEDY: So going back to i and ii,
22 did I understand, using the example of embrittlement
23 or the reactor vessel itself, if that fell in either
24 i or ii, would that mean it's not subject to aging
25 management?

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1 MR. COX: It would mean that that
2 particular aging effect does not require an aging
3 management program.

4 JUDGE KENNEDY: Okay. And that's why, at
5 least it sounded to me like that's why this has these
6 categories, so that you could bin them. It sounds
7 like what you just testified, that -- Under metal
8 fatigue, even though i or ii may be a calculation that
9 has either been done before or redone, it would still
10 be managed for aging or at least monitored for cycles.

11 MR. COX: That's correct and it's not, I
12 mean, it's not actually managing the aging effect
13 directly as much as it is monitoring the numbers of
14 transients that are assumptions in the analyses to
15 make sure that those assumptions remain valid and,
16 therefore, the analysis remains valid.

17 JUDGE KENNEDY: One more question, Mr.
18 Cox, before we turn to the staff because, these re-
19 analyses or calculations that are done under Item ii,
20 are those done as part of license renewal or is that
21 done somewhere else? The little i.

22 MR. COX: Those calculations or those
23 projections would be done as part of the evaluation of
24 TLAAAs for license renewal.

25 JUDGE KENNEDY: For license renewal.

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1 Okay.

2 Going back to cumulative usage factors, is
3 every cumulative usage factor a TLAA?

4 MR. COX: I would say the analysis that
5 calculated the cumulative usage factor would be a
6 TLAA.

7 JUDGE KENNEDY: And I think that's, I have
8 my own internal confusion over that terminology and it
9 shows up when I read the testimony. Maybe you could
10 amplify that a little bit so we can get some clarity
11 to what a CUF, which sounds like a calculation, and a
12 TLAA, which is a calculation, and what's the
13 relationship between those two?

14 MR. COX: Okay. The CUF is the result of
15 the fatigue calculation. Fatigue calculation, which
16 is the TLAA, calculates the cumulative usage factor,
17 compares that to the acceptance criteria, which is
18 1.0, and that's how you would determine whether that
19 calculation is valid. So the CUF is a product of a
20 TLAA or a fatigue analysis, which is a TLAA.

21 JUDGE KENNEDY: Is that saying I wasn't
22 confused, that they are the same thing?

23 MR. COX: I mean, it's a subtle
24 difference. It's the analysis in one case and it's
25 the result of the analysis. The CUF is a result of

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1 the TLAA.

2 JUDGE KENNEDY: I think the reason I'm
3 spending a little bit of time on it, maybe more than
4 I should, but in some of the responses to the
5 testimony under the contentions it seems like there's
6 an attempt to put some of this out of reach as being
7 within the current licensing basis and not being done
8 as part of license renewal and I'm trying to find
9 where that line is.

10 It would seem to me in metal fatigue that
11 they're all in. I guess that's what it looked to me
12 like. They were all calculations that were needed for
13 license renewal and part of the license renewal
14 process.

15 MR. COX: Yes, this is Alan Cox again with
16 Entergy. Let's take the single i example or case for
17 an example. You have an analysis that's based on an
18 example I used, 100 heat-ups and cool-downs. Okay,
19 that's a current licensing basis analysis. That was
20 done as part of the plant design.

21 So we're not changing any of the
22 assumptions. We're not changing anything about that
23 analysis. All we're doing is evaluating that analysis
24 to see if it remains valid for the period of extended
25 operation by looking at the operating history of the

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1 plant and projecting the number of cycles.

2 So that's what we intended by any
3 references to saying that's part of the current
4 licensing basis, is that those assumptions and the way
5 you calculated fatigue is all defined in the current
6 licensing basis. We're not changing that for that
7 particular calculation.

8 You know, so that's why we're saying it's
9 CLB. It's not part of license renewal. It's not
10 changed due to license renewal.

11 JUDGE KENNEDY: So the single i items
12 would be viewed as current licensing basis and not
13 challengeable within a license renewal proceeding?

14 MR. COX: Yes and, again, it's a little
15 bit of a hybrid here because we're saying that even
16 for the single i we're using the program to manage the
17 number of cycles but we're still not touching the
18 original analysis or changing, you know, even on a
19 double ii we're not changing necessarily the methods
20 that are used to calculate fatigue from what's defined
21 in the current licensing basis by references to the
22 applicable parts of the ASME Code, for example.

23 JUDGE KENNEDY: Would the double ii CUFs
24 be challengeable as part of or subject to challenge as
25 part of the license renewal proceeding? I mean, is

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1 that the line? Is it little i versus double ii or
2 single i versus double ii as being the boundary even
3 though they're -- I think Dr. Hiser seems to want to
4 say something here. We'll get to you. We'll see if
5 they got a --

6 MR. COX: In my opinion on this, even if
7 you changed the calculation, if you still followed
8 procedures and processes that were established as part
9 of the CLB, those processes and procedures would not
10 be subject to challenge as part of license renewal.

11 JUDGE KENNEDY: Is that the same as saying
12 the CUF values would not be challengeable, whether
13 they're single i or double i?

14 MR. COX: I think the result of the
15 calculation would be the CUF values that you're
16 referring to and I think that would be the conclusion
17 that I would reach, is that those are not subject to
18 challenge because they are done using the same methods
19 that were established as part of the CLB.

20 JUDGE KENNEDY: All right. Thank you, Mr.
21 Cox. Dr. Hiser, would you like to add to this
22 discussion? I know it's not your application but --

23 DR. HISER: This is Dr. Hiser. Actually
24 I would say the NRC would consider any TLAA to be
25 challengeable, whether it's single i, double i, or

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1 triple i, because the applicant must make certain
2 assumptions and evaluations as a part of that
3 determination and clearly those would be, you know, we
4 challenge them as we review the application and so
5 from that perspective I think they certainly would be
6 subject to challenge.

7 Now, I mean, just to be clear, the
8 methodology used to do the calculation, to do the
9 analysis, would not be subject to challenge.

10 The input value of, in using Mr. Cox's
11 examples of heat-up and cool-down cycles, that would
12 be where the challenge really would be because the
13 methodology is current licensing basis and that is not
14 challenged.

15 The time-limited aspect of the analysis,
16 which would be the input heat-up and cool-down number
17 of cycles, that would be the part that would be
18 subject to challenge in this case.

19 CHAIRMAN MCDADE: Okay, Dr. Hiser, and,
20 again, I just want to make sure I'm hearing what
21 you're saying.

22 Under i, the method isn't challengeable
23 but if they're saying initially it's good for 100
24 cycles, they have to demonstrate that it's not going
25 to exceed 100 cycles during the period of original and

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1 extended operation.

2 On the other hand, if it is going to
3 exceed 100 cycles during the period of extended
4 operation, then you go to double i and make a
5 determination as to whether or not the analysis
6 demonstrates that with the additional cycles it will
7 remain, you know, valid, using this CUF that it'll
8 still be below one as an example. Am I correctly
9 understanding what you're saying?

10 DR. HISER: Yes, that's correct.

11 CHAIRMAN MCDADE: Okay, thank you.

12 JUDGE KENNEDY: With that, I have no
13 further questions on TLAAs. My board mates may have
14 some.

15 JUDGE WARDWELL: I'm not sure I heard,
16 I'll ask Dr. Hiser again just to make sure I heard
17 this last bit correctly. Would the initial 100
18 transient cycles be challengeable also? You may have
19 answered that but, if not, I want to make sure that is
20 answered.

21 DR. HISER: The original 100 in the
22 original analysis would not be. The demonstration
23 under single i that the number of expected transients
24 will remain below 100, that would be challengeable.

25 JUDGE WARDWELL: That's what I meant to

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1 ask. Thank you.

2 MR. COX: And this is Alan Cox with
3 Entergy. I might add to that, for the case of fatigue
4 analyses, that's the reason why we credit the triple
5 i. We credit the fatigue monitoring program because
6 that's what we're going to use to make sure that that
7 100 number does remain valid and is a good projection.

8 DR. HISER: This is Allen Hiser. Just to
9 clarify one thing as well, the fatigue monitoring
10 program is required in the tech specs by the
11 applicant, so that program is there regardless of
12 license renewal or regardless of TLAAs. The plant is
13 required to monitor transients and compare with
14 assumptions that are listed in the tech specs as well.

15 So this is one situation, as Mr. Cox
16 mentioned, that they can demonstrate, using single i
17 or double i, that the analysis is acceptable, but they
18 still are required by tech specs to continue to verify
19 that those assumptions are still met.

20 JUDGE WARDWELL: And is it fair to say
21 they're more than assumptions too? I mean, they are
22 estimates based on some operating experience or
23 evaluation or --

24 DR. HISER: You know, they really are
25 projections. In the case of fatigue cycles,

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1 applicants will determine the number of cycles up to
2 some point in time.

3 Normally around the date that they submit
4 the application, they will evaluate the trends from
5 that and then project forward what they expect to be
6 the case at 60 years, so it is a projection.

7 I guess assumption I took in the manner of
8 an analysis has certain assumptions. Maybe input
9 value is what I should have used, that that input
10 value is what is used in the analysis.

11 MR. COX: This is Alan Cox with Entergy.
12 I guess one more point of clarification on that, at
13 the time these analyses were first performed back in
14 the early '70s they were estimates. There wasn't a
15 lot of operating history you could use to project what
16 you're going to have after 40 years. Nobody had been
17 operating for that long. There was very little
18 operating experience to go by so, in essence, they
19 were --

20 JUDGE WARDWELL: True --

21 MR. COX: -- educated guesses about or
22 estimates about what cycles would be necessary to
23 qualify that component.

24 JUDGE WARDWELL: Good point.

25 JUDGE KENNEDY: I ceded the floor, sir.

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1 JUDGE WARDWELL: So I think now we're
2 going to move on to our first contention that we're
3 going to address. That's Contention 25.

4 Couple little introductory comments I
5 might make before we get started here. We've read all
6 the testimony so we're familiar with what you've
7 offered.

8 Generated some questions to help clarify
9 some of what we read. Many times I'll be asking, and
10 other judges will too I'm sure, yes/no questions.
11 We're not trying to trick you.

12 Oh first of all, the entire panel for 25
13 ceded? Is that correct? We're all set with that,
14 right? This is the 25 panel, all right.

15 We're not trying to trick you with yes/no
16 questions. More often than not, it is just a question
17 to help confirm what we understood you were saying or
18 advocating within the, usually, in my case, on
19 something I'm going to quote out of your testimony.

20 Don't think you need to elaborate on those
21 yes/no's. Just answer them as yes and no and, as part
22 of that, I'll let you know the topics I'm planning to
23 cover so that you can be comforted that, yes, you
24 don't have to cover everything right now with these
25 yes/no questions. There will be times to elaborate

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1 more on any position you have.

2 But, again, I'm just trying to fix a point
3 mostly with some of those and, just for time
4 constraints, try to stay with yes or no because
5 usually it's just trying to fix an obvious point more
6 often than not.

7 Sometimes I may interrupt you in your
8 response. Don't be crushed. Don't take it
9 personally. More often than not it's because I wasn't
10 clear with my question.

11 And if I find that you're wandering off,
12 I can see that obviously I haven't made myself clear
13 so I want to interrupt you and try to ask it another
14 way to bring you back to where I'm trying to go with
15 this to help complete the record, which is what I'm
16 trying to do with these questions that I have on 25.

17 Also, I'd like to hold down any offers to
18 provide additional testimony from other witnesses
19 besides the ones that I am questioning. You know, if,
20 in fact, we're confused, we certainly will ask for
21 that.

22 If you have a burning desire -- And,
23 again, this is for time constraints because otherwise
24 we'd be here for a long time and some of the times I
25 think with Track 1 we did get too much off course with

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1 some discussion that was more than that was needed.

2 If you do have a burning desire that you
3 just, and this is I just have too much to offer here
4 that I cannot sit still, well, jot it down and get it
5 to your counsel and they'll be able to offer it as
6 questions at the end of each of these sessions to
7 offer those up and then we can look at them and say,
8 oh, yes, gee, we should have asked that so that we
9 will seek that information through those questions.

10 And if nothing else, they can, you know,
11 add it to the findings of facts or conclusions of law,
12 so there is a way to get something in that you might
13 have a burning desire to offer, but we will generally
14 ask the additional questions we need if we're confused
15 as we go along here and that will allow us to do it
16 the most efficiently.

17 Under 25, I'll just read a synopsis, one
18 of the synopses that I saw offered and get everyone
19 familiar again with what we're covering here. Twenty-
20 five says that "Entergy's license renewal application
21 does not include an adequate plan to monitor and
22 manage the effects of aging due to embrittlement of
23 the reactor pressure vessels and the associated
24 internals."

25 New York State submitted a declaration in

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1 support of the additional bases identifying concerns
2 with, among other things, that declaration discussing
3 the synergistic effects of embrittlement and fatigue
4 and efficiencies in the visual and remote examination
5 techniques that Entergy and industry had proposed to
6 employ as part of the aging management program for the
7 embrittlement of reactor internals.

8 As part of this, I will be asking
9 questions and discussing just the general adequacy of
10 these AMPs, you know, related to the reactor pressure
11 vessel and the internals. Talk then about synergistic
12 degradation. Follow that up with talking about the
13 full range of transient shock loads that may or may
14 not influence that degradation. Discuss the
15 adequacies of inspections, and then finish it up with
16 preventive actions, corrective actions and acceptance
17 criteria, so that's where we're going with this.

18 And with that, I think I'll start off with
19 talking about the general adequacy of the AMP and
20 reference to start with Entergy's Exhibit 616.

21 Oh and by the way, all my references are
22 to non-public documents. I don't believe I've asked
23 any questions, relayed anything that had been redacted
24 by the various parties within those testimonies.

25 So if we do pull up an exhibit, it will be

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1 the redacted exhibit and it'll show up in the process
2 as we pull up any testimony that we may want to ask a
3 question about and then we'll proceed from there on
4 how to address that, but hopefully it hasn't happened.

5 But I just wanted to notify you now that,
6 yes, I have referenced as far as page numbers and
7 various answers from your testimony the public version
8 of it, the non-public version of it, I'm sorry, in
9 regards to, although I don't think the page numbers
10 change but I just wanted to reference that anyhow.

11 So Entergy's Exhibit 616, testimony for
12 Question and Answer 51 on Page 27, the question and
13 answer on Page 55 for 29, and the question and answer
14 for 64 on Page 33 where within those sections --

15 And you don't have to look them up. I'm
16 going to read to you what I'm interested in and that's
17 the case here in all of these. I'll be reading what
18 I'm interested in and then ask questions about that.
19 So it's better just listen for now, and then if you
20 need to see it, we can call it up.

21 But within those groups of areas, Entergy
22 notes that while State's initial pleadings in 2007 on
23 this contention focused primarily on the reactor
24 pressure vessel rather than the reactor vessel
25 internals, following the admission of Contention New

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1 York State 25, Entergy submitted several reactor
2 vessel-related amendments to clarify its license
3 renewal application, revise the description of how
4 Entergy would address the then proposed alternative
5 pressurized thermal shock, or the PTS rule, and noted
6 the closure of certain reactor pressure vessel-related
7 commitments.

8 The State, however, has never amended New
9 York State 25 to address or challenge these updates.
10 This is, again, Entergy's statement, not mine.

11 Going on with Entergy's statement, they
12 say that, instead, the State has shifted its focus to
13 reactor vessel internals.

14 Specifically, in Entergy's opinion, in Dr.
15 Lahey's pre-file testimony and the State's statements
16 of position on this contention, Dr. Lahey and the
17 State do not allege any specific deficiencies in
18 Entergy's license renewal application regarding
19 reactor pressure vessels.

20 And I'll start off with Entergy and ask
21 are the AMPs for the reactor vessel internals and the
22 reactor pressure vessels one and the same or are they
23 covered by different AMPs?

24 MR. KUYLER: Your Honor, if I may, this is
25 Ray Kuyler for Entergy. I believe Your Honor has been

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1 reading from the Statement of Position, the legal
2 brief that Entergy submitted, rather than our witness
3 testimony.

4 JUDGE WARDWELL: I think the question and
5 answers on Page 51 of 27 and 55 of 29 and 64 of 33
6 cover those same topics. This wasn't a quote. This
7 was just a statement that I gathered from those but,
8 so anyone from Entergy who would like to answer that.

9 MR. COX: Could you repeat your question
10 one more time, Your Honor?

11 JUDGE WARDWELL: Yes, I'm interested in
12 are the, is the reactor pressure vessel covered by the
13 same AMP as the reactor vessel internals?

14 MR. COX: No, it's not.

15 JUDGE WARDWELL: Okay, thank you. NRC
16 statement, Testimony 197, Answer 10 to Page 20 states,
17 quote, this is the NRC speaking, "The reactor vessel
18 internals also do not include any pressure or boundary
19 component such as reactor pressure vessels. These
20 components are addressed in other programs," which
21 seem to support Entergy's answer that we just
22 received.

23 Entergy's Testimony Exhibit 616, Answer
24 64, Pages 33 to 34, and this I will quote, says that
25 "with regard to the reactor pressure vessels, Dr.

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1 Lahey briefly alludes to some of his prior claims
2 regarding the reactor pressure vessel when he refers
3 to the, quote, 'variance' that was, quote, 'endorsed'
4 by the ACRS to permit continued operation with reactor
5 pressure vessels end-of-life Charpy upper-shelf USE,
6 and I believe that's the capital U, capital S, capital
7 E, values that are less than 50 foot pounds.

8 In his 2015 testimony, Dr. Lahey also
9 refers to certain documents discussing branch
10 technical position regarding the initial fracture
11 toughness of reactor pressure vessel materials,
12 suggesting that certain reactor pressure vessel
13 embrittlement analyses may be non-conservative.

14 The staff then goes on to say that "but
15 Dr. Lahey and the state stop short of asserting," I
16 mean, sorry, that's Entergy, and 616 goes on to say
17 "but Dr. Lahey and the state stop short of asserting
18 any specific deficiencies in Entergy's license renewal
19 application regarding the reactor pressure vessels."

20 And I'll direct this to Dr. Lahey. Are
21 there any other locations, besides what I just said,
22 that Entergy said that you were referred to reactor
23 pressure vessels where you feel you have challenged
24 the AMP for reactor pressure vessels within your
25 testimony?

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1 DR. LAHEY: Thank you, Your Honor. This
2 is Richard Lahey, a witness for New York State. We
3 did, in fact, starting in 2007 I believe, raise the
4 issue of certain plates in the pressure vessel which
5 were either going to violate the upper-shelf criteria
6 --

7 JUDGE WARDWELL: Yes. Excuse me, I'm
8 interested in your testimony that you submitted now
9 for the current issue --

10 DR. LAHEY: Yes.

11 JUDGE WARDWELL: -- not what you did
12 before.

13 DR. LAHEY: Interestingly my testimony has
14 been pretty consistent for the last eight years, but
15 the answer is there are a few plates in the pressure
16 vessel which have some problems with pressurized
17 thermal shock.

18 JUDGE WARDWELL: And where did you cite
19 those in your testimony?

20 DR. LAHEY: Which testimony?

21 JUDGE WARDWELL: Yes, where did you cite
22 that in any of your testimony that you've provided
23 here?

24 DR. LAHEY: Well, in fact, I think in the
25 2007 I cited it first and then in others I've said,

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1 but if you just let me finish --

2 JUDGE WARDWELL: Okay.

3 DR. LAHEY: -- I can tell you why it was
4 not a big deal for me, because this is an area that
5 has been of great importance to the U.S. NRC since day
6 one, pressure vessel integrity, and I felt very
7 comfortable that they had their arms around this
8 problem and there was not too much I could add to it,
9 other than bring it to the attention of the board.

10 And the fact is there have been some BTP
11 53 issues in terms of how you determine the
12 embrittlement of these things that are related. But
13 I feel really comfortable the NRC is on top of this,
14 so compared to my other issues, this has not been
15 highlighted in my testimony.

16 CHAIRMAN MCDADE: The focus of your
17 testimony is on the reactor vessel internals and the
18 adequacy of the aging management for those reactor
19 vessel internals, correct, doctor?

20 DR. LAHEY: That's certainly true because
21 of how that impacts the possibility of core cooling,
22 adequacy of core cooling, because my overall concern
23 is safety. That's what I've been doing all my life.
24 And so anything related to that is what I'm concerned
25 with and what I've focused on in my testimony.

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1 JUDGE WARDWELL: So you would agree that
2 then the heart of your contention for 25 now deals
3 with the reactor vessel internals, and specifically
4 I'm going to pull out from your testimony 482 on Page
5 78, Lines 14 through 21, where you summarize that and
6 just want to confirm if there's anything else extra
7 you'd like to add to this list.

8 DR. LAHEY: Do you want me to look that
9 up?

10 JUDGE WARDWELL: No, I'm going to read it
11 for you right here now so that you don't have to do.

12 One, the synergistic effect on degradation
13 and integrity of reactor pressure vessel internals of
14 radiation-induced embrittlement, corrosion, and
15 fatigue was one of your issues.

16 The second issue was the potential for
17 unanticipated failure of reactor vessel internals due
18 to a severe seismic event or accident-induced thermal
19 and/or pressure shock loads.

20 Three, the implications of the failure of
21 the reactor pressure vessel internal structure
22 components and fittings on post-accident core
23 coolability.

24 And then citing another area was your same
25 testimony, Exhibit 482 on Page 40, Lines 1 through 4,

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1 that, quote, "Highly embrittled and fatigued reactor
2 vessel internal components may not have signs of
3 degradation that can be detected by an inspection but
4 such weakened components could, nonetheless, fail as
5 a result of severe seismic event or thermal pressure
6 shock loads." Is that a fair assessment of your main
7 points of your contention?

8 DR. LAHEY: Yes, Your Honor.

9 JUDGE WARDWELL: Thank you. And without
10 getting into any inadequacies associated with the
11 RVIs, is it fair to say then that we can move forward
12 with only looking at the reactor vessel internals and
13 that the pressure vessel itself is no longer an issue
14 with this contention?

15 DR. LAHEY: I would leave that up to New
16 York State. I told you how I feel about the issue.

17 JUDGE WARDWELL: But as I heard --

18 DR. LAHEY: I mean, my primary concern is
19 with the impact of failed reactor pressure vessel
20 internals on core coolability.

21 JUDGE WARDWELL: Okay, and there's no
22 longer a need to address anything else with you as far
23 as testimony you'd like to provide in addition in
24 regards to the pressure vessel itself?

25 DR. LAHEY: Well, I've told you the issue

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1 is the plates which are, in fact, the wall of the
2 pressure vessel. And at some point in time, they are
3 going to exceed the pressurized thermal shock criteria
4 and the implications of that are not good, but it's
5 well-known and I think the NRC is totally on top of
6 that issue as far as I'm concerned.

7 JUDGE WARDWELL: Thank you very much.

8 DR. LAHEY: Maybe they could say they're
9 not, but I doubt it.

10 JUDGE WARDWELL: Dr. Hiser, are you on top
11 of those plates for the pressure vessel itself?

12 DR. HISER: I am technically on top of
13 them, yes.

14 JUDGE WARDWELL: Right. Thank you.

15 CHAIRMAN MCDADE: Not physically on top of
16 them.

17 DR. HISER: I'm in Tarrytown, New York
18 right now.

19 JUDGE WARDWELL: Top of the world. It
20 doesn't get any better than this, does it?

21 DR. HISER: No, sir.

22 JUDGE WARDWELL: Thank you.

23 CHAIRMAN MCDADE: You were under oath when
24 you said it doesn't get any better than this.

25 (Laughter.)

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1 JUDGE WARDWELL: Let's turn to these AMPs
2 again and a little bit of this may be a repeat from
3 what we've managed to cover already but we'll see
4 where we are with that.

5 NRC's testimony, Exhibit 197, Answer 114
6 on Page 72, states that "The IP2 and IP3 RVI," that's
7 for reactor vessel internals, "AMP consists of a
8 program description describing the ten elements of the
9 AMP. A program description was initially submitted on
10 July 14th, 2010, and was revised in a letter dated
11 February 17th, 2012." And here you're citing New York
12 State's Exhibit 496, which is the letter NL-12-037 and
13 Attachment 1.

14 Entergy, do you agree that the program
15 description of Entergy's AMP for reactor vessels
16 internals is attached to Entergy's letter NL-12-037 in
17 New York State's Exhibit 496?

18 MR. DOLANSKY: This is Bob Dolansky with
19 Entergy. Yes.

20 JUDGE WARDWELL: Thank you. And, Dr.
21 Lahey, do you agree that that is their AMP for reactor
22 vessel internals?

23 DR. LAHEY: As I understand it, yes.

24 JUDGE WARDWELL: Thank you. For anyone
25 with NRC, where have -- I think you've already been

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1 tasked to answer this but I'll answer it again. Where
2 have you addressed the ten elements of GALL for the
3 RVI AMP in your SER? Is that one of those ones that
4 I asked you earlier to get for me at some time?

5 MR. POEHLER: This is Jeffrey Poehler for
6 the staff. The ten elements are addressed in the
7 supplement to the SER. It's NUREG-1930, Supplement 2.

8 JUDGE WARDWELL: And if you have the
9 section numbers and can get that for us later, that's
10 fine. It just --

11 MR. POEHLER: I don't have the exact
12 section number at the moment. I can get it for you.

13 JUDGE WARDWELL: The only reason I ask you
14 is not because I'm lazy. Well, that is part of the
15 reason, but oftentimes there are sections we're not
16 aware that really apply to that when you look at
17 something like the table of contents and that's why I
18 just want to make sure that you're telling me where I
19 should be looking for the SER for things like that.

20 And when I ask this question in other
21 areas, that's why I do it, whether it's for New York
22 or any expert. I may ask you where is that actually
23 stated and that's because I don't want to assume I
24 know every place that it might be stated within a
25 given document.

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1 MR. POEHLER: Yes, Dr. Hiser just pulled
2 up the citation. It's Section 3.0.3.3.9 of NUREG-
3 1930, Supplement 2.

4 JUDGE WARDWELL: Thank you very much.

5 MR. HARRIS: Your Honor, this is Brian
6 Harris for the staff. Can we just let that reflect
7 that it's NYS 507, I believe is the Exhibit number for
8 the supplemental safety evaluation report.

9 JUDGE WARDWELL: Better yet. That's
10 great. Thanks. Yes, I really appreciate any of those
11 cites that you provide. It always helps the record as
12 we go through the transcript. That's welcomed
13 interruption by the way.

14 MR. HARRIS: Thank you, Your Honor.

15 CHAIRMAN MCDADE: If I could clarify for
16 myself, that was Section 3.0.3.0.9. Is that --

17 DR. HISER: This is Allen Hiser.
18 3.0.3.3.9, Page 3-13 of Supplement 2.

19 CHAIRMAN MCDADE: Thank you. Thank you.

20 JUDGE WARDWELL: Staying with the staff,
21 we kind of skirted this but I think I'm going to ask
22 it anyhow because it says it a little more directly
23 too.

24 From a technical standpoint, is
25 consistency with GALL, containing the ten program

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1 elements, in and of itself enough or is more depth
2 analysis of the adequacy of the described program in
3 the AMP needed for you to reach the conclusion that
4 the intended functions of the passive reactor vessel
5 internals within the scope of license renewal will be
6 maintained?

7 DR. HISER: This is Dr. Hiser, the staff.
8 In and of itself, consistency with the ten elements is
9 not sufficient. The applicant must demonstrate that
10 the components at the applicant site that are covered
11 by the AMP are consistent and they also must
12 demonstrate that operating experience is consistent.
13 So they have to provide a context that shows that the
14 AMP really is responsive to the aging management needs
15 at the facility.

16 JUDGE WARDWELL: And is that response
17 documented in the SER also in at least some summary
18 form or so someone can understand what you went
19 through in your interactions with the staff to provide
20 this demonstration that the ten elements are being
21 addressed?

22 DR. HISER: I'm not sure that we can point
23 to a specific place within the SER because I think it
24 really is embedded within the evaluation in the SER of
25 each of the elements and in the applicant action

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1 items.

2 JUDGE WARDWELL: That was my question. I
3 didn't mean to ask you to point me to a page number.
4 I just asked you as a standard practice that you
5 incorporate those interactions within your narratives.
6 Thank you.

7 I'll ask Dr. Lahey, have you looked over
8 the ten elements of the GALL in the submittal that was
9 provided in Attachment 1 of that letter, and do you
10 see any area where you feel there is inconsistencies
11 associated with what's required by law?

12 DR. LAHEY: Your Honor, this is Richard
13 Lahey again. I have looked it over. I have concerns
14 about synergisms, and to understand how I feel, at
15 some point I need to give you some overview of why I'm
16 saying what I'm saying but I don't know it's the right
17 time. If you just want --

18 JUDGE WARDWELL: Well, I think you have.
19 You provided your testimony in 482. Isn't that your
20 overview?

21 DR. LAHEY: Well, it's part of it but I
22 think --

23 JUDGE WARDWELL: Well, that should be.
24 That's what we're interrogating here. That should be
25 all of it if, I mean, that's what you've submitted for

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1 your testimony and now we're getting elaborations on
2 that overview that you provided.

3 DR. LAHEY: Your Honor, if you understood
4 everything I said, that's fine.

5 JUDGE WARDWELL: Oh, no, don't get me --
6 I've got a lot of questions for you. Don't worry
7 about that. I just want to make sure you're aware
8 that your testimony has been submitted as pre-filed
9 testimony and we're not here to create more testimony.
10 We're here to explore the details of your testimony,
11 and so that testimony is the overview of your position
12 and we're just exploring the details of that.

13 DR. LAHEY: Yes, Your Honor.

14 JUDGE WARDWELL: And along those lines,
15 those items I just read in regards to the heart of
16 your contentions where I went through each one of
17 those issues that you've summarized from your
18 testimony, if you ever want to refer to those again in
19 a general sense to caveat a response to my question,
20 just go ahead and call them synergism et al. or
21 something like that, so you don't have to worry.
22 We'll know you're referring to all of those that we
23 just covered previously.

24 So if I ask you a question about was this
25 suitable or something like that, you can say with the

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1 exception of the synergism, et al., we see no other
2 differences or I see no other differences or something
3 like that. Do you get what I'm driving at? So you
4 don't have to repeat the caveat.

5 I understand what your concerns are and so
6 you can express those again just by that symbolic
7 representation if you feel the need to whenever I ask
8 you a question.

9 DR. LAHEY: Okay. Thank you, sir.

10 JUDGE WARDWELL: Sure. Entergy's Exhibit
11 616 again, Answer 133, Page 82, says that the IPEC RVI
12 AMP, as updated, relies upon the extensive industry
13 research document in MRP-227-A and MRP-228 and in the
14 many reports supporting these documents where you're
15 citing to New York State, again 496, NL-12-037,
16 Attachment 1.

17 Entergy's testimony Answer 119, Page 74,
18 talks more about this EPRI materials reliability
19 programs. That's the MRP, of MRP-227-A which is
20 entitled "Pressurized Water Reactor Internal
21 Inspection and Evaluation Guidelines," and states that
22 it is the NRC-approved version of EPRI's guidance on
23 the aging management for reactor vessel internals.

24 Entergy's Testimony 116 Exhibit again,
25 Answer 133, Page 83, goes on, and I quote, that "the

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1 RVI AMP has three principal components. One,
2 examinations and other inspections along with a
3 comparison of data to examination acceptance criteria
4 as defined in MRP-227-A and MRP-228, two, a resolution
5 of indications that exceed examination acceptance
6 criteria by entering them into the applicant's
7 corrective action program, and, three, monitoring and
8 control of reactor primary coolant water chemistry
9 based on industry guidelines."

10 And I guess I'd ask staff if you agree
11 with Entergy's statement that the MRP-227-A is the
12 NRC-approved version of EPRI's guidance and what
13 you're approving it for. What does that approval
14 mean? What's the significance of it?

15 MR. POEHLER: This is Jeffrey Poehler, the
16 staff. Yes, we agree that MRP-227-A is the approved
17 version of the MRP-227 topical report.

18 JUDGE WARDWELL: And that's all it is, is
19 the approved version of that report? It doesn't
20 approve that report for anything else?

21 MR. POEHLER: No, it approves basically
22 our safety evaluation, approved that report to be used
23 as the basis for plant-specific reactor vessel
24 internals aging management program or I should, aging
25 management programs and inspection programs.

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1 JUDGE WARDWELL: A plant specific or a
2 generic plant? I would think it would be the
3 opposite.

4 MR. POEHLER: Yes, plant specific because
5 any individual plant that needs to develop a reactor
6 vessel internals aging management program can now use
7 the framework of MRP-227-A to develop that program.

8 But what this does is it makes the plant-
9 specific programs consistent with the generic
10 guidance, so it's generic guidance for individual
11 plants to use.

12 DR. HISER: This is Dr. Hiser. And I
13 think the main thing, it is a generic program. Plant-
14 specific applicability is demonstrated, in part,
15 through the action items, A/LAI, that are --

16 JUDGE WARDWELL: A/LAI.

17 DR. HISER: Yes, licensee --

18 JUDGE WARDWELL: Is that correct?

19 DR. HISER: Yes, applicant/licensee action
20 items, yes.

21 JUDGE WARDWELL: Is there a way to
22 pronounce that acronym? I'm going to call it "a lay,"
23 is that all right with you?

24 DR. HISER: Yes.

25 JUDGE WARDWELL: Does anyone else use

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1 anything else different, because I can't go A/LAI
2 anymore.

3 DR. HISER: We can just call them action
4 items. How about that?

5 JUDGE WARDWELL: That would work.

6 DR. HISER: Okay.

7 CHAIRMAN MCDADE: But before we move on,
8 if you could explain to me, the MRP-227-A was
9 developed by industry for a particular purpose. What
10 is the nature of the NRC staff's review of that
11 document and how then is it used by the NRC staff in
12 determining the adequacy of aging management?

13 DR. HISER: This is Dr. Hiser. The
14 purpose of the AMP is to demonstrate adequacy of aging
15 management for reactor vessel internals. The NRC
16 approved that report, approved the methodology in its
17 safety evaluation for the report. That safety
18 evaluation was then incorporated in the -A version,
19 MRP-227-A, as a topical report that is acceptable to
20 the NRC staff.

21 When we then implemented that report into
22 the LR-ISG to modify the AMP for reactor vessel
23 internals, that is where the NRC determined that that
24 methodology was acceptable for license renewal
25 applicants.

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1 CHAIRMAN MCDADE: Yes, but how does the
2 NRC go about doing that? What is the nature of your
3 review? I mean, is it simply a read through and
4 subjecting that to the technical expertise of your
5 staff? Is there a period of, you know, the equivalent
6 of the RAI situation that you have on a license
7 renewal?

8 I'm just trying to understand what is it
9 the ARC ExpressScribe staff does with MRP-227-A to
10 effectively put its imprimatur on it as a guide for
11 AMP compliance?

12 DR. HISER: Okay. Yes, this is Dr. Hiser.
13 What we did was a detailed technical review, and items
14 that we believed were not appropriately addressed in
15 the report or that we had questions about we asked
16 RAIs and went through a question and answer sequence
17 to get to the point that we had no more questions on
18 the adequacy of the report.

19 This was part of the topical report review
20 which is a standard process that we use to review
21 industry reports that try to address generic issues,
22 such as adequacy of aging management for vessel
23 internals.

24 CHAIRMAN MCDADE: And is that process part
25 of what caused the metamorphosis from 227 to 227-A?

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1 DR. HISER: That's correct, yes.

2 JUDGE KENNEDY: Dr. Hiser, this is Judge
3 Kennedy. Is there a staff safety evaluation document
4 that's issued for an approved topical report?

5 DR. HISER: Yes there is. In general,
6 there is and for this one there was a safety
7 evaluation. In addition, we had, I believe it was a
8 revision to the SE for MRP-227.

9 JUDGE KENNEDY: Would that be the ultimate
10 culmination of the staff's review of that industry
11 document?

12 MR. POEHLER: Almost. I just wanted to
13 clarify that. So when the industry, so we issued our
14 safety evaluation. Then EPRI takes that and includes
15 it in the approved version of the topical report.

16 They also had to make some changes to the
17 topical report, that the staff had included conditions
18 in our final safety evaluation that related to changes
19 that we wanted to see made in the final version of
20 MRP-227.

21 EPRI made those changes. Then they
22 submitted to us the final -A version. And at that
23 point, the staff still had to verify that those
24 promised changes had been made.

25 And then at that point, I believe we

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1 issued a letter that said it's good to, you know, we
2 agree that you made all the changes so, and at that
3 point they were able to publish the -A version.

4 JUDGE KENNEDY: Okay, thank you.

5 JUDGE WARDWELL: And are the lists of the
6 RAIs that were generated documented anywhere, either
7 in the SE or the industry document in the MRP?

8 MR. POEHLER: Jeffrey Poehler from the
9 staff. Yes, the RAIs are included as an appendix to
10 the -A version.

11 JUDGE WARDWELL: Well, the whole RAI is,
12 not just the --

13 MR. POEHLER: The RAI letters and the
14 responses. There were four rounds of RAIs so those
15 are all included as appendices, although they're not
16 all, every RAI is not explicitly discussed in the
17 staff's safety evaluation.

18 JUDGE WARDWELL: But they're physically
19 attached to the MRP-A?

20 MR. POEHLER: Correct.

21 JUDGE WARDWELL: MRP-227-A?

22 MR. POEHLER: Correct.

23 JUDGE WARDWELL: Thank you.

24 CHAIRMAN MCDADE: Okay, Mr. Poehler, just
25 to, for my point to clarify for the record, when you

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1 mention EPRI, that's the Electric Power Research
2 Institute, which is what?

3 MR. POEHLER: The Electric Power Research
4 Institute is the organization that developed the MRP-
5 227-A or Rev. 0 and -A report, specifically the
6 materials reliability program, which is, you know, a
7 sub-program of EPRI that specifically deals with
8 pressurized water reactor vessel materials integrity
9 issues.

10 CHAIRMAN MCDADE: Okay, and it's a non-
11 governmental entity that is supported by the electric
12 power industry.

13 MR. POEHLER: Correct.

14 CHAIRMAN MCDADE: And in preparing this
15 document, it works in conjunction with the NRC to
16 determine appropriate guidelines for AMPs here, for
17 reactor vessel internals.

18 MR. POEHLER: In preparing the document,
19 it was, you know --

20 CHAIRMAN MCDADE: Their goal was to come
21 up with a proposal and the proposal is then reviewed
22 by the NRC, the goal being to have the NRC put its
23 imprimatur on it after a technical review that
24 requires them to answer questions and modify their
25 proposals. Is that correct?

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1 MR. POEHLER: That's correct.

2 CHAIRMAN MCDADE: Okay, thank you. Thank
3 you, Mr. Poehler.

4 DR. HISER: This is Dr. Hiser. Just to
5 add one thing to what Jeff said, the RAI, RAIs
6 themselves and the MRP responses are in, I'm not sure
7 if it's Enclosure or Appendix B to MRP-227-A, so the
8 full record is provided there in the report.

9 CHAIRMAN MCDADE: Thank you.

10 JUDGE WARDWELL: Which does bring to mind
11 another general comment I was going to make early on.
12 We sometimes focus more time on one group of witnesses
13 than the other. Don't also take that personally, that
14 you're feeling slighted or that you're feeling you're
15 getting beat up on. It's strictly how, where the
16 questions come up from.

17 And usually, it's been my experience at
18 least, that we do spend more time on staff and
19 Entergy, the applicant, staff and the applicant,
20 because they are the ones defending from the
21 allegations that have been made.

22 And so that's why we end up challenging
23 you more than we seem to with, oftentimes, witnesses
24 for the intervenors, and if that ends up to be the
25 case here, that's not necessarily unusual. It just is

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1 what it is based on the questions that we come up
2 with, so that was a comment I forgot to mention
3 earlier, general comment.

4 And back to that, I wanted to ask Dr.
5 Lahey whether he disagreed with any of those principal
6 components of Entergy's RVI AMP, and I think it's been
7 long enough that I'm going to have to repeat them
8 again for you unless you remember them. I'd like to
9 repeat them again to make sure you know what I'm
10 asking.

11 All I'm asking about is do you have any
12 disagreement with Entergy's statement that the RVI AMP
13 has three principal components and that is, one, the
14 examinations and other inspections along with a
15 comparison of data to examination acceptance criteria
16 as defined in MRP-227-A and MRP-228 and then, two,
17 resolution of indications that exceed examination
18 acceptance criteria by entering them into the
19 applicant's corrective action program, and, three,
20 monitoring and control of reactor primary coolant
21 water chemistry based on industry guidelines. Do you
22 agree those are three principal components of
23 Entergy's RVI?

24 DR. LAHEY: This is Richard Lahey again.
25 I certainly agree but I have problems with the MRP-

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1 227-A, which it is based on.

2 JUDGE WARDWELL: And I assume you'll be
3 able to refer back to that when we cover each of those
4 other topic areas where that differs from that, rather
5 than just open up a general discussion.

6 DR. LAHEY: Fine. Great, thanks.

7 JUDGE WARDWELL: NRC's Exhibit 197, Answer
8 114, Page 72, in addition to the program description,
9 quote, "The IP2 and IP3 RVI AMP consists of an
10 inspection plan initially submitted on September 28th,
11 2011, and a revised version consistent with MRP-227-A
12 was submitted on February 17th, 2012."

13 And now for this inspection plan, citing
14 New York State's Exhibit 496-NL-12-037, Attachment 2,
15 Entergy's Exhibit 616, Answer 134, Page 83, and I
16 quote, states that, "The reactor vessel," excuse me,
17 "The RVI inspection plan provides additional details
18 on inspections to be covered under the RVI AMP," and,
19 again, citing that Attachment 2.

20 And I guess I'll ask Dr. Lahey, did you
21 have a chance to look over that inspection plan and
22 were those basic contents provided in Attachment 2 of
23 12-037 for their inspection plan?

24 DR. LAHEY: The inspection, excuse me,
25 this is Richard Lahey again. The inspection plan

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1 that's associated with MRP-227-A? Is that what you're
2 asking about?

3 JUDGE WARDWELL: Yes.

4 DR. LAHEY: I have read that in detail,
5 yes.

6 JUDGE WARDWELL: Okay well, yes, and that,
7 do you agree, has -- No, I'm sorry. I'm getting into
8 the next question relating to the contents of that.

9 Entergy's testimony, Exhibit 616, Answer
10 134, Page 83, states that the reactor vessel
11 inspection plan provides additional details on the
12 inspections to be conducted under the RVI AMP,
13 including, one, the type of examinations; two, the
14 level of examination qualification; three, the
15 schedule of initial inspection and frequency of
16 subsequent inspections; four, the criteria for
17 sampling and coverage; five, the criteria for
18 expansion of scope if unanticipated indications are
19 found; six, the acceptance criteria; seven, the
20 methods for evaluation of examination results that do
21 not meet the acceptable criteria; seven, provisions to
22 update the program based on industry-wide results;
23 and, eight, contingency measures to repair, replace,
24 or mitigate beyond the information set forth in the
25 RVI AMP.

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1 And, again, without getting into the
2 adequacies with which they addressed those particular
3 items, Dr. Lahey, do you agree that those components
4 were in the inspection plan?

5 DR. LAHEY: This is Richard Lahey again.
6 I heard you say reactor vessel rather than reactor
7 vessel internals, is that correct?

8 JUDGE WARDWELL: You probably heard
9 correct. I probably misspoke, so it's reactor vessel
10 internals. If I ever say reactor vessels, it's
11 probably reactor vessel internals from now on but,
12 yes, I meant reactor vessel internals. I'm sorry.

13 DR. LAHEY: Yes, sir, I agree that that's
14 what they're doing.

15 JUDGE WARDWELL: Thank you.

16 CHAIRMAN MCDADE: Okay and, Dr. Lahey,
17 it's your contention not that these aren't addressed
18 but they're not adequately addressed in a number of
19 instances. Is that correct?

20 DR. LAHEY: I think this document that
21 they use is a very well-done document. It's
22 inspection based and that's only part of it, so it's
23 necessary but it's certainly not sufficient in my
24 view. Thank you.

25 CHAIRMAN MCDADE: Thank you, Dr. Lahey.

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1 JUDGE WARDWELL: Back to staff, there are
2 various Westinghouse reports that came up in the
3 testimony and I jotted down WCAP 13587, 14577, 15030,
4 15270, 16156, 16211, 17096, 17894, 17901. Could you
5 briefly summarize what's in all -- No.

6 (Laughter.)

7 JUDGE WARDWELL: What I'm interested in is
8 --

9 CHAIRMAN MCDADE: Ten words or less.

10 JUDGE WARDWELL: Yes. How do these
11 reports fit into your assessment of the adequacy of
12 Entergy's RVI AMP? What role do they play and of what
13 significance are they?

14 MR. POEHLER: This is Jeffrey Poehler.
15 Just to clarify the question, were those referenced in
16 MRP-227-A or in the staff's testimony on New York
17 State 25?

18 JUDGE WARDWELL: We ask the questions.
19 You can't ask us questions.

20 (Laughter.)

21 JUDGE WARDWELL: I'm not sure where I got
22 these from. I just know they've cropped up and I had
23 any reference to Westinghouse report. I was
24 interested and they seemed to have a significant
25 influence on something that you've done. And I was

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1 just wondering how do they fit in? What role do they
2 play? How should we consider them?

3 I believe all of those are, well, I'm not
4 sure whether they're exhibits or not. I didn't go to
5 look for an exhibit number but I know they've come up,
6 and is this new to you? Have you never heard of any
7 of these reports, or would you like me to ask Entergy
8 and --

9 MR. POEHLER: Well I can answer for --
10 This is Jeffrey Poehler of the staff. So one of the
11 ones that you mentioned was WCAP 17096. Is that
12 correct?

13 JUDGE WARDWELL: Yes, that was one. WCAP
14 just call it.

15 MR. POEHLER: Just using that as an
16 example, that's another topical report that was under
17 review by the NRC staff. It was kind of related to
18 MRP-27-A and, you know, that's a document that
19 provides methodologies for performing engineering
20 evaluations when you find, if you were to find
21 degradation in reactor vessel internals that exceeds
22 the acceptance criteria of MRP-227-A.

23 So the staff was concurrently reviewing
24 that at the time period that they were reviewing
25 Entergy's reactor vessel internals aging management

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1 program, but those WCAP reports are not, they're not
2 directly relied upon in our review of 227-A.

3 Another one that I think I heard you
4 mention was WCAP 14577.

5 JUDGE WARDWELL: Yes.

6 MR. POEHLER: And that one was a
7 Westinghouse report that addressed some of the same
8 issues as MRP-227-A, aging management, for aging
9 management of reactor internals and --

10 CHAIRMAN MCDADE: Okay, Mr. Poehler, let
11 me interrupt here for a second just by way of
12 background for my edification. Can you explain to me
13 what a WCAP report is, what the genesis is, how
14 they're developed, and then how they're used by the
15 NRC in their evaluation of MRP-227?

16 JUDGE WARDWELL: That's just what I asked
17 earlier --

18 MR. POEHLER: And so, yes.

19 CHAIRMAN MCDADE: I didn't follow --

20 JUDGE WARDWELL: -- in a terrible way.

21 MR. POEHLER: Those reports were not
22 direct components. They're not components of MRP-227-
23 A. There were some supporting EPRI reports.

24 CHAIRMAN MCDADE: Okay, first, how are
25 they generated? Who --

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1 MR. POEHLER: They're generated by
2 Westinghouse Electric Company as technical reports and
3 sometimes those are submitted to NRC for review and
4 approval as topical reports and sometimes they're not.

5 CHAIRMAN MCDADE: Are they submitted to
6 EPRI as part of the development of MRP-227 or are they
7 submitted to the NRC after MRP-227 has been
8 circulated?

9 MR. POEHLER: I don't know if they're
10 submitted to EPRI. But to the NRC they're not, we did
11 not have any WCAPs that were submitted to directly
12 support the MRP-227 review.

13 The one that I mentioned, the 17096, was
14 submitted subsequently to MRP-227, Rev. 0. So it's a
15 completely independent topical report that the NRC was
16 reviewing separately.

17 CHAIRMAN MCDADE: Okay, submitted to the
18 NRC by who, by Westinghouse?

19 MR. POEHLER: The WCAP 17096 was, I
20 believe, submitted by EPRI and on behalf of the PWR
21 Owners Group and Westinghouse, but I believe EPRI was
22 the entity that actually submitted it, so.

23 CHAIRMAN MCDADE: Okay. So, again, I'm
24 just trying to get on the record here how these
25 reports are developed and used and correct me if I

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1 have a misinterpretation.

2 You've got a MRP-227. It is out there.
3 It's submitted, not the A. This is not the final,
4 that it is prepared by an industry group. Various
5 entities in the industry, such as Westinghouse, have
6 an interest in getting this right.

7 They prepare a document such as this WCAP
8 17096 which is then used to provide technical support,
9 technical accreditation, as you were, for the
10 underlying EPRI document which can be then evaluated
11 by the NRC for whatever value you view it might have.
12 You may view it very helpful. You may view it not be
13 helpful. Is that correct?

14 MR. POEHLER: Well, this is Jeffrey
15 Poehler of the staff.

16 CHAIRMAN MCDADE: And I realize I went on
17 there. Some of what I said may have been right and
18 some of it may have been wrong. Don't just say yes if
19 a lot of it is wrong.

20 MR. POEHLER: For the specific example of
21 WCAP 17096, that was not a supporting document that
22 was necessary for the staff's review of MRP-227. It
23 would be something that would be used by licensees in
24 conjunction or with their MRP-227-A inspection program
25 if they needed to do engineering evaluations of

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1 conditions that they found. But we didn't rely, we
2 certainly didn't rely upon that for approval of 227-A.

3 DR. HISER: This is Dr. Hiser. The
4 sequence is MRP-227-A. Plants go to implement it.
5 They find some indication. Maybe it exceeds
6 acceptance criteria. Put that in the corrective
7 actions program.

8 MRP 17096 is one method they can use under
9 corrective actions to determine whether it's
10 acceptable or what other corrective actions they may
11 need to take. So it's independent time-wise and
12 process-wise really of MRP-227-A.

13 JUDGE WARDWELL: Did you provide any of
14 these WCAPs as testimony as an exhibit to the best of
15 your knowledge?

16 DR. HISER: Yes, I believe we did. NRC
17 200 is WCAP 17096.

18 JUDGE WARDWELL: Okay. And how about the
19 14577?

20 DR. HISER: I do not remember other than
21 doing a --

22 MR. HARRIS: Your Honor, this is Brian
23 Harris for the staff. WCAP 14577, I think it's Rev.
24 1-A, is Exhibit NYS 341.

25 CHAIRMAN MCDADE: Thank you very much, Mr.

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1 Harris. Maybe we can turn to Entergy who's --

2 CHAIRMAN MCDADE: I'm sorry. Could you
3 repeat that?

4 MR. HARRIS: It's New York State 341.

5 CHAIRMAN MCDADE: 341. Thank you.

6 JUDGE WARDWELL: Would someone from
7 Entergy like to shed some light on what are these
8 Westinghouse reports and answer the question Judge
9 McDade provided so eloquently?

10 MR. AZEVEDO: Yes, Your Honor. This is
11 Nelson Azevedo for Entergy. The MRP 227 was written
12 by EPRI in MRP specifically which is a subgroup of
13 EPRI but a lot of analysis in the additional
14 evaluations were required to develop MRP-227 and also
15 for the implementation details.

16 And there's another industry group called
17 the PWR Owners Group. I actually sit on both of these
18 groups, and the PWR Owners Group develops a lot of
19 these WCAPs that you're talking about, both for
20 implementing the requirements in MRP-227 and
21 performing evaluations that supports MRP-227. So
22 that's a separate organization, PWR Owners Group, that
23 supports the development of these guidelines.

24 JUDGE WARDWELL: And have you provided any
25 of these WCAPs as exhibits to this proceeding?

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1 MR. AZEVEDO: Yes we have, Your Honor.

2 JUDGE WARDWELL: Thank you. Anything more
3 on that? You comfortable?

4 NRC Exhibit 197, Answer 114, Page 72,
5 quote, "The inspection plan contains tables specifying
6 the inspections for primary expansion and existing
7 program components and tables containing the
8 acceptance and expansion criteria for these
9 components.

10 "The inspection plan also contains
11 Entergy's proposed resolution of the Applicant/license
12 action items" these are these A/LAIs or A lays or just
13 action items as we'll call them from here on in, "from
14 the staff's final safety evaluation of MRP-227, Rev.
15 0."

16 And I guess I'll start with the staff.
17 What makes a component a primary component, an
18 expansion component, or existing component and how
19 does it fit into the inspection program?

20 MR. POEHLER: This is Jeffrey Poehler of
21 the staff. So a primary component is a component that
22 was judged either most likely to experience some form
23 of degradation such as tracking, for example, and/or
24 also, you know, a higher safety risk component.

25 So those primary components are those

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1 components that will be inspected as part of the
2 initial and subsequent inspections under MRP-227-A or,
3 you know, any inspection program that is based on 227-
4 A.

5 You inspect the primary components within
6 two refueling outages at the beginning of the period
7 of extended operation and every ten years thereafter
8 for the majority of the primary components.

9 Expansion components are those that are
10 the next tier of components. They're somewhat less
11 susceptible to degradation and/or lower risk, and
12 expansion components would only be inspected if a
13 primary component that is linked to it, in other words
14 one that has the similar degradation mechanisms,
15 materials, et cetera, experiences degradation.

16 So the expansion component may never be
17 inspected unless its associated primary component
18 first experiences degradation. So the primary
19 components are considered the lead components for
20 degradation.

21 CHAIRMAN MCDADE: I'm sorry. They're
22 considered what?

23 MR. POEHLER: The lead.

24 CHAIRMAN MCDADE: Lead?

25 MR. POEHLER: Leading indicators basically

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1 of degradation as compared to the expansion
2 components.

3 And then existing program components are
4 components that were determined to be adequately
5 managed by existing programs.

6 Generally the most common existing program
7 is the American Society of Mechanical Engineers Boiler
8 and Pressure Vessel Code, Section 11, in-service
9 inspection program. We'll just call that the in-
10 service inspection program from now on.

11 But that's something that is required by
12 the ASME Code, which is incorporated by reference into
13 NRC regulations, and the plants do that every ten
14 years and they have been doing that since day one.

15 But basically what that program does is
16 visual inspections of the internals, but there were
17 certain components where the type of visual inspection
18 that's done was considered adequate to manage aging so
19 MRP-227 took credit for those inspections for certain
20 components, so those will be inspected as well,
21 basically on the same timing as the primary.

22 JUDGE WARDWELL: You said the same
23 sequence, the ten-year sequencing.

24 MR. POEHLER: The ten-year interval,
25 depending on when the plant's Section 11 inspections

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1 are scheduled, which typically they would, plants will
2 try to have those coincide with the augmented
3 inspections that are done under MRP-227-A.

4 DR. HISER: This is Dr. Hiser. I just
5 want to clarify one thing. The expansion components
6 are inspected if the inspections of the primary
7 components, if the results exceed the expansion
8 criteria that are in MRP-227-A and also in the
9 Applicant's AMP.

10 JUDGE WARDWELL: You said expansion
11 criteria. You mean acceptance criteria or --

12 DR. HISER: No, expansion criteria.

13 JUDGE WARDWELL: Say your sentence over
14 again. I'm sorry.

15 DR. HISER: Okay. The expansion
16 components are examined if the primary component
17 inspections, if the results exceed the expansion
18 criteria that are in the Applicant's inspection plan.

19 So you do the primary inspection. If you
20 have no findings, you're finished until the next
21 inspection. If you find degradation, you go to the
22 expansion criteria. If it exceeds the expansion
23 criteria, then you do the expansion inspections.

24 CHAIRMAN MCDADE: Okay, and we've been
25 going for about, almost two hours now since our last

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1 break and it may be appropriate to take another ten-
2 minute break. Does anyone believe they need more than
3 ten minutes?

4 (No audible response.)

5 CHAIRMAN MCDADE: Okay, apparently not.
6 And before we break, just one thing while it's still
7 on my mind and before I lose it here.

8 You've got a list, Table 5-2, where the
9 primary 5-3 would be expansion components, 5-4 would
10 be existing program components. Can you explain
11 briefly how you determine whether something should be
12 in the primary as opposed to the expansion components?
13 Just what's the process on --

14 DR. HISER: This is Dr. Hiser. I guess we
15 didn't determine whether they should be in one or the
16 other. I mean, the industry program did that. We
17 reviewed it and determined that we agreed with the
18 binning that was done of the components just to
19 clarify that.

20 CHAIRMAN MCDADE: Okay, and what's the
21 nature of that vetting?

22 MR. POEHLER: The nature of the binning
23 that was done -- This is Jeffrey Poehler of the staff.
24 So the binning that was done by EPRI in developing
25 these recommendations was basically, they used a

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1 process -- Well, initially they did screening of the
2 components to determine which aging mechanisms were
3 applicable.

4 Then they took those results and they did
5 a process called failure modes, effects, and
6 criticality analysis, or FMECA, and basically that
7 process looks at all the different ways a component
8 can fail and what the consequences would be if a
9 individual component is to fail as far as the
10 functions of the reactor vessel internals, the various
11 safety functions.

12 And based on that process, the components
13 were given an initial ranking and that was basically
14 the, they were given a ranking like A, B, C with C
15 being the, you know, most likely to, most critical
16 components I guess.

17 And then there was, some additional
18 analyses were done by EPRI to refine the initial
19 binning so there were some initial, more detailed
20 engineering analyses done on certain components. And
21 after that, they came up with the final rankings or
22 the final binning of primary expansion existing
23 programs and --

24 CHAIRMAN MCDADE: And then did the NRC
25 conduct a de novo review of those conclusions or did

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1 you rely on EPRI's conclusions unless they were
2 demonstrably faulty?

3 MR. POEHLER: We did review that process
4 and EPRI submitted, the MRP, EPRI MRP submitted
5 several supporting reports that contained some of the,
6 you know, the detailed analysis that went into this.

7 So there were a series of technical
8 reports that were submitted to the staff for
9 information to support our review of MRP-227. So we
10 did review those reports to some degree and so, no,
11 yes, we didn't just accept the industry's or EPRI's
12 determination. In fact --

13 CHAIRMAN MCDADE: Okay, you kind of had a
14 throwaway phrase there. You said "to some degree."
15 Before that, it sounded like the review was rather
16 extensive and then you described it as "to some
17 degree," which suggests less than. Which is it or did
18 I read more into it than was intended?

19 MR. POEHLER: Yes, perhaps but, you know,
20 did we, yes, did we review every component in detail?
21 I cannot answer that question.

22 CHAIRMAN MCDADE: Would it be accurate to
23 say that some of them were obvious, that it's only the
24 stuff on the fringes that could be, you know, could go
25 to Table 2 as opposed to Table 3?

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1 MR. POEHLER: And, you know, we --

2 CHAIRMAN MCDADE: Is that correct, that
3 those are the ones that got the in-depth review and
4 the others that were obvious got less of a review,
5 received less of an in-depth review?

6 MR. POEHLER: Some of them were obvious
7 and, yes, in some cases the staff challenged some of
8 the binning, the final binning for some of these
9 components.

10 And we included conditions. We included
11 conditions for certain components, saying you need to
12 elevate this component from expansion to primary, for
13 example, because we did have concerns about the safety
14 significance of certain components. So, yes, we
15 didn't just accept without question what EPRI had
16 done.

17 CHAIRMAN MCDADE: Okay, thank you. Do you
18 have anything before we break?

19 JUDGE WARDWELL: No.

20 CHAIRMAN MCDADE: It's 3:35. Why don't we
21 break until 3:45.

22 (Whereupon, the above-entitled matter went
23 off the record at 3:35 p.m. and resumed at 3:46 p.m.)

24 CHAIRMAN MCDADE: Okay, the hearing will
25 come to order. Judge Wardwell.

1 JUDGE WARDWELL: Getting back to where we
2 left off, we were talking about the primary expansion
3 in existing components. And in addition to getting
4 various components into one of those sitements, the
5 inspection plan contains Entergy's proposed resolution
6 of the Applicant's license action items.

7 And I've asked the Staff if they could
8 explain a little bit more about what these ALIs are
9 and how they are used in either your evaluation of
10 MRP-227 or in your review of the Aging Management Plan
11 for vessel internals?

12 MR. POEHLER: This is Jeff Poehler of the
13 Staff.

14 So there were eight Applicant licensee
15 action items. And so those were included in the
16 staff's safety evaluation of MRP-227-A, or MRP-227.
17 They were included generally for things where for a
18 licensee or Applicant that wanted to reference
19 MRP-227-A, that there would be some plant-specific
20 technical evaluation that was needed to be done that,
21 in addition to just following the recommendations of
22 MRP-227-A.

23 So these were things that weren't
24 addressed in sufficient detail or have a
25 plant-specific aspect that couldn't be addressed

1 generically in -- by the topical report 227-A.

2 And an example of that is Action Item 1
3 where it's -- it requests the Applicants or licensees
4 to confirm the plant-specific applicability of
5 MRP-227-A.

6 JUDGE WARDWELL: Is it your position that
7 if a plan addresses these action items that then by
8 definition they're AMP will be site-specific enough to
9 provide a demonstration that the -- of aging
10 management for these items?

11 MR. POEHLER: Yes, that's one important
12 component. The other is just verifying that they are,
13 they're -- the inspections that they have -- the
14 inspections that they're doing under their plan are
15 consistent with the inspections that are specified in
16 MRP-227-A for their particular design.

17 JUDGE WARDWELL: So are most of these
18 related to the inspections more than the other part of
19 the plan or is it evenly distributed?

20 MR. POEHLER: Yeah, some of them are
21 related to the inspections. I would say, I would say
22 most of them are, but.

23 DR. HISER: Just sort of -- this is Dr.
24 Hiser -- just sort of skipping through 1 and 2, 1
25 relates to the applicability of the MRP-227-A to the

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1 plant. So is the plant within the parameters that
2 were considered in development for the report?

3 JUDGE WARDWELL: And what are those
4 approximate parameters that would make a plant
5 eligible or not eligible?

6 DR. HISER: One of them relates to core
7 power density.

8 One relates to the top of the -- distance
9 from the top of the active fuel to the bottom of the
10 upper core plate.

11 The third one relates to heat generation
12 within the core.

13 JUDGE WARDWELL: And if a plant didn't
14 meet those, then in fact 227 is inapplicable or?

15 DR. HISER: Well, then we would expect the
16 plant to propose additional actions. For example,
17 maybe they would include more components under primary
18 category or something along those lines. But they
19 would then need to take some additional actions beyond
20 what is in the base program in MRP-227-A.

21 JUDGE WARDWELL: All right. You were
22 stepping us through the ALIs. Do you still want to go
23 over it or did you -- you were hoping I wouldn't
24 remember something you can't remember all of? That's
25 fine if you don't.

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1 DR. HISER: Well, those are two in
2 particular that really don't relate directly to change
3 -- well, they both I guess in reality could relate to
4 changes in the inspection activities.

5 Action Item 2 then is components not
6 covered in the generic evaluation of MRP-227-A, or
7 potentially different materials that were used from
8 within 227-A.

9 JUDGE WARDWELL: Thank you.

10 Commitment 30: could you talk a little
11 bit about that? What did the Applicant agree to and
12 has that been fulfilled and now moot?

13 MR. POEHLER: This is Jeffrey Poehler of
14 the Staff.

15 So commitment 30 was the commitment
16 originally made in the license general application for
17 Indian Point where they committed to follow the
18 industry program when it was issued, basically
19 implement the industry program within a certain time
20 frame of that program being issued.

21 And that, we do consider it to have been
22 fulfilled by their submission of their Aging
23 Management Program and inspection, inspection plan;
24 and as modified, you know, as approved by the Staff
25 through our review process which, you know, basically

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1 as documented in the Supplemental Safety Evaluation
2 Report NUREG 1930, Supplement 2.

3 JUDGE WARDWELL: So if I went to 1930,
4 Supplement 2, would I be able to see a statement that
5 commitment 2 has been fulfilled or something along
6 those lines?

7 MR. POEHLER: Yes, I believe so. I think
8 I would have to check the conclusions but I believe
9 there is a statement to that effect.

10 JUDGE WARDWELL: Thank you.

11 CHAIRMAN MCDADE: You were talking about
12 commitment 30?

13 JUDGE WARDWELL: Yes.

14 CHAIRMAN MCDADE: I thought you said so.

15 JUDGE WARDWELL: I may have said something
16 different but I started off that way this last time I
17 said it. I don't know. We'll check the transcript.

18 Let's talk a little bit about the
19 adequacies of the RVI.

20 New York's Exhibit 482, their testimony on
21 page 51, lines 7 through 10, and I quote, "A
22 systematic safety evaluation of the degraded pressure
23 vessel internals is needed to identify the limiting
24 structures, components and fittings that need to be
25 repaired or replaced before the onset of extended

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1 operations."

2 And in response to that, Entergy's Exhibit
3 616 on page -- Answer 128, page 79, says that "The
4 guidelines in MRP-227 are based on a systematic
5 evaluation of degradation of mechanisms, including
6 multiple concurrent mechanisms, the resulting aging
7 effects, including combination of effects, and
8 consequences that identify the limiting RVI
9 structures, components and fittings."

10 They go on in Answer 129 to say, "Based on
11 a considerable body of research and operating
12 experience, MRP-227-A provides Aging Management
13 guidelines, defines inspections to detect the effects
14 of aging, and recommends methods to evaluate aging
15 effects. As described..." And then it goes on and
16 describes it further in Answers 121 to 129, pages 75
17 to 80.

18 Entergy also then in their Answer 201,
19 page 135, states that "The guidelines in MRP-227-A
20 were developed through a systematic evaluation of all
21 RVIs and all potential aging effects on those RVIs,
22 including combined effects caused by multiple aging
23 mechanisms."

24 And I guess my question for you, Dr.
25 Lahey, is do your criticisms mostly relate to what

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1 Entergy omitted or missed in its RVI AMP rather than
2 proffering any evidence that challenges specific
3 aspects of the engineering work that was expanded --
4 expended to develop MRP-227?

5 DR. LAHEY: So can I talk about synergisms
6 now or? Richard Lahey. I'm aching to talk about
7 synergy.

8 JUDGE WARDWELL: I know it. Hold off for
9 just about another half hour and then I think we'll be
10 able to rock and roll with details.

11 DR. LAHEY: Okay.

12 JUDGE WARDWELL: But I need time --

13 DR. LAHEY: I think they missed the boat,
14 to your specific question, they did not, when they
15 evaluated the degradation they do not take into
16 account all the effects.

17 JUDGE WARDWELL: And as the synergism et
18 al. statement that's there?

19 DR. LAHEY: Right.

20 JUDGE WARDWELL: And exclusive of that
21 though, looking at -- I guess my heart of my question
22 is, what they did do, do you have challenges in
23 regards to what they did do, not what they did not do?
24 Not the inadequacies or what's missing out of that but
25 the fact of do you have any specific criticisms in

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1 your testimony in regards to the specific actions that
2 they did take in this systematic evaluation that they
3 claimed has been performed as part of MRP-227?

4 DR. LAHEY: I certainly do, Your Honor.
5 But I have to talk about synergisms to tell you what
6 those are.

7 JUDGE WARDWELL: It's related to that
8 then?

9 DR. LAHEY: Yes, sir.

10 JUDGE WARDWELL: That's fine. That's
11 fine.

12 CHAIRMAN MCDADE: Well, Doctor, if you
13 could, I mean there's a couple of aspects to this.

14 One, as I understand it, your -- you focus
15 on the fact that this is an inspection program and
16 that inspection alone is inadequate?

17 DR. LAHEY: Yes.

18 CHAIRMAN MCDADE: They need something more
19 than inspection. Okay.

20 Focusing just on the inspection aspect of
21 the program, are there specific areas that you view as
22 inherently deficient in the method of inspection?

23 DR. LAHEY: It's Richard Lahey again.

24 Yes, sir. There are some very specific
25 things where it appears that just the visualization

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1 techniques they're using would not be sufficient. But
2 quite frankly, my real concern is the things that are
3 the biggest problem you don't see until they happen.
4 All right. They occur. They're happening right along
5 but you're not able to determine the level of
6 degradation based on the techniques that they're
7 using.

8 That's the real concern. That's the
9 synergism concern.

10 CHAIRMAN MCDADE: Okay. Are there
11 inspection techniques that they could use that they're
12 not using that would solve that problem?

13 DR. LAHEY: They're aware of the issue and
14 they claim they can't, for example, determine the
15 level of embrittlement. They don't know how to do
16 that in situ. So --

17 CHAIRMAN MCDADE: You don't disagree with
18 them on that, do you?

19 DR. LAHEY: No, I don't. But I, I think
20 the other thing they're missing is it's not just
21 sufficient to do inspection, there needs to be
22 complementary analysis, particularly when you look at
23 such things as earthquake events or shock load events
24 which can really disrupt and relocate some of these
25 key structures.

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1 And if you then wind up with an uncoolable
2 geometry, I can tell you you're in deep trouble.
3 That's what I've been doing all my life. And, and
4 this is what I am concerned about.

5 CHAIRMAN MCDADE: Winding up in deep
6 trouble?

7 DR. LAHEY: You're in deep trouble if you
8 don't, if you don't maintain an intact geometry
9 because you really don't know where things are going
10 and what of blockages may occur and what it means in
11 coolability.

12 CHAIRMAN MCDADE: And from my standpoint,
13 and I'm sure Judge Wardwell is going to get into this
14 later, is, is to bifurcate things for the moment. And
15 accepting your premise that no inspection program
16 standing alone would be sufficient, but just looking
17 at the inspection program that is there, to focus on
18 what you view as the defects in the existing
19 inspection program by way of what they inspect, how
20 they inspect, how often they inspect, baseline those
21 kinds of issues with regard to the -- your view of
22 deficiencies in the existing inspection program
23 without accepting that standing alone inspection is
24 sufficient?

25 DR. LAHEY: Well, for most of them I think

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1 they're, they're good. It's very well thought through
2 and screened.

3 However, for instance for some of the
4 bolts which they don't have the ability to determine
5 the degradation until it's to a certain percentage,
6 and in fact, on the interval where they inspect there
7 can be bolts missing. And the concern is if you then
8 have an event which pops out, which unzips a lot of
9 the other bolts, you have a vary distorted geometry.
10 You have no idea what's going to be happening to the
11 materials and what it will do for core coolability.

12 So for the bolting, I have serious
13 concerns.

14 CHAIRMAN MCDADE: But on a couple of
15 those, Doctor, for example the baffle former bolts.

16 DR. LAHEY: Yes, sir.

17 CHAIRMAN MCDADE: They indicate that, one,
18 there will be cracking that is observable before you
19 get anywhere close to failure.

20 Secondly, that even if there were a
21 failure, there is so much redundancy built in that you
22 could have 50 percent of the bolts crack and fail and
23 it wouldn't adversely affect the operation of the
24 facility. And on others, like the Clovis bolts, they
25 indicate that even -- that once the facility is

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1 operational that they never serve a function, so if
2 they would fail it wouldn't have an adverse impact.

3 So with regard to those that you address,
4 why is that a safety issue?

5 DR. LAHEY: Well, I read the same thing
6 you did but I don't come to the same conclusion that
7 they did.

8 CHAIRMAN MCDADE: I haven't come to a
9 conclusion yet.

10 DR. LAHEY: Right.

11 CHAIRMAN MCDADE: I'm just asking you to
12 criticize their conclusion.

13 DR. LAHEY: My, my concern is, number 1,
14 they can have up to 30 percent cleavage of a bolt
15 before they can detect it with ultrasound. That's
16 what they found.

17 They also have found in other reactors,
18 bolts that have failed. It's not a hypothetical
19 event; it happens. And it's because their highly
20 irradiated, and irradiated-assisted stress cores, and
21 cracking and other events, fatigue, cause these
22 failures to occur.

23 If you look at the analysis, it's really
24 a steady state analysis for why you have enough
25 redundancy to keep operating. If you then look at a

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1 accident which puts significant loads and pops the
2 other bolts, you no longer have an intact geometry.
3 And once your baffles are going anywhere, it's bad
4 news.

5 That's, that's where I'm at. I'm not, I'm
6 not in the steady state mode, I'm in an actuative
7 mode. That's what I'm looking at.

8 CHAIRMAN MCDADE: Okay. But you're
9 talking still about design-basis accidents?

10 DR. LAHEY: Not just. Earthquake events
11 can do the same thing if they're severe enough.

12 CHAIRMAN MCDADE: Okay. But as your
13 testimony is right now that with regard to inspection
14 techniques, for example, the VT-3, you don't have
15 specific suggestions to change that or criticisms of
16 why that doesn't serve the purpose proffered by
17 Entergy?

18 DR. LAHEY: Are you only talking about the
19 inspection part of it? Because --

20 CHAIRMAN MCDADE: Right now.

21 DR. LAHEY: -- my concern is the lack of
22 analysis, the complementary analysis part.

23 CHAIRMAN MCDADE: Okay. Well, Dr.
24 Wardwell is going to get into that in great detail
25 later. But right now just on the inspection.

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1 DR. LAHEY: Well, the inspection program.

2 CHAIRMAN MCDADE: Yes.

3 DR. LAHEY: Yeah, I have, I have concerns
4 about the inspection technique being adequate for the
5 bolting. And there's some other components where the
6 visualization technique they're using is not, in my
7 view, sufficient. But more or less I think what
8 they're doing, other than those specific things, is a
9 good thing, it's a usable thing, but not sufficient.

10 CHAIRMAN MCDADE: Okay. Essential but not
11 sufficient?

12 DR. LAHEY: Right. Necessary. As the
13 mathematicians say, necessary but not sufficient.

14 CHAIRMAN MCDADE: Okay. Judge Wardwell.

15 JUDGE WARDWELL: NRC in your Exhibit 197
16 testimony, Answer 122 to page 74 says that the
17 "MRP-227-A relies on PWR water chemistry control to
18 prevent or mitigate aging effects that can be induced
19 by corrosion aging mechanisms. For instance, loss of
20 material induced by general corrosion, pitting
21 corrosion, crevice corrosion, or stress corrosion
22 cracking of any of its forms." Some of the acronyms
23 that are used are SCC, PWSCC and IASCC. And probably
24 there's a way to pronounce those, but we'll find out
25 as we move through here.

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1 Anyhow, section Roman Numeral XI.1M16A of
2 the Interim Staff Guidance, which we talked about
3 earlier, 2011/04, further states that the "reactor
4 coolant water chemistry is monitored and maintained in
5 accordance with the water chemistry program as
6 described in GALL AMP Section XI.M2, 'Water
7 Chemistry.'

8 My question for Entergy: have you
9 implemented a water chemistry water control program at
10 IP-2 and 3?

11 MR. AZEVEDO: Yes, Your Honor. I'm sorry,
12 this is Nelson Azevedo for Entergy.

13 The Indian Point water chemistry program
14 does follow the AMP requirements.

15 JUDGE WARDWELL: And how long ago did you
16 implement that? And could you describe the program
17 generally, what its function is and how, what benefit
18 you gain out of that program?

19 MR. AZEVEDO: I can describe some
20 portions. I'm not a chemist so I cannot go into the
21 details.

22 But I can tell you from the '70s and the
23 '80s Indian Point has been following the
24 recommendations of the EPRI for water chemistry. That
25 program, as I understand, has evolved over the years.

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1 As far as getting details, I'm not sure if
2 anybody in the Entergy panel can add to that.

3 MR. COX: This is Alan Cox for Entergy.

4 I will add that there's been several
5 revisions of the EPRI water chemistry guidelines. The
6 EPRI guidelines are the industry guidelines and
7 recommendations for a chemistry program for a nuclear
8 reactor. And those have been revised several times
9 over the years.

10 And typically a plant will upgrade their
11 program to align with the latest version.

12 JUDGE WARDWELL: I think you may be too
13 worried that we want to know too much technical
14 detail.

15 What's the basic goal of the program?
16 What water are you chemistrizing? What's the purpose
17 of any chemistry controls that you're putting on and
18 how does that help your operations?

19 MR. GORDON: This is Barry Gordon from
20 Entergy.

21 JUDGE WARDWELL: Where are you?

22 MR. GORDON: I'm right here.

23 JUDGE WARDWELL: I'm kidding. I'm
24 kidding.

25 MR. GORDON: I don't even have a sign.

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1 You know?

2 JUDGE WARDWELL: Yes.

3 MR. GORDON: Respect I guess.

4 Anyway, the water chemistry is to min --
5 basically to minimize all forms of corrosion,
6 including stress corrosion cracking. And what's
7 unique about or more favorable for Indian Point is
8 that they're doing an excellent job on controlling
9 their water chemistry, and exceeding even the
10 guidelines that are required by, by the water
11 chemistry guidelines.

12 For example, they have the recommended
13 level -- we'll just talk about one technical factor
14 here -- of dissolved hydrogen in the plant, is between
15 25 and 50 --

16 JUDGE WARDWELL: Of hydrogen or oxygen?

17 MR. GORDON: Hydrogen. Hydrogen.

18 JUDGE WARDWELL: Okay.

19 MR. GORDON: We don't want oxygen in
20 there.

21 It's between 25 and 50 cc's per kilogram.
22 It's an unusual unit but that's what they use.

23 And at Indian Point they're up -- the
24 higher level the more benefit you have, minimizing
25 corrosion. And Indian Point is actually running at

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1 the higher level. They're running at 42.5 cc's per
2 kilogram. So that's beneficial.

3 Also, in IP, Indian Point Unit 2 they are
4 adding zinc to their water, which is also beneficial
5 to minimizing corrosion. And otherwise they just have
6 general things like lithium hydroxide, things like
7 that, which are just to minimize general corrosion of
8 the material.

9 JUDGE WARDWELL: You say you don't want
10 oxygen. What do they do to not have oxygen?

11 MR. GORDON: They have excess hydrogen
12 present. And also during start-up they put hydrozine
13 in there which consumes, it consumes oxygen. It's a
14 de-aerated environment, unlike the BWR.

15 JUDGE WARDWELL: I'll ask anyone from
16 Entergy, and we can stay with you if you are the best
17 that can answer it, what types of data do you see, do
18 you have any quantification of your reduction in your
19 corrosion issues at the plant? Do you have any
20 parameter that helps guide you in quantifying how
21 helpful this really is.

22 MR. GORDON: This is Barry Gordon from
23 Entergy again.

24 They do keep track of the dissolved
25 hydrogen. They keep track of how much zinc is in the

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1 water. And all the chemical controls that are
2 required by the PWR water chemistry guidelines.

3 But the performance of the plant has been
4 exceptional. If you look at their alloy 600 thermally
5 treated steam generator tubing it's, they've hardly
6 plugged anything and most of it was conservatively
7 plugged. They've had very good results.

8 JUDGE WARDWELL: Most of it was
9 conservatively plugged when? And at this plant or is
10 this --

11 MR. GORDON: At this plant.

12 JUDGE WARDWELL: Okay.

13 MR. GORDON: You know, you're allowed 10
14 percent. And they've done a very small percentage of
15 it. And usually it's because they found something
16 going on and said, well, we'll be conservative and
17 we'll do all the tubes around it, even though it's
18 really they're just being very conservative how they
19 deal with it.

20 The performance has been outstanding at
21 this facility relative to stress corrosion cracking.
22 And that's a good measure that the water chemistry
23 control is doing its job.

24 JUDGE WARDWELL: Dr. Lahey, did you review
25 anything in regards to the water chemistry program

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1 and/or have any comments in regards to its
2 effectiveness in helping to control one of the aspects
3 that you were concerned about, that is corrosion?

4 DR. LAHEY: I didn't specifically review
5 the water chemistry program. It's my opinion based on
6 other input that I have had over the years that Indian
7 Point is run very well in that regard. And overall
8 it's a tight plant, what we call a tight plant.

9 JUDGE WARDWELL: And wouldn't that go a
10 long ways to controlling some of those aspects of that
11 particular failure effect, if you will, of any
12 component for aging?

13 DR. LAHEY: Are you going back to the
14 bolts now?

15 JUDGE WARDWELL: Well, of anyone, just the
16 fact that the water chem -- isn't there some benefits
17 gained on though from the water chemistry program in
18 regards to aging effects on this location?

19 DR. LAHEY: Yeah, there's definitely
20 benefits gained. And, you know, when we talked about
21 the bolts which were failing, they're failing by
22 irradiation-induced stress corrosion and cracking,
23 just because of their location. But it's not a show
24 stopper. I mean those are things you can easily
25 replace.

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1 So it's a very doable thing to fix that
2 problem.

3 JUDGE WARDWELL: Thank you.

4 CHAIRMAN MCDADE: Okay. Let me go back a
5 second just to make sure I understand.

6 The water chemistry control program is
7 something separate and apart from the Aging Management
8 Program for the reactor vessels' internals; correct?

9 MR. COX: This is Alan Cox with Entergy.

10 It's treated and described as a separate
11 program. The reactor vessel internals program does
12 have a reference that refers to that program and says
13 that it is an effective preventive action. So it's,
14 I mean it's a matter of semantics. It's not described
15 as part of the reactor vessel internals program but
16 it's applicable to all the reactor vessel internals.

17 CHAIRMAN MCDADE: When you use the term
18 "preventive action" is it more accurate to say it
19 ameliorates the condition rather than prevents, you
20 still have the potential for stress corrosion cracking
21 regardless of the water chemistry; isn't that correct?

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3 as part of the reactor vessel internals program but
4 it's applicable to all the reactor vessel internals.

5 CHAIRMAN MCDADE: When you use the term
6 "preventive action" is it more accurate to say it
7 ameliorates the condition rather than prevents? You
8 still have the potential for stress corrosion cracking
9 regardless of the water chemistry; isn't that correct?

10 MR. COX: Yes, that's correct.

11 CHAIRMAN MCDADE: Okay. But if you don't
12 have a well-controlled water chemistry, then that
13 potential for stress corrosion cracking is greater?

14 MR. COX: That's correct.

15 CHAIRMAN MCDADE: Okay. And, Dr. Lahey,
16 is it your position that given this potential for
17 stress corrosion cracking along with other aging
18 mechanisms that there is a risk that is not adequately
19 identified by the inspection program that exists? Is
20 that your view?

21 DR. LAHEY: Could you rephrase the
22 question, Your Honor?

23 CHAIRMAN MCDADE: I don't know if I could
24 rephrase it but I could repeat it.

25 DR. LAHEY: Yes, please do. Are you

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1 asking do I think the water chemistry program is
2 beneficial to mitigate stress corrosion cracking?

3 CHAIRMAN MCDADE: And I believe your
4 answer to that is yes?

5 DR. LAHEY: Yes, I do.

6 CHAIRMAN MCDADE: Okay. But that even
7 though they do have a effective water control program
8 that it doesn't eliminate the potential for stress
9 corrosion cracking; is that correct?

10 DR. LAHEY: Yeah, there's different types
11 of stress corrosion cracking. And it doesn't
12 eliminate all of them.

13 CHAIRMAN MCDADE: Regardless of the water
14 chemistry?

15 DR. LAHEY: Yes, sir.

16 CHAIRMAN MCDADE: Okay. And you're not
17 saying that the stress corrosion cracking standing
18 alone is the basis for your opinion with regard to the
19 adequacy of the AMP? You're saying that it's "a"
20 factor?

21 DR. LAHEY: It's a factor and perhaps not
22 even the primary factor.

23 CHAIRMAN MCDADE: Okay. And Judge
24 Wardwell will get to it in a second, but before we
25 move on, just very quickly could you tell me in your

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1 view what in sequence are the most significant
2 factors? You said this is water -- stress corrosion
3 cracking is not one of the more significant.

4 What is the most significant and sort of
5 working your way down through various of these aging
6 mechanisms?

7 DR. LAHEY: Can I have a few minutes to do
8 that?

9 CHAIRMAN MCDADE: I don't know. Let's
10 start --

11 JUDGE WARDWELL: Not now.

12 CHAIRMAN MCDADE: Okay. Judge Wardwell
13 will get to that later, so.

14 DR. LAHEY: Okay. We need to talk about
15 silos to answer your question.

16 JUDGE WARDWELL: Because I want to finish
17 on this topic area before we move into the next one.

18 CHAIRMAN MCDADE: No, that's fine. It's
19 just, you know, there are big silos and there are
20 little silos, and I just want to find out which silos
21 contain the largest problem.

22 JUDGE WARDWELL: NRC's testimony 197,
23 Exhibit 197, Answer 85, page 61, in industry review of
24 the MRP-227, Revision 0, "The NRC staff identified
25 eight action items that must be addressed by the

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1 Applicants or licensees --" And these are these
2 action items we talked about earlier. "-- in order to
3 apply the methodology of the topical report Aging
4 Management of the Reactor Vessel Internals at a
5 particular plant."

6 And I guess I just want to confirm that --
7 two things from Staff -- I want to confirm that those
8 ALIs have been incorporated into the most recent
9 version of MRP-227-A, Revision 1, issued on December
10 16th, 2011?

11 MR. POEHLER: This is Jeffrey Poehler from
12 the Staff.

13 Yes, the action items have been
14 incorporated in -- well, they're incorporated in the
15 Staff's safety evaluation which is included in the
16 MRP-227-A.

17 JUDGE WARDWELL: Okay. So where they're
18 really documented and incorporated is in your SE
19 rather than in the MRP-227 text of the body, if you
20 will?

21 MR. POEHLER: That's correct.

22 JUDGE WARDWELL: And included as an
23 appendix in the SE?

24 MR. POEHLER: That's correct.

25 JUDGE WARDWELL: Thank you.

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1 For Dr. Lahey. In regards to these action
2 items, exclusive of 7 which I believe deals with the
3 specific analysis of cast austenitic stainless steel,
4 which we will talk about later, so exclusive of that
5 do you have any -- well, let me ask you, have you had
6 a chance to review those Action Items 1 through 8, are
7 familiar with them and have any comment on them?

8 DR. LAHEY: I don't remember them by
9 heart, Your Honor. If we can --

10 JUDGE WARDWELL: No, but I just want to
11 make sure that exclusive of 7, are there any others
12 that jumped out at you as something that related to
13 your issues associated with their Aging Management
14 Plan?

15 DR. LAHEY: I'd have to look at them to
16 know. I just don't remember them that well.

17 JUDGE WARDWELL: Nothing jumped out at you
18 though with regards to that?

19 DR. LAHEY: Honestly, I'd have to look at
20 them to give you a good answer.

21 JUDGE WARDWELL: Entergy's testimony
22 Exhibit 616, Answer 169, page 109, and I quote,
23 "During the development of MRP-227-A, EPRI
24 appropriately considered combination of aging effects,
25 including potential synergistic effects that could

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1 affect the reactor vessel internals. As the NRC Staff
2 concluded in its safety evaluation of MRP-227-A, EPRI
3 considered 'individual or synergistic effects of
4 thermal aging or neutron irradiation embrittlement'
5 and 'loss of pre-load due to either individual or
6 synergistic contributions from thermal and
7 irradiation-enhanced stress relaxation.'"

8 Dr. Lahey, do you agree that EPRI
9 considered combination of aging effects and that Staff
10 reviewed these and concluded that potential
11 synergistic effects were considered?

12 DR. LAHEY: To the extent that you have
13 described it there they did. But they did not look at
14 the effect of an accident type load on a weakened
15 structure, both fatigue-weakened or embrittled with
16 the various embrittlement mechanisms. As far as I
17 could tell, that was not at all considered.

18 JUDGE WARDWELL: So if I heard you
19 correctly, you believe that the synergistic effects
20 had been looked at with the exception of the loading
21 associated with what you called seismic and shock
22 loads; is that a fair assessment of your position?

23 DR. LAHEY: Well, you talked about, for
24 example, the relaxation of spring loads. And they
25 definitely did look at that and the effect of some of

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1 these synergistic effects. But what I am concerned
2 with hasn't been looked at.

3 JUDGE WARDWELL: So the synergistic
4 effects they looked at aren't the synergistic effects
5 that you believe should be looked at?

6 DR. LAHEY: They're somewhat the same but
7 for a whole different application.

8 JUDGE WARDWELL: Okay. And how do yours
9 differ and how do they -- how would you apply them as
10 opposed to how they apply them?

11 DR. LAHEY: Well, for example, if we're
12 talking about reactor vessel internals.

13 JUDGE WARDWELL: That's where we are.

14 DR. LAHEY: Okay. One of the problems
15 that I see is that when they look at fatigue they do
16 not --

17 JUDGE WARDWELL: At the what? I'm sorry.

18 DR. LAHEY: When they look at fatigue --

19 JUDGE WARDWELL: Okay, fatigue.

20 DR. LAHEY: -- fatigue in their
21 structures, they do not take into account any
22 embrittlement, what the effect of embrittlement is on
23 the fatigue. They assume that once the fatigue will
24 go just like it goes for ductile material, until the
25 crack, until the crack occurs, is one. And then the

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1 crack will propagate more rapidly if it's embrittled.

2 Actually, if you have a shock load, a
3 highly fatigued structure will fail well before that,
4 well before they see surface cracks. And that's
5 exactly what the light water reactor sustainability
6 program is doing right now. I mean they're working on
7 the report right now with Argonne.

8 JUDGE WARDWELL: You just stated that a
9 highly fatigued component will?

10 DR. LAHEY: If you hit it, if you hit it
11 with a shock load. Do you know what I mean by a shock
12 load?

13 JUDGE WARDWELL: Well, no. Tell me what
14 you mean by a shock load.

15 DR. LAHEY: All right. I mean I can show
16 you a picture but try this.

17 JUDGE WARDWELL: Just tell me.

18 DR. LAHEY: You've seen people that do
19 karate that put bricks across. And you can stand on
20 them, you can sit on them. And then you get back and
21 if you hit it with an impulsive load, real snap, it
22 will break a dozen bricks, not just one, which would
23 support the weight of the intensity.

24 So it's a impulsive load. And if you want
25 to see a picture I can do that.

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1 JUDGE WARDWELL: No, I think I've got a
2 clear view.

3 DR. LAHEY: Okay.

4 JUDGE WARDWELL: Unless one of the other
5 Board members has a question.

6 DR. LAHEY: It's a lot more than the
7 static load. So when, when I've asked about this in
8 the past the response that has come back, this is no
9 problem because we have shown that the loads are, you
10 know, the static loads can be withstand -- withstood
11 by the structure, even if it's embrittled. But it's
12 a lot different when you hit it with a shock load.

13 And that's what I'm worried about because
14 of the location.

15 JUDGE WARDWELL: Sorry. Sorry to
16 interrupt. You just used the word "embrittled"
17 though. That's different than fatigue, isn't it?

18 DR. LAHEY: Yeah. But what I said is if
19 you embrittle a structure, a reactor vessel internal,
20 and then do the fatigue analysis, right now they do
21 them quite separately, all right. They're in two
22 different silos and they don't interact. And then the
23 third silo is the shock loads.

24 So when they do the safety analysis it's
25 implicitly assumed that the geometry is intact. And

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1 I can tell you I spent lots of decades working on the
2 coolability of light water reactors for intact
3 geometries. I was involved in the Loft Program and
4 all the programs for the NRC and whoever. And as long
5 as you maintain the cool geometry the engineered
6 safety systems work. That's what they're designed
7 for.

8 Once you lose the intact geometry, all
9 bets are off. That's, that's what I'm concerned with.
10 They're not looking at, they're not looking at just a
11 fatigue-weakened structure, and you hit it, it can
12 snap before you have any cracks.

13 They're not looking at an embrittled
14 structure, and it can, it can snap well before you
15 reach the fatigue limit. And they're all synergistic,
16 and it's not taken into account right now. That's the
17 concern.

18 So I, you know, I really like the
19 structure that we're doing now. It's a compliant
20 structure and I think it has a lot of advantages
21 because it makes people do things in a consistent way
22 and you eliminate falling through the cracks with
23 important things. But it only works with everything
24 that's on the list. If you have things that aren't on
25 the list, they're not going to get done. They're not

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1 required to be done and they're not done.

2 And so what I'm concerned about are things
3 that aren't on the list. That's what I've been trying
4 to bring.

5 JUDGE WARDWELL: Okay. Let me just make
6 sure I understand you correctly.

7 You believe, it's your position, is it
8 not, that a fatigued structure component or the SSC,
9 a fatigued internal if we're talking about reactor
10 vessel internals, so we can eliminate -- we can focus
11 on those, that as it fatigues it may very well have
12 values that show that it's, for instance if we're
13 using the CUF as a parameter, which we'll get into in
14 26 in more depth, below 1, that's still adequate. But
15 you believe, it's your position that if a shock load
16 hits it, that could still fail at CUF values below 1;
17 is that correct? Without any embrittlement.

18 DR. LAHEY: That's correct.

19 JUDGE WARDWELL: Okay.

20 DR. LAHEY: Because there's lots of
21 micro-cracks in there. It is being weakened. And if
22 you hit it hard enough it will break. And that's, as
23 I said, they're doing those systematic fatigue
24 structure tests for light water reactor sustainability
25 right now. And they will, they will show this.

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1 And so my concern is somehow we're not
2 taking this into account in our safety analyses right
3 now.

4 JUDGE WARDWELL: Okay. And then,
5 likewise, you believe that as the material embrittles,
6 likewise it will be more susceptible, it will be fine
7 until a shock load comes in and then that also will
8 have a -- lose its intended function?

9 DR. LAHEY: Exactly, Your Honor.

10 JUDGE WARDWELL: Okay. And --

11 CHAIRMAN MCDADE: So if I can before you
12 move on, I just want to make sure I understand. When
13 you talk about neutron embrittlement, in 10 words or
14 less can you explain exactly what you mean?

15 DR. LAHEY: Well, it's not just neutron,
16 it can also be, depending on the material, it can have
17 a different embrittlement mechanism. But let's say
18 you have high energy neutrons that are hitting the
19 atoms, they're knocking them out of their lattice
20 position. And if you go to the end of life for the
21 period of extended operations, you're talking 75 to
22 several 100 displacements per atom. That is, every
23 atom in the lattice has been knocked out of the
24 lattice 100 times.

25 So it's a very beat up material. It

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1 doesn't have the properties of a ductile material
2 anymore.

3 CHAIRMAN MCDADE: And perhaps I'm not
4 using the appropriate technical term, but does this
5 necessarily affect the toughness of the metal?

6 DR. LAHEY: It affects the ductility, the
7 fracture toughness, you know, the propagation of the
8 metal; it will propagate cracks easier. It also -- do
9 you know what the stress-strain curve looks like?

10 CHAIRMAN MCDADE: Yes.

11 DR. LAHEY: Okay. The normal stress
12 versus strain curve is, you know, goes up to the yield
13 stress, the element stress. When you irradiate it, it
14 hardens it. And so it goes into a higher peak but it
15 can't take much strain. So if you go to a large
16 enough strain, you're gone.

17 CHAIRMAN MCDADE: Okay.

18 DR. LAHEY: That's the concern.

19 CHAIRMAN MCDADE: Now, when you're talking
20 about these shock loads, are you talking about shock
21 loads within the design basis to have this effect or
22 only shock loads that are beyond the design basis?

23 DR. LAHEY: No, the shock loads can be,
24 for example, a very severe thermal shock load is a
25 steam line break, coupled with the scram so you're

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1 really sucking energy out of the system and you're
2 putting a lot of cold water shock into the core and
3 hitting those internals hard.

4 Or you could have --

5 CHAIRMAN MCDADE: So you're saying within
6 design basis?

7 DR. LAHEY: Oh yes. The various accidents
8 are sufficient to do it, depending on how weakened it
9 is. I mean as you, as you go on in time it gets more
10 and more susceptible to these types of failures.

11 CHAIRMAN MCDADE: If I can, just two more
12 quick questions before I turn it back over to Judge
13 Wardwell.

14 Can you explain to me, to make sure I
15 understand, what is irradiation enhanced stress
16 relaxation?

17 DR. LAHEY: Irradiation enhanced stress
18 relaxation is if you have a -- as I understand it, if
19 you have a residual stress in a material and it's
20 irradiated, that this can relax the stress.

21 CHAIRMAN MCDADE: Okay. And how do you
22 evaluate the level of embrittlement?

23 DR. LAHEY: How do you evaluate it?

24 CHAIRMAN MCDADE: Yes.

25 DR. LAHEY: Well, you calculate the

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1 fluence. The fluence is the neutron flux, the high
2 energy neutrons times the time. So you integrate that
3 for how long you've been running. And then you use
4 cross-sections, what we call cross-sections to look at
5 the interaction of the neutrons with the material.
6 And then from that you can determine the damage and,
7 therefore, the embrittlement.

8 JUDGE WARDWELL: So we've got the fatigue
9 that may, may be influenced by thermal. And let me
10 ask you one question about the shocks.

11 What about normal transience? Do those
12 provide enough shock to hurt either the -- to fail
13 either a fatigued member or an embrittled member?

14 DR. LAHEY: Probably you want to wait
15 until we talk about 26, because I've got a lot of nice
16 figures to show and talk about all of that. But the
17 answer is yes, --

18 JUDGE WARDWELL: And this is in your
19 testimony?

20 DR. LAHEY: -- they can have an effect.

21 JUDGE WARDWELL: And that's in your
22 testimony on 26?

23 DR. LAHEY: Yes. And I have some nice
24 visual aids I think will help.

25 JUDGE WARDWELL: And where was I with that

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1 now? Yes, we have the fatigued and we've got the
2 embrittled. What about the embrittled under a
3 transient, would that -- is that considered a shock
4 for embrittled materials, sufficient enough shock?

5 DR. LAHEY: Take two benches and you put
6 a copper pipe across it and hit it; it will break.

7 Take the same two benches, put a candy
8 cane across it; it's gone.

9 So, well, I don't know if that translates
10 into that, into the recording. But if it's brittle it
11 can't take shock loads because of the way the stress
12 strains are --

13 JUDGE WARDWELL: So you're concerned about
14 these vessel internals under normal transience?

15 DR. LAHEY: Yes.

16 JUDGE WARDWELL: I mean operational
17 transience I should say.

18 DR. LAHEY: Yes. Not every one, but yes.
19 Some important ones that can lead to loss of a
20 coolable geometry. See, bottom line for me is, is the
21 plant safe? That's, that's why I'm involved in all
22 this; right? And when I look at things --

23 JUDGE WARDWELL: I think we're all here
24 for that.

25 DR. LAHEY: -- which say it's not for sure

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1 it's safe, I worry about it. And I'd like to see it
2 on the list. I'd like to see the NRC with on top of
3 that --

4 JUDGE WARDWELL: What would be "it"? You
5 said you'd like to see "it" on the list; what is "it"
6 you want to see on the list? And what list is this?

7 DR. LAHEY: I'd like to break the silos
8 and have things instead of issue 25, 26 and 38, it's
9 issue. And the issue is they're all going on
10 together.

11 JUDGE WARDWELL: Okay. And that's where
12 your synergism comes in --

13 DR. LAHEY: Exactly.

14 JUDGE WARDWELL: -- is in between fatigue
15 and embrittlement. Is there anything else in regards
16 to it?

17 DR. LAHEY: Well, and safety, the safety
18 analysis.

19 JUDGE WARDWELL: It's the safety analysis
20 for under fatigue and embrittlement.

21 DR. LAHEY: Right.

22 JUDGE WARDWELL: And you said how it would
23 affect fatigue and how it would affect embrittlement.
24 Where does a synergism come in?

25 DR. LAHEY: The synergism has to do with,

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1 for example, if you have an embrittled material --
2 we're talking about embrittlement now -- and you do a
3 analysis of fatigue, they don't take it into account
4 at all until right at the end when it already fails.

5 JUDGE WARDWELL: So you believe it will be
6 less resistant to fatigue as it embrittles?

7 DR. LAHEY: All the data shows that if you
8 have low amplitude -- I mean high amplitude/low cycle
9 fatigue you reduce the cycles for failure and it can
10 be significant, yes.

11 JUDGE WARDWELL: And what data are you
12 citing for this?

13 DR. LAHEY: Well, I've cited three or four
14 references in the, in my testimony. And I've also
15 cited some of the work that they're doing at Argonne
16 where the people at Argonne are saying the same thing
17 really.

18 JUDGE WARDWELL: But could you, you know,
19 tomorrow focus me towards those specific ones that
20 you're thinking of --

21 DR. LAHEY: Sure.

22 JUDGE WARDWELL: -- and so to refresh your
23 memory in regards to where you cite them in your
24 testimony and --

25 DR. LAHEY: I have them. I could look

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1 them up for you and tell you, yes.

2 JUDGE WARDWELL: Right. I just don't want
3 to take the time now to do it.

4 DR. LAHEY: Right.

5 JUDGE WARDWELL: And so the synergism
6 comes in that you think it's worse with a combination
7 of the two than just the additive of the two effects
8 in regards to the potential problem?

9 DR. LAHEY: Absolutely. And it's three,
10 because now once you have that going on, you hit it
11 with the shock load and that's the concern.

12 JUDGE WARDWELL: Considering you've been
13 dealing with this for all your career -- and I assume
14 your career was probably about as long as mine was, so
15 we can say it might be a fairly long career --

16 DR. LAHEY: Yeah.

17 JUDGE WARDWELL: -- that have you noticed
18 this effect actually occurring in existing plants?

19 DR. LAHEY: Have I noticed?

20 JUDGE WARDWELL: Of the same age.

21 DR. LAHEY: I think the reason -- well,
22 that's a very good question, Your Honor. This is
23 Richard Lahey, so I'm sorry to not identify myself.

24 JUDGE WARDWELL: Well, no, once you get on
25 you don't have to worry. They've got you.

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1 DR. LAHEY: It's an interesting question
2 because there have been remarkably few fatigue
3 failures in nuclear reactors. But it's not accident.
4 They -- when we designed, I used to be in charge of
5 safety in thermohydraulics, R&D and reactor physics,
6 all that at GE. All right. And when we designed
7 these nuclear reactors we designed them for a certain
8 life. And we put margin in. And they profited by
9 that design.

10 So there's no, you know, there's not a lot
11 of those kind of failures.

12 But if you now start looking at going
13 beyond what the design life is and start fiddling away
14 at the margins until you get into really safety
15 margins, that concerns me a lot. And we'll talk about
16 that tomorrow I guess.

17 JUDGE WARDWELL: I guess I want to fix
18 once more, and do you believe that MRP-227 doesn't
19 look at the systematic effects, the synergistic
20 effects associated with fatigue and embrittlement? Is
21 that your position, that the synergistic effects
22 they're talking about are different than the ones that
23 you are concerned with?

24 DR. LAHEY: They have certain components
25 that they're applying that logic to. But it's not

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1 carried over to others because the analyses that are
2 of concern don't take that into account. They just
3 don't consider it. That's, that's what I'm worried
4 about. And they're not considering it. It's a well
5 done study focused on inspection, so it's sort of like
6 you detect things after the fact.

7 I'm worried about you don't see anything
8 and then you have some sort of load that you don't
9 expect, and all hell breaks loose. That's what I'm
10 worried about.

11 CHAIRMAN MCDADE: Okay, Dr. Lahey, one
12 thing. And again, Dr. Wardwell has given you certain
13 homework to do that he wants to discuss tomorrow. One
14 of the things I'd like to have you look at overnight:
15 in the safety evaluation for MRP-227, and that's the
16 NRC document 115A at page 4, they talk about the
17 impact of the synergistic contributions from various
18 factors.

19 And what I'd like to do is have you review
20 that specifically. And perhaps tomorrow we can talk
21 about it as of what you think they're missing there.

22 DR. LAHEY: Can I ask, do we have it with
23 us?

24 MR. SIPOS: Yes, I believe we do.

25 CHAIRMAN MCDADE: Yes, it's NRC-114.

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1 DR. LAHEY: Yeah. I just, I mean I have
2 mountains of stuff. We've been working on this for
3 eight years back at the ranch.

4 CHAIRMAN MCDADE: We all have mounds. I'm
5 sure Mr. Sipos has it. And if not, we can provide it.

6 DR. LAHEY: Okay. Be happy to.

7 MR. SIPOS: More mountains, Your Honor?

8 CHAIRMAN MCDADE: No. Just the 114A.

9 MR. SIPOS: Very good.

10 CHAIRMAN MCDADE: But if you'd like a
11 mountain, we can give you a mountain.

12 MR. SIPOS: I believe we have it.

13 CHAIRMAN MCDADE: Okay, thank you.

14 JUDGE WARDWELL: I guess I'll turn to
15 Entergy because that was the testimony I was quoting.

16 Answer 169, page 109, where you state that
17 "EPRI considered individual or synergistic effects of
18 thermal aging or neutron irradiation embrittlement and
19 loss of pre-load due to either individual or
20 synergistic contributions from thermal and
21 irradiation-enhanced stress relaxation."

22 Does -- how does that apply to the types
23 of synergism that Dr. Lahey is bringing up, that being
24 a synergistic effect between fatigue and
25 embrittlement?

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1 DR. LOTT: Well, I --

2 JUDGE WARDWELL: Now you can introduce
3 yourself.

4 DR. LOTT: Yes, I'm sorry. My name is
5 Randy Lott. I'm here on behalf of Entergy.

6 I don't think that that particular
7 statement did relate to fatigue --

8 JUDGE WARDWELL: I'm sorry, I can't --
9 Could you get close to it and try to talk a little
10 slower because I can't, I can't hear you very well.

11 DR. LOTT: I don't believe that statement
12 that you read refers particularly to fatigue and
13 irradiation embrittlement, it related to stress
14 relaxation, the loss is corroding both.

15 JUDGE WARDWELL: Okay.

16 DR. LOTT: And its impact on the
17 assumption of the component.

18 In the particular case, and just even
19 within the screening criteria that was used, whenever
20 you identified, for instance, a bolt that would be --

21 JUDGE WARDWELL: A what?

22 DR. LOTT: A bolt.

23 JUDGE WARDWELL: Okay.

24 DR. LOTT: A threaded fastener. That is
25 potentially subject to irradiation such that the load,

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1 the pre-load on the bolt, which is critical to its
2 function might relax. We took that same component and
3 we screened it in for concerns about fatigue and
4 concerns about wear because we felt that with the loss
5 of pre-load we'd have an impact on the ability of the
6 component to survive those particular concerns.

7 JUDGE WARDWELL: But can you point me to
8 where you believe MRP-227 does look at fatigue versus
9 embrittlement synergistically? And what steps are you
10 doing within the Aging Management Program to address
11 the concerns that you just heard Dr. Lahey express?

12 DR. LOTT: First of all, the relationship
13 that is within the structure of the document to look
14 at fatigue and embrittlement is that the loss to
15 fracture toughness limits the size of the crack that
16 would be acceptable in the component. So when we look
17 at acceptance criteria for fatigue cracking, it's
18 based on the ability of the component to withstand the
19 type of design basis loads that Dr. Lahey just
20 discussed.

21 In other words, we have not changed our
22 requirement to survive the design basis load, but if
23 a component has a fatigue crack, that would degrade --
24 or decrease the ability to withstand those loads.

25 JUDGE WARDWELL: But how do you address

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1 the potential fatigued member that may not be over its
2 ultimate resistance just yet but is also embrittled
3 and then receives such a transient shock that between
4 the two effects --

5 DR. LOTT: Well, yeah, I'm --

6 JUDGE WARDWELL: -- it now doesn't perform
7 its intended function?

8 DR. LOTT: Again, I don't know of any
9 evidence of there being a significant loss in the
10 ability of a component prior to the initiation or
11 prior to its exceeding effectively it's CUF equals 1
12 value of an decreasing ability to withstand loading.

13 So I don't, I don't think we did agree
14 with the particular statement about fatigue weakening.
15 We have looked at other things in those data in our
16 testimony related to the effect of irradiation on
17 fatigue life. And in general, I think for most of the
18 irradiated internals you'll find that they operate in
19 a region where fatigue life is not impacted
20 significantly by irradiation.

21 JUDGE WARDWELL: And does this mean that
22 you've had -- there's data in your testimony in
23 regards to the change in fatigue durability as a
24 material is brittled?

25 DR. LOTT: I think most of the data that

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1 they were talking about there is probably the same
2 data that Dr. Lahey just referred to. And I think it
3 would probably be good for us to discuss that tomorrow
4 or whenever you want to discuss it. But I don't --
5 we'd have to pull up the references at this point.

6 JUDGE WARDWELL: You'd have -- what was
7 the end of that sentence?

8 DR. LOTT: I said I -- unless you want to
9 pull out the references and begin that discussion now.

10 JUDGE WARDWELL: Between fatigue and the
11 durability under embrittled materials in regards to
12 their fatigue strength, are you saying that's part of
13 26 rather than 25 or?

14 DR. LOTT: Well, I think you just had the
15 discussion. You asked Dr. Lahey about the impact of
16 fatigue and irradiation on the life of the component.
17 And he discussed it with that there was released data
18 about the fatigue life, the CUF, effective of
19 allowable number of cycles and strain related to the
20 irradiation of a component.

21 Again, it's really the fatigue data that's
22 available that we're talking about.

23 DR. LAHEY: Your Honor, this is the data
24 you asked me to bring tomorrow, those references.

25 CHAIRMAN MCDADE: And we may get to it

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1 tomorrow. We may get to it after tomorrow, but.

2 DR. LAHEY: Okay.

3 JUDGE WARDWELL: Let me allow Staff to
4 chime in with any comments they might have just to
5 complete the loop, I guess, in regards to hearing what
6 he said in regards to the fatigue durability, if you
7 will, as the material embrittles.

8 MR. STEVENS: This is Gary Stevens of the
9 NRC Staff.

10 I'm a little confused by some of the
11 conversation because I do hear crack initiation,
12 propagation, embrittlement and Charpy specimens. And
13 so my response is going to be related to crack
14 initiation and the CUF types of analyses that are
15 done. I'm assuming that's kind of where you're going
16 with your questioning.

17 As Mr. Lott has pointed out, there is not
18 much data with respect to crack initiation under
19 irradiated conditions available. The Staff in our
20 research has looked at a lot of that or what is
21 available. And generally speaking, in general terms
22 irradiation tends to increase the mechanical strength
23 of materials, increases yield strength, ultimate
24 strength. And those kind of changes tend to increase
25 the fatigue life of materials.

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1 JUDGE WARDWELL: At all strains?

2 MR. STEVENS: Generally, yes. It's not
3 always that way. You can see some data where that's
4 not observed.

5 And one of the things you have to be
6 careful about, for example, some of the data may be at
7 high temperature, which is not applicable to the
8 reactors we're talking about here. So the general
9 lack of data is inconclusive completely as to what the
10 effects might be. There's not enough data to evaluate
11 specifically factors for irradiation.

12 Based on what we've seen, generally we see
13 an improvement in life. And some of the exhibits
14 demonstrate that. And we have concluded as of now
15 there's not enough information for us to say that
16 there's an effect that isn't covered by the standard
17 fatigue calculations that are done in accordance with
18 ASME code.

19 CHAIRMAN MCDADE: Mr. Stevens, as I
20 understood what Dr. Lahey was saying -- and I may be
21 wrong, so please correct me if that's the case -- that
22 it's different with embrittlement reacts differently.
23 That even if you have a increase in the metal strength
24 with a constant load, when you have a shock load you
25 have a lack of ductility -- and I mispronounced that

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1 -- that can cause it to break unexpectedly.

2 Dr. Lahey, is that -- am I correctly
3 understanding what you were saying?

4 DR. LAHEY: Yeah. A shock load can do
5 significantly more damage than a static load for a
6 weakened material, either weakened by fatigue or
7 embrittled, or a combination.

8 CHAIRMAN MCDADE: And what Mr. Stevens was
9 saying is that the data indicates that in many
10 circumstances it's not weakened by the exposure to
11 neutrons but rather it's actually strengthened. Is
12 that correct, Mr. Stevens?

13 MR. STEVENS: That's correct. With
14 respect to crack initiation.

15 CHAIRMAN MCDADE: Okay. Now, does that
16 matter whether or not the crack initiation is as a
17 result of a constant pressure or opposed to a shock
18 load?

19 MR. STEVENS: No, sir. I mean all cyclic
20 -- constant load would not contribute to fatigue, it
21 must be a cyclic load. But all cyclic loads in the
22 design bay or current licensing basis for normal upset
23 or test conditions must be evaluated for crack
24 initiation. If the CLB includes, it would include any
25 kind of shock loads, those would have to be included

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1 in the calculation.

2 CHAIRMAN MCDADE: So you're saying they
3 are included in the calculation?

4 MR. STEVENS: That's correct.

5 CHAIRMAN MCDADE: It's not just the normal
6 cycles but all within design basis?

7 MR. STEVENS: Well, okay, so if there are
8 shock loads that are in the normal upset or test
9 condition levels specified by ASME code, they would be
10 included in the fatigue calculation.

11 Some of the events that you're describing
12 -- and that would include, by the way, some form of
13 seismic events which would, which would be considered
14 an upset event, and they would be included in the
15 calculation.

16 JUDGE WARDWELL: What are those events?
17 I didn't understand the word you said.

18 MR. STEVENS: Earthquake.

19 JUDGE WARDWELL: Huh?

20 MR. STEVENS: Earthquake.

21 JUDGE WARDWELL: Okay, sorry.

22 MR. STEVENS: There are other events, for
23 example, some of the local loads and more severe
24 earthquakes that are considered accident. And the
25 ASME code requires them to be evaluated but not for

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1 fatigue crack initiation.

2 JUDGE WARDWELL: Okay. Dr. Hiser's body
3 language sort of suggested that I was wandering off
4 the path in an erratic fashion. Do you want to --

5 DR. HISER: This is Allen Hiser. I
6 apologize.

7 JUDGE WARDWELL: -- put me back in the
8 right direction.

9 DR. HISER: I apologize for that because
10 I was -- there's, I think there's about three
11 different topics that are on the table. And it's
12 untangling them I think is very difficult.

13 What Mr. Stevens was talking about was
14 effects of irradiation on CUF. And he, I think what
15 he was saying was that there is minimal effect on CUF.
16 And in reality it may retard crack initiation as
17 modeled by CUF. So neutron embrittlement improves the
18 fatigue life of the component.

19 Now, the shock loads only come into effect
20 not as a part of the evaluation of CUF, but in terms
21 of you have a structure in its condition and you, you
22 subject it to a certain load. From that perspective
23 you need to consider the effects of the load level on
24 the condition of the material that exists at that
25 time.

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1 If it is -- has a CUF of less than 1, the
2 Staff believes there are no cracks evident in the
3 structure that could cause failure. If there was a
4 crack that existed, then one would properly account
5 for the reduced fracture toughness due to the neutron
6 embrittlement of the structure.

7 So the shock loads would only come into
8 play at a point in time. It's an impulse load at a
9 certain point in time.

10 JUDGE WARDWELL: And does the Aging
11 Management Plan require analysis of those shock loads
12 on given vessel internals for materials that have been
13 embrittled?

14 MR. POEHLER: This is Jeffrey Poehler of
15 the Staff.

16 The Aging Management Program does not
17 require that analysis to be performed of embrittled,
18 basically a crack to an embrittled component. Because
19 the Aging Management Program is an inspection-based
20 program so it performs various inspections to provide
21 reasonable assurance that there are no cracks in the
22 components. And without a crack you're not going to
23 get failure even of an embrittled material.

24 CHAIRMAN MCDADE: As a -- the Aging
25 Management Program does require a demonstration,

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1 right, of functionality, that meets its intended
2 function. And so is it your statement that the Aging
3 Management Program doesn't require any calculations to
4 do that but is relying solely on the inspections to
5 detect a crack indicative of a potential effect
6 associated with whatever mechanism caused it?

7 DR. HISER: This is Allen Hiser for the
8 Staff.

9 The inspections are intended to preserve
10 the geometry of the materials, in effect no cracks.
11 The Staff believe that no cracks under design basis
12 loading conditions that the structure will not fail.

13 If one were to find a crack in one of the
14 components then one of the evaluation options would be
15 to look to ensure that that structure with the crack,
16 with accounting for crack growth during one or more
17 future cycles, with the embrittled state of the
18 material -- or actually I won't say embrittled but
19 with the actual fracture toughness of the material, be
20 it whatever level of embrittlement it might be, and
21 you apply the loads and you have to be able to show
22 that that crack will remain stable.

23 So from that perspective, if you have a
24 crack you consider the worst case loads that are in
25 the design basis, you consider the fracture toughness

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1 of the material that exists at that point in time
2 projected forward -- maybe you project to 60 years
3 because you want to demonstrate that it's good for the
4 rest of the license renewal period. Once you can do
5 that then you have an assessment of whether the crack
6 is acceptable or not.

7 JUDGE WARDWELL: So if I hear you
8 correctly, this all hinges on the fact that there has
9 to be a crack before there's any failure?

10 DR. HISER: My belief is that that is
11 true. I have not seen evidence of reactor internal
12 components that has failed without a crack.

13 CHAIRMAN MCDADE: Dr. Lahey, if I could,
14 as I understood your testimony, you hypothesized that
15 in embrittled material that is then subject to a shock
16 load, that you could have a failure even though there
17 is no discernible cracking prior to that time, no
18 cracking as far as crack initiation or propagation,
19 that no visible cracking but highly embrittled
20 material, that you could have a failure under a shock
21 load. Is that your theory?

22 DR. LAHEY: Yes. That -- yes.

23 And I would -- can I answer just a few of
24 these things? So I agree wholeheartedly that we need
25 more data. All right? But the data set that I'll

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1 bring the reference on shows that for low
2 amplitude/high frequency fatigue that embrittlement
3 due to radiation, things are even better. Okay?

4 Because if you look at the stress-strain
5 curve, you know, you are on the elastic part. But
6 when you get high amplitude/low cycle fatigue you have
7 a reduction. Many of the kind of transients we're
8 talking about when we evaluate life are not high
9 frequency. They're not flowing vibration, so they're
10 transients. They're a lower frequency event.

11 Everybody thinks that more data is needed.
12 So but the focus on surface cracks is what the big
13 difference is. I --

14 CHAIRMAN MCDADE: Okay. But, Dr. Lahey,
15 given the fact that these components are primarily
16 high grade stainless steel --

17 DR. LAHEY: Yes.

18 CHAIRMAN MCDADE: -- is it realistic to
19 think that you would, without any crack propagation
20 but simply a shock load could cause failure?

21 DR. LAHEY: Well, let me tell you. Can I
22 give you just a Gedankenexperiment and we can see if
23 we agree or not? All right?

24 The Gedankenexperiment which is actually
25 being done or has been done is you now fatigue the

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1 metal. Forget about irradiation, just fatigue it.
2 And it gets to a CUFen of .1.

3 And then you do a Charpy test and it has
4 a certain energy to crack it. And then you --

5 CHAIRMAN MCDADE: And then, excuse me,
6 what type of test is it? Is that for embrittlement?

7 DR. LAHEY: Just a fatigue test.

8 CHAIRMAN MCDADE: No, but the Charpy test?

9 DR. LAHEY: The Charpy test is to test it,
10 what's the strength of the material to fracture? All
11 right? How much does it take to --

12 CHAIRMAN MCDADE: So under embrittlement
13 then?

14 DR. LAHEY: Or damage. I mean I don't
15 like to call it embrittlement but metal damage due to
16 fatigue.

17 So now you go to .5, do the same thing.
18 Doesn't change much.

19 Now you go to .5. Oh, it's different.

20 .9, a lot less energy needed.

21 .99, bang-o, you know, it's easy to break.

22 So that's the difference. I mean the way
23 it's being looked at now, nothing happens until you
24 get to the CUF of 1, until you start to see a surface
25 crack. What I'm concerned with is well before 1.0 on

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1 CUF. If you hit it hard enough, it will break. And
2 it doesn't have to have a surface crack.

3 CHAIRMAN MCDADE: Okay. Dr. Hiser, do you
4 wish to respond?

5 DR. HISER: This is Allen Hiser. I'm not
6 familiar with any experiment such as that with
7 austenitic stainless steel, be it with fatigue at
8 different levels of CUF, be it with neutron
9 embrittlement or any combination thereof. My belief
10 is CUF is 1.0 or less, it's very unlikely that you
11 have a surface crack even in the material.

12 I think your likely incipient to have a
13 surface crack. Without a surface crack I think you're
14 unlikely to fail under a shock load or any other kind
15 of a load that's representative of the kind of
16 conditions that you'd see in vessel internals for a
17 PWR plant.

18 DR. LAHEY: Okay, so --

19 JUDGE WARDWELL: I would like to get back
20 to my question. My question to you was, doesn't your,
21 doesn't the AMP rely on a surface crack in regards to
22 any evaluation of embrittlement?

23 DR. HISER: This is Allen Hiser.

24 Yes. That would be when the AMP would
25 bring into account the neutron embrittlement.

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1 Otherwise the way that neutron embrittlement, thermal
2 embrittlement are managed in this AMP and in others is
3 through the detection of cracks.

4 JUDGE WARDWELL: So without a crack those
5 embrittlements aren't evaluated until a crack occurs?

6 DR. HISER: I think that's correct.

7 JUDGE WARDWELL: And they haven't been
8 evaluated as part of the AMP that's been submitted and
9 approved by you; correct?

10 DR. HISER: That's correct.

11 JUDGE WARDWELL: What is to say why -- I
12 understand that you haven't seen any data to show the
13 relationship between the Charpy test and fatigue for
14 stainless steel, but likewise have you seen any tests
15 that might indicate this potential where the material
16 after the additional 20 years of the PEO, right before
17 you're ready to shut down, is so embrittled that
18 there's no cracks, but it is so embrittled that a
19 transient could fail it catastrophically?

20 Similar to what I imagine I've experienced
21 myself with rubber bands holding together a bunch of
22 envelopes. And after digging up a shoe box 30 years
23 later I look at it and I go, Oh, that's neat. And I
24 grab them and the whole rubber band disintegrates.

25 Why couldn't that happen -- and that's the

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1 way I picture what Dr. Lahey is talking about -- what
2 data do you have that shows that can't happen?

3 DR. HISER: My experience is the same as
4 yours. I find stuff that's been left away for a
5 period of time and the rubber band is broken.

6 Stainless is not rubber bands.

7 JUDGE WARDWELL: What data do you have on
8 the stainless steel? Because, likewise, my rubber
9 band isn't in the middle of a nuclear reactor. What
10 evidence do you have that that same type of thing
11 could not be happening over this period of extended
12 operation that no one's been through yet that would
13 make for catastrophic failure without the presence of
14 a crack initially?

15 DR. HISER: There is data, very high
16 fluencies, fracture toughness data, that show that the
17 materials retain ductility. Ductility is all that you
18 need to resist initiation even of cracks.

19 So if there is no cracks, really the only
20 failure mechanism that you have is a tensile overload
21 of the structure. And with a highly embrittled
22 material, actually the yield strength is increased
23 quite a bit, so from that perspective the component
24 has somewhat gotten more resistant to shock loads
25 because it now can sustain a higher load before it

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1 fails in a tensile section collapse.

2 JUDGE WARDWELL: And but likewise it could
3 have strained enough within that such that it may not
4 reach that peak; isn't that correct? Isn't that a
5 possibility?

6 DR. HISER: If you had, if you had a
7 crack. And I think fundamentally it comes down to do
8 you have a crack? If no crack, I believe there is no
9 impact.

10 JUDGE WARDWELL: And can you get us a cite
11 for this data that you're talking about that shows
12 that highly embrittled materials under -- and I'm not
13 real up to speed on the fluence, but that is a time
14 relation type of thing, that's just a total amount of
15 -- that is time related in regards to the magnitude of
16 the number means it's been under an influence for a
17 longer period of time?

18 Or is it just the rate at which it is
19 being bombarded? And if so, have those tests been
20 performed for to simulate 20 additional years of
21 operation after the initial 40 years, total 60 years?

22 DR. HISER: The fracture toughness data
23 normally correlated in terms of fracture toughness is
24 a function of fluence. And fluence is, it depends on
25 where you are in the vessel, what the exposure rate

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1 is, things like that.

2 But we can do that for all internal
3 components.

4 JUDGE WARDWELL: But that relationship
5 that I heard you talk about in regards to the data was
6 that you have -- I forgot the words you used to
7 indicate --

8 DR. HISER: Ductility.

9 JUDGE WARDWELL: What?

10 DR. HISER: Ductility.

11 JUDGE WARDWELL: No, no, I know what
12 ductility is.

13 DR. HISER: Oh, sorry.

14 JUDGE WARDWELL: Did you use a phrase
15 embrittlement strength or toughened fracture strength?
16 Or what's the term you have for embrittlement? You
17 said, you said you had data relating fluence to what
18 parameter, other parameter?

19 DR. HISER: Fracture toughness.

20 JUDGE WARDWELL: Fracture toughness, okay.

21 You have data, you believe you have data
22 related between fluence and fracture toughness. Is
23 fluence, the fluence parameter is the rate at which
24 the neutrons are bombarding it? Is that correct? Or
25 is it the total amount of neutron or --

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1 DR. HISER: Yes. Flux is --

2 JUDGE WARDWELL: -- neutron embom --
3 attacking it?

4 DR. HISER: Yes. Flux is the rate.
5 Fluence is the time integrated.

6 JUDGE WARDWELL: That was my question.
7 Okay.

8 DR. HISER: But again, the level, you
9 could turn to the spot that I think Jeff will discuss
10 in terms of -- instead of fluence in terms of time,
11 but you would have to determine the flux. So it would
12 depend on where you are in the vessel internals.

13 JUDGE WARDWELL: Sure. And we'll talk
14 about that with regards to specific components and
15 where they are, whether they'd be susceptible to it.

16 But given, given there are some internals
17 that are under high influence -- high fluence, sorry,
18 in the core; right?

19 DR. HISER: Yes.

20 JUDGE WARDWELL: And again, my question is
21 I'm interested in that data that somehow comforts one
22 to believe that a crack is needed prior to
23 embrittlement failure, for lack of a better term. You
24 know, rubber band disintegration, the equivalent of it
25 in my shoe box.

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1 DR. HISER: I would just caution using a
2 rubber band analogy is off because there's still
3 ductility. Your rubber band doesn't have ductility
4 left. That's why, that's why it did break. And my
5 guess is it probably had cracks in it that ultimately
6 caused the failure.

7 JUDGE WARDWELL: And that, that lack of
8 ductility, whether or not it exists with the stainless
9 steel would be indicated by those tests that you have
10 that help support that potential -- help support your
11 hypothesis. Is that a fair assessment?

12 DR. HISER: That's correct.

13 JUDGE WARDWELL: Okay.

14 DR. LOTT: Your Honor, this is Randy Lott
15 from Entergy.

16 JUDGE WARDWELL: Yes.

17 DR. LOTT: I just wanted to point out that
18 while the data that Mr. Hiser is offering is quite
19 valuable in terms of showing that the fracture
20 toughness is still characterizable in science and
21 ductility in high fluence, in fact if there's not a
22 crack there's no way to know the fracture toughness of
23 the material because it's only used to analyze a crack
24 component.

25 And I think part of what is protecting us

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1 here from the failures that you're describing, the
2 unfailed, uncracked component, is really the fact that
3 the components themselves were designed based on
4 value, yield stress values and demonstrated in
5 unirradiated condition that they do not exceed the
6 stresses that are allowed under the design basis
7 loads. They will withstand in the unfailed condition
8 even higher stresses due to the increase in yield
9 stress without failure.

10 So, again, the fact that you design to the
11 unirradiated load limits helps protect us. Again, the
12 magnitude of these shock loads, as Dr. Lahey calls
13 them, or the local loads or the seismic loads don't
14 change with time. It's just the ability of the
15 material to withstand it that we're interested in.

16 JUDGE WARDWELL: Thank you, Dr. Lott.

17 If I could go back to Dr. Lahey, I did
18 stop you from speaking because I was on a --

19 CHAIRMAN MCDADE: Before you do, could I
20 just say one thing?

21 A suggestion. We're sort of going back
22 and forth here among the various witnesses. And a
23 witness may say ten things, eight of which the other
24 witnesses agree with. But then by the time we get
25 back to them they're only going to discuss one of the

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1 two things they disagree with.

2 So I don't know if you want to, you know,
3 as the other witnesses are testifying, to jot down a
4 note I you want to get back to it. I find little note
5 cards handy to just jot things down to remind me that,
6 yeah, let me go back to that. If anyone wants to,
7 I've got plenty of extra note cards.

8 But anyway, I know it's, it is challenging
9 to follow back and forth from my standpoint of exactly
10 what is being said to who. And, you know, to the
11 degree there is a disagreement, that might be helpful
12 to draw your attention back to it.

13 Judge Wardwell, please.

14 JUDGE WARDWELL: Which is a good segue
15 into when I interrupted you, Dr. Lahey, or I started
16 asking questions as you were starting to speak just
17 before we started this discussion about embrittlement.
18 If you remember what that was you wanted to say,
19 proceed with it. If not, or even if you do after you
20 get done with that, then I would appreciate your
21 comments on any tests you've seen in regard to
22 fracture toughness versus fluence.

23 DR. LAHEY: Okay. The last remark I guess
24 is a good way to start. And, you know, I didn't draw
25 it but I did the professor thing in the air with the

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1 stress-strain. And as it gets hardened, now it moves
2 up like that and the yield strength and the ultimate
3 stress gets higher, no doubt as long as you're in that
4 range with a low strain things are better.

5 That's why low amplitude/high frequency
6 experiments are better, even if it's irradiated, in
7 terms of failure, crack initiation.

8 If you have a large load, though, and you
9 go beyond, you know, beyond the ultimate strength with
10 a high enough strain, it's gone. All right? So it's
11 not true that things are good once it's highly
12 embrittled. It depends a lot on what the, what the
13 strain is, what the amplitude of it is.

14 And if you have a very large shock -- can
15 I get you to show this now? Because he said he could
16 project it. Because if you -- I mean I can't really
17 draw it with my finger very well. I'm sorry. I tried
18 and it's too, too ugly.

19 But if you have --

20 JUDGE WARDWELL: This is nothing more.
21 Let me look at it first before.

22 DR. LAHEY: It's something you would say
23 simple spring mass system and showing an impulsive
24 load, what happens?

25 Well, anybody who's ever had a course in

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1 differential equations, this is an equation you saw,
2 and that any undergraduate student gets.

3 JUDGE WARDWELL: It's how the --

4 DR. LAHEY: It's what the amplitude --

5 JUDGE WARDWELL: It's the compressibility
6 of organic soils with fiber decomposition, in case
7 you're ever interested.

8 DR. LAHEY: Okay. And the way we, the way
9 we model elasticity, there's a bunch of them, or
10 plasticity.

11 MS. SUTTON: Your Honor, Kathryn Sutton
12 for the Applicant. What are we about to look at?

13 JUDGE WARDWELL: At the moment, Ms.
14 Sutton, I haven't the slightest idea.

15 MS. SUTTON: Nor do our experts, Your
16 Honor.

17 CHAIRMAN MCDADE: But what we are going to
18 do, I believe Dr. Lahey feels that this diagram will
19 --

20 DR. LAHEY: You know, help them understand
21 what I'm trying --

22 CHAIRMAN MCDADE: -- help to explain
23 better, you know, the point that he's trying to make.
24 It will be marked as an exhibit for identification.

25 What is the next New York exhibit, Mr.

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1 Sipos?

2 MR. SIPOS: I'm at 82. I believe it's
3 582. I'll double check, Your Honor.

4 CHAIRMAN MCDADE: Okay. So but when we're
5 done we'll mark it as a -- it's a demonstrative
6 exhibit. It's not received into evidence. It's the
7 testimony of Dr. Lahey that we're receiving as
8 evidence --

9 DR. LAHEY: Fine.

10 CHAIRMAN MCDADE: -- and but it will be an
11 exhibit for identification and part of the record in
12 that regard.

13 MR. HARRIS: Your Honor, could the Staff
14 at least request some copies of it so that we could,
15 you know, have a chance to evaluate it? Because if it
16 only shows up here right now, the witnesses may not
17 have a chance to review it, you know, in full detail.

18 CHAIRMAN MCDADE: What we're going to do
19 right now, Mr. Welkie is going to put it up. We will
20 then capture it electronically. And then we can give
21 everybody as many autographed copies as they want.

22 DR. LAHEY: Believe me, it's not suitable
23 for framing.

24 MR. KUYLER: Your Honor, Ray Kuyler for
25 Entergy.

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1 Entergy would like to note it's objection
2 to the use of this. This certainly could have been
3 provided in previous testimony.

4 CHAIRMAN MCDADE: Well, we don't know yet.
5 I mean it's Dr. Lahey is indicating that this will
6 help him explain his answer to a question that has
7 been posed to him. And maybe it will and maybe it
8 won't. But again, it's the testimony of Dr. Lahey
9 that we're going to be evaluating.

10 DR. LAHEY: Yes, I mean if it's hard to
11 show then we'll -- I'll try to draw it with my finger.
12 But, oh, look at that.

13 Can you all see it? Bring it down a
14 little if you will. All right, so just a little more.
15 So bring it down a little bit. All right.

16 So what this is is the second order spring
17 mass dashpot system. So as I say, anybody who's an
18 engineer solved this equation at one point in their
19 life. It's the second order ordinary differential
20 equation. It's F equals ma .

21 And so what you're doing is you have the
22 mass of the structure. All right? And then you have
23 a force on it. And so now I'm going to hit it with a
24 impulsive force. I could either do it delta function,
25 but I'm going to do a step change just so you see

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1 where it goes.

2 The spring has to do with the elasticity
3 of the metal. The dashpot has to do with the damping.

4 So if you hit it at time equals 0 with a
5 force, then what will happen if you, if you look at X
6 which is the position of the thing, the mass that
7 you're modeling, versus time, at first it will, it
8 will go up. And then I would assume it's under
9 damped, so it will oscillate a bit, and then it will
10 go to the steady state value which is F over the mass
11 times the natural frequency squared.

12 So that's what a static load would be.
13 That's where you would be.

14 But if you hit an impulsive one, you go
15 way higher. You go much higher. So the strain, the
16 amplitude is high. And if you're high enough in
17 amplitude you can fracture your material.

18 If it's highly weakened, either by
19 irradiation, by thermal embrittlement, by fatigue,
20 anything that weakens that material, if it's weak
21 enough you can break it.

22 And that's, that's all I was trying to
23 say. So it's not true that if you harden it, which it
24 will harden by irradiation, that everything is good.
25 Because it depends on what the amplitude is of the

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1 load that you're hitting it with.

2 Notice the load. The amplitude is small
3 relative to the peak. All right? The steady state
4 amplitude. And that, unfortunately, all the analyses
5 that I've seen from the last seven years of this stuff
6 is they're doing steady state kind of loading. Any
7 time they do accidents they implicitly assume intact
8 geometry and don't, don't really take into account the
9 degradation of the material itself.

10 So that's all I was trying to show.

11 JUDGE KENNEDY: Dr. Lahey, this is Judge
12 Kennedy.

13 I'm trying to get a handle on this
14 impulsive loading. I guess if you pick the right load
15 you'll break anything. How do you tie this load into
16 the types of loads that are of concern at Indian
17 Point? I mean are you suggesting they're using the
18 wrong loads?

19 DR. LAHEY: It depends on what causes the
20 load. For instance, if it's a very severe earthquake
21 and you have a structure and all of a sudden, pang,
22 you hit it hard you can create this kind of
23 phenomenon. You will overpower the ability of the
24 metal to withstand the load.

25 If it's a local load, you know --

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1 JUDGE KENNEDY: I guess that's what I'm
2 struggling with. It sounds like you get to pick the
3 load. And I think there's -- presume there's a set of
4 rules of engagement here that goes with the design of
5 this facility. And I'm trying to get to the bottom of
6 are you suggesting that Entergy is not using the
7 appropriate loads?

8 DR. LAHEY: No.

9 JUDGE KENNEDY: Or are you suggesting
10 there are loads out there that they need to consider?

11 JUDGE KENNEDY: Your Honor, I believe that
12 their safety evaluations consider the various loads,
13 the various accident type loads. And their seismic
14 analysis takes into account those type of loads.

15 What's not done though is the effect of
16 that on a highly degraded material. I've never seen
17 anything that looks, that looks at the effect of the
18 significant shock loads on a degraded material and
19 what happens after that.

20 JUDGE KENNEDY: When the NRC Staff was
21 discussing the ASME code loads, upset conditions and
22 accident conditions, those loads are different than
23 the ones you're speaking of?

24 DR. LAHEY: The type of loads that I heard
25 them talking about were the normal -- when we were

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1 talking about the FSAR, for example --

2 JUDGE KENNEDY: FSAR?

3 DR. LAHEY: -- they were the normal local
4 loads. And I assume then they also would talk about
5 the seismic loads, yes.

6 JUDGE KENNEDY: So is there yet another
7 set of loads that you think needs to be considered
8 here that aren't currently being considered?

9 DR. LAHEY: No. My concern is that the
10 integrity of the various structures, the internals,
11 the bolts for example, the baffle bolts, when you
12 apply significant shock loads to them they don't look
13 at the degradation of the material. That's what I'm
14 concerned with.

15 JUDGE KENNEDY: This, this takes us back
16 to the cracking discussion, doesn't it? Or does it?

17 DR. LAHEY: Well, I, I'm --

18 JUDGE KENNEDY: Because I hear they
19 consider it.

20 DR. LAHEY: Yeah. But I'm absolutely sure
21 you can fail structures without a crack. If you hit
22 it hard enough you'll fail a structure.

23 JUDGE KENNEDY: I don't think anyone here
24 will dispute that if you get to pick the load and it
25 has no basis in anything within the design of this

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1 plant you can probably break it. I think my concern
2 is that Entergy, the Staff are playing within a
3 certain set of boundaries --

4 DR. LAHEY: Right.

5 JUDGE KENNEDY: -- and the only thing I'm
6 trying to get to is are you suggesting that there is
7 something wrong with that boundary?

8 DR. LAHEY: The loads are fine with me.
9 All right? The effect of the loads is what I'm
10 concerned with.

11 JUDGE KENNEDY: Okay.

12 JUDGE WARDWELL: So by that do you mean
13 it's -- you agree that they have incorporated the
14 loads that should be incorporated into this analysis
15 of any of the vessel internals?

16 DR. LAHEY: The safety analysis reports
17 that I looked at for Indian Point look like they do
18 all the normal accident evaluations, and similarly
19 with the seismic. I'm not sure about the new seismic
20 criteria now. As you may know, that has changed since
21 the recent earthquake a few years ago. But definitely
22 they look at that event as well.

23 JUDGE WARDWELL: And it's your position
24 that it's the application of those loads, it's the way
25 they apply those loads to the materials and what they

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1 -- excuse me -- consider for their resistance that is
2 of the issue?

3 DR. LAHEY: Do they consider the
4 degradation of the material to these type of loads?
5 And I have seen no evidence that that has occurred.

6 CHAIRMAN MCDADE: And how would they do
7 that?

8 DR. LAHEY: How would you do it?

9 CHAIRMAN MCDADE: Yes.

10 DR. LAHEY: You put, you put the force on
11 the body and then you have the material properties in
12 terms of if it's brittle or not or fatigued or not.
13 And then see, see if it can withstand it.

14 JUDGE WARDWELL: Isn't that the lack of
15 data you understand isn't available?

16 DR. LAHEY: One of the problems is there's
17 not enough data to know for sure. But there's enough
18 data to know that there can be an effect. So normally
19 you would, because of uncertainty you would put some
20 sort of uncertainty factor there on their cycles to
21 failure, until you know for sure.

22 So some of these things are going to be
23 done. As I said, the light water reactors'
24 sustainability program is going to supply the fatigue
25 stuff.

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1 With the embrittlement it's a much more
2 lengthy process. There's only one place in the
3 country you can do that. That's in Idaho in their hot
4 cells. And it's a very long, expensive iterative
5 process. But eventually we will have all that data.

6 JUDGE WARDWELL: But lacking that, what
7 else would you suggest they do at this point?

8 DR. LAHEY: I would not suggest --

9 JUDGE WARDWELL: Shut down until that's
10 done?

11 DR. LAHEY: No. I, I would not suggest
12 you just press on. I mean that's basically what,
13 what's being done.

14 I would suggest, and I've gotten a lot of
15 kickback on the suggestion, that some of these things
16 are easy to fix. You just repair them. It's not a
17 big ticket in the scheme of things. You get rid of
18 the problem and don't worry about it because there's
19 certain things you'll see tomorrow when we talk about
20 CUFen that are right on the ragged edge and there's
21 others that aren't.

22 And similarly in core, you have stuff that
23 is highly embrittled and stuff that's not.

24 So nobody's talking about replace
25 everything. But the key things, get rid of the

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1 problem. That's my suggestion.

2 JUDGE WARDWELL: Let me just turn to we'll
3 start with Dr. Lott and see if he has any other
4 comments that he might want to make in regards to what
5 could be done at this point in regards to addressing
6 the lack of the application of the correct loads that
7 you had been doing to materials that are both
8 embrittled and fatigued.

9 DR. LOTT: I'm not sure I fully understood
10 all of the things that were just said.

11 JUDGE WARDWELL: I was counting on you to
12 sort them all out.

13 DR. LOTT: I think that as was said
14 before, we're not here arguing about the loads that
15 are applied to the components. I think that's part of
16 the current licensing basis. And I think a lot of
17 what we discussed about how impulse loads and all that
18 are already dealt with within our current process.

19 So we're not talking about that. What
20 we're talking about, the ability of the component to
21 withstand those loads and how that may be improved or
22 degraded over the life of the component.

23 Again, as I understand it we're talking
24 about -- we talk about irradiation embrittlement in
25 broad terms as a bunch of different phenomena.

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1 Because it's true, it increases yield stress, it
2 increases the ultimate stress. It decreases the
3 ductility, how much stretch there is in the material
4 before it fails.

5 Our point with respect --

6 JUDGE WARDWELL: Does it fail at lower
7 strains or higher strains or does it vary based on?

8 DR. LOTT: Well, again, that's a -- you
9 need to look at the true stress-strain curve I guess
10 to actually answer that question. What happens in a
11 normal tensile bar when you pull it under these
12 conditions is it's a great deal of strain
13 localization.

14 So while you might see a normal stainless
15 steel provide a long, gradual necking process to it,
16 this steel is kind of localized with a very sharp
17 neck. And so they do have in an engineering
18 stress-strain curve exactly the behavior that Dr.
19 Lahey described: a large increase in the yield stress
20 and the ultimate stress. And limited amount of
21 uniform elongation. And then some amount of
22 additional deformation to failure.

23 That's typical of highly irradiated
24 materials.

25 There's a bunch of things I guess I'd like

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1 to say. Let me just point out to you that not all of
2 the materials, even in the internals, are highly
3 irradiated. These very high fluences we're discussing
4 are pretty much limited to the baffle former and
5 baffle former bolts. And we can talk about that in
6 the future, too, if we need to.

7 So it does not affect a wide range of the
8 components there.

9 Again, I think we need to be careful about
10 this whole discussion of, of what, you know, I don't
11 know of a phenomena called irradiation weakening. I
12 know of irradiation-induced decrease in fracture
13 toughness which, as I said, decreases the ability to
14 maintain its dimensional stability, whether in part to
15 withstand fracture or at least the initiation of a
16 crack, crack, form a crack.

17 The only, only time that comes into place
18 is when you have a crack in the component, the
19 fracture toughness that is decreased. And I do not
20 believe any of these components are designed to
21 undergo large strains in the normal application.
22 They're not deformed, they're just not deformed that
23 way so they're never going to fail by these other
24 brittle mechanisms.

25 There may be more to that question. I am

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1 not sure what all was implied by it.

2 MR. STROSNIDER: This is Jeff Strosnider
3 from Entergy.

4 I'd like to add something to this on the
5 notion of this failure of a component without a crack.

6 JUDGE WARDWELL: Okay, please do.

7 MR. STROSNIDER: So I think the first
8 thing to recognize is that if there's no fracture in
9 it, then the fracture toughness is out of the picture.
10 What's dominating the failure mechanism is the
11 strength.

12 And as was explained, when these materials
13 are irradiated the strength goes up. Right? So if
14 these components could withstand the design basis
15 loads when they were originally designed under their
16 original condition without any embrittlement, and it's
17 governed by strength, when the strength goes up
18 they're going, they're still going to withstand those
19 loads. In fact, their load carrying capacity is
20 increased.

21 So just logically you would conclude that
22 they still meet the current licensing basis loads,
23 which we said include the dynamic factors, et cetera.

24 Now, what's being confused here is when
25 they do fail, right -- and this actually Judge Kennedy

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1 was touching on this with his question earlier -- if
2 you hit it with big enough a load, if you were to take
3 it to a load higher than the design basis load and
4 fail it when it's been embrittled, it will show less
5 ductility than if it were not embrittled. But you
6 still have to get to that load that's higher than the
7 design basis loads in order for that to happen.

8 And oh, by the way, none of these
9 materials are going to fail like a candy cane. And
10 when you look at the data that's been discussed in
11 terms of fracture toughness -- and I think people have
12 talked about getting to that tomorrow -- you're going
13 to see that they still have ductility. Right?

14 Now, let's take the other situation where
15 you actually have a crack. All right? And as was
16 explained, in the Aging Management Program if you find
17 a crack then you will, you could, in fact a crack in
18 embrittled material will reduce the load bearing
19 capability. So you have to do an analysis considering
20 what level the fracture toughness is at because that
21 now governs failure. And you have to determine if
22 that crack can be left in service and for how long.

23 There's one other thing I want to add to
24 that is that there are analyses that have been done to
25 look at the critical flaw sizes, critical crack

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1 lengths in these components when they're irradiated.
2 They're much larger than the crack sizes that can be
3 determined with the inspection methods they're using.
4 And that's the other piece that you didn't get to but
5 that's an important part of this.

6 JUDGE WARDWELL: Yeah, we'll be talking
7 about inspection tomorrow. Yes.

8 MR. STROSNIDER: Yeah, so you'll get
9 there.

10 But the point is none of these materials
11 are going to, going to fail. Even with the crack in
12 it, it's not going to fail like the candy cane. It
13 will still field ductility. That's why they're using
14 an elastic plastic fracture mechanics analysis method
15 in these cases.

16 And if you look at it without a crack,
17 it's load bearing capability goes up. So the only
18 logical conclusion is that it's going to withstand the
19 design basis loads as it did when it was originally
20 designed.

21 JUDGE WARDWELL: But doesn't its ductility
22 drop drastically with age?

23 MR. GRIESBACH: Your Honor.

24 MR. STROSNIDER: When it fails it will
25 show less, less ductility. And this is you could look

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1 at it. I mean if you use undergraduate testing of a
2 uni-axle tensile bar, if you take low strength and
3 high strength materials, the more ductile one will
4 show more, more necking, more elongation.

5 The one that's the higher strength which
6 has less ductility will not show as much necking and
7 it may, it may fail with a flat fracture. But it's
8 not going to shatter, not these materials.

9 MR. GRIESBACH: Your Honor, this is Tim
10 Griesbach for Entergy.

11 I think we should point out that --

12 JUDGE WARDWELL: I've got a follow-up
13 question. And I'm going to forget it if I don't ask
14 it. In fact, I may have forgotten it already. And
15 that's why I don't like interruptions if I can avoid
16 them because it prevents us from getting the answers
17 we need to make a decision.

18 CHAIRMAN MCDADE: Jot it down and we'll
19 get back to you.

20 JUDGE WARDWELL: Yeah, that's the way to
21 do it. Except you might as well say it now because
22 now I've forgotten what I was going to follow up on.

23 Go ahead.

24 CHAIRMAN MCDADE: Now he's forgotten what
25 he was going to say.

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1 MR. GRIESBACH: Thank you.

2 JUDGE WARDWELL: You may go ahead now that
3 I've forgotten what I wanted to say. But I want to
4 point out that's why I want to minimize the
5 interruptions because when I've got a follow-up
6 question that I had for your compadre there --

7 MR. GRIESBACH: Okay.

8 JUDGE WARDWELL: -- it was right on point
9 to what he had said. And now it's not on point
10 anymore. It's been axed from this hearing.

11 So proceed.

12 MR. GRIESBACH: What I think we really
13 would like to point out, though, is the materials that
14 we're talking about are austenitic stainless steels
15 for the most part. They're, they're face center
16 cubic, which means they have much more ductility than
17 the type of ferritic steels that tend to undergo a
18 ductile to brittle transition and can be brittle.

19 So these types of materials don't
20 experience that type of brittle fracture. Even in the
21 irradiated condition they still have much ductility
22 and strength, as we've talked about, and wouldn't fail
23 in that brittle manner as some people have pointed out
24 here.

25 So I think we need to keep that in mind.

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1 And the data that we can show you tomorrow will point
2 that out as well.

3 JUDGE WARDWELL: And we will be able to
4 see from that data highly embrittled type of results
5 that might be indicative of what it would be like in
6 the reactor after 60 years of operation?

7 MR. GRIESBACH: The levels of fluence in
8 the test data is representative of exposure for a
9 significant period of time in PWR reactors, yes.

10 JUDGE WARDWELL: Great.

11 MR. COX: Just one clarifying comment on
12 that. That the highly, the term "highly embrittled"
13 --

14 JUDGE WARDWELL: And this is Mr. Cox;
15 correct?

16 MR. COX: That's correct. This is Allen
17 Cox with Entergy.

18 When you say "highly embrittled" that's
19 one of those words that ends with "l-y" and it could
20 have a number of meanings. What Mr. Griesbach said is
21 that we'll have data that's based on the fluence
22 that's experienced at the end of 60 years. That does
23 not necessarily equate to highly embrittled or highly
24 irradiated.

25 JUDGE WARDWELL: I stand corrected. The

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1 embrittlement that does occur after 60 years, however
2 it is. I won't pre-judge that.

3 I think I remember the question I was
4 going to ask. So the various internals -- and if
5 you're not the person to address it to, then fine,
6 then any of your compadres can pick up on it either,
7 also. But you made me think of it.

8 Not all internals are under a tension
9 load; correct? With normal operations or with shock
10 loads they're going to be under different types of
11 load applications?

12 MR. STROSNIDER: This is Jack Strosnider
13 for Entergy.

14 That's true.

15 JUDGE WARDWELL: And so how is that taken
16 into effect, because one component may be very
17 sensitive to corrosional activity based on where it is
18 and how it may perform. And another would be under
19 compression, another under shear, another under
20 bending, another under tension. How is that addressed
21 in any manner or?

22 Well, no. In fact let me rephrase that.
23 Really that isn't addressed in your AMP because you
24 don't, you do not evaluate anything until you see a
25 crack based on this inspection-based AMP; is that

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1 correct?

2 MR. STROSNIDER: So this is Jack
3 Strosnider for Entergy. And some of my colleagues
4 here may be able to get into more detail.

5 But, again, I think if you look at this
6 logically, when the internals were designed, right,
7 they were designed to the ASME code section 3. They
8 were designed to stay in the elastic range. Right?
9 And various loadings, whether they be compressive or
10 torsional or thermal, whatever was driving them, they
11 were included in that original design. And they
12 haven't changed.

13 Under the license removal you're assessing
14 the same loads that were in the original design. So
15 whatever those loads were, they're still there.
16 They're the same. And what's done in the analysis in
17 the MRP-227 is to use the design basis loads.

18 So that's the big picture answer. And I
19 don't know if there's any more detail to add to that.
20 I think I need to turn --

21 CHAIRMAN MCDADE: It's not that the loads
22 are different, it's that the ability of the metal to
23 withstand the loads is different based on
24 embrittlement and other aging mechanisms. That's what
25 Dr. Lahey's thesis says.

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1 MR. STROSNIDER: Well, Jack Strosnider for
2 Entergy.

3 And just what I was trying to explain
4 earlier is let's take two cases. If there's no crack
5 in the component, you put the same loads on it and
6 because it's been embrittled, all right, its strength
7 has gone up and that's --

8 CHAIRMAN MCDADE: But ductility has gone
9 down?

10 MR. STROSNIDER: Yeah. So you have to get
11 to high enough a load to fail it, all right, before
12 you're going to see that, that impacted ductility.
13 And this was the question that I mentioned earlier
14 that Judge Kennedy brought up is, sure, if you hit it
15 with high enough a load it will fail. But we're not
16 talking about unlimited loads here, we're talking
17 about loads that are within the design basis.

18 CHAIRMAN MCDADE: But isn't what Dr. Lahey
19 is suggesting is that there's a lack of data to show
20 the effect of the same loads, these loads that it's
21 undergone for the past 40 years, that those loads will
22 not affect the particular item differently because of
23 the embrittlement and other aging mechanisms and that
24 there's a lack of data to demonstrate where the
25 cut-off line is? Is that data available?

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1 MR. STROSNIDER: Jack Strosnider for
2 Entergy.

3 What I would suggest -- and again my
4 colleagues can maybe expand on this -- but if you want
5 to see the impact of embrittlement on the parameter
6 that controls failure, which is the yield strength,
7 the yield or the ultimate strength, all you've got to
8 do is look at the tensile test results. It goes up.

9 There's lots of tensile tests out there.
10 All right? And, you know, that's how we know that
11 these tensile properties the strength improves, the
12 strength gets brighter when you irradiate the
13 material.

14 JUDGE WARDWELL: And is it your position
15 that the torsional strength and the compressive
16 strength and the shear strength and the bending
17 strength also go up? And does the data support that?

18 MR. STROSNIDER: My colleague has a
19 response.

20 MR. GRIESBACH: Various different --

21 JUDGE WARDWELL: And to who are we --

22 MR. GRIESBACH: This is Tim Griesbach for
23 Entergy.

24 JUDGE WARDWELL: Thank you.

25 MR. GRIESBACH: You're suggesting that

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1 various combinations of loading, be it tension,
2 torsion, bending, those are all still dependent on the
3 maximum tensile stress or flow stress to reach
4 failure. So, yes, that would go up under various
5 different load combinations without the presence of a
6 crack.

7 JUDGE WARDWELL: Okay, thank you.

8 DR. LAHEY: Can I say? I think --

9 JUDGE WARDWELL: Pardon?

10 CHAIRMAN MCDADE: Before that I think we
11 ought to go to Staff.

12 JUDGE WARDWELL: Okay.

13 DR. LAHEY: You'd summarized my feeling
14 exactly.

15 CHAIRMAN MCDADE: Hold it for one minute
16 and we'll get back to you.

17 JUDGE WARDWELL: Unless it's something
18 really quick.

19 DR. LAHEY: No, I just agreed, if that's
20 okay, that the essence of the --

21 CHAIRMAN MCDADE: We always have time for
22 that.

23 JUDGE WARDWELL: Yes.

24 DR. LAHEY: It's just the difference has
25 to do with what's the integrity of the metal, given

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1 those loads. And the problem is how to quantify it
2 because of the lack of data.

3 The only data, if it's available, suggests
4 these effects. But there's not enough to quantify it?
5 So then what do you do? I mean how -- do you just
6 press on? Or how do you --

7 JUDGE WARDWELL: So let me make sure I
8 understand what you're saying. You agree with Entergy
9 that if the tensile strength goes up then likewise all
10 the other types of strengths will also go up with
11 irradiation? Is that what you were saying?

12 DR. LAHEY: The ductility goes down.

13 JUDGE WARDWELL: Ductility goes down but
14 the strength will go up.

15 DR. LAHEY: It has to do -- it's not just
16 strength, it's amplitude. You have to look at --

17 JUDGE WARDWELL: Right. But you agree
18 with that?

19 DR. LAHEY: Yes, of course.

20 JUDGE WARDWELL: Okay, that's good. Thank
21 you.

22 DR. LAHEY: Sure.

23 JUDGE WARDWELL: Staff, do you have any
24 comments on what we've talked about the last 10, 15
25 minutes? The same question I asked Dr. Lott. And I

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1 forgot what that was. But you must know if you've got
2 some burning thoughts in your mind that you've jotted
3 down.

4 And this will probably pretty much finish
5 us for the, yeah, for the evening. It will.

6 DR. HISER: This is Allen Hiser. Then I
7 think Gary Stevens has something he would like to add.

8 I think the, what I articulated maybe 30
9 minutes ago was: no crack, no problem. And I think
10 that's the case. If the loads don't change, the
11 ability of the material, even if the ductility drops,
12 is unchanged. It still will perform its intended
13 functions. And that's what we're here to assess.

14 The ductility decrease becomes important
15 if a crack is found. If they find a crack they would
16 have to do -- take corrective actions. It will either
17 be repair, replacement or they would try to use an
18 engineering evaluation to demonstrate acceptability.
19 In that case they would have to consider the true
20 state of the materials in terms of the embrittlement.

21 So from that perspective, the ductility
22 may decrease but it really is not significant until
23 there's a crack in place.

24 MR. STEVENS: This is Gary Stevens of the
25 Staff.

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1 I made a bunch of notes as everybody was
2 talking. And then Mr. Strosnider and Dr. Hiser talked
3 and a lot of my notes went away. But sometimes if I
4 say something differently maybe it will have an
5 impact.

6 I think the point is that a structure
7 behaves differently if a crack is present or it's not.
8 And how it behaves is measured by different things.
9 If a crack is present, where failure might be an
10 outcome, things like fracture toughness and
11 embrittlement and those kinds of things are important.

12 And in those kinds of evaluations -- and
13 my colleagues who are more intimately familiar with
14 them or PT-27 can say -- but the acceptance, the
15 acceptance criteria that's in there and the evaluation
16 procedures that are done take into account reductions
17 in toughness, increases in crack propagation due to
18 embrittlement. It's factored into those analyses.

19 When a crack is not present, and we look
20 at crack initiation, as you've heard and I think most
21 of the parties have agreed, that irradiation tends to
22 increase the strength of the material. And if it was
23 okay in the design and the strength goes up, it's okay
24 under irradiated conditions. If the figure represents
25 a load that was defined in the CLB, then it was

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1 evaluated.

2 And I think you also had a question, Judge
3 Wardwell, on data. And I think we have a couple
4 different things. There might be some data related to
5 crack propagation.

6 With respect to crack initiation, one of
7 the exhibits, I don't remember the number but it was
8 I think a New York State exhibit for NUREG CR 6909
9 Rev. 1, that was actually a draft document, section
10 1.3 of that document discussed irradiation on crack
11 initiation, the available data and what the Staff
12 research and interpretation of that data has to say.

13 And that's when I discussed earlier of
14 there not being a lot of data, and from our
15 perspective the effects we don't think are
16 significant, and a lot of our guidance equally applies
17 to irradiated conditions, it was with respect to crack
18 initiation.

19 That's all.

20 JUDGE WARDWELL: Thank you.

21 CHAIRMAN MCDADE: Is this a good place to
22 break? Okay, I think this may be a good place to
23 break for this evening. I would propose to come back
24 tomorrow at 8:30 in the morning.

25 Does anybody have any administrative

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1 matters to take up before we break?

2 MR. HARRIS: No, Your Honor.

3 CHAIRMAN MCDADE: Entergy?

4 MR. KUYLER: No, Your Honor. Your Honor,
5 did you say 8:30 or 8:00 tomorrow morning?

6 CHAIRMAN MCDADE: 8:30.

7 MR. KUYLER: Thank you, Your Honor.

8 CHAIRMAN MCDADE: Mr. Kuyler.

9 MR. SIPOS: One matter. I'm not sure if
10 this is on.

11 One matter, Your Honor. At the outset
12 today the Board did issue a ruling on the State's
13 pending motion concerning the withdrawal of
14 designations for confidential business information.
15 And the State is concerned or renews its request that
16 the Board consider redactions as well.

17 I don't know that that was addressed. I
18 just wanted that on the record so that it's absolutely
19 clear that the State is pursuing that.

20 CHAIRMAN MCDADE: Okay. And in that
21 regard, what I would suggest is if you would submit a
22 document with proposed redactions. We're saying, at
23 this point we're saying we're not making the documents
24 publicly available. From what you just said it
25 appears that you're suggesting that there are

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1 significant portions of the documents that, while the
2 Board views the documents themselves should keep the
3 proprietary designation, you're suggesting that there
4 are certain portions of it where that's not required
5 or appropriate.

6 And if that's the case, you know, submit
7 those proposed redactions initially to Entergy and
8 Westinghouse. And if there isn't an agreement, then
9 to the Board.

10 MR. SIPOS: Very good, Your Honor. It was
11 an alternative argument. The State still maintains
12 its more overarching position. But this was an
13 alternative argument as well.

14 We will follow up on it, Your Honor.

15 CHAIRMAN MCDADE: And there's two aspects
16 to that. One is whether or not it's necessary to be
17 public for the purposes of the evidentiary hearing in
18 the next couple of days. And the other is, you know,
19 the sort of overarching concern that you seem to have
20 that this is the kind of information that should be in
21 the public sector.

22 So it's something that even though we
23 would be done with this evidentiary hearing no later
24 than COB Friday, you know, it doesn't necessarily
25 foreclose that that document could be moved to the

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1 public -- or portions of it, publicly later.

2 MR. SIPOS: Okay. Other than that, no
3 other issues from the State.

4 CHAIRMAN MCDADE: From Riverkeeper?

5 MS. BRANCATO: Just for the record,
6 Riverkeeper supports the State's position regarding
7 the confidenti -- or redaction to the confidential
8 document issue. But other than that, no. Thank you.

9 CHAIRMAN MCDADE: Okay, thank you. We
10 will see you tomorrow, 8:30.

11 (Whereupon, at 5:50 p.m., the hearing was
12 recessed, to reconvene at 8:30 a.m., Tuesday, November
13 17, 2015.)

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