

**Official Transcript of Proceedings**  
**NUCLEAR REGULATORY COMMISSION**

Title: Entergy Nuclear Operations, Inc.  
Indian Point Units 2 and 3

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

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

Location: Tarrytown, New York

Date: Thursday, December 13, 2012

Work Order No.: NRC-2033 Pages 4209-4485

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD PANEL

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HEARING

-----x Docket Nos.

In the Matter of: : 50-247-LR and

ENTERGY NUCLEAR OPERATIONS, INC.: 50-286-LR

(Indian Point Generating Units 2:

and 3) : ASLBP No.

-----x 07-858-03-LR-BD01

Thursday, December 13, 2012

DoubleTree by Hilton Hotel Tarrytown

Westchester Ballroom

455 South Broadway

Tarrytown, New York

BEFORE:

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MICHAEL F. KENNEDY, Administrative Judge

RICHARD E. WARDWELL, Administrative Judge

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P R O C E E D I N G S

8:05 A.M.

1  
2  
3 JUDGE McDADE: Does anybody have any  
4 housekeeping matters before we begin with the  
5 presentation of evidence this morning?

6 MR. SIPOS: Your Honor, John Sipos.  
7 Just a follow-up, I think where we left off  
8 yesterday, on the document New York State 000270,  
9 we've gone back and double checked some more. It  
10 was produced as a non-proprietary document. It was  
11 IPEC00208853 on the log entry 8749. That was dated  
12 December 30, 2009. We requested its production and  
13 it was produced to us on January 4, 2010, again,  
14 without any limitation on it.

15 JUDGE McDADE: Okay, thank you.

16 MR. O'NEILL: Your Honor, this is Martin  
17 O'Neill for Entergy. And this is in regard to the  
18 testimony we'll be discussing today, Entergy  
19 testimony -- excuse me, Exhibit ENTR00091. We were  
20 informed that on page 105 of that testimony there's  
21 a heading that says "Revised Draft Privileged and  
22 Confidential Litigation Work Product Attorney-Client  
23 Communication." I just wanted to inform the Board  
24 that you can disregard that. The testimony is  
25 obviously final. It was just a formatting glitch.

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1 And it's just that one page, page 105.

2 JUDGE McDADE: Okay, thank you.

3 Anything from the staff?

4 MS. MIZUNO: Yes, Your Honor. Beth  
5 Mizuno for the staff. We discovered when we were  
6 reviewing our documents that when we PDFed the  
7 document, that is, NRC Exhibit 000036 which is an  
8 IEEE report on maintenance of oil-filled  
9 transformers, when we PDFed that document because  
10 it's a proprietary document and copyrighted, we only  
11 took the minimum number of pages that we had to. The  
12 original document, 36 pages long, we only took 3  
13 pages. The problem is we meant to pick four pages  
14 and we dropped one when we PDFed it. And I propose  
15 when we get back to D.C. next week to straighten  
16 that out in the form of a motion.

17 I've spoken to counsel for Entergy, New  
18 York State, for Riverkeeper, and for Clearwater this  
19 morning about it.

20 JUDGE McDADE: And what was that exhibit  
21 number again?

22 MS. MIZUNO: It was NRC000036. So we  
23 will be submitting a revised, corrected exhibit,  
24 NRC000036.

25 JUDGE McDADE: Okay, thank you.

1 MR. SIPOS: And Your Honor, just one  
2 other detail, I'd like to reintroduce my colleague,  
3 Assistant Attorney General Laura Heslin, who is  
4 joining us today.

5 JUDGE McDADE: Good morning.

6 MS. HESLIN: Good morning.

7 JUDGE McDADE: We're going to get  
8 started here in a few minutes with taking your  
9 testimony. Let me explain very briefly sort of how  
10 the procedure is going to go. This is pretty much a  
11 dialogue between the members of the Board, us, and  
12 you. We're going to be asking you questions.  
13 You're going to be responding directly to us.

14 In many instances, the testimony of  
15 witnesses representing one party or the other will  
16 differ, but it's not going to be a debate between  
17 the two witnesses going back and forth between you.  
18 We're going to direct questions to you. You're  
19 going to direct your answers back to us. If you  
20 disagree with the testimony of another witness, just  
21 make a note of it and we'll get to you eventually  
22 and hopefully, we'll be able to answer. We'll ask  
23 the questions. It will allow you to inform us as to  
24 the correct information from your point of you.

25 Usually, there aren't any objections

1 made when the Judges are asking questions. At the  
2 conclusion of our asking questions, counsel for the  
3 various parties will have an opportunity to ask your  
4 questions. If they do and if there is an objection,  
5 you should hold your answer until after we've ruled  
6 on the objection. We will either say that the  
7 objection is sustained, meaning you don't have to  
8 answer the question and shouldn't answer the  
9 question, or that it's overruled, in which case  
10 we'll tell you to go ahead and answer the question.

11 If at any time during the course of the  
12 proceeding you need a break, don't be shy about  
13 asking for it. Let us know. If for some reason you  
14 can't catch our eye, try to catch the eye of your  
15 counsel, and they will stand up and make a request  
16 for a break.

17 Are there any questions from any of the  
18 witnesses before we get started? Apparently not.

19 The testimony you give, just as the  
20 testimony you gave in writing, has to be under oath.  
21 So at this point, we're going to swear you. You  
22 don't need to stand, but if you just raise your  
23 right hands, please? Do you swear that the  
24 testimony you'll give in this proceeding will be the  
25 truth, the whole truth, and nothing but the truth?

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1 (The panel was sworn.)

2 JUDGE McDADE: Thank you. Judge  
3 Wardwell.

4 JUDGE WARDWELL: Good morning, all.

5 JUDGE McDADE: One other thing I wanted  
6 to mention that I forgot, it's important that the  
7 court reporter attribute statements to the correct  
8 person. The court reporter doesn't know any of you  
9 yet at this point in time. So when you answer a  
10 question, when you speak, if you could preface by  
11 stating your name so that will be clear on the  
12 record so we don't wind up having a statement made  
13 by New York attributed to Entergy or vice versa or  
14 to the staff. So please try to just preface your  
15 answer with your name. If for some reason you  
16 don't, we will probably jump in and say thank you,  
17 Mr. Rucker, so that it gets clear on the record  
18 exactly who it is that is making a statement. Thank  
19 you.

20 Judge Wardwell.

21 JUDGE WARDWELL: Are you sure you're  
22 through now?

23 JUDGE McDADE: No. But it's likely.

24 JUDGE WARDWELL: Today, we're starting  
25 off with New York State 8 transformers. So if that

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1 isn't an area you're an expert in, I would ask that  
2 you now leave rather than stay here or whatever.

3 The contention states that the License  
4 Renewal Application for IP2 and IP3 violates 10 CFR  
5 54.21(a) and 54.29 because it fails to include an  
6 Aging Management Program for each electrical  
7 transformer whose proper function is important for  
8 plant safety.

9 That's what we're dealing with. I have  
10 broken down the questions into about 11 sections or  
11 areas of inquiry and I think we'll just rather than  
12 read through them now, we'll just jump into the very  
13 first set of those questions. And if I could get  
14 those questions up on the screen? I think I pretty  
15 much an able to see everyone and the witness for New  
16 York State, do I pronounce your name Dr. Degeneff?

17 DR. DEGENEFF: Degeneff.

18 JUDGE WARDWELL: Degeneff.

19 DR. DEGENEFF: Yes.

20 JUDGE WARDWELL: Degeneff. Let me see  
21 if I can remember that. When I get caught up I  
22 don't remember stuff very well. Degeneff. Thank  
23 you, sir.

24 To start off with, Entergy's testimony  
25 000091, we'll see this on the screen. I'll point to

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1 the questions that -- to the sections that I'm  
2 citing and then I'll ask the question for those that  
3 are new to the approach that I have used when  
4 leading off on organizing a contention, but  
5 Entergy's Exhibit 000091 on page 12 states that  
6 "without citing any technical or regulatory bases in  
7 his testimony" -- see, right off the bat, "Dr" --

8 DR. DEGENEFF: Degeneff.

9 JUDGE WARDWELL: Degeneff. "Dr.  
10 Degeneff erroneously equates the electrical  
11 engineering community's definitions of static and  
12 impassive with the Commission's Part 54 concept of a  
13 passive component."

14 I'd start off by asking anyone from  
15 Entergy to help me with this in regards to stating  
16 where the term passive is defined in the regulations  
17 as far as you know?

18 DR. DOBBS: Dobbs for Entergy. The word  
19 passive is not defined within the regulation itself,  
20 but there is some reference to that terminology in  
21 the SOC. The word static is not used in the SOC or  
22 the regulation.

23 JUDGE WARDWELL: Thank you. And you say  
24 the term passive is in the Statement of  
25 Consideration. Are you sure of that?

1 DR. DOBBS: I'm positive. Yes, it is.

2 JUDGE WARDWELL: You go on to state that  
3 "Dr." -- say it one more time.

4 DR. DEGENEFF: Degeneff.

5 JUDGE WARDWELL: Degeneff. "Dr.  
6 Degeneff erroneously classifies transformers as  
7 passive components under 10 CFR Part 54, despite  
8 Commission and staff guidance that indicates that  
9 transformers are not passive components."

10 Again, I'll stay with Dr. Dobbs or  
11 anyone else from Entergy. Where in the guidance is  
12 there a specific designation of transformers stating  
13 them as active system structures or components  
14 excluded from Aging Management Review?

15 MR. CRAIG: This is John Craig for  
16 Entergy. Let me start by saying that active,  
17 passive, and readily monitored are not discussed in  
18 the regulation, Part 54. All the terms are  
19 discussed in the Statement of Consideration for 54  
20 as the Commission explained the logic and the basis  
21 for implementing Part 54.

22 Transformers are not specifically  
23 discussed in either Part 54, nor in the Statement of  
24 Consideration.

25 JUDGE WARDWELL: Thank you. The next

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1 question deals with 10 CFR 54.21(a)(1)(i) and (ii).  
2 It says that "Aging Management Review is required  
3 for systems, structures, or components that perform  
4 their intended function without moving parts and  
5 without a change in configuration and properties."

6 The Statement of Consideration which is  
7 included here in the exhibits as New York 000016 an  
8 at page 22477 and these are the Statement of  
9 Considerations for the 1995 revisions to the license  
10 renewal regulations, states that "structures and  
11 components that perform 'active functions can be  
12 generically excluded from Aging Management Review on  
13 the basis of performance or condition monitoring  
14 programs' and that 'change in configuration or  
15 properties' should include 'a change in state.'"

16 So I'll stay with Entergy. What's your  
17 understanding of the fundamental reason for  
18 requiring aging management of systems structures and  
19 components that perform their intended function  
20 without moving parts or without a change in  
21 configuration properties or states, state, and for  
22 which aging degradation is not readily monitored?

23 MR. CRAIG: John Craig for Entergy. As  
24 the Commission discussed in the Statement of  
25 Consideration the distinction is that those

1 components that perform an intended function without  
2 a change in configuration properties, change in  
3 state, the performance is less directly monitored or  
4 verified and that distinction between active and  
5 passive as the Commission describes in the SOC is  
6 based on how directly the performance of the  
7 intended function can be monitored or condition.

8 JUDGE WARDWELL: So the key in your mind  
9 is the ability to monitor these components that do  
10 not exhibit a change in properties, configuration,  
11 or state in some fashion so that they could be  
12 monitored to assure that they're managing the  
13 effects of aging during the period of extended  
14 operation?

15 MR. CRAIG: John Craig for Entergy. I'd  
16 say it slightly differently. It's that when the  
17 component performs its intended function, there's a  
18 change that can be monitored. It can be a change  
19 with respect to transformers, the voltage or current  
20 at the primary or secondary site, it should be the  
21 voltage that is available at a motor control center  
22 or a breaker in the associated circuit on the  
23 secondary side. But an important part of monitoring  
24 and managing aging is that it's performance or  
25 condition. So it also includes the surveillance,

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1 the testing, the other activities that collectively  
2 look at the particular component or structure so  
3 that you can make a determination as to whether or  
4 not the component or structure could perform its  
5 intended function.

6 JUDGE WARDWELL: But aren't those  
7 somewhat monitoring activities of that system  
8 structure component that you just described?

9 MR. CRAIG: Monitoring if you're  
10 including specific testing that is done and those  
11 kinds of things, yes.

12 JUDGE WARDWELL: I'll stay with you, Mr.  
13 Craig, and pass it off if you want to, but you seem  
14 to be taking the lead here on that. Why do you  
15 think the Commission also included a change in state  
16 to those items that are now presently in the  
17 regulation? Or maybe a better way to say it is the  
18 Commission defined changes in properties to include  
19 a change in the state?

20 MR. CRAIG: Let me say -- this is John  
21 Craig. While I don't have direct knowledge of the  
22 basis for the decision, I believe the Commission and  
23 the staff worked through and gained the experience  
24 of looking at individual structures and components  
25 and tried to make a determination as to whether or

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1 not the activities performed under the maintenance  
2 rule would, in fact, be sufficient to manage the  
3 aging that could affect the structure or component.

4 There were questions with respect to  
5 things like transistors or other components and as  
6 discussed in the Statement of Consideration, the  
7 Commission had created this unique term, this term  
8 of convenience, passive, to be used only in the  
9 context of Part 54. And they concluded that adding  
10 a change of state, something that is quiescent or  
11 then transmits energy in the case of a transformer.  
12 You see that a transformer when it performs its  
13 intended function, there's a constant change in  
14 magnetic flux. If there's a load being supplied on  
15 the secondary site, etcetera.

16 JUDGE WARDWELL: Let's not get into --  
17 we're just talking on a general basis now, to lay  
18 the groundwork for those future discussions is what  
19 I'm trying to do.

20 MR. CRAIG: Yes, sir. And the basic  
21 thought was is there something that we can readily  
22 monitor that will lead us to, if it doesn't meet a  
23 goal, a condition, a parameter in the context of the  
24 maintenance rule, that that would then trigger a  
25 review to identify why something wasn't performing

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1 as it was expected to do that would then get into  
2 the requirement to identify the cause for the change  
3 in performance --

4 JUDGE WARDWELL: Can I cut you off here?

5 MR. CRAIG: Yes, sir.

6 JUDGE WARDWELL: I should have  
7 introduced this also. Don't be miffed if I happen  
8 to cut you off if we're going beyond what my  
9 question was. There is a need to get through this  
10 in a timely fashion and oftentimes if I do cut you  
11 off it's because my question is not clear more than  
12 you're doing something you shouldn't be doing. So  
13 don't feel bad about it if I do. And in this case,  
14 I just wanted to get us back to why was the term  
15 "state" added to the list of configuration and  
16 properties? Why was there a need for that do you  
17 surmise, Mr. Craig?

18 MR. CRAIG: I believe it was because in  
19 the context of electrical components, a change in  
20 state is the term that's used that would indicate  
21 that the component is performing its intended  
22 function.

23 DR. DOBBS: Can I take a stab at that?  
24 This is Steve Dobbs for Entergy. The SOC explains  
25 that on page 22477. It makes the statement "change

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1 in state" which is a term -- let me go back. "A  
2 change in configuration or properties should be  
3 interpreted to include a change in state which is a  
4 term sometimes found in the literature relating to  
5 passive." So I think that's about as direct  
6 explanation as you can find.

7 JUDGE WARDWELL: Thank you. If I  
8 understood what I heard from you, Mr. Craig, do you  
9 agree that the Statement of Consideration does  
10 stress the need to be able to monitor the moving  
11 parts and/or change in configuration properties and  
12 states or state in order for an SSC to be excluded  
13 from Aging Management Review?

14 MR. CRAIG: It's those changes or  
15 changes in condition. Yes, sir.

16 JUDGE WARDWELL: So you agree. Staff,  
17 would you like to comment on anything that you've  
18 heard in regards to either modifying it or adding to  
19 it or if you're in general agreement with what  
20 you've heard, that's fine, too. But I want to make  
21 sure what's being said isn't completely antithesis  
22 to how a staff interprets these considerations.

23 MR. MATTHEW: This is Roy Matthew from  
24 NRC. We agree with Entergy's statements. I would  
25 like to add a couple more clarifications. An SOC,

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1 whether it's active or passive, that determination,  
2 you have to look at the Part 54 requirements as well  
3 as the Statement of Consideration which specifically  
4 states two things. The regulation states if it has  
5 moving parts or changes states or properties, it's  
6 an active component.

7 Passive components do not change its  
8 states or properties. Also, the SOC, the Statements  
9 of Consideration use additional statements which is  
10 key which states that an SOC is really monitored,  
11 then it is an active component. So you have to look  
12 at both the regulation as well as the SOC to  
13 understand how you determine an SOC, whether it's  
14 active or passive.

15 JUDGE WARDWELL: I'd have to check the  
16 transcript, but just to make sure I do clarify it  
17 here orally since I'm not able to do that, when you  
18 first brought up the phrase active and passive in  
19 your answer right now, I think you were referring to  
20 the regulations?

21 MR. MATTHEW: Yes.

22 JUDGE WARDWELL: Are the words active or  
23 passive ever presented in the regulations?

24 MR. MATTHEW: Not really.

25 JUDGE WARDWELL: And you were using

1 those as the common trigger phrase that is often  
2 used in our discussion of related issues in the  
3 license renewal period?

4 MR. MATTHEW: Yes, that's true.

5 JUDGE WARDWELL: Do you have any -- was  
6 that your interpretation of the situation that we're  
7 dealing with or not?

8 DR. DEGENEFF: Yes, Robert Degeneff. I  
9 would like to make one comment though. We were  
10 talking about monitoring, monitoring for performance  
11 and monitoring for condition and the requirements  
12 there are substantially different.

13 JUDGE WARDWELL: I think we'll wait and  
14 talk more about that as we get into the specifics of  
15 that, Mr. Degeneff. But other than that, you didn't  
16 hear anything that raised a --

17 DR. DEGENEFF: No.

18 JUDGE WARDWELL: Thank you. Moving on  
19 to Entergy's Exhibit 000091, their testimony page  
20 99, answer 111, in discussing the Statement of  
21 Consideration for the revised Part 54 rules, Entergy  
22 states that "the Commission expressly concluded that  
23 the focus on identification of aging mechanisms is  
24 not necessary because regardless of the aging  
25 mechanism, only those that lead to degraded

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1 component performance or condition, that is, the  
2 potential loss of functionality are of concern."

3 And that was presented at 22488 of the Statement of  
4 Considerations.

5 And Mr. Craig, I'll stay with you and  
6 you can pass it on, and others can add if they want  
7 to, but isn't basically what this is saying is that  
8 the Commission is interested in whether degraded  
9 performance of a system, structure, or component can  
10 be detected and not just the complete failure of  
11 that system, structure, and component that's  
12 important?

13 MR. CRAIG: I don't think that's  
14 correct. I think it's both. I think that the  
15 monitoring of the performance of the components is  
16 related to safety significance and the risk, the  
17 failure of the individual structure or component  
18 would perform when you -- the Commission is relying  
19 on the maintenance rule to do -- to ensure that the  
20 performance or condition of structure or components  
21 are monitored.

22 And in the context of the maintenance  
23 rule, there are a couple of different categories of  
24 the extent of the programs that you would impose.  
25 And some of the structures or components are defined

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1 as inherently reliable and they're typically low  
2 risk, low or no safety significance and those can be  
3 run until failure. So that's acceptable under the  
4 maintenance rule.

5 JUDGE WARDWELL: But in regards to  
6 license renewal and what the Commission is talking  
7 about, they've said that only those that lead to  
8 degraded component performance or condition is what  
9 is of concern. Doesn't that seem to imply that  
10 they're interested in not just whether or not  
11 something can be detected that is not working any  
12 more, but in fact, when we're dealing with aging  
13 management we're interested in being able to track  
14 the degraded performance of that.

15 MR. CRAIG: Well, in a general sense, I  
16 agree with that. I think that's correct. The  
17 thought is that the current licensing basis has  
18 layers of activities that are required. And when  
19 you think about all of the activities that comprise  
20 the regulatory oversight process, the operational  
21 reviews, the inspections, etcetera, that the  
22 Commission and the staff concludes that that  
23 provides an adequate level of safety.

24 JUDGE WARDWELL: But we're here now  
25 discussing license renewal, aren't we, and not

1 current operations? And that's what the Statement  
2 of Consideration deals with. It doesn't deal with  
3 current operations.

4 MR. CRAIG: The Statement of  
5 Considerations discusses how the current licensing  
6 basis will continue and then the additional part,  
7 the change to the current licensing basis that will  
8 be required to ensure adequate protection in the  
9 renewal term.

10 JUDGE WARDWELL: Right, and so and  
11 they're here, as you're saying you agree that they  
12 are raising a real concern in regards to abilities  
13 associated with the degraded performance of a  
14 system, structure, or component for this license  
15 renewal effort?

16 MR. CRAIG: Yes.

17 JUDGE WARDWELL: In that same area of  
18 Entergy's testimony, you go on to state that  
19 "further, the Commission stated that functional  
20 degradation resulting from the effects of aging on  
21 active functions [such as those performed by  
22 transformers] is more readily determinable and  
23 existing programs and requirements are expected to  
24 directly detect the effects of aging." And that's a  
25 quote from the Statement of Consideration. Again,

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1 that's New York State Exhibit 000016 at 22472.

2 And just to make sure we're clear on  
3 this, Mr. Craig, the bracketed phrase "such as those  
4 performed by transformers" was your editorial  
5 addition. That's not part of the quote. Is that  
6 correct?

7 MR. CRAIG: Yes, sir. That's correct.

8 JUDGE WARDWELL: What's your  
9 understanding of functional degradation?

10 MR. CRAIG: Well, my understanding for  
11 functional degradation is that if you had a  
12 component like a transformer that was supposed to  
13 supply 480 volts on the secondary side, that it  
14 would for some reason not be able to do that. You  
15 saw voltage fluctuations, frequency fluctuations. If  
16 in a piping system you were supposed to have 1,000  
17 pounds pressure, it could only get to 800 pounds  
18 pressure. In a piping system, pipes would leak. It  
19 would not maintain its structural integrity.

20 JUDGE WARDWELL: Doesn't that sound  
21 closer to functional failure than degradation?

22 MR. CRAIG: From my way of thinking, it  
23 performs its function and it meets the goals on one  
24 end. And the other end, it fails. And in between  
25 is degradation. It's a matter of the extent of

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1 degradation.

2 JUDGE WARDWELL: So that's what they  
3 were talking about in regards to this functional  
4 degradation is to be able to -- well, let me ask  
5 this, could you cite anywhere in the regulations or  
6 in the Statement of Consideration where it says that  
7 the ability to detect ultimate failure is sufficient  
8 to exempt a system, structure, or component from  
9 Aging Management Review?

10 MR. CRAIG: No, it's not discussed in  
11 either the rule or the Statement of Consideration  
12 for renewal.

13 JUDGE WARDWELL: And that based on the  
14 phrase we just said, they did talk about functional  
15 degradation as being something that should be looked  
16 at, in essence, or is of concern. Maybe that's a  
17 better way to phrase it.

18 MR. CRAIG: Yes, Your Honor.

19 JUDGE WARDWELL: In the Statement of  
20 Consideration, on pages 22477 to 78, if you need to  
21 pull it up, I'll get it up, but you may remember  
22 this, but it was expressed in the context of cables  
23 that the Commission discussed the need for  
24 functional degradation, expressed concern about the  
25 lack of methods that can provide the necessary

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1 information about the conditions of the components  
2 regarding the extent of aging degradation or  
3 remaining qualified life and stated the desire for  
4 continuous monitoring and worried about failures of  
5 systems that might be induces during accident  
6 conditions. Do you remember that section -- does  
7 that ring a bell to you in regards to what's in the  
8 Statement of Consideration?

9 MS. SUTTON: Your Honor, this is Kathryn  
10 Sutton for the applicant. I would ask that you  
11 please bring that up on the screen?

12 JUDGE WARDWELL: Sure, New York State  
13 0000016. And you'll want to go down to about page  
14 17 of the PDF. It will end up to be 22477, yes.  
15 And zoom in on the bottom right-hand corner because  
16 then it will overlap also at 2488. Yes, right at  
17 that last paragraph. The phrase I just referenced  
18 was basically summarizing this paragraph as it moved  
19 on to the next page also, some of the highlights  
20 that I picked out of there. And does that seem to  
21 be -- do you agree that's a representation of about  
22 what's said in there?

23 MR. CRAIG: Yes, sir.

24 JUDGE WARDWELL: Thank you, Mr. Craig.  
25 And with this as it said, would you agree that the

1 degradation in performance is the goal of monitoring  
2 and that detection of failure after it occurs is not  
3 sufficient?

4 MR. CRAIG: No, I wouldn't.

5 JUDGE WARDWELL: So you would believe  
6 that the Commission would be happy with these  
7 components that do fall under Aging Management  
8 Review if we could monitor just -- strike that. Let  
9 me rephrase it.

10 Do you believe that the Commission would  
11 be satisfied that if the only thing we could monitor  
12 was ultimately failure, then it would exempt it from  
13 Aging Management Review, if all we could do was  
14 monitor failure? They'd be happy if the pressure  
15 vessel, for instance, if we monitored ultimate  
16 failure of the pressure vessel, that would be  
17 sufficient and we're not concerned with being able  
18 to somehow track its functional degradation?

19 MR. CRAIG: No, that's not what I'm  
20 trying to convey. What I'm trying to convey is that  
21 the level of safety at a plant during the renewal  
22 term is going to be the level of safety at a plant,  
23 the adequate level of protection of public health  
24 and safety during the current licensing term. And  
25 for all of the programs and the processes that are

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1 in place, the processes from the design, redundancy,  
2 duplication of activities that the NRC does, that  
3 the licensees do and the industry, all those  
4 activities ensure an adequate level of protection is  
5 preserved at the plant. Recognizing that, in the  
6 rare event that equipment fails, components break in  
7 complex machines, those are provided for in the  
8 current process.

9 JUDGE WARDWELL: I'm going to have to  
10 stop you again because I'm focusing now on what is  
11 included in Aging Management Review and was excluded  
12 in Aging Management Review as part of license  
13 renewal. I understand how plants are safe and  
14 controlled under the operating licensing basis, but  
15 right now I'm trying to focus strictly on this  
16 contention which deals with license renewal. And  
17 under that, my question was do you believe the  
18 Commission would be satisfied and would exempt a  
19 system, structure, or component from Aging  
20 Management Review if the only thing that could be  
21 monitored is its complete failure and nothing else?

22 MR. CRAIG: No.

23 JUDGE WARDWELL: To make sure we bridge  
24 the gap of this also, would it be a logical  
25 conclusion to say that these concerns that the

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1 Commission expressed here in the Statement of  
2 Consideration that were focused toward cables would  
3 apply to any SSC that requires Aging Management  
4 Review under license renewal? It wouldn't be a  
5 large leap to extrapolate it from cables to other  
6 ones?

7 MR. RUCKER: This is Roger Rucker for  
8 Entergy. I'd like to specifically talk to this and  
9 for the example, maybe I can clear this up maybe a  
10 little bit. This example, talking about cables, and  
11 it's talking about the function of cables. The  
12 intended function for cables is to conduct  
13 electricity. So that is the function you're trying  
14 to manage to make sure you do not lose. To manage  
15 that intended function, you're monitoring the  
16 insulation of the cable, so degradation of the  
17 insulation is not degradation of the intended  
18 function. So you monitor the component that can be  
19 monitored for cable which is insulation. And that  
20 prevents the degradation of the intended function.  
21 So for transformers, the intended function would be  
22 to supply power from --

23 JUDGE WARDWELL: We haven't talked about  
24 transformers yet. I'm not trying to compare them to  
25 cables yet. I'm just trying to say the Commission

1 has made some statements that seem to say that the  
2 functional degradation is important and I'm going in  
3 itty-bitty steps and you are way ahead of me and  
4 that's good. But for now, I'd like to concentrate,  
5 I just wanted to see whether in just a general  
6 sense, it's a simple question, whether or not it  
7 would be much of a leap to take what the Commission  
8 said about cables and apply it to other systems,  
9 structures, or components that, in fact, we all end  
10 up agreeing fall under Aging Management Review.

11 It's a pretty simple, specific question.  
12 I just want to make sure we're not held up for  
13 criticism later on to say oh, gee, no one said  
14 anything about the other systems, structures, or  
15 components. This just relates to cables. And I  
16 just want to see if it's a giant leap to say that if  
17 someone was reading this, they might want to use  
18 that as a guideline for other systems, structures or  
19 components that do fall under Aging Management  
20 Review and understand what the Commission would  
21 want.

22 MR. CRAIG: This is John Craig. I  
23 believe it's an example that was intended to provide  
24 guidance to show the need to have a performance or  
25 condition monitoring that would then form the basis

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1 of whether or not it was included as requiring Aging  
2 Management Review or not. So it's an example and  
3 it's not \* (8:44:01).

4 JUDGE WARDWELL: Thank you. I think  
5 that answers the question nicely.

6 I'll do a side track there. Keep in  
7 mind, you may feel I'm trying to trick you into  
8 something and I'm not. Probably the vast majority  
9 of these questions we ask are merely things that we  
10 have because we don't really, we don't know where  
11 we're going. We've read all the prefiled testimony,  
12 so we know the positions. And we know once we reach  
13 our decision, we're going to have to write a  
14 decision. And if there's some clarification on some  
15 points that may or may not even end up in our  
16 decision, we need to get it now because if we do  
17 want to put it in our decision, it's going to be too  
18 late a month from now as we're trying to write this  
19 up.

20 So I mean that's where slugging through  
21 some of these in these itty-bitty steps sometimes  
22 gets frustrating, but that's the nature of what we  
23 have to do in order to be able to refer back to it  
24 later. So I just want to make sure everyone is  
25 comfortable with that. I don't care whether you're

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1 comfortable with it or not, as long as you somewhat  
2 understand it.

3 (Pause.)

4 If we can come back to -- staff's  
5 testimony, it's Exhibit 000031, page 23, answer 32,  
6 transistors, power inverters, power supplies,  
7 circuit breakers, and battery chargers, do not  
8 require external controls, but they are all active  
9 components. Like transformers, they can easily be  
10 monitored for performance. Gross failure, and I  
11 added the underline, I believe, to that, of these  
12 components is readily detectable during plant  
13 operation.

14 And I'll turn to staff with similar  
15 questions that we're talking about. Where in the  
16 regulations or the Statement of Consideration does  
17 it say that the mere ability to detect gross failure  
18 is sufficient to an exempt a system, structure, or  
19 component from Aging Management Review?

20 MS. RAY: This is Sheila Ray from the  
21 staff. The Statements of Consideration discuss the  
22 maintenance rule and this is -- Statements of  
23 Consideration is Exhibit New York State 000016.

24 JUDGE WARDWELL: What page were you on  
25 and we can call that up.

1 MS. RAY: I'm on page 22471.

2 JUDGE WARDWELL: Hang on a second.

3 Andy, can we get that?

4 (Pause.)

5 And what's the page number again, Ms.

6 Ray?

7 MS. RAY: 22471.

8 JUDGE WARDWELL: Okay.

9 MS. RAY: This is on the bottom of the  
10 first column. And it starts with, in that middle of  
11 the paragraph "because the intent of the license  
12 renewal rule and the maintenance rule is similar,  
13 ensuring that the detrimental effects of aging on  
14 the functionality of important systems, structures,  
15 and components are effectively managed, the  
16 Commission has determined that the license renewal  
17 rule should credit existing maintenance activities  
18 and maintenance rule requirements for most  
19 structures and components."

20 So we rely on the maintenance rule to  
21 track the aging degradation.

22 And further on in the next column, the  
23 end of that paragraph, it says "as a result, the  
24 requirements in this rule reflect a greater reliance  
25 on existing licensing programs that manage the

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1 detrimental effects of aging on functionality  
2 including those activities implemented to meet the  
3 requirements of the maintenance rule."

4 JUDGE WARDWELL: And it's your opinion  
5 that that says that the ability to detect gross  
6 failure is sufficient to exempt a system, structure,  
7 or component from Aging Management Review?

8 MS. RAY: No. I would say that the  
9 point is to track aging, not to necessarily detect  
10 the gross failure, but to detect continual aging of  
11 the component.

12 JUDGE WARDWELL: Thank you. So would  
13 you agree with the statement that the express  
14 concerns of the Commission all point to the need to  
15 monitor for degradation rather than just be  
16 cognizant of the complete failure when it occurred?

17 MS. RAY: This is Sheila Ray. Yes,  
18 that's correct.

19 JUDGE WARDWELL: New York State Exhibit  
20 000012 is NUREG/CR-5753, pages 50 to 51, states that  
21 "a continual program of inspection, surveillance,  
22 monitoring, and maintenance will help ensure  
23 transformer reliability. Such a program will" and  
24 it goes on with a gap, but I've pulled out the  
25 statement "detect degradation in the early stages so

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1 that preventive and corrective action can be taken  
2 prior to transformer failure to reduce the rate of  
3 aging."

4 I'll go back to Entergy and doesn't this  
5 statement in the NUREG confirm that the intent of  
6 monitoring program for transformers hinges on its  
7 ability to detect potential failure before it  
8 occurs?

9 MR. CRAIG: This is John Craig. This  
10 hinges on -- the intent of the program is to manage  
11 aging and NUREG/CR-5753 did a review and the details  
12 for transformers --

13 JUDGE WARDWELL: May I interrupt? Do  
14 you know the title of that? I was going to pull it  
15 up. I should have had the title or maybe you can  
16 paraphrase the title of it? If not, I'll pull it  
17 up.

18 MR. McCAFFREY: This is Tom McCaffrey  
19 for Entergy. I have the exhibit. It's the Aging of  
20 Safety Class, Class 1E Transformers in a Safety  
21 System Nuclear Power Plants.

22 JUDGE WARDWELL: Thank you.

23 MR. McCAFFREY: So that would be a small  
24 subset at any nuclear plant. It would be Class 1E.  
25 It's sort of our discussion yesterday. It's in that

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1 separate class that's required for specific  
2 operation for post-accident.

3 JUDGE WARDWELL: Great. Thanks. Sorry  
4 to interrupt.

5 MR. CRAIG: The thrust of that work done  
6 under the Nuclear Plant Aging Research Program,  
7 NPARP, was to assess current industry practices with  
8 respect to maintenance and surveillance of  
9 transformers and answer the question are they  
10 acceptable for, are they adequate to manage aging of  
11 transformers. And the conclusion was yes, and the  
12 conclusion, I think, is correctly stated here to --  
13 and the goal to identify transformer degradation  
14 before failure. And of course, it recognizes that  
15 sometimes equipment fails in spite of the best  
16 monitoring, surveillance testing programs.

17 JUDGE WARDWELL: Thank you. Mr.  
18 McCaffrey, you said that this NUREG related to just  
19 a subset of transformers. Is it a small subset, a  
20 large subset of all of them or is it in between?  
21 Just give us a flavor for --

22 MR. McCAFFREY: Typically, Class 1E  
23 components at any site, those are the more  
24 stringent, safety related, relied on before an  
25 accident are a very small subset of all the total

1 electrical components at the site. At Indian Point,  
2 the transformers are not Class 1E.

3 JUDGE WARDWELL: Thank you. Staff's  
4 testimony at Exhibit 000031, page 14, answer 20,  
5 "the staff determined that transformers should be  
6 considered active components which did not require  
7 Aging Management Review because performance and  
8 degradation were readily monitorable. Any  
9 degradation of the transformer's ability to perform  
10 its intended function is readily monitorable by a  
11 change in the electrical performance of the  
12 transformer and the associated circuits."

13 With this testimony, don't you agree  
14 that it's the degradation performance that is the  
15 goal of monitoring and that the mere detection of  
16 failure after it occurs is not sufficient? Either  
17 of you from staff.

18 MR. MATTHEW: This is Roy Matthew from  
19 NRC. I would say you have to monitor the functional  
20 degradation. Also, the failure of the component is  
21 also monitorable. So it's both.

22 JUDGE WARDWELL: Have you been involved  
23 or are you aware of the current aging -- not aging,  
24 let's say the current maintenance activities meaning  
25 including monitoring of transformers that are

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1 occurring under the current licensing basis at  
2 Indian Point?

3 MR. MATTHEW: Yes, yes. Part of the  
4 maintenance rule, the transformers are included in  
5 part of the maintenance rule's scope. So licensees  
6 are supposed to establish performance goals for  
7 these transformers in terms of functional  
8 performance and they have to monitor and manage it  
9 through Preventive Maintenance Program. If you look  
10 at the maintenance rule, you have subsection (a)(1),  
11 (a)(2), and (a)(3); (a)(2) is the normal performance  
12 monitoring you do with the Preventive Maintenance  
13 Program. And New York exhibit shows what preventive  
14 maintenance Entergy is doing for those transformers.

15 If the transformers are degraded and  
16 they cannot meet the performance, the maintenance  
17 rule (a)(1) says you have to put it under that  
18 program, under that subsection and you have to take  
19 corrective action until the performance goal is  
20 achieved. So the maintenance rule program is a  
21 performance monitoring program which, of course,  
22 preventive maintenance and my understanding is  
23 Entergy is doing that, even though this particular  
24 discussion is not about the adequacy of the  
25 preventive maintenance.

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1 JUDGE McDADE: Help me understand this a  
2 little bit better.

3 Dr. Degeneff, earlier you drew a  
4 distinction between monitoring for performance and  
5 monitoring for condition. Can you explain the  
6 difference and the significance of that difference  
7 for me?

8 DR. DEGENEFF: Bob Degeneff. If I'm  
9 monitoring for performance, we're determining if the  
10 transformer is supplying power, if voltage is  
11 applied and current is flowing through the  
12 transformer. On the other hand, if we're monitoring  
13 for condition, we need to or we can use things like  
14 trends. We would look at the power factor on a  
15 bushing over a long period of time and see how that  
16 compares.

17 We could do frequency analysis of the  
18 winding structure to see if the windings have moved.  
19 We would look at gas and oil to see if there's  
20 anything going on inside the transformer structure.  
21 So the transformer could be performing exactly as  
22 it's designed and yet it's minutes away from failure  
23 because of some event that is monitorable, but that  
24 wouldn't affect its performance, but would affect  
25 its health.

1 JUDGE McDADE: So if we're only  
2 monitoring for performance, then we don't know what  
3 -- we're not in a position to realistically  
4 interpret what's going to happen in the near term in  
5 the future. If we're monitoring for condition,  
6 we're in a better position to be able to anticipate  
7 future action?

8 DR. DEGENEFF: Bob Degeneff. Yes,  
9 that's my opinion.

10 JUDGE WARDWELL: Mr. Matthew, do you  
11 know of any condition monitoring that is currently  
12 going on for transformers under the maintenance rule  
13 or current licensing basis which I assume is  
14 equivalent?

15 MR. MATTHEW: Yes. Yes, this is --

16 JUDGE WARDWELL: That's okay, I'll ask  
17 Entergy.

18 MR. MATTHEW: Yes, Entergy may be able  
19 to provide. I have an understanding of what  
20 maintenance they do, particularly they do, oil  
21 analysis they do, Doble test, power factor test.  
22 They do -- industry recommends preventive  
23 maintenance on those transformers.

24 JUDGE WARDWELL: Would you like to  
25 comment the success rate of minimizing or -- let me

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1 -- the success rate at being able to detect  
2 impending failure of a transformer as opposed to  
3 just the final, ultimate failure of the transformer?

4 MR. MATTHEW: Actually, whether you have  
5 a preventive maintenance or you have an Aging  
6 Management Program, irrespective of any program that  
7 you have, transformers can fail. It can fail due to  
8 10,000 different reasons. Some of them are  
9 manufacturer defect. It could be a design issue.  
10 It could be a transient caused by lightning or be  
11 out of your control.

12 All you can do with the Aging Management  
13 Program, even if you have it, is to monitor the  
14 functional performance on a preventive maintenance  
15 mode and you trend the data.

16 Let's say for instance oil analysis is a  
17 pretty good indicator of transformer degradation.  
18 Oil analysis gives you a lot of information, whether  
19 internals of the transformer are functioning  
20 properly. So there are a lot of information  
21 available through the industry standards and these  
22 are being done as part of the maintenance rule  
23 requirements.

24 JUDGE WARDWELL: In your experience with  
25 things like, let's just say, for instance, the oil

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1 analysis, I assume that can only be done offline, is  
2 that correct?

3 MR. MATTHEW: Yes, yes.

4 JUDGE WARDWELL: That can't be done  
5 while it's operating.

6 MR. MATTHEW: But some of the licensees  
7 have online maintenance, online monitoring, so it  
8 can be monitored automatically. So there are  
9 different ways of doing it.

10 JUDGE WARDWELL: So there are ways to do  
11 that?

12 MR. MATTHEW: Yes.

13 MR. McCAFFREY: Your Honor, this is Tom  
14 McCaffrey, Entergy --

15 JUDGE WARDWELL: Okay, just let me  
16 finish.

17 MR. McCAFFREY: I just wanted to clarify  
18 that you can test for oil online from -- on large  
19 power transformers. That's a standard practice that  
20 the industry does do.

21 JUDGE WARDWELL: Thank you. I'll be  
22 with you in just a second anyhow.

23 MR. MATTHEW: When I said online  
24 monitoring, it may not be necessarily all testing.  
25 Other functional monitoring.

1 JUDGE WARDWELL: Let's go to -- I assume  
2 Mr. McCaffrey would like to talk about it and then  
3 I'll get to you, Mr. Degeneff and any comments you  
4 might have.

5 MR. McCAFFREY: I just wanted -- the  
6 online testing that the NRC staff was talking about,  
7 dielectric sampling, oil and gas, whether you have  
8 an online monitoring system or not that you can take  
9 those samples from a transformer that's energized.  
10 The chemistry tech goes out there and takes a little  
11 oil sample, sorry --

12 JUDGE WARDWELL: Get the caffeine out  
13 for a second.

14 MR. McCAFFREY: You can take an oil  
15 sample on line. It takes a little jar sample, sends  
16 it to a lab or you can take a nitrogen -- a gas  
17 sample with a syringe and that gets sent off to a  
18 lab and that can be done when a transformer is  
19 energized.

20 JUDGE WARDWELL: It can be done.

21 MR. McCAFFREY: It can be done and it is  
22 done. It's normal practice. It's an industry  
23 standard practice to do that.

24 JUDGE WARDWELL: Now can you describe  
25 the various tests that you are currently conducting

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1 under the current license? Give us a little flavor  
2 for what those are, trying to keep electrons out of  
3 the discussion. This is broad-based, just to give  
4 us a feeling for what those are and then say whether  
5 they're done online or offline.

6 MR. McCAFFREY: Can we go to Entergy  
7 ENT000091. That's our testimony on page 97?

8 JUDGE WARDWELL: Yes.

9 (Pause.)

10 MR. McCAFFREY: There's a quote in the  
11 middle where there's bulleted items.

12 Your Honor, this is the list of tests we  
13 do on our transformers and I'll walk through which  
14 ones are done online and which ones are done when  
15 the transformer is out of service for maintenance  
16 and this would apply to our large oil-filled  
17 transformers at the site. Power factor,  
18 capacitance, hot collar, excitation current, leakage  
19 current, transformer turns ratio, winding resistance  
20 are typically done during a refueling outage or when  
21 a transformer is out of service. We can do all  
22 those electronic tests on the transformer when it's  
23 disconnected and they give you some indication of  
24 the major subcomponents inside a transformer of its  
25 health.

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1                   Corona scan, that would be done when the  
2 transformer is energized. We're looking for  
3 electrons jumping off the conductors, kind of  
4 simple.

5                   JUDGE WARDWELL: So by definition,  
6 that's done online.

7                   MR. McCAFFREY: That's done online, yes.

8                   JUDGE WARDWELL: You can't do it  
9 offline.

10                  MR. McCAFFREY: Correct. Winding  
11 resistance, insulation resistance, the sweep  
12 frequency response analysis are done during an  
13 outage when the transformer is out of service.  
14 Dissolved gas analysis, oil quality are done along  
15 with the furanic oil compound analysis, can be done  
16 online. Visual inspection and cleaning, obviously  
17 would be done during an outage and thermography is  
18 done while the transformer is in service.

19                  JUDGE WARDWELL: And what is that  
20 thermography?

21                  MR. McCAFFREY: For the exposed  
22 conductors, we're looking for high-resistance  
23 connections.

24                  JUDGE WARDWELL: And in your experience  
25 with trending the results of this, have you been

1 able to track the degradation of transformers and  
2 able to successfully predict the remaining service  
3 life of these components?

4 MR. McCaffrey: Again, this is Tom  
5 McCaffrey for Entergy. I believe we have ENT000125  
6 is our life-cycle management program. It's the  
7 results of all this preventive maintenance  
8 activities and trending. It's put together for our  
9 results of how are transformer health is going. As  
10 the staff mentioned, we don't identify, the program  
11 is not -- the industry cannot identify right now  
12 every single potential failure mechanism in the  
13 transformer and identify all those failures and  
14 prevent from happening, but these are the collective  
15 practices right now the industry is using for  
16 monitoring transformer health and we use that to  
17 identify the degrading trends in our transformers.

18 I'll give you an example, in February of  
19 this year, we saw a trend of our oil and gas  
20 analysis associated with one of our large power  
21 transformers. We started our corrective active  
22 process, made decisions to take the transformer  
23 offline before failure, make the repairs and return  
24 the transformer to service.

25 JUDGE WARDWELL: And it showed that the

1 repairs were needed when you got in there and were  
2 able to correct them?

3 MR. McCAFFREY: That's correct.

4 JUDGE WARDWELL: About how many failures  
5 have you had at the plant over the last -- well, let  
6 me ask this. When was this maintenance program to  
7 this extent initiated at Indian Point? Has it been  
8 going on since the plant's inception or is it fairly  
9 new or is it between?

10 MR. McCAFFREY: This is Tom McCaffrey  
11 again. There's been -- some of these tests have  
12 been going on for many years and some have been  
13 coming on as the technology has evolved and the  
14 industry has accepted these practices. They've been  
15 implemented at the site. So I don't know the exact  
16 time when one of these tests were rolled in, but  
17 it's been over the life of the plant.

18 JUDGE WARDWELL: Did you have any data  
19 that would be able to plot the number of failures  
20 per year through the years that Indian Point has  
21 been operating, came online?

22 MR. McCAFFREY: There's not a large  
23 amount of transformers on site and I believe I only  
24 recall three failures in the history of the site.

25 JUDGE WARDWELL: How many transformers

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1 are we dealing with on site that are under your  
2 maintenance rule? Let me ask this first, are all  
3 your transformers on site under your maintenance  
4 rule?

5 MR. McCAFFREY: All the transformers  
6 that perform a function are under the maintenance  
7 rule. There's some transformers that apply to the  
8 admin. building. They don't count in that -- they  
9 provide a safety-related function or a function  
10 required for maintenance rule, but they all would be  
11 under the maintenance rule.

12 JUDGE WARDWELL: Admin. is not important  
13 anyhow, right?

14 MR. McCAFFREY: Well, for the people  
15 working in the office they are. But not for the  
16 purposes of what we're here for.

17 JUDGE WARDWELL: That's right.

18 MR. McCAFFREY: The numbers I would --  
19 the numbers I have in my head is probably seven  
20 transformers at Unit 2 and nine at Unit 3 that would  
21 be considered transformers that are used for power  
22 operation. One of those at Unit 2 is oil filled.  
23 The other six are air filled, air transformers. And  
24 at Unit 3 there's two oil filled and seven air-  
25 cooled transformers.

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1 JUDGE WARDWELL: How many of these are  
2 the original transformers?

3 MR. McCAFFREY: That list I gave you was  
4 not inclusive of the main transformers, so there are  
5 two main transformers for each unit, so --

6 JUDGE WARDWELL: What do you mean by the  
7 main transformers as opposed to these?

8 MR. McCAFFREY: The transformers that --  
9 the two main transformers are what we step up from  
10 the main generator to the transmission generation  
11 system, so that are -- each unit has 22 kV and 345  
12 kV transformers. Those would be under the  
13 maintenance rule. That's why I want to make sure --  
14 there were two transformers for each unit, so there  
15 would be a total of 9 and 11 that would be under the  
16 maintenance rule. Those are oil-filled transformers  
17 and those are the ones we've had failures with, not  
18 the ones that are associated with off-site power or  
19 power provided to the emergency buses.

20 JUDGE WARDWELL: Back to my question,  
21 how many of these are the original ones, do you  
22 know?

23 MR. McCAFFREY: The four main  
24 transformers have all been replaced with new  
25 transformers. The remaining power transformers have

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1 not been replaced. So out of these --

2 JUDGE WARDWELL: Four of these have been  
3 replaced?

4 MR. McCAFFREY: Four of them have been  
5 replaced with new.

6 JUDGE McDADE: When and why?

7 MR. McCAFFREY: At the two at Unit 2  
8 were replaced with new transformers due to aging.  
9 We used our program here that we needed to replace  
10 our main transformers in 2006.

11 Those transformers were replaced in  
12 2006, and then at Unit 3, we had a transformer  
13 failure in 2007 that required a replacement, and  
14 then in the early 80's, there was a transformer  
15 failure at Unit 3 that required another replacement.

16 JUDGE WARDWELL: And just to make sure I  
17 understand this correctly, do you trend this data to  
18 see whether or not you can pick up anything in  
19 regards to the degree of performance of the  
20 transformers?

21 MR. McCAFFREY: Yes, we do. That  
22 Entergy Exhibit 125 is a life cycle management  
23 program, and that's where we pull all this data  
24 that's on the screen here. It's pulled all together  
25 to make a determination upon the health of the

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1 transformer.

2 JUDGE WARDWELL: How often do you  
3 collect this data on a transformer? Is it some of  
4 it continuous, for instance, or is there --

5 MR. McCAFFREY: Some of it's continuous.  
6 Some of it's based upon quarterly or monthly,  
7 depending upon when we get the oil samples, and some  
8 of it's on a refueling outage basis, or the outage  
9 basis when we do this work on a transformer.

10 JUDGE WARDWELL: Would you like to  
11 comment on that?

12 MR. McCAFFREY: I would --

13 JUDGE WARDWELL: And just try to limit  
14 it what we discussed so far, because this is on  
15 point for where we're at at this time.

16 MR. McCAFFREY: The major issue is what  
17 we monitor and how often we monitor. So if we look  
18 at the data on a four-year cycle, there's an awful  
19 lot of information that's lost, just because of the  
20 period, and --

21 JUDGE WARDWELL: What is the  
22 significance with the four-year cycle?

23 MR. McCAFFREY: Well, if I look at the  
24 failure on Indian Point 3, prior to that, if I  
25 remember correctly, the acceptable life, the

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1 acceptable monitoring period for bushing power  
2 factor was four years. And then after the failure,  
3 it was reduced to two years, and the question is is  
4 that often enough, as an example.

5 So the data that's being taken is  
6 superb. The problem is it's oftentimes so granular  
7 that you can't pick out the issue.

8 JUDGE WARDWELL: If we started with a  
9 new transformer now, what is generally considered to  
10 be the expected service life for that transformer?

11 MR. McCAFFREY: Well, you would hope --

12 JUDGE WARDWELL: Decades? Weeks,  
13 months, years, decades?

14 MR. McCAFFREY: No. You would hope  
15 decades. But the failure profile generally is a  
16 bathtub curve. So a device installed brand new  
17 probably will have a much higher failure rate in the  
18 first few years, and then once it's functioning,  
19 then it may function without incident for 20 years,  
20 and then it, for whatever reason, issues start to  
21 show up again.

22 So to put in a new transformer, and  
23 assuming that you can prolong the monitoring of it  
24 for whatever reason initially, I think it's missing  
25 how these devices tend to fail.

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1 JUDGE WARDWELL: Would you not agree  
2 that the initial startup of a transformer, like any  
3 other device, is somewhat hard to manage in regards  
4 to that failure of that component as it new, and is  
5 something that probably aging management isn't going  
6 to be real successful in trying to achieve  
7 monitoring of that?

8 MR. McCAFFREY: I don't know if you'd  
9 call it aging management or just monitoring the  
10 condition.

11 JUDGE WARDWELL: Do you believe the  
12 intent of the aging management review for license  
13 renewal attempts to weed out new components and  
14 their higher failure rates than those that have  
15 been off and running for a while?

16 DR. DEGENEFF: Bob Degeneff. I think  
17 the aging management program is to assess the  
18 performance and the condition of the transformer, so  
19 that it doesn't put us in a situation where we've  
20 got a safety issue. So if that's short term or long  
21 term --

22 JUDGE WARDWELL: Well for instance, in  
23 the short term area, you can't rely on trending  
24 much. There's not enough time, really, to develop  
25 the database --

1 DR. DEGENEFF: No, not at all. But let  
2 back off. Maybe that's a misstatement. If I  
3 install a new transformer, and I make the power  
4 factor measurements on the bushings, and three  
5 months later, as an example, I would go out and look  
6 at the power factor on the bushing again, and I see  
7 it's moved by 20 percent or 30 percent.

8 While that's an acceptable level of  
9 performance, it should be alarming as far as that  
10 the movement. So that trending should tell me  
11 something, and if I -- and what I would be concerned  
12 with, if someone puts in a new transformer and it  
13 says it's a new transformer and I'm not going to  
14 look at it for two years or four years.

15 Then I've missed that. So whether it's  
16 aging management or trending or whatever we call it,  
17 I think it would be prudent to have a program that  
18 looks at not only what we're measuring, but the  
19 frequency.

20 JUDGE WARDWELL: And these measurements  
21 you're talking about with regards to the bushing,  
22 what do you call them, the "bushing measurements"?

23 DR. DEGENEFF: Well, power factor or  
24 capacitance.

25 JUDGE WARDWELL: Where are those on this

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1 list that's shown up here?

2 DR. DEGENEFF: I would assume the first  
3 two, power factor and capacitance as an example,  
4 yeah.

5 JUDGE WARDWELL: And are those done,  
6 those can be done online or do they have to be off?

7 DR. DEGENEFF: Generally offline.

8 JUDGE WARDWELL: Okay. Mr. McCaffrey,  
9 what are your normal fuel cycle, your shutdown  
10 periods at Indian Point?

11 MR. McCAFFREY: I believe the question  
12 is what is our refueling cycle?

13 JUDGE WARDWELL: Yeah, that's --

14 MR. McCAFFREY: It's a two year, it's a  
15 two-year period.

16 JUDGE WARDWELL: Thank you.

17 MR. McCAFFREY: I just want to add  
18 though, we do do the tests that were just discussed  
19 on a two year frequency, and I do like to add,  
20 though, that the transformer failures they  
21 discussed, they were not age-related transformer  
22 failures. Those were design deficiencies or  
23 manufacturing deficiencies with the transformer that  
24 cause those failures.

25 JUDGE WARDWELL: And that's where I was

1 going next with staff. You've provided some  
2 insight. Staff, would you consider those early  
3 failures as part of aging or not?

4 DR. DEGENEFF: This is Roy Matthew for  
5 the NRC. I want to clarify a couple of things.  
6 First of all, the transformer failures to happened  
7 at Indian Point 2 and 3, those are the main  
8 transformers.

9 Otherwise, we call them as generation  
10 step-up transformers, so if you look at the license  
11 renewal scope, license renewal function, these main  
12 transformers are now required to perform any  
13 functions.

14 So the only function that occurred part  
15 of the license renewal scope, license renewal  
16 function, these main transformers are now referred  
17 to perform any function. So the only function that  
18 are referred part of the license renewal scope is  
19 what we call as station auxiliary transformers.

20 Those are smaller transformers. They  
21 usually during operation they are really lightly  
22 loaded. So from a performance regulation  
23 perspective, these transformers is not loaded pretty  
24 much. It sits with minimum loads.

25 So any kind of thermal degradation, any

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1 kinds of overloading, you know, that kind of  
2 phenomena doesn't exist. Mainly, in the industry,  
3 if you look at all the exhibits provided for this  
4 hearing, a high percentage, I think almost 99  
5 percent of them are main transformers, because these  
6 are the transformers where generation power is being  
7 transported to a firewall base.

8 At Indian Point, the generator is  
9 producing 22 kV, and it's being stepped up to 138  
10 kV. So for the license renewal function, there is  
11 no transformer function that has to step up. All  
12 the license renewal function transformers are  
13 stepping down from 138 kV to 649 kV, either 649 kV  
14 to 4.16 kV or 480.

15 So the degradation mechanism is totally  
16 different from that perspective. So I just want to  
17 mention, the population that has to meet the license  
18 renewal function is very few, on the two high  
19 voltage transformers, and most of them are all air-  
20 cooled, no oil transformers.

21 JUDGE WARDWELL: Thank you. Entergy's  
22 Exhibit 096 is often termed "The Grimes letter," and  
23 I'm looking at the attachment to that at page two.  
24 It's also included in 098, Entergy's Exhibit 098,  
25 which is the NEI 9510 document. There's a more

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1 readable version of the letter in that exhibit, I  
2 believe.

3 But in this 1997 letter, and at Staff,  
4 in their testimony, on Testimony Exhibit 031, page  
5 17, Answer 24, staff states, and I quote, "Any  
6 degradation of the transformer's ability to perform  
7 its intended function is rarely monitorable by a  
8 change in the electrical performance of the  
9 transformer and the associated circuits.

10 "Trending electrical parameters  
11 measuring during transformer surveillance and  
12 maintenance, such as Doble tests and advanced  
13 monitoring methods such as infrared thermography and  
14 electrical circuit characterization and diagnostics,  
15 provide a direct indication of the performance of  
16 the transformer."

17 For staff, what did you mean by when you  
18 have the phrase "Change in the electrical  
19 performance"?

20 MS. RAY: This is Sheila Ray of the  
21 staff. Your Honor, regarding some of the electrical  
22 tests that can be performed on the transformer, such  
23 that the ones similar to, that Entergy had  
24 mentioned, the capacitance and the power factor  
25 testing, were to determine the entirety of the

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1 windings.

2 JUDGE WARDWELL: And can you -- what is  
3 your impression, Ms. Ray, of the track record of  
4 using these changes in this electrical performance,  
5 in predicting the remaining qualified life of  
6 transformers?

7 MS. RAY: This is Ms. Ray. I would say  
8 you'd have to use the electrical information, as  
9 well as some of the other tests, such as an oil-  
10 filled transformer. The oil tests can give you a  
11 great deal of information regarding the degradation  
12 of the components of the transformer.

13 JUDGE WARDWELL: I think we have a  
14 pretty good handle on some of those. I'm not quite  
15 sure I understand what a Doble test is. Would you  
16 describe the test, or we can find someone else, if  
17 you're not familiar with the details of it, and we  
18 don't need much detail either.

19 MS. RAY: It's a power factor test, but  
20 I would defer to Entergy.

21 JUDGE WARDWELL: It's one of the power  
22 factor tests. That's sufficient, sure. I don't  
23 need to know any more indepth than that. Staff, in  
24 your testimony, Exhibit 031, page 17, Answer 25, you  
25 say "Samples of the transformer oil can tell service

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1 engineers a great deal about the condition of the  
2 transformer."

3 Do you know if anyone has used oil  
4 analysis successfully to detect an impending failure  
5 of a test? Are they trendable results, or are they  
6 mostly either yes or no in regards to whether or  
7 not there's going to be problems in the near future?

8 MS. RAY: This is Ms. Ray of the staff.  
9 Yes, it is trendable results

10 JUDGE WARDWELL: Thank you. And again,  
11 there is now -- there are now, if I understand the  
12 testimony, techniques to do it online, but I  
13 believe, Mr. McCaffrey, you said that you don't do  
14 it online, or is that one that you do?

15 MR. McCAFFREY: This is Tom McCaffrey,  
16 Entergy. We do perform those tests online, and we  
17 do have an installed online gas monitor for large  
18 power or main transformers that does it  
19 continuously.

20 JUDGE WARDWELL: Thank you very much.  
21 And staff, you also state -- oh no. It's Entergy  
22 that's stating in their exhibit on page 37, A55,  
23 "The primary voltage and current are regularly  
24 monitored for both." Certainly.

25 But let me ask, how does monitoring the

1 primary voltage incurred give anyone an indication  
2 in regards to impending failures, and a mechanism to  
3 predict the remaining life? Anyone from Entergy who  
4 wants to address that?

5 MR. McCAFFREY: This is Tom McCaffrey,  
6 Entergy. Primary voltage and current, we monitor  
7 that in our control room, our Operations monitor.  
8 It depends on the transformer that's primary or  
9 secondary current. They can monitor the voltage and  
10 current somewhere in the control room.

11 They take logs, I believe, twice a  
12 shift, and there are alarms that for indications on  
13 our 400 volt and 6.9 kV buses. There are alarms of  
14 degradation that are occurring that the operators  
15 can detect, and then take action to correct it.

16 JUDGE WARDWELL: And do you see much of  
17 that beforehand? I mean is there much change in the  
18 -- is there a successive change in voltage in the  
19 current that would indicate a degradation of the  
20 transformer as it ages?

21 MR. McCAFFREY: There could be  
22 indications. If there's some issue with the  
23 transformer, there could be indications the  
24 operators would detect and would pick up, and would  
25 take actions in accordance with the procedures, to

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1 isolate that transformer before failure occurs.

2 JUDGE WARDWELL: But generally it's not,  
3 I can't pull an example off my head, but it's not  
4 that you see the voltage gradually dropping as the  
5 transformer ages, such as it's something that could  
6 be plotted out and estimate the service life  
7 remaining of the transformers?

8 MR. McCAFFREY: No. Typically, voltage  
9 is not used as an aging, you know, criteria for  
10 determining its life. Some of the other tests we  
11 do, which we run, are used directly to its life  
12 cycle management.

13 JUDGE WARDWELL: Dr. Degeneff, how are  
14 transformers power rated? Are they, is there  
15 terminology that's used for it, "Oh, that's a  
16 blankety-blank transformer." And all the electrical  
17 engineers sit and go "yeah, that's really cool."

18 DR. DEGENEFF: It's a 200 MVA  
19 transformer. It's rated or designed --

20 JUDGE WARDWELL: And the VA is what?

21 DR. DEGENEFF: Volt amperes.

22 JUDGE WARDWELL: And is a transformer  
23 100 percent efficient?

24 DR. DEGENEFF: No, no. Depends upon the  
25 size and depends upon the design. So a large GSU

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1 might be 99.7 percent efficient. A smaller  
2 transformer, an 100 kVA transformer, might be 97  
3 percent or 96 percent efficient.

4 JUDGE WARDWELL: Considering it's not  
5 100 percent efficient to start with means that  
6 there's some losses in there.

7 It would strike me that as various  
8 things start to age, such like the winding  
9 insulation, the core lamination, separations that  
10 are talked about in the testimony, as those  
11 occurred, wouldn't that reduce the efficiency, and  
12 why can't that be picked up in a monitoring program?

13 DR. DEGENEFF: Bob Degeneff. The  
14 efficiency that you're referring to is the  
15 efficiency or the rate that the power is converted  
16 from one winding to another, all right, and the  
17 losses that we're talking about here, are divided  
18 into a couple of categories.

19 Copper loss, okay. So the conductors,  
20 the current just passing through the copper  
21 conductors, that has a certain amount of  
22 inefficiency. Typically in a large transformer,  
23 that might be two-thirds of the loss, okay.

24 As the transformer ages, the insulation  
25 ages, but the copper or aluminum windings, if it's a

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1 well-maintained transformer, don't move and don't  
2 change size. So the copper losses, the conductive  
3 losses essentially would be invariant, for a  
4 particular load.

5 The other major component of losses  
6 would be the core loss, and that's driven by the  
7 size of the core and the core material. And again,  
8 even as the transformer aged, by and large the  
9 transformer core isn't going to change.

10 You do make a good point, though. If a  
11 transformer is abused, the core can have welding and  
12 laminations, and that would cause additional  
13 heating, and also additional losses, and those  
14 things can be picked up.

15 JUDGE WARDWELL: But generally the core  
16 is pretty stable most of --

17 DR. DEGENEFF: Pretty invariant.

18 JUDGE WARDWELL: In New York's  
19 testimony, Exhibit 005, that may not be your  
20 testimony, but that exhibit, is that your report, or  
21 is that your testimony?

22 MR. SIPOS: Your Honor, this is John  
23 Sipos. Yes, that is Dr. Degeneff's report.

24 JUDGE WARDWELL: Okay, that's what I  
25 thought, and I think it's dated December 12th, 2011,

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1 at 4 of 15. You discuss transformer conditions such  
2 as "polymerization, diminishment in the mechanical  
3 and structural integrity of the core and core  
4 assembly, and movement of winding structure that can  
5 cause transformer failure. Yet these conditions may  
6 not affect the operating characteristics of the  
7 transformer prior to failure."

8 Staff, do you agree with New York  
9 State's position on this in regards to these types  
10 of transformer conditions, that wouldn't readily be  
11 picked up by monitoring operational characteristics?

12 MR. MATTHEW: I don't think this  
13 mentioned in any of the industry standards. The  
14 industry could probably amplify that.

15 JUDGE WARDWELL: Fine. I'm just asking  
16 you. Do you have any disagreement with these, with  
17 this statement is all? I just --

18 MR. MATTHEW: It is possible.

19 JUDGE WARDWELL: In the testimony at 21,  
20 New York states that "The metals in the structure,  
21 magnetic circuit and windings are in general not  
22 subject to aging, as are non-metallic components.  
23 Thus, the life of the transformer depends mostly on  
24 the life of the insulation." Entergy, would you  
25 agree that the life of the transformer depends

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1 mostly on the insulation?

2 MR. McCAFFREY: This is Tom McCaffrey  
3 for Entergy. I would agree that the majority of the  
4 components are associated with insulation. But  
5 there are metallic structures inside the transformer  
6 that can describe or limit the life of the  
7 transformer. The majority of it associated with the  
8 insulation qualities of the transformer.

9 JUDGE WARDWELL: Thank you. Staff,  
10 isn't it this loss of insulation that the Commission  
11 was also concerned about in its Statement of  
12 Consideration. That's Exhibit 016 at 22477, that  
13 they were concerned about with cables, and listed  
14 them as items requiring aging management review?

15 MS. RAY: This is Sheila Ray for the  
16 staff. Yes, they were concerned about the cable  
17 insulation.

18 JUDGE WARDWELL: And do you know of any  
19 ability to detect the degradation of the insulation  
20 in transformers, the internal windings, on the  
21 transformer performance?

22 MS. RAY: This is Ms. Ray of the staff.  
23 Yes, there are tests that can be performed, and  
24 those were included in the list that Entergy had  
25 referred to earlier.

1 JUDGE WARDWELL: Thank you. Bear with  
2 me for a minute. I'm just reading through to see,  
3 to cull out repetitive questions that have already  
4 been covered, based on the testimony so far today.

5 Let me ask this question of Mr.  
6 McCaffrey, and others can chime in afterwards. Has  
7 the electrical industry in general, in your  
8 experience, and anyone else from Entergy who wants  
9 to comment on this also, known of anyone that has  
10 replaced transformers on a set period of time prior  
11 to failure, to prevent that from happening?

12 MR. McCAFFREY: This is Tom McCaffrey,  
13 Entergy. The question, do we know of anybody who's  
14 replaced, proactively replaced a transformer before  
15 a failure has occurred?

16 JUDGE WARDWELL: As a preventive  
17 maintenance technique, yes.

18 MR. McCAFFREY: Yes. At Indian Point we  
19 have. In the transformers that were replaced at  
20 Indian Point Unit 2, were replaced in 2006, based  
21 upon a life cycle management program that dictated  
22 that it needed to be replaced prior to the failure.  
23 That's why they were new transformers put in in  
24 2006.

25 It is a common practice to use the

1 techniques that we described before as part of the  
2 life cycle management plan for the transformers to  
3 be replaced, and that's a generally accepted  
4 practice for the industry to follow.

5 JUDGE WARDWELL: For the nuclear  
6 industry. The electrical industry on a whole  
7 doesn't do that, do they? They don't have the  
8 safety needs, you know. They can wait until a  
9 transformer, you know. They can wait until a  
10 transformer fails and then replace it, can't they?

11 MR. McCAFFREY: I believe most people do  
12 not try to run those large power transformers to  
13 failure that we're discussing here. Those are, you  
14 know, from an economic and safety impact, or  
15 liability impact, there are impacts to the business  
16 of any utility or electrical power generation plant,  
17 just the same as being nuclear.

18 It's an impact, and nuclear just has the  
19 added safety factor on top of it. So everybody does  
20 not want to have a transformer failure.

21 JUDGE WARDWELL: But the observation of  
22 the one out my window probably doesn't have that  
23 scrutiny of maintenance concerns? They're liable to  
24 wait for that to fail than replace it?

25 MR. McCAFFREY: Correct. It's easy for

1 a line crew to come out and replace that small  
2 overhead transformer versus the -- if we're talking  
3 large power transformer, you know, 40 mVA or larger,  
4 they were not simple devices and they take a lot of  
5 effort to replace.

6 JUDGE WARDWELL: Again, I have been  
7 pointed out that the operation of my home is  
8 significantly different than the operation of a  
9 nuclear power plant, and I recognize that. Let me  
10 get this up for you.

11 New York, it's your testimony, I  
12 believe, 003, page 32, you state that in addition to  
13 degradation of the entire core assembly, individual  
14 windings may also deform and affect adjacent  
15 windings, leading to internal arcing in the  
16 insulation structure."

17 Is this internal arcing detectable?  
18 Does it have any side effects that would make it  
19 readily monitorable in regards to problems  
20 associated with the --

21 DR. DEGENEFF: Bob Degeneff. Yes, the  
22 reason that the windings would or could move was  
23 because of the short circuit currents that would  
24 flow in the winding, and the forces developed some  
25 kind of an event out on the system around the

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1 transformer.

2 And if windings move, there's a  
3 possibility that the insulation structure within the  
4 windings will be deformed or damaged, and that would  
5 cause arcing. Depending upon the magnitude of the  
6 arcing, if it's severe enough, you would fail a  
7 transformer outright.

8 If it's not severe enough, what would  
9 happen is you would generate, you'd break down the  
10 insulating oil, and you'd get combustible gases in  
11 the oil, and probably you would see acetylene, as an  
12 indicator that some kind of arcing was going on.

13 So depending upon how frequently the gas  
14 and oil measurements were made, you would see that,  
15 and that could be trended. Oftentimes, what happens  
16 is you will get a small event, and you'll get  
17 degradation, and that degradation will grow over  
18 time. So the level of acetylene would grow, and  
19 there are actually guidelines on when to remove a  
20 transformer from service.

21 JUDGE WARDWELL: You mentioned something  
22 about a gas. It that where the gas analysis comes  
23 in that I've --

24 DR. DEGENEFF: That's correct, yes.

25 JUDGE WARDWELL: And is that something

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1 that is also done online --

2 DR. DEGENEFF: Can be done. Can be done  
3 either offline or online.

4 JUDGE WARDWELL: And I gather Entergy,  
5 that those lists of tests that we had up before,  
6 some of those would try to achieve that monitoring  
7 of the gas and the arcing and the associated gas  
8 generated from it?

9 MR. McCAFFREY: This is Tom McCaffrey,  
10 Entergy. That would be the gas monitoring, oil and  
11 gas analysis. We do do that, and we do have an  
12 installed online gas monitor for our main generation  
13 transformers.

14 JUDGE WARDWELL: Thank you. Back to New  
15 York. On page 33, you state that a corona or radial  
16 interference voltage, RIV, generated by the  
17 transformer, will have no affect on the operating  
18 characteristics of the transformer, but is a sure  
19 indication of a problem with the transformer."

20 And again, is that part of this arcing,  
21 and is that just another --

22 DR. DEGENEFF: Yes, or even before  
23 arcing, if the stress in a localized area is great  
24 enough, you'll get a -- it will be a blow or a small  
25 amount of arcing, which will grow over time. That

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1 can be picked up acoustically or can be picked up  
2 electrically, and it's certainly an indication that  
3 there's some issue.

4 In factory acceptance tests,  
5 manufacturers listen for that and that level of  
6 electrical noise has to be below a certain level.  
7 So when you put the transformer out in the field and  
8 that level gets higher, it's indication that there  
9 may be an issue.

10 JUDGE WARDWELL: Mr. McCaffrey, do you  
11 monitor for RIV at your plant? I didn't --

12 MR. McCAFFREY: That would be picked up.  
13 This is Tom McCaffrey, Entergy. That would be  
14 picked up as part of our gas monitoring, if there's  
15 any type of degradation going on with the coil or  
16 insulation it would be picked up there, and then  
17 also through our offline global electrical tests.

18 JUDGE WARDWELL: Thank you. New York,  
19 you state at page 34 that "Regardless of whether  
20 age-related degradation is reversible or not, in  
21 either case a robust surveillance program relying on  
22 various monitoring techniques is necessary.

23 In the end, many types of age-related  
24 degradation are only identifiable through visual  
25 inspections made when the transformer is offline,

1 even when a monitorable technique may identify a  
2 general concern."

3 After hearing the testimony today and  
4 reading their written testimony, isn't Entergy  
5 performing these inspections and observations  
6 offline and doing online stuff to monitor the aging  
7 of these transformers?

8 DR. DEGENEFF: Bob Degeneff. I think I  
9 mentioned earlier that the suite of measurements  
10 that they're making, the measurements are fine. The  
11 frequency is what's of concern.

12 Again, if we go back to Indian Point 2,  
13 the power factor measurements on the bushing, after  
14 the transformer was installed initially with one  
15 year and then it was two, and then it was -- there  
16 was no measurement.

17 But it was a two and a half year period  
18 between the last measurement and then the bushing  
19 failed, and the question, I would venture that the  
20 question should be if measurements were made every  
21 six months, would that have been caught?

22 JUDGE WARDWELL: Well, Entergy, would  
23 you like to comment on that position of --

24 MR. McCAFFREY: This is Tom McCaffrey,  
25 Entergy. At the time, the Unit 2 21M (ph)

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1 transformers installed, we were following the  
2 initial guidelines, I believe it was four years for  
3 global testing. That's the bushing testing. We did  
4 not have an install -- there is really no online  
5 testing you could do for bushing to determine its  
6 health.

7 It had a catastrophic failure due to a  
8 design construction weakness in the bushing itself.  
9 We engaged the manufacturer on that. We changed the  
10 bushing out to a different type, and we reduced our  
11 frequently to two years, which is greater than the  
12 current industry experience for testing of bushings.

13 So we basically took our own OE, changed  
14 our process and are right now, are operating or  
15 testing of our bushings are more frequent than our,  
16 the industry recommendations right now.

17 JUDGE WARDWELL: Thank you. On New York  
18 Exhibit 019, there's an Information Notice of  
19 transformer failures dated July 7th, 2009, and in  
20 that notice, staff states that "A relatively high  
21 incidence of transformer failures has occurred in  
22 the last few years, the majority of which could have  
23 been avoided had the license fully evaluated and  
24 effectively implemented corrective actions and  
25 recommendations identified in industry operating

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1 experience."

2           Could you give us a handle of what you  
3 consider to be relatively high incidence of  
4 failures, anyone, either of you from staff?

5           MR. MATTHEW: Yes. This is Ryan Matthew  
6 from the NRC. We issued the Information Notice in  
7 2009, based on really of all operating experience.  
8 We do an annual review for reactor operating plants.  
9 We did that for failures, and we know that the high  
10 rate of failures of transformer, compared to  
11 previous years.

12           So that was a concern to the NRC, not  
13 because of license renewal aspects, because of  
14 effectiveness of maintenance in following the  
15 maintenance rule. These transformers are from a  
16 plant report, plant perspective. Any time a reactor  
17 scram happened, it challenged the safety systems.

18           So from that aspect, it's an initiating  
19 event concern. That's why, one of the reasons why  
20 we issued this Information Notice, to alert the  
21 industry there are failures. They had to look at  
22 the industry standards.

23           One of the examples is the IEEE C57-107  
24 regarding maintenance and acceptance of insulating  
25 oil, because oil analysis gives a lot of information

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1 on the condition of transformer internal workings.

2 Like we talked about arcing for, you  
3 know, corona, the insulation, breakdown of oil  
4 because of many concerns. So we alerted the  
5 industry to look at their maintenance program. So  
6 that was an --.

7 JUDGE WARDWELL: So it's true that  
8 you've asked them to look at really what's taking  
9 place under a Part 50, to assure that the  
10 maintenance rule is performing as you wish to, and  
11 there is a level of incidences that needs some  
12 addressing.

13 MR. MATTHEW: Right.

14 JUDGE WARDWELL: Thank you.

15 JUDGE McDADE: Okay. It's --

16 (Pause.)

17 JUDGE McDADE: Two minutes hopefully.  
18 Just something very brief. We're going to take a  
19 break here for a few minutes, and before we go into  
20 the break, there's just something I'd like to be  
21 thinking about, and Dr. Dobbs, if you could please  
22 explain to me what you understand the term "change  
23 of state" to be. We're going to get into this in  
24 more detail later. But I'd just like to, as we go  
25 into the break, have this in my mind.

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1 DR. DOBBS: My background -- this is  
2 Steve Dobbs for Entergy. My background, I have a  
3 lot of digital electronic experience, and had you  
4 asked me this question before these, I got into  
5 these proceedings, when I would say in the terms of  
6 digital electronics, change of state typically  
7 refers to a transistor, when it changes in a digital  
8 circuit from on to off, 1 to 0.

9 However, as I read through the testimony  
10 and how it's used in these proceedings, I have to  
11 believe that that is much more expanded than that,  
12 and that you must consider it to mean, be almost  
13 synonymous with changing properties.

14 The reason I say that is because of its  
15 usage through this. Like if you look at the Grimes  
16 letter, the NRC says that the changing of voltages  
17 represents a change in state. If you look at the  
18 table at the end of the Degeneff report, he refers  
19 to a battery as experiencing a change in state.

20 There are some other -- there are other  
21 places in the testimony where change in state is  
22 used, and the way it is used in those does not show  
23 it to be a definite on/off type situation, but to  
24 have intermediate type situations.

25 Like in a battery, if you consider a

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1 battery to be undergoing a change in state as the  
2 chemicals are used up, change in specific gravity  
3 and those type things, then it's not a strict on/off  
4 situation.

5 Another example would be there are some  
6 places in here where change in state refers to water  
7 going from liquid to steam. So I believe that in  
8 these proceedings, change in state and change in  
9 properties are almost synonymous terminology.

10 JUDGE McDADE: Dr. Degeneff, would you  
11 expand on that? Do you view it differently?

12 DR. DEGENEFF: Bob Degeneff. Yes, a  
13 little differently. If we're talking about a  
14 transistor or a thyristor, the idea of changing  
15 state is, as Dr. Dobbs said, on or off, okay. If  
16 I'm talking about a battery changing state, the  
17 chemical composition of the battery fluid, its pH,  
18 is changing. It's something that can be measured.

19 On the other hand, a pipe isn't changing  
20 state, because the fluid is passing through it, is  
21 passing through it, okay, and a transformer, in the  
22 same way, is just passing energy through it while  
23 there's something going on. The transformer is not  
24 changing its configuration or its state. So I --

25 JUDGE McDADE: Okay. We're going to

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1 get into this quite a bit later. But I just wanted,  
2 before we took the break, just to have sort of  
3 triggered in my mind your views on that. Judge  
4 Wardwell, take a break? Judge Kennedy?

5 Okay. It's ten minutes of. If we  
6 break, then, until 10:00. We are in recess.

7 (Whereupon, a short recess was taken.)

8 JUDGE WARDWELL: I have a series of  
9 questions dealing with this interaction between the  
10 maintenance rule current licensing basis and aging  
11 management review for transformers. Entergy's  
12 testimony 091, page 94, answer 105 says, "The  
13 Commission specifically excluded Part 50 or CLB  
14 issues from the scope of license renewal as defined  
15 in 10 CFR 54.30."

16 And I guess that confused me a little or  
17 it confuses me a lot. I don't know -- Well, I guess  
18 I'll start with Entergy. Are you implying that any  
19 system, structure or component --

20 People are starting to look to you, Mr.  
21 Craig. So I assume you might be the one that will  
22 be answering this. You look the most attentive. So  
23 I guess I'll ask you, Mr. Craig. And you can pass  
24 it on if you want to. Are you implying that if a  
25 system, structure or component is currently handled

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1 under the current licensing basis in a maintenance  
2 rule that is exempt from aging management review  
3 under Part 54?

4 MR. CRAIG: John Craig for Entergy.  
5 I'll start and let me Mr. Rucker add in when I'm  
6 done. I don't want to imply anything.

7 What I want to state is that the rule,  
8 Part 54, says that if there's an issue of question  
9 with respect to current operation of the plant as  
10 this Commission described in the Statement of  
11 Consideration it will be dealt with under the  
12 provisions of its Part 50 license. And in  
13 particular the Commission made it quite clear if  
14 there was a safety issue, a concern that was  
15 important, that it was not going to wait until a  
16 plant had operated for 40 years before it addressed  
17 it.

18 JUDGE WARDWELL: Right. But likewise  
19 they didn't say if that is just because we said that  
20 doesn't exempt it from Aging Management Review  
21 either, does it?

22 MR. CRAIG: No. But with respect to the  
23 criteria in 54.21, the Commission tried to define a  
24 process that differentiated between how aging would  
25 be managed, not whether it was going to be managed.

1 So the key is what process, what question, can you  
2 ask to determine whether you're going to treat aging  
3 management in the context of 10 CFR 65, The  
4 Maintenance Rule, and your current licensing. Or  
5 whether you're going to require an Aging Management  
6 Review and the establishment of an Aging Management  
7 Program.

8 So when the Commission did the initial  
9 work in the `80s as part of the Nuclear Plant Aging  
10 Research Program and all the other work that was  
11 done, they were trying to determine whether there  
12 were some aging mechanisms or degradation effects  
13 that would be uniquely relevant to the renewal term.  
14 And the conclusion was after we tried one rule that  
15 the maintenance rule was in effect. And if you  
16 could conclude that there was a parameter that was  
17 monitorable, readily monitorable, when a system,  
18 structure or component performed its intended  
19 function, that would then allow the Commission to  
20 rely on the maintenance rule to manage aging for  
21 that component under Part 50.65.

22 JUDGE WARDWELL: But that would still be  
23 potentially addressed and included in Aging  
24 Management Review depending upon other factors as  
25 delineated in Part 54.

1 MR. CRAIG: No. It's a --

2 JUDGE WARDWELL: You said no. That's  
3 all I really need because I'll ask this question to  
4 make it simple. Do you believe that a system,  
5 structure or component that's currently under Part  
6 50, Current Licensing Basis, is automatically exempt  
7 from Aging Management Review?

8 MR. CRAIG: No.

9 JUDGE WARDWELL: Okay. That's really  
10 what I just wanted to make sure of that. Try and  
11 explain it simply in regards to why you might want  
12 to modify that no if you want to add anything more  
13 to it beyond what you already have.

14 MR. CRAIG: I think Part 54 is pretty  
15 clear.

16 JUDGE WARDWELL: That seems to me --  
17 then maybe I'll focus your attention to it -- a  
18 different statement than the one that was made in  
19 regards to answer 105. The Commission specifically  
20 excluded Part 50 or CLB issues from the scope of  
21 license renewal as defined in 54.30. Was it just my  
22 warped reading of that then? You don't see any  
23 discrepancy between the two positions.

24 MR. CRAIG: No, sir. I don't.

25 JUDGE WARDWELL: Okay. Good.

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1 Staff, on your testimony, page 11,  
2 answer 17, you said, "Are transformers within the  
3 scope of license renewal?" And the answer is "yes."  
4 What do you mean by the "scope of license renewal"?

5 MS. RAY: This is Sheila Ray. This is  
6 defined in 10 CFR Part 21 of the -- I'm sorry. 10  
7 CFR 54.4 of the components that would be within the  
8 scope of license renewal. And specifically for  
9 transformers we'd be looking at the transformers  
10 included for station blackout recovery to get power  
11 back from the grid to the plant.

12 JUDGE WARDWELL: If one argues as I  
13 believe you did in your testimony that transformers  
14 are -- and I'm going to use the code phrase "active"  
15 even though that doesn't appear in the regulations.  
16 But keep in mind that active are those that have  
17 moving parts and/or changes in the configuration  
18 properties or state. Aren't they outside the scope  
19 of license renewal or are they still within the  
20 scope of license renewal but excluded?

21 MS. RAY: This is Sheila Ray. They are  
22 within the scope of license renewal, but two parts  
23 happen -- I guess it's scoping and screening. So  
24 they are within the scope of license renewal, but  
25 they are screened out because they are active

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1 components which then would mean they don't require  
2 an Aging Management Program.

3 JUDGE WARDWELL: And so you would agree  
4 then also that they are still within the scope of  
5 license renewal even though they're under the  
6 current licensing basis and maintenance rule. That  
7 doesn't have a bearing necessarily on whether  
8 they're within the scope of license renewal.

9 MS. RAY: This is Sheila Ray. Yes,  
10 that's correct.

11 JUDGE WARDWELL: It's coming clearer now  
12 to me. Lots of interactive words that are sometimes  
13 hard to mesh together to one unified understanding.

14 Entergy, in your testimony on page 87,  
15 answer 96, "Transformers and activities relating to  
16 transformer monitoring and maintenance activities  
17 are within the scope of equipment and activities  
18 governed by 10 CFR 50.65."

19 And just to clarify this point again in  
20 regards to this statement, do you know of any  
21 regulation -- and I'll turn to Mr. Craig -- that  
22 exempts a passive -- again I'll use the phrase as  
23 being one that doesn't have moving parts, etc., etc.  
24 -- that is currently monitored under Part 50 as  
25 being exempt from the 54 rules?

1 MR. CRAIG: Let me try and answer it  
2 this way. There is a large volume of structures and  
3 equipment within the scope of license renewal.

4 The question that the Commission needed  
5 to address was how will aging management for that  
6 group of equipment be managed during the period of  
7 extended operation. And they determined that there  
8 were two primary mechanisms to do it. The bulk of  
9 the equipment because it is active as we've  
10 discussed they would rely on the current licensing  
11 basis part which is the maintenance rule, 10 CFR  
12 50.65.

13 And because the current licensing basis  
14 continues in the renewal term, there is reasonable  
15 assurance that aging will be managed for the bulk of  
16 the equipment, structures and components, in the  
17 scope of the License Renewal Rule. There's a much  
18 smaller subset for which using the logic in 54.21  
19 that the performance of the intended function, the  
20 way it performs, the changes are not readily  
21 monitored. For that group of equipment in the  
22 context of license renewal the requirement is that  
23 there's an aging management review is done and from  
24 that you develop an aging management program.

25 So you start with a lot of equipment.

1 You ask how aging is going to be managed. And at  
2 the end, you get Part A. It's going to managed by  
3 50.65. Part B it's going to be managed by Part 50  
4 via an AMR and an AMP.

5 JUDGE WARDWELL: Thank you. That was  
6 very helpful. I lost my thought on that.

7 So where we stand now really then and is  
8 it your opinion that the question now comes down to  
9 whether transformers are ones that are included for  
10 Aging Management Review or excluded from it in  
11 regards to that universe population of all the SSCs  
12 that fall under scope of license renewal.

13 MR. CRAIG: Yes, sir.

14 JUDGE WARDWELL: And do you agree with  
15 that?

16 DR. DEGENEFF: Yes.

17 JUDGE WARDWELL: Why don't you state it  
18 so they can hear?

19 DR. DEGENEFF: Degeneff. Yes.

20 JUDGE WARDWELL: Thank you. That's  
21 going to solve a lot of my incremental questions I  
22 think in this area.

23 Well, I am going to bring up some others  
24 just because I think they'll come into play later  
25 on. No. I guess I didn't get rid of as many as I

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1 thought for other reasons.

2 New York, I believe this is your  
3 rebuttal testimony, Exhibit 000414, page 36-37, the  
4 questions and answers there. The question that's  
5 presented is "Are you arguing as Entergy experts  
6 assert that Entergy is required to detect in advance  
7 of failure all of the aging defects and degradation  
8 phenomena in components including transformers?"

9 And where Entergy asserted that I just  
10 put in a reference to that as part of your question.  
11 Or maybe you did. I can't remember. That was  
12 presented as Entergy's testimony at 96, answer 107.

13 Your answer to that is "No, I'm not  
14 arguing that an AMP is required to detect all aging  
15 degradation in transformers. I am arguing that an  
16 AMP is necessary to detect degradation that can  
17 cause the loss of transformer functionality."

18 My question to you is do you believe  
19 that a meaningful AMP for transformers could be  
20 written that would achieve an effective improvement  
21 over what is currently being done as a maintenance  
22 rule, under the maintenance rule.

23 DR. DEGENEFF: Degeneff. Yes.

24 JUDGE WARDWELL: And, Dr. Degeneff, and  
25 your main area of concern in addition to the fact

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1 that there is not an aging management program for  
2 transformers is that it's the frequency of the  
3 testing and the monitoring that's being performed.  
4 That is your main issue of contention.

5 DR. DEGENEFF: Degeneff. I think that's  
6 the major. But as mechanisms become more available,  
7 then those should be applied. In other words, gas  
8 and oil measurements are possible now. Ten years  
9 ago they really weren't. Frequency analysis is only  
10 done offline now. In a reasonable period of time,  
11 that will be able to be accomplished online. So the  
12 measure issue is the frequency. The second issue is  
13 as better methods become available the process  
14 should be such that those could be added.

15 JUDGE WARDWELL: Is there any reason  
16 that same need to add and update the monitoring  
17 program to reflect that state-of-the-art for lack of  
18 a better term be achieved through Part 50 and the  
19 maintenance rule?

20 DR. DEGENEFF: In Part 50 and I'm a  
21 little bit out of my depth but I understand Part 50  
22 --

23 JUDGE WARDWELL: And if you are, in  
24 fact, I was just going to interject while you were  
25 pausing to say that you may not be a scholar of Part

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1 50 or the current licensing basis. And that's fine.  
2 You don't have to be. I was just curious if --

3 DR. DEGENEFF: My only thought would be  
4 is that the aging management program really need to  
5 be something monitored or at least agreed to not  
6 only by Entergy, but by other participants.

7 JUDGE WARDWELL: Thank you.

8 On 37, you state that "While there could  
9 never be a guarantee that no failures will occur the  
10 purpose of the license renewal rule is to provide a  
11 reasonable assurance that the transformers will not  
12 fail. The recent history of transformer failures  
13 show that the maintenance rule is insufficient on  
14 its own to provide the reasonable assurance." Do  
15 you agree that the reasonable assurance standard  
16 does not require a license renewal applicant to  
17 provide absolute assurance that no failures within  
18 scope transformers will occur or that it would  
19 preclude all aging effects?

20 MR. SIPOS: Your Honor, this is John  
21 Sipos. I'd just like to note. I think that's  
22 getting into a legal issue. I'd just like to note  
23 that for the record.

24 JUDGE WARDWELL: Well, that's fine. But  
25 I'm addressing a statement he made in his testimony.

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1 And so he was comfortable enough making a statement.  
2 And so I'm asking him the same degree of level of  
3 comfort in regards to what he knows about reasonable  
4 assurances. That's the intent anyhow. If he  
5 wasn't, then maybe this statement shouldn't been in  
6 his testimony.

7 DR. DEGENEFF: Degeneff. I guess two  
8 comments. In the last five years, Entergy has  
9 experienced three major transformer failures. I'm  
10 assuming that the process that they followed they've  
11 done everything that was required and yet there were  
12 three very substantial transformer failures. That's  
13 one issue.

14 The other is if I look at New York State  
15 000034 it's an EPRI life cycle report of transformer  
16 failures. Now that's from 1991 until 2001. But the  
17 rate of failures increases from 1991 at about four  
18 percent to at 2001 to about 16 percent. And I'm  
19 assuming that all of the procedures are followed.  
20 And yet the failure has tripled. So I think my  
21 comment is reasonable.

22 JUDGE WARDWELL: Thank you, Dr.  
23 Degeneff. And I'll also applaud your answer in  
24 regards to something I should have added to Mr.  
25 Sipos that when I make these statements here such as

1 this that border on the line of legalities inherent  
2 in that and I probably should before each question  
3 say, "From your technical perspective..." And  
4 that's exactly how you answered it. And I think  
5 that may allay some of your concerns, Mr. Sipos,  
6 also.

7 MR. SIPOS: Thank you, Your Honor.

8 JUDGE WARDWELL: But that's just what  
9 you did and that's what I was after.

10 I would like to go to Entergy to respond  
11 to any comments they might have on what they just  
12 heard from Dr. Degeneff in regards to failures that  
13 have occurred recently.

14 MR. McCAFFREY: This is Thomas  
15 McCaffrey. Just give me one second to find my  
16 testimony where I discuss that.

17 JUDGE WARDWELL: It gives me time to set  
18 up for the next question so I can pay more attention  
19 also to what you say.

20 MR. McCAFFREY: I'm in Entergy. It's  
21 our testimony. It's ENT000091. I believe it's page  
22 105. It's answers to question 115. I kind of talk  
23 about -- In here, we talk about the 2007 failure  
24 dealing with the design condition of a bushing, U  
25 type condenser bushing they had a problem with the

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1 original manufacturer of that bushing.

2 And in here I also talk about the second  
3 event that happened in November of 2010 which  
4 happened at Indian Point. That was a four year old  
5 transformer that failed. That was due to a  
6 manufacturing design defect.

7 And the third event that Dr. Degeneff  
8 mentioned happened recently at Fitzpatrick. This  
9 was a transformer failure of a four year old  
10 transformer that happened approximately a month ago  
11 and we do know the cause of that yet. But again  
12 that was a brand new transformer that was installed.  
13 And we're following the industry guidelines for  
14 doing testing of that transformer. And it did fail  
15 prematurely. And we're currently doing a root cause  
16 analysis to find out why that occurred.

17 JUDGE WARDWELL: Thank you.

18 MR. CRAIG: This is John Craig and I'd  
19 like to add that I don't believe any of the  
20 transformer failures we're talking about these  
21 transformers I don't believe were in the scope of  
22 license renewal.

23 JUDGE McDADE: And, Mr. Matthew from  
24 Staff, you seem to be jiggling in your chair a bit.  
25 Would you like to describe what the jiggling is

1 about.

2 MR. MATTHEW: This is Roy Matthew from  
3 NRC. Yes. What Craig was talking about is  
4 absolutely right. These transformer failures are  
5 not within the scope of license renewal. Dr.  
6 Degeneff's concerns about the transformer failures  
7 have no requirement from Part 54. It is a Part 50  
8 requirement especially from maintenance rule.

9 The maintenance rule occurs to monitor  
10 the performance of transformers for degradation.  
11 You take corrective actions in accordance with  
12 50.65. That is the only requirement.

13 JUDGE WARDWELL: So these other  
14 transformers aren't under the maintenance rule or  
15 don't have the same type of monitoring.

16 MR. MATTHEW: All this transformer  
17 failures was noted through our information notice.  
18 Those are all covered by maintenance rule for  
19 different intended function, but not the required  
20 function that is required for license renewal.

21 JUDGE WARDWELL: Mr. McCaffrey from  
22 Entergy, do you separate out how you monitor your  
23 transformers based on whether or not they're within  
24 the scope of license renewal or outside the scope of  
25 license renewal differently?

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1 MR. McCAFFREY: This is Tom McCaffrey  
2 for Entergy. We apply the same industry guidelines  
3 if it's a large oil filled power transformer, if  
4 it's cooled by oil, we will follow the same  
5 recommended testing and maintenance. If it's an air  
6 cooled transformer we'll follow that industry  
7 guideline for testing and maintenance of that kind  
8 of transformer. So we do apply across components,  
9 but the function of those transformers that fail are  
10 really step-up transformers to transmit the main  
11 generator output to the transmission grid. And  
12 those transformers industry wide are the ones that  
13 we are typically having a problem with, not the  
14 transformers that Mr. Matthews mentioned about  
15 before which were required for station blackout or  
16 10 CFR 50.40 if I remember correctly.

17 JUDGE WARDWELL: And, Mr. Matthew from  
18 Staff, before we took a break we were talking about  
19 a letter that was submitted by Staff where they were  
20 talking and concerned about failures of  
21 transformers. Were most of those transformers -- I  
22 assume most of those if not all of them were not  
23 part of license -- would not fall under the scope of  
24 license renewal. Is that a fair assessment or not?

25 MR. MATTHEW: So of them do. Some of

1       them don't.

2                   JUDGE WARDWELL:   So the fact that  
3       transformers fail whether or not they were within  
4       license renewal or not is still of concern and is  
5       informative, is it not, in regards to those that  
6       fall under the license renewal and those that don't?  
7       The transformer isn't very smart.

8                   It doesn't know whether it's under  
9       license renewal or not, correct?  There's no magical  
10      key that the transformer knows.  So any failures of  
11      interest and then how it fails would then be looked  
12      at, would it not, to see whether or not it had any  
13      impact on those that were within license renewal?

14                  MR. MATTHEW:  This is Roy Matthew from  
15      NRC.  The only comment I would like to make about  
16      that is like I mentioned before regarding the  
17      cousins to this fact is the transformers for license  
18      renewal function for station blackout, almost  
19      smaller transformers, normally with the set power  
20      there are many, many -- That means degradation from  
21      cooling performance, you know, cooling systems,  
22      degradation of the transformer from overheating.  
23      There are several mechanisms that triggers a  
24      transformer failure which are less in those kinds of  
25      transformers.

1                   So there is a difference between loss  
2 power transformers which is useful, step-up  
3 transformers. Even those some other failures could  
4 affect. But from a realistic scenario of failure  
5 mechanism you will see less.

6                   JUDGE WARDWELL: But do you agree it  
7 would be prudent to look at any transformer failure,  
8 see what the root cause was and then see whether or  
9 not it has any application to those that fall under  
10 license renewal regardless of whether the one that  
11 failed fell under?

12                  MR. MATTHEW: Yes, agree.

13                  JUDGE WARDWELL: Thank you.

14                  Any last follow-up comments from you,  
15 Dr. Degeneff?

16                  DR. DEGENEFF: No. Thank you.

17                  MR. CRAIG: Your Honor, could I make a  
18 comment? A quick follow-up?

19                  JUDGE WARDWELL: Yes. Go ahead.

20                  MR. CRAIG: Looking at operating  
21 experience of transformers across the board and  
22 determining how that experience is relevant to the  
23 transformers at this plant or any other plant not  
24 only is a good idea. It's required under the  
25 maintenance rule.

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1 JUDGE WARDWELL: Thank you very much.  
2 That's helpful.

3 MR. CRAIG: And I agree with Dr.  
4 Degeneff that as new information and technology  
5 comes out you should review your existing program  
6 and in fact that's required under the maintenance  
7 rule as well. At a minimum it has to be done at  
8 least once every two years.

9 JUDGE WARDWELL: Is that codified in the  
10 regulations?

11 MR. CRAIG: Yes, sir.

12 JUDGE WARDWELL: Okay. Thank you.

13 JUDGE McDADE: Thank you, Mr. Craig.

14 JUDGE WARDWELL: That was a subtle hint  
15 to say your name before you speak.

16 MR. CRAIG: Sorry.

17 JUDGE WARDWELL: In my own opinion it  
18 was not so subtle. It's a subtle hint for me to  
19 make sure I have you people say your name.

20 Entergy's testimony 000091 Exhibit, page  
21 97, answer 108, quotes specific details of "the IPEC  
22 large power transformer inspection and maintenance  
23 practices are contained in Entergy Fleet Engineering  
24 Guide EN-EG-G-001, Large Power Transformer  
25 Inspection Guidelines. IPEC Maintenance Procedure

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1 0-XFR-407-ELC, Rev 0, Station or Unit Auxiliary  
2 Transformer Annual In-service Inspection is an  
3 example of an IPEC specific procedure dealing with  
4 in-service inspection activities for certain large  
5 oil filled transformers."

6 And then the EN-EG-G-001 states that  
7 "the intent of this guide is to provide methods for  
8 performing inspections of large power transformers  
9 when degraded conditions are detected." Just to  
10 know where I'm at now in regards to the various  
11 transformers we have on the site. And I'll start  
12 with Mr. McCaffrey and pass it off if you're the  
13 wrong person.

14 This EN-EG-G-001, does that apply to  
15 transformers that are within the scope of license  
16 renewal or outside the scope of license renewal or  
17 some or both? Or does it apply to both?

18 MR. McCAFFREY: This is Tom McCaffrey  
19 for Entergy. It would be some of both.

20 JUDGE WARDWELL: And is that the same  
21 that covers both the same for the procedure 0-XFR-  
22 407?

23 MR. McCAFFREY: That procedure XFR-407,  
24 that would apply to some of both.

25 JUDGE WARDWELL: And that procedure, do

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1 any of those procedures indicate how the degraded  
2 conditions are detected for the transformers because  
3 that was the purpose of it as stated in the  
4 document?

5 MR. McCAFFREY: It could get you into  
6 that. It doesn't include all aspects of how we get  
7 into monitoring degraded conditions. It get to some  
8 of the conditions that are picked up as part of  
9 those procedures. It's not all inclusive.

10 JUDGE WARDWELL: Could you give some  
11 examples I guess? What is the level of detail in  
12 this document?

13 MR. McCAFFREY: In the document it's  
14 going to tell you for the maintenance procedure it's  
15 going to tell the maintenance mechanics what to look  
16 for when they're doing their inspections of their  
17 transformers. And that could drive an action that's  
18 written into our corrective action program. It's  
19 going to drive evaluation by engineering to make  
20 corrective actions for that.

21 JUDGE WARDWELL: Do they talk about some  
22 of the tests that could be performed and any  
23 frequencies of those tests within that document or  
24 is that left up to the individual plants? Let me  
25 back up. Is this a fleet wide document?

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1 MR. McCAFFREY: The fleet wide document  
2 is for the inspection guidelines. Right. The site  
3 specific guidelines for testing -- I think that's  
4 what you're asking about is testing -- that is not  
5 covered in that. That's a site specific  
6 implementation of the industry guidelines.

7 And the fleet has a set template that  
8 says you're going to do it at the industry  
9 guidelines. At IPEC based upon our experience have  
10 increased our frequency based upon our internal OE  
11 and what we've seen in the industry as I talked  
12 before about our Doble testing of our transformers.

13 JUDGE WARDWELL: And is this 0-XFR-407-  
14 ELC a plant specific maintenance program for  
15 transformers at IPEC?

16 MR. McCAFFREY: That is a plant specific  
17 document.

18 JUDGE WARDWELL: And you say this one  
19 does have some tests and frequencies in it to that  
20 level of detail?

21 MR. McCAFFREY: It does not have  
22 frequencies. And it has detail for the maintenance  
23 to perform inspections of our station of the unit  
24 aux transformers.

25 JUDGE WARDWELL: And so where does the

1 frequency come in? That's down at the operational  
2 level in regards to the frequency that you use and  
3 the change of that frequency as you observe  
4 different conditions that take place.

5 MR. McCAFFREY: That's correct. It's  
6 part of our preventive maintenance program for our  
7 components. We evaluate the as-found condition of  
8 the transformer. I'm going to go a little more  
9 generic here. We go out and go to a valve and a  
10 maintenance mechanic is at the valve. He says it's  
11 in good condition. We might evaluate that to extend  
12 the pre-preventive maintenance frequency. If the  
13 maintenance technician says, "Hey, the valve is not  
14 in good condition" we would increase the frequency  
15 to maintain that valve in a good condition.

16 The same thing would apply to our  
17 transformers and we would evaluate based upon  
18 industry recommendations and our current site OE.

19 JUDGE WARDWELL: The fleet wide  
20 procedural guideline, the EN-EG-G-001 was at least  
21 for Revision 2 published in March of 2011 I believe.  
22 And it's Entergy Exhibit 000121 in case anyone is  
23 interested. Where the fleet wide procedure was in  
24 May of 2007 that's Entergy's Exhibit 000124. Was  
25 there any need to modify your plan specific one

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1 based on the guidelines that have come out recently  
2 in March of 2011?

3 MR. McCAFFREY: This is Tom McCaffrey. I  
4 don't believe so.

5 JUDGE WARDWELL: Thank you. Entergy's  
6 Exhibit 000091, pages 97-98 and answer 108, "Entergy  
7 has used such results to develop the Indian Point  
8 Energy Center Large Power Transformer Life Cycle  
9 Management Plan 2011 and that's given the name the  
10 IPEC Transformer Management Plan. It's Entergy  
11 Exhibit 000125.

12 "The plan provides reasonable assurance  
13 that the transformers operate satisfactorily until  
14 the planned replacement date of the transformers."  
15 Mr. McCaffrey, could you quickly describe the  
16 difference between the IPEC Transformer Management  
17 Plan and then the IPEC Management Procedure 0-XFR-  
18 407?

19 MR. McCAFFREY: The question is what's  
20 the difference between the Life Cycle Management  
21 Plan and the procedure we talked about. The Life  
22 Cycle Management Plan takes the comprehensive data  
23 results we talked about I believe on page 97 of our  
24 testimony, pulls it altogether and makes a  
25 recommendation of the health of that transformer.

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1           If for some reason the health of that  
2 transformer is trying to dictate we should work to  
3 do an internal inspection. That fleet procedure is  
4 going to help us do that internal inspection of that  
5 transformer.

6           JUDGE WARDWELL: Thank you. I'm going  
7 to turn to Staff before I move on to the next  
8 section. I'm not sure much of the next section will  
9 survive much. But I've got one question left for  
10 Staff and then I'll turn it over to the Board if  
11 they have any questions in these areas that we've  
12 covered so far.

13           But even though there's not an Aging  
14 Management Plan required for transformers that falls  
15 within the scope of license renewal. And as such I  
16 was wanted to assure whether or not there were any  
17 commitments associated with the License Renewal  
18 Application that you are proposing to apply for  
19 transformers under the license renewal.

20           MS. RAY: This is Sheila Ray from the  
21 Staff. No, I don't believe there are any  
22 commitments regarding transformers.

23           JUDGE WARDWELL: I didn't think there  
24 were, but I just wanted to fix that point.

25           Does the Board have any?

1 (No verbal response.)

2 Bear with me for a minute while I look  
3 through and quickly scan this next section.  
4 Entergy's Exhibit 000091, page 91, answer 100,  
5 Staff, was that the same information notice that I  
6 asked the other question about? I couldn't get back  
7 and find it quick enough. So it's quicker to ask  
8 you.

9 MS. RAY: This is Sheila Ray. Yes,  
10 that's correct.

11 JUDGE WARDWELL: Okay. Thank you.

12 Let's address this question. Staff,  
13 Exhibit 000031, page 24, question and answer 33.  
14 The question was Dr. Degeneff lists 18 instances of  
15 transformer failures in the report he filed with the  
16 testimony. And that is New York Exhibit 000005,  
17 pages 18-21. And the question that was presented in  
18 your testimony was were these failures readily  
19 apparent. And answer 33 said, "Yes, in each  
20 instance the failure was readily apparent. In some  
21 instances the failure was accompanied by an  
22 explosion or in a fire both of which were readily  
23 apparent."

24 This seems like a higher number, Staff,  
25 of instances of transformer failures than we were

1 talking about earlier. Was I a bit confused or not  
2 listening close enough in regards to answers into  
3 the number of failures that have been reported?

4 MS. RAY: This is Sheila Ray from the  
5 Staff. The information notice lists several of  
6 them. But these 18 instances may cover a larger time  
7 frame. I would have to double-check.

8 JUDGE WARDWELL: Well, I'll just ask Dr.  
9 Degeneff. What were these 18 instances of  
10 transformer failures and how do they compare to the  
11 ones that we've discussed so far? Were they other  
12 plants? Were they other time periods?

13 DR. DEGENEFF: Degeneff, yes. The three  
14 that we talked about were Entergy plants. The 18  
15 were the nuclear fleet in general over a period of  
16 time.

17 JUDGE WARDWELL: Thank you.

18 And I think I'll ask Staff again. While  
19 the failure is readily apparent, certainly for those  
20 transformers that fall under license renewal, is  
21 that really the desirable goal is just to be able to  
22 detect the ultimate failure as we discussed earlier?  
23 Is there a desire to detect degraded performance  
24 that would help you get a handle on when it might  
25 potentially fail?

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1 MS. RAY: This is Sheila Ray. Yes,  
2 you're correct. We had heard the degradation to be  
3 tracked through certain tests that are performed on  
4 a frequency to determine if there are any actions  
5 that need to be taken.

6 JUDGE WARDWELL: Thank you, Ms. Ray.

7 The rest of the questions in this area  
8 we've already covered in regards to the ones at  
9 Indian Point. Any follow-up questions from other  
10 Board members under failures?

11 JUDGE KENNEDY: Not on failure, no.

12 JUDGE McDADE: No.

13 JUDGE WARDWELL: Well, let's jump into  
14 the operation of a transformer now and start probing  
15 whether or not it's really active or passive using  
16 those coined phrases of course and knowing that's  
17 not what's in the regulations.

18 Entergy Exhibit 0000091, page 11, answer  
19 24, "When a transformer is energized from an  
20 electrical source it changes from an idle state to  
21 an active state. The electrical and magnetic  
22 properties of the transformer change. These changes  
23 in electrical and magnetic properties are integral  
24 to the transformer operation, necessary for  
25 operation, necessary for performance of the

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1 transformers' intended function and can be directly  
2 measured or observed."

3 And I will start with Entergy. Dr.  
4 Dobbs or Mr. Craig and then Dr. Dobbs is shaking his  
5 head. So it sounds like he's somewhat familiar with  
6 this section. Can you define idle and define active  
7 states?

8 DR. DOBBS: Dobbs for Entergy. Idle is  
9 not energized. Active is energized in performing  
10 its intended function.

11 JUDGE WARDWELL: And so you're saying  
12 that by turning the on/off switch to the on position  
13 changes it from an idle to an active state.

14 DR. DOBBS: Correct.

15 JUDGE WARDWELL: This definition,  
16 wouldn't all electrical devices change from an idle  
17 to an active state when you flip the switch?

18 DR. DOBBS: I'd say yes. That's on/off.  
19 That's kind of like the digital situation I talked  
20 about earlier.

21 JUDGE WARDWELL: Thank you. At page 32,  
22 answer 50, didn't you define a property as something  
23 that is inherent to an object? Does that sound  
24 familiar? You can look back at it if you want to.

25 DR. DOBBS: No. This is Dobbs for

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1 Entergy. Correct. That's my preferred definition.  
2 There are dictionary definitions. But I think  
3 inherent is a good word to describe it.

4 JUDGE WARDWELL: At page 13, answer 24,  
5 that's also at page 33 if you want to jot these  
6 down. No, I'm sorry. That's not up there. Page  
7 33, answer 52 and page 69, answer 78. If something  
8 is caused by an external force, didn't you state  
9 that it is not inherent to an object and therefore  
10 cannot be a property of that object?

11 DR. DOBBS: I believe that's correct.

12 JUDGE WARDWELL: Entergy's testimony  
13 still page 35-36, answer 54, you testified that "if  
14 a transformer is not connected to an electrical  
15 source and the circuit load, it has no voltage and  
16 no current." By that, isn't it true that voltage,  
17 current and magnetism associated with a transformer  
18 are caused by external forces as you also seem to  
19 state on page 35-36 of answer 54?

20 DR. DOBBS: This is Dobbs for Entergy.  
21 In making this testimony, I never believed that we  
22 would get to this level of discussion. But since  
23 we're here I guess I need to clarify that that is  
24 correct. A transformer has no external force acting  
25 upon it. Now I know some people are going to say

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1 "Oh, but voltage is an external force" because  
2 voltage is referred to as EMF or electromotive  
3 force.

4 But in reality voltage is not a force.  
5 This is a common shortcut that electrical engineers  
6 think of. But if you look at the dimensional units  
7 of voltage, the dimensional units are joules per  
8 coulomb. Dimensional units of a force are newtons.  
9 So what voltage in reality is is the amount of work  
10 performed in separating charge in an electric field.  
11 So it is a measure of potential and not a measure  
12 of force.

13 Now when you think of it as a force,  
14 this is a common concept in electrical engineering.  
15 Typically, no error is committed because whenever a  
16 voltage is present current will flow. However,  
17 voltage is not the force causing the current to  
18 flow.

19 To give an example, let's consider water  
20 on earth. If you have water in two different  
21 reservoirs say that are separated by an elevation  
22 difference and you connect those two bodies of water  
23 with an appropriate conduit such as a ditch or a  
24 pipe, then water will flow from the higher water  
25 body to the lower water body. Now the elevation

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1 difference indicates that that will happen. But the  
2 elevation difference did not cause the water to  
3 flow.

4 Voltage is in this same area. As the  
5 elevation represents different potential in a  
6 gravitational field, a voltage difference represents  
7 different potential in an electric field.

8 So if you go back to Newton's Second Law  
9 of Motion,  $F=ma$ , it says force causes objects to  
10 move. There is nothing applied to a transformer  
11 that causes a transformer to move. Therefore, it is  
12 clear that there are not external forces acting upon  
13 a transformer.

14 JUDGE WARDWELL: So you just clarified  
15 or modified or elaborated on what was briefly stated  
16 on page 35-36, answer 54 of your testimony where it  
17 says that it was an external -- that these are  
18 caused by external forces. And you believe this is  
19 a better representation.

20 DR. DOBBS: I'm having trouble keeping  
21 up with all the references. Where I --

22 JUDGE WARDWELL: Do you want to pull  
23 that up? And maybe I pulled it off wrong. It's  
24 been awhile.

25 DR. DOBBS: Which one are you speaking

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1 to specifically?

2 JUDGE WARDWELL: Let's go to Exhibit  
3 000091.

4 DR. DOBBS: I have 000091.

5 JUDGE WARDWELL: Actually, 000091, Andy.  
6 And try page 35 and we're looking for answer 54.

7 DR. DOBBS: Dobbs for Entergy. What  
8 particular is the issue in this testimony?

9 JUDGE WARDWELL: Well, I thought here or  
10 at some place I had read that someone had said that  
11 voltage, current and magnetism within a transformer  
12 are caused by external forces. That's what we're  
13 trying to look for. That's the reference was here.  
14 We're got to go to 35 and 36.

15 And maybe you could search, Andy, for a  
16 phrase such as "external." Yes, just search for  
17 external. It may take us a while to get here.

18 DR. DOBBS: I read through the testimony  
19 and I believe you will find voltage referred to as a  
20 force in both my testimony and Dr. Degeneff's  
21 testimony. However, that is an imprecise statement.  
22 Okay.

23 Really if you stated it properly it  
24 would be voltage is an external potential or a  
25 potential difference because it is really not a

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1 force. It is a potential that exists and when it  
2 exists the current will flow. But it does not cause  
3 the current to flow. What causes the current to  
4 flow is the electric field that is present when a  
5 voltage is present.

6 JUDGE WARDWELL: Do you want to clarify  
7 your statement in regards to property is something  
8 that is inherent to an object?

9 DR. DOBBS: No.

10 JUDGE WARDWELL: Do you currently  
11 believe that current voltage is inherent to a  
12 transformer?

13 DR. DOBBS: Yes, I believe so. I could  
14 expand if you'd like.

15 JUDGE WARDWELL: Yes, do.

16 DR. DOBBS: Okay. If we want to look at  
17 a transformer in terms of the voltage and current  
18 which we're currently talking about let me just walk  
19 through what I believe happens if you look at it  
20 from the detailed level of physics. From the  
21 detailed level, what happens is you have a generator  
22 and the generator through mechanical energy  
23 separates charge. When the charge is separated, work  
24 is done on the charge to separate it and so you have  
25 an accumulation of charge at one terminal which is

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1 the higher potential and less charge at the other  
2 terminal which is the lower potential.

3 This potential difference --

4 JUDGE WARDWELL: He paused because I had  
5 my finger up and you could tell I wanted to pause  
6 for just a minute. So to go back to your previous  
7 analogy because I'm not an electrical engineer, that  
8 generator is lifting one of those reservoirs you  
9 talk about higher than the other one.

10 DR. DOBBS: That's a good analogy. They  
11 separate.

12 JUDGE WARDWELL: Okay. Proceed.

13 DR. DOBBS: Okay. So now we have --

14 JUDGE WARDWELL: I can understand water  
15 and flowing down. I'm a civil engineer. I only  
16 know three things basically. Water flows downhill.  
17 You can push a rope. And hot is on the left. So  
18 when we get to electrical engineering, I'm a little  
19 lost.

20 DR. DOBBS: I'm going to try to make  
21 this as simple as possible at this level. Okay. So  
22 now we are at the point that the generator through  
23 mechanical energy has separated the charge. That  
24 means that work has been performed to separate the  
25 charge. So we have created a potential difference

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1 which now is a voltage that can be measured.

2 Now as I said earlier, voltage does not  
3 force current to flow. Voltage simply indicates  
4 that current will flow. The reason for this is that  
5 nature always seeks the lowest possible energy  
6 state. That's the reason water flows downhill. All  
7 right.

8 Current will flow from the higher  
9 potential to the lower potential which is akin to  
10 flowing downhill. When that potential difference is  
11 hooked to a transformer, current will flow because  
12 it has now a path to get to the lower energy state.

13 When current flows, that's charge  
14 motion. There's a fact of physics that when charge  
15 moves it creates a magnetic field. So as that  
16 current flows along there is a magnetic field around  
17 the wire. But that's not what we're interested in.

18 As that current flows into the primary  
19 winding of the transformer, it produces a magnetic  
20 field. That magnetic field is very much manipulated  
21 by the way that coil has been wound into position.  
22 So it concentrates the magnetism in the center of  
23 the coil and it's reduced on the exterior of the  
24 core.

25 Now as it flows through that core it

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1 will cause a separation of charge because that coil  
2 presents some impedance to the flow of the current  
3 and so you'll have a build-up of charge on the top  
4 side and less charge on the exiting side. Now the  
5 voltage it has created at this point is determined  
6 by Faraday's Law.

7 Faraday's Law is in my initial  
8 declaration. It is that the voltage is equal to the  
9 number of turns in the coil times the time rate of  
10 change of the magnetic field in the coil. So as you  
11 see the current flows because of the potential  
12 difference. The current creates the magnetism. And  
13 in actuality the magnetism creates the voltage.

14 The magnetism is then coupled through  
15 the coil of the transformer which is iron which is  
16 like a conductor for magnetism. That magnetism is  
17 very much manipulated by the core form. The  
18 magnetism flows in the core. So by the construction  
19 of details it controls and forms that magnetic field  
20 so as to couple it to the highest degree possible --  
21 this is called coupling -- to the secondary core.

22 Th secondary core then because the  
23 magnetism is changing again we apply Faraday's Law.  
24 That the voltage that will appear at the secondary  
25 is equal to the number of turns in the secondary

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1 times the time rate of change of that magnetic  
2 field.

3 Now if you look at the secondary,  
4 there's any doubt that the voltage on the primary  
5 was created by the magnetism and not that the  
6 voltage created the magnetism. You can look at the  
7 secondary because in the secondary, nothing needs to  
8 be connected to it and the voltage will still  
9 appear. So the voltage is due to the changing  
10 magnetic field. The voltage does not create the  
11 magnetic field. The voltage is a result of the  
12 magnetic field.

13 Now when we get to the idea of the rule,  
14 what we're concerned with is is there a property  
15 that changes. Dr. Degeneff's definition --

16 JUDGE WARDWELL: Before we go into that.

17 DR. DOBBS: Okay.

18 JUDGE WARDWELL: Let me ask this. And  
19 let's focus just on the voltage for the time being.

20 DR. DOBBS: Certainly.

21 JUDGE WARDWELL: Why do you consider the  
22 voltage the property of -- this is just the voltage  
23 now -- the transformer? Should it not be more the  
24 property of the generator that created the initial  
25 voltage?

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1 DR. DOBBS: No. I thought I just  
2 explained that. The voltage is created by charge  
3 separation.

4 JUDGE WARDWELL: And that was initially  
5 done by what?

6 DR. DOBBS: It was initially done by the  
7 generator.

8 JUDGE WARDWELL: The generator.

9 DR. DOBBS: All right. Let's --

10 JUDGE WARDWELL: Why is that a property  
11 of the generator?

12 DR. DOBBS: Because instead of  
13 connecting the transformer there, we connected it  
14 with a straight piece of wire. There would be no  
15 voltage at the other end. What happens is the  
16 voltage was originally separated by the generator.  
17 But when we connect the transformer up to the  
18 generator current flows because current is trying to  
19 get back and reduce the charge separation.

20 The voltage you see at the terminals of  
21 the transformer is not just the voltage from the  
22 generator transposed to the transformer. Instead,  
23 it's as the current tries to flow through the  
24 transformer it builds up on the ending terminal and  
25 it ratifies on the ex-ending terminal.

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1 JUDGE WARDWELL: So going back to our  
2 analogy of the reservoirs and let's put one of the  
3 reservoirs on a winch that we're raising it up or  
4 lowering it down as we wish to and that's our  
5 generator. Right? As we raise up the one reservoir  
6 in relationship to the other, we've increased the  
7 potential, i.e., the voltage between the reservoirs,  
8 correct?

9 DR. DOBBS: Yes.

10 JUDGE WARDWELL: And we have flow in the  
11 pipe connecting the two reservoirs.

12 DR. DOBBS: Yes.

13 JUDGE WARDWELL: Is it your position  
14 that the head difference between the reservoirs is a  
15 property of the pipe? That's an analogy to what we  
16 have here with the transformer.

17 DR. DOBBS: The head difference is a  
18 property of the pipe, no.

19 JUDGE WARDWELL: Because that head  
20 difference is the voltage equivalent in our  
21 scenario. And the pipe could very well have a  
22 Venturi in it, could it not, going between the two  
23 reservoirs such that in fact wouldn't the flow  
24 change as it went through there? The pressures  
25 would change and the flows would change and that's

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1 properties of the pipe.

2 DR. DOBBS: And that's probably a pretty  
3 good analogy because when you put the Venturi --  
4 Let's consider that we have just a straight pipe.

5 JUDGE WARDWELL: Yes.

6 DR. DOBBS: Okay. In that case as the  
7 water flows down, there is no build-up or there is  
8 no pressure change. So there is no voltage drop.

9 JUDGE WARDWELL: Well, certainly there's  
10 a pressure change from where the water is at the  
11 beginning to where it comes out.

12 DR. DOBBS: But there is no pressure  
13 change across the section. I mean if you look at --

14 JUDGE WARDWELL: And there are head  
15 losses in the pipe, aren't there?

16 DR. DOBBS: There are head losses in the  
17 pipe. And that is exactly what I'm talking about  
18 the build-up of the separation of charge. But  
19 they're so small you don't see them. But when you  
20 put the Venturi in there you will suddenly have a  
21 measurable change right there at the Venturi.

22 Okay. That measurable change is like  
23 the change you see when you put the transformer in  
24 there. What happens is the water builds up on the  
25 upstream side of the constriction and so you see

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1 that pressure change.

2           Okay. That pressure drop across the  
3 Venturi is the same as the voltage drop you see when  
4 you try to apply the current out of the generator to  
5 the transformer. When it sees the transformer  
6 that's like a constriction. And you see the build-  
7 up of charge at one or the other and there now is a  
8 voltage. If you replace that transformer with a  
9 piece of straight wire you will get the same thing  
10 as the straight pipe. There will be a very small  
11 voltage drop, but it will be almost unmeasurable.

12           JUDGE WARDWELL: Let's get back to our  
13 very initial, starting point here because we are a  
14 bit ahead. But this has been good discussion. So  
15 we need to do this. But we started at the point of  
16 what are voltage current properties of? And I'm  
17 having a hard time grasping that the voltage and the  
18 current are properties of the transformer in a  
19 similar fashion that I don't believe that I would  
20 consider the pressure in the water to be properties  
21 of the pipe and/or the Venturi going that the water  
22 passes through.

23           Likewise, I would consider the voltage  
24 and the current to be if anything properties of the  
25 electricity and not the transformer. How do you

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1 address that?

2 DR. DOBBS: Okay. I address this by --  
3 This is Dobbs for Entergy -- the fact that if you're  
4 going to proceed we must agree on a definition of  
5 property. And my definition is that a property is  
6 something that is characteristic of, it is peculiar  
7 to or is inherent in the object of consideration.

8 Dr. Degeneff's definition of property  
9 states that it is quality or traits of an object or  
10 could considered to be possessed by. Is that an  
11 acceptable thing?

12 In any case, I think a definition of  
13 property is a trait possessed by the object. Can we  
14 agree on that? If we agree that that is a valid  
15 definition, then if an object possesses a trait,  
16 then that trait should be with it. Okay.

17 So let's consider water. If we take  
18 water out of a gravitation field where it's not  
19 acted upon by any external forces, then water will  
20 exhibit neither pressure nor flow because in order  
21 to have pressure it must have weight. In order to  
22 have weight, it must have gravity.

23 JUDGE WARDWELL: I've got a bucket of  
24 water. Is the pressure the same at the top or at  
25 the bottom of the bucket?

1 DR. DOBBS: If you remove it from a  
2 gravitational field there is no difference.

3 JUDGE WARDWELL: Just sitting right here  
4 on the table. Does it have --

5 DR. DOBBS: With a gravitational field  
6 it will have pressure.

7 JUDGE WARDWELL: Is that a property of  
8 the pail?

9 DR. DOBBS: No. It's a property of the  
10 gravitational field in which the water exists.

11 JUDGE WARDWELL: But it's not of the  
12 pail.

13 DR. DOBBS: It's not of the pail.

14 JUDGE WARDWELL: Isn't that pressure,  
15 the gravitational force, very analogous to what the  
16 generator is doing in creating a potential?

17 DR. DOBBS: I'm not following you.

18 JUDGE WARDWELL: Well, you're saying  
19 it's not a property of the pail. You're claiming  
20 it's a property of the gravitational force rather  
21 than the water. Fine. Well, isn't that equivalent  
22 to what the generator is doing? If it's not the --  
23 The pail is equivalent to that's the device that the  
24 water is in that, i.e., would pass through if there  
25 was any way to pass through

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1                   That would be equivalent to a  
2 transformer. That's the device. That's the system,  
3 structure or component that we would be monitoring  
4 if we didn't want it to agingly management fail and  
5 spring a leak later on.

6                   You've got the gravitational force and  
7 some external force that is causing some pressure in  
8 the water. But it's certainly not a property of the  
9 pail, i.e., the transformer in our situation in that  
10 analogy, is it not, to make it into a question.

11                  DR. DOBBS: Well, I'm having difficulty  
12 separating out the pail -- Are you trying to compare  
13 a pail to a transformer? Is that the analogy you're  
14 trying to make?

15                  JUDGE WARDWELL: I'm trying to compare a  
16 transformer situation that you have and the argument  
17 that you're making in regards to monitoring a change  
18 in properties and the definition of calling the  
19 voltage and current going through a transformer, the  
20 properties of a transformer, to other systems that I  
21 can more readily understand.

22                  And one of those is this pail with a  
23 bucket of water in it. And that pail's intended  
24 function is to hold the water. And it has some  
25 water in that has a pressure. And I don't believe

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1 that pressure is a property of the pail.

2 DR. DOBBS: I agree. It's not a  
3 property of the pail. But I also said that it's not  
4 a property of the water because if the water is not  
5 in a gravitational field it does not have weight.  
6 If it does not have weight, it does not have  
7 pressure. If it does not have pressure, it does not  
8 have flow.

9 Now if you want to go --

10 JUDGE WARDWELL: Can I stop you just  
11 quickly right there. Would you consider boiling  
12 point of water to be a property of the water?

13 DR. DOBBS: Yes.

14 JUDGE WARDWELL: If we remove the  
15 gravitational field, does that property of the  
16 boiling point change?

17 DR. DOBBS: Yes, it does.

18 JUDGE WARDWELL: But it doesn't have to  
19 be constant. A property does not have to be  
20 constant.

21 DR. DOBBS: Does not have to be  
22 constant. It just has to -- It's possessed by the  
23 object. So it has to follow the object. Okay.

24 Maybe if I gave an explanation of my  
25 view of properties of electricity that might help.

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1 JUDGE WARDWELL: Yes, do that.

2 JUDGE McDADE: Doctor, if you could go  
3 back and just as you're doing that because you had  
4 described your definition of properties. And you  
5 described it as something that is characteristic of,  
6 peculiar to and inherent in. And we're talking  
7 about those properties of the transformer. Can you  
8 describe those properties that are characteristic  
9 of, peculiar to and inherent in the transformer that  
10 change during its operation?

11 DR. DOBBS: Yes. I can do that. This  
12 is Dobbs for Entergy. There was a section. I  
13 believe it's section 2 in my original declaration  
14 where I go through operation of a transformer. And  
15 in that I actually derive the turns ratio which is  
16 referred to by Dr. Degeneff as being a critical or  
17 the primary property of a transformer. All right.

18 MR. O'NEILL: Your Honor, sorry. Sorry,  
19 Dr. Dobbs, to interrupt. But I just want to make  
20 sure we're all on the same page. You're referring  
21 to your August 2009 declaration which I believe is  
22 Entergy Exhibit 000108. Thank you.

23 JUDGE WARDWELL: Why don't you call that  
24 up, Mr. Welkie? 000108. Should have a page for it.  
25 I also believe it's in the testimony but.

1 DR. DOBBS: Yes, it's 000108, section 2,  
2 Theory of Transformer Operation.

3 JUDGE WARDWELL: Do you have the page  
4 for it there?

5 DR. DOBBS: Yes. It's pages 2-5.

6 JUDGE WARDWELL: Are you looking at a  
7 specific?

8 DR. DOBBS: Okay. A property is  
9 inherent. If we talk about what is a transformer  
10 and what does it do, a transformer is a component  
11 which converts voltage and current at one set of  
12 terminals, the primary, to a different value of  
13 voltage and current at the secondary terminal. The  
14 output terminal is called the secondary. It does  
15 this through a scientific process known as  
16 induction. That's given by Farady's Law.

17 So we cannot describe what a transformer  
18 is or what it does without referring to the magnetic  
19 field, the terminals, voltages and currents. To me  
20 that's inherent. If you look at the derivation  
21 starting on page 3 you will see that the derivation  
22 of the turns ratio and what a transformer is is tied  
23 up to the magnetic field. That's the little phi  
24 symbol with I with a circle through it and that  
25 means magnetic field flux.

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1           In order to derive transformer  
2 operation, you must refer to the magnetic field.  
3 Therefore, magnetic field must be considered a  
4 property of the transformer. It's inherent to the  
5 transformer. It's necessary for its operation.

6           If you look at Farady's Law which is on  
7 page 3, item 10, you see that the primary voltage is  
8 defined in terms of the changing magnetic flux. If  
9 you look on the next page, you'll see that on number  
10 11 that the secondary voltage is also determined by  
11 the time rate change of the magnetic flux.

12 Therefore, since the voltages are defined by the  
13 magnetic field, I have said that the magnetic field  
14 is a property of transformer. Therefore, the  
15 voltage is also a property of the transformer  
16 because it's tied to the magnetic field directly.

17           Now if we look at those two  
18 implementations of Faraday's Law, if you look at the  
19 phi symbol that is the I with the little circle  
20 around it, that actually contains current because  
21 magnetic field is always associated with a current.

22           And you can actually take that and  
23 change it into another format if you wish and it  
24 would be the time rate of change of current where L  
25 is the inductance of the coil. So the magnetic field

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1 is also tied to the current flow. Therefore, you  
2 must consider the current to be a property of the  
3 transformer.

4 Now if you get down to the definition of  
5 the or the regulation. The regulation is talking  
6 about the changing properties and are they readily  
7 monitored, can they be directly measured or  
8 observed. You cannot observe the magnetic field  
9 inside a transformer just like you cannot observe  
10 the electric field inside a transistor. The fact  
11 that they are there and that they are operating is  
12 only measurable at the terminals.

13 So whether you're talking about a  
14 transformer or a transistor whether it's performing  
15 its intended function can only be measured at the  
16 terminals. And since those terminal characteristics  
17 are what you have to monitor and to reflect what's  
18 going on inside, then I feel like they should be  
19 included as properties just like the magnetic field  
20 should be a property.

21 JUDGE McDADE: Okay. And, Dr. Degeneff,  
22 your testimony is that you view these as properties  
23 of the electricity rather than the properties of the  
24 transformer, correct?

25 DR. DEGENEFF: Degeneff. That's

1 correct.

2 JUDGE McDADE: Can you explain how you  
3 come at this differently?

4 DR. DEGENEFF: Differently. Well, the  
5 transformer as Dr. Dobbs mentions, its purpose is to  
6 transform electric power only from one voltage to  
7 another. What we're discussing is that the idea  
8 that the transformer itself is passive and what  
9 happens through it is something different.

10 So let me back up and talk about just a  
11 cable, an electric cable. In other words, the cable  
12 will have some diameter. It will have some  
13 insulation structure. And we would apply some  
14 source -- let's call it a source, not call it a  
15 voltage but some electrical source -- to that cable  
16 and current will flow through that cable to a load  
17 and then return through some other path, through  
18 ground or through another cable.

19 Around that cable will be generated a  
20 magnetic field. And that's all dictated by  
21 Maxwell's equations and reasonably well understood  
22 characteristics. Now the source being applied to  
23 that cable and the current flowing through the cable  
24 and the magnetic field around the cable are not  
25 characteristics of the cable. They're a function of

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1 what we do to that cable. And that's a function of  
2 whoever owns it and however they want to operate it.

3 So now if I have a transformer and I  
4 apply a voltage source to that transformer and I  
5 connect that transformer to some load, then the  
6 current flowing through the transformer windings  
7 which are invariant, same size, some number of  
8 turns, will be determined by the source magnitude  
9 and the load.

10 And there is a magnetic field generated  
11 around the current carrying conductors in the  
12 primary. And if it's an iron core transformer that  
13 magnetic field because it's easier for the magnetic  
14 field to flow in iron flows through the iron and  
15 that links the secondary and generates a voltage  
16 across the secondary at which if you're connected to  
17 a load pushes the current through the load.

18 But the transformer winding and core are  
19 completely invariant to what's passing through it.  
20 That's the --

21 MR. COX: But isn't the magnetic field  
22 something inherent with the transformer that changes  
23 the current that passes through it?

24 DR. DEGENEFF: Not at all. No, no. The  
25 magnetic field is a function of the current flowing

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1 through the winding. That's completely independent.

2 Now a good transformer -- An appropriate  
3 transformer designer will size the core  
4 appropriately. But whether there's the actual  
5 magnitude of the magnetic field is determined by the  
6 current flowing through the winding, not the  
7 transformer.

8 JUDGE WARDWELL: With the flow of water  
9 that we were talking about earlier in my simple mind  
10 I can see how the pressure and the velocity I would  
11 interpret as being properties of the material  
12 passing through it. But the water going in is the  
13 same water coming out.

14 DR. DEGENEFF: That's correct.

15 JUDGE WARDWELL: When we talk about the  
16 transformer, that's not the case, is it? The same  
17 electricity, if we want to assume it, okay. We'll  
18 buy that the properties are -- these voltage,  
19 currents or properties of the electricity, the  
20 electricity going in is not the same electricity  
21 going out. There's a gap there, isn't it, where in  
22 fact that electricity has changed?

23 DR. DEGENEFF: Well, if there is a turn  
24 ratio in a transformer, say a two to one -- I'm  
25 sorry. Degeneff. Let's say the transformer is a

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1 two to one stepdown transformer. The amount of  
2 power coming in, assuming we ignore the losses of  
3 the transformer, the power coming in is going to  
4 equal the power going out. Exactly the same.

5 The voltage is going to be different.  
6 It's going to step down 2:1. The current going out  
7 is going to be increased 1:2. But the amount of  
8 power is the same. And if somebody wants to count  
9 the electrons, that's above my pay grade to know if  
10 they're the same ones coming in and going out.

11 JUDGE WARDWELL: It is your position,  
12 isn't it, that the voltage and the current are  
13 properties of the electricity?

14 DR. DEGENEFF: Yes, they are.

15 JUDGE WARDWELL: The electricity is  
16 flowing around that primary cable. Isn't that  
17 correct? That's flowing around it and that has a  
18 voltage and a current with it.

19 DR. DEGENEFF: The current is flowing in  
20 in the primary winding and around that primary  
21 winding is a magnetic field wholly dependent upon  
22 the amount of current, not the magnetic structure of  
23 the core. In other words, whether they have an air  
24 core or iron ore the flux is going to be the same.

25 If there's an air core, it may require

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1 more exciting current, but that's a different issue.  
2 So around the primary winding is going to be a  
3 magnetic field. And if that links a secondary  
4 winding then that will produce a voltage across that  
5 secondary winding. And if that secondary winding is  
6 connected to a load, current will flow.

7 JUDGE WARDWELL: And that current and  
8 voltage that you claim are properties of the  
9 electricity --

10 DR. DEGENEFF: Are independent of the  
11 transformer.

12 JUDGE WARDWELL: But it is first  
13 different than the stuff going through the primary  
14 wire, isn't it? I'm presenting something that's  
15 different in my analogy with the water because I  
16 always have the water which is a continuous mass.

17 DR. DEGENEFF: It's two different --

18 JUDGE WARDWELL: Here I see a break in  
19 that analogy in that with the transformer the  
20 electricity around the primary if that's what we're  
21 counting on to have the properties of current and  
22 voltage is different than the current and the  
23 voltage around the secondary loop.

24 DR. DEGENEFF: Yes. Degeneff. You are  
25 correct. What flows in the primary, that path is

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1 different than what flows in the secondary unless we  
2 have an auto transformer and then they would tend to  
3 share.

4 JUDGE WARDWELL: I knew that.

5 DR. DEGENEFF: I'm sorry.

6 JUDGE WARDWELL: I knew that.

7 DR. DEGENEFF: But if we step back what  
8 we're really I think driving at is the transformer  
9 passive, do the characteristics change or not. And  
10 I'm submitting that the transformer itself in  
11 effective is a conduit. It's a channel. It's not  
12 changing. Its characteristics are not changing.  
13 The size of the core is not changing. The size of  
14 the conductor is not changing. The turn ratio is  
15 not changing. The insulation thicknesses in the  
16 primary and in the secondary are not changing.

17 And if I would remove the nameplate from  
18 that transformer -- The nameplate on all of these  
19 transformers are going to have a nameplate which  
20 will tell you that nominally what power it's rated  
21 for and what voltage would be anticipated to be  
22 applied to it. But if I remove that nameplate and  
23 ask someone to tell me what that transformer's  
24 operating characteristics would be it would be  
25 different for each manufacturer because each

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1 manufacturer has different operating  
2 characteristics, what they would be able to  
3 accomplish in their factory.

4 JUDGE WARDWELL: Dr. Dobbs, would you  
5 like to comment on this discussion that we had with  
6 Dr. Degeneff?

7 DR. DOBBS: First off, I would like --  
8 This is Dobbs for Entergy. I would like to point  
9 out one thing. Dr. Degeneff just stated that the  
10 magnetism of the transformer is simply caused by the  
11 current flowing through it. In his rebuttal  
12 testimony on page 12 -- I'm sorry. That's wrong.  
13 Let me see just a second. On his rebuttal testimony  
14 on page 12 on lines 18-22, he states "a property  
15 does not cease to be a property of one object simply  
16 because another object also possesses that  
17 property."

18 The fact that current flow has the  
19 property of having a magnetic field does not negate  
20 the fact that the transformer can also have a  
21 property of having a magnetic field. Point number  
22 one.

23 The second point that I'd like to make  
24 is without going into all the details of  
25 transformers, let's just take the concept of voltage

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1 and current being properties of electricity. I do  
2 not believe that voltage and current are properties  
3 of electricity because they are not inherent to  
4 electricity. And I believe I can give some examples  
5 that will make that clear.

6 In my testimony, I point out that  
7 electricity is charge. It has the properties of  
8 being positive and negative, that like charges are  
9 repeal, unlike charges attract and that moving  
10 charge produces a magnetic field. Those are the  
11 properties I believe that I listed.

12 Voltage and current are not properties  
13 because they do not always exist when charge exists.  
14 As an example, charge exists virtually everywhere.  
15 Atoms are composed of a nucleus which is positive  
16 and the electrons flying around it which are  
17 negative. When you get to molecules, molecules are  
18 formed by atoms connecting together through  
19 electrical forces. Those molecules connect together  
20 and form matter. So virtually all matter is held  
21 together by electrical forces and electricity that  
22 is charge is present everywhere.

23 This table is charge. You yourself are  
24 charge. You're composed of positive and negative  
25 charges. But because the charge has not been

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1 separated, there is no voltage and no current.

2 Let's look at some examples. A good  
3 example is like when I was growing up I liked to  
4 shuffle my feet across the carpet and sneak up  
5 behind somebody and zap them on the ear. The  
6 electricity was always there. But until I shuffled  
7 my feet across the carpet and separated the charge,  
8 there was no voltage. Once I did that, I had  
9 voltage, but I had no current.

10 JUDGE WARDWELL: And you're saying  
11 electricity is there because you claim electricity  
12 is charge.

13 DR. DOBBS: Electricity is charge.

14 JUDGE WARDWELL: And, Dr. Degeneff, is  
15 that a commonly understood definition of  
16 electricity? Commonly accepted definition of  
17 electricity?

18 DR. DEGENEFF: I'm not comfortable with  
19 it. Maybe a more straightforward or simply way of  
20 looking at it would be with voltage the pressure to  
21 --

22 JUDGE WARDWELL: Not voltage. Just  
23 electricity is a charge. Is that a readily accepted  
24 definition in the electrical engineering community?

25 DR. DEGENEFF: It is electricity is just

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1 simply charge.

2 JUDGE WARDWELL: Yes.

3 DR. DEGENEFF: I wouldn't go that far,  
4 no.

5 JUDGE WARDWELL: What do you think the  
6 definition of electricity is?

7 DR. DEGENEFF: It's a whole cadre of  
8 components together. Charge is one piece of it.  
9 Material characteristics are another.

10 JUDGE WARDWELL: So you believe it  
11 involves more than just a charge. And, yes, there  
12 are charges everywhere, but until something is done  
13 --

14 DR. DEGENEFF: Is done to it.

15 JUDGE WARDWELL: -- to that with either  
16 whatever is needed it's not electricity until  
17 something is flowing or what. When does it become  
18 electricity?

19 DR. DEGENEFF: I don't really know how  
20 to answer that.

21 JUDGE WARDWELL: Let me ask you a  
22 question then. Does it need voltage to be  
23 electricity? Does voltage have to be present for it  
24 to be electricity?

25 DR. DEGENEFF: I think there has to be a

1 potential difference to make a meaningful system, to  
2 have a meaningful system.

3 JUDGE WARDWELL: And that's voltage,  
4 isn't it?

5 DR. DEGENEFF: That's voltage.

6 JUDGE WARDWELL: Okay. Sorry. So I  
7 guess you can't go any further in regards to  
8 definitions. Do you have any more to offer in  
9 regards to definitions?

10 DR. DEGENEFF: Degeneff. I think and  
11 maybe I'm over simplifying it. But if we step back  
12 what we're looking at -- I think what we were  
13 looking is an aging management program for a  
14 transformer so that we could assure ourselves that  
15 the transformer's life would be long and we would  
16 have a system that's relatively safe.

17 And what we're doing is we're talking in  
18 depth about the electrical characteristics of the  
19 transformer. And I think maybe delving a little  
20 deeper than we need to.

21 JUDGE WARDWELL: And we may or may not.  
22 I don't know where we are with that. But we got  
23 here for a reason. And the reason is still solid  
24 because I've been reassessing that reason as we've  
25 been having this dialogue. And every time it gets

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1 back to it and it relates to the fact that the  
2 regulations talk about a change in property. And  
3 that's why we're discussing this.

4 And is voltage and current a property of  
5 electricity? Or is it a property of the wire  
6 carrying it? Or is it a property of the generator  
7 making it? That's potentially a significant  
8 contribution to ultimately determining whether a  
9 transformer may be active or passive. Just so I can  
10 help you steer in your thinking of what this is  
11 relevant here and why we're getting into it in  
12 depth.

13 I'll go to Dr. Dobbs. We'll have another  
14 opportunity to readdress this I think and you can  
15 bring up other questions as you ponder this.  
16 Because I know it's not easy necessarily and  
17 especially to what I consider to be a somewhat  
18 innovative argument that Dr. Dobbs is presenting,  
19 but yet something of interest to pursue.

20 And, Dr. Dobbs, would you like to  
21 provide some initial comments that may help all of  
22 us figure this out better?

23 DR. DOBBS: Dobbs for Entergy. I  
24 thought of something while sitting here that I  
25 believe supports the contention that electricity is

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1 charge. If you go to the International System of  
2 Measurement, normally it's called the SI system, the  
3 only electrical base quantity in that is the coulomb  
4 which is a measure of charge. Current is measured  
5 in coulombs per second. And voltage is measured in  
6 joules per coulomb.

7 So those are all derived. The only  
8 nonderived unit is the coulomb which is charged. I  
9 believe that supports my idea that electricity is  
10 charge.

11 JUDGE WARDWELL: So go back to our  
12 analogy of water, water is H<sub>2</sub>O. That's what I  
13 equate now to where we're at in the discussion of  
14 electricity. However, I'm having a hard time  
15 assigning pressure and flow of water to a property  
16 of the pipe. I just don't see that. And that's the  
17 closes analogy I can get to electricity flowing  
18 through a cable or a transformer or a lightbulb or  
19 anything else. And so help with that if you can.

20 MS. RAY: This is Ms. Ray. Could I add  
21 a few comments?

22 JUDGE WARDWELL: Sure. It's about time  
23 to break the ice here as we go back and forth.  
24 Let's have a fresh face here to talk about this.  
25 Great. Staff. Yes, Ms. Ray, please.

1 MS. RAY: Can I just basically describe  
2 the elements of a transformer? The transformer has  
3 two sides. One is the primary winding which is  
4 wrapped around the core. And the secondary winding  
5 is also wrapped around the core. So you'll have  
6 voltage and current coming into the transformer  
7 which then creates a magnetic field.

8 And that magnetic field is collected in  
9 the core. And then it induces a voltage and current  
10 on the secondary side.

11 So one function of the transformer is to  
12 either step up or step down the voltage and current.  
13 But another function of a transformer also could  
14 lead to provide isolation since the primary winding  
15 and the secondary winding are not connected. So  
16 they are considered two separate electrical  
17 circuits.

18 In that sense, you may not be able to  
19 create a perfect analogy between a pipe or a cable.  
20 As you had mentioned for the pipe, the water coming  
21 in is the same water coming out. It may have  
22 different velocity, but it's still the same water.  
23 Whereas for a transformer I wouldn't say that it's  
24 the same set of electrons.

25 JUDGE WARDWELL: Can you say that it

1 absolutely isn't?

2 MS. RAY: It is not. That is correct  
3 because --

4 JUDGE WARDWELL: You can say that.

5 MS. RAY: Yes, because the electrons in  
6 the primary winding the current creates a magnetic  
7 field. And the magnetic field creates the current  
8 and the voltage on the secondary winding.

9 JUDGE WARDWELL: But we're almost going  
10 to get to a subatomic approach here now. Do we know  
11 for certain -- I don't certainly. Lord knows I  
12 don't -- that the collection of the magnetism isn't  
13 created by some movement of electrons? Do the  
14 electrons have a DNA? Can you test whether the  
15 electrons coming out are different than the ones  
16 coming in?

17 MS. RAY: No, because you can't really  
18 test an electron. You don't know where it goes.

19 JUDGE WARDWELL: So it breaks down a  
20 little in that area.

21 MS. RAY: But it's still electrical  
22 isolation because the two circuits are not connected  
23 that if that provides any help.

24 JUDGE WARDWELL: Yes.

25 MS. RAY: So the analogy of a cable or a

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1 pipe is not quite the same.

2 JUDGE McDADE: But if current is created  
3 in a magnetic field, then the magnetic field is not  
4 inherently part of the transformer, correct?

5 MS. RAY: But it's collected in the  
6 core. So the unit is permeability. So the magnetic  
7 field is created and the flux is essentially the  
8 field in a certain amount of area. The flux is  
9 generated regardless. But the flux is essentially  
10 collected in a core.

11 If you have a current carrying wire  
12 there is a magnetic field. But it's permeating  
13 through air which isn't really helpful. It doesn't  
14 do anything.

15 JUDGE WARDWELL: But it would be  
16 possible.

17 MS. RAY: It is possible. I mean it is  
18 generated, yes. The field is there, but it is not  
19 doing anything. But the core is designed to collect  
20 the magnetic flux essentially.

21 JUDGE WARDWELL: Right. But it's not  
22 doing it actively. It's not sweeping it up. It  
23 doesn't have levers or gears or anything.

24 MS. RAY: No. There is no movement.

25 JUDGE WARDWELL: It's sitting there.

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1 And so is that magnetism necessarily a property of  
2 the transformer?

3 MS. RAY: This is Ms. Ray.

4 JUDGE WARDWELL: A property of the  
5 current going around.

6 MS. RAY: This is Ms. Ray. We would say  
7 that there's a changing magnetic flux. The flux has  
8 to change in order for the current to be induced on  
9 the secondary side as Dr. Dobbs had mentioned by  
10 Faraday's Law. So we're stating that it's the  
11 changing magnetic flux that creates the operation of  
12 the transformer. The transformer wouldn't operate  
13 without the changing magnetic flux which is due to  
14 the voltage and current.

15 JUDGE WARDWELL: And it's still a  
16 question of is that changing flux related to an  
17 inherent property of the transformer or is it  
18 related to the properties of incoming voltage?  
19 Electricity I should say.

20 MR. MATTHEW: Roy Matthew from NRC. Let  
21 me supplement Ms. Ray's statements. Transformer is  
22 a unique component in the electrical system. There  
23 is so called in how the transformer works. We say  
24 there's a transformer action. What it is is we have  
25 to have a rate of change of magnetic flux for

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1 stepping up or stepping down the vortex. So the so-  
2 called transformer action is unique to the  
3 transformer.

4 The transformer you would say the  
5 primary winding is like a normal inductance and a  
6 normal winding for a magnet. But the transformer  
7 action makes it unique because the rate of change of  
8 magnetic flux happens because of the core. And the  
9 core is the main collecting point where electric  
10 energy is input into the primary of a transformer  
11 and that electrical energy is converted to magnetic  
12 energy. And the magnetic energy is converted back  
13 to electrical energy.

14 So that's the reason why the  
15 longstanding guidance we issued in response to the  
16 NEI question where NRC clarified. Now the  
17 transformer is an acting device because a change in  
18 its status is happening. So you can call it change  
19 in properties or change in characteristics. It's  
20 changing.

21 JUDGE WARDWELL: But I still look at it  
22 as it's sitting there passively. It's just laying  
23 there dumber than a nail.

24 MR. MATTHEW: Right.

25 JUDGE WARDWELL: And along comes

1 electricity and boy it's a good thing that happened.  
2 It's still sitting there dumber than a nail.

3 MR. MATTHEW: Right.

4 JUDGE WARDWELL: Same as a pipe. The  
5 pipe is just sitting there and they've got water  
6 flowing through it. It don't know nothing is going  
7 on. Even if it's got a Venturi in the middle of it,  
8 fine. It's the properties of the input and what's  
9 going through it that's changing and not the dumb  
10 old pipe or the dumb old transformer.

11 MR. MATTHEW: Yes, I think the analogy  
12 Dr. Degeneff is using is not a good comparison. You  
13 should be comparing the transformer to other  
14 components mentioned in the regulation.

15 JUDGE WARDWELL: We'll get into that,  
16 yes.

17 MR. MATTHEW: Right.

18 JUDGE WARDWELL: We'll go that way, too.  
19 We're approach it from that area.

20 MR. MATTHEW: Like what I was saying,  
21 you can only put a transformer to a pipe. It has a  
22 primary winding and a secondary winding. The beauty  
23 of the transformer is there is no electrical  
24 connection between the primary winding and the  
25 secondary winding. There has to take place some

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1 change.

2 JUDGE WARDWELL: I've got a pipe with a  
3 Venturi in it. And the properties of what I would  
4 consider to be the water flowing through it change  
5 through that, but it's not a property of the pipe or  
6 the Venturi. The Venturi causes it, but it's not a  
7 property of it. I can't measure anything on that  
8 Venturi to see whether that's working or how much  
9 the pressure is changing or anything with that  
10 Venturi.

11 MR. MATTHEW: Right. The analogy can  
12 say for the pipe if you are putting 10 gpm input you  
13 will get 10 gpm output. But in terms of  
14 transformer, if you are putting for Indian Point 138  
15 kV you want the safety bus to be powered for 480 V.  
16 It has to go through 649 kV. Then out of the  
17 transformer make it to 480 V. So it's not like 10  
18 gpm here, 10 gpm there.

19 JUDGE WARDWELL: You could look at  
20 velocity in and velocity out. And sometimes that  
21 will change through the pipe and it's still a pipe.  
22 We could go around and around with that.

23 MR. MATTHEW: One other point --

24 JUDGE WARDWELL: But the key point I  
25 think I heard you say and I like Dr. Degeneff --

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1 Well, go ahead and finish your other key point.

2 MR. MATTHEW: One other thing is we can  
3 sit here and make analogy of different components.  
4 But the Staff has -- Actually, NRC Commission has  
5 stated in the Statements of Consideration that why  
6 don't we list all the components that need to be  
7 aging management review done. And the Commission  
8 said there is no need to put all the components in  
9 the rule itself and to the commentor, the Commission  
10 said Staff will provide adequate guidance to  
11 interpret what is the required 10 CFR 54.21  
12 requirements.

13 In that regard, we provided guidance  
14 through the Standard Review Plan. And also the NEI  
15 95-10 which is in the exhibits provided by this  
16 hearing. So there is longstanding guidance provided  
17 by the NRC in this to say that transformer is an  
18 active device.

19 JUDGE WARDWELL: And we'll get to that  
20 and there were some components, were there not, that  
21 were specifically called out in Part 54 dictating  
22 that they were included or excluded for aging  
23 management review which in our key phrases and  
24 industry tradition has been called active and  
25 passive, correct?

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1                   Where was I going to ask you and what  
2                   was I going to ask you, Dr. Degeneff? Yes. One of  
3                   the point that seems to be emphasized and Dr. Dobbs  
4                   touched upon it and Mr. Matthew and Ms. Ray did talk  
5                   to about it is regardless of where we're going to  
6                   assign these properties, a transformer does have a  
7                   break in the system that is not similar to other  
8                   types of things. Why doesn't that create a  
9                   situation that is different than any of the other  
10                  types of analogies we may want to create such that a  
11                  transformer truly should be assigned the properties  
12                  of voltage and current because it has such a and is  
13                  designed to do some manipulation of voltage and  
14                  current?

15                  DR. DEGENEFF: Degeneff. If we go back,  
16                  the aging management review is really I guess driven  
17                  by several requirements or lack of requirements.  
18                  The transformer doesn't have any moving parts. It  
19                  doesn't as we said change its configuration.

20                  I maintain that its properties are fixed  
21                  and don't change. So it's a passive device. And  
22                  whether it in effect breaks, the continuity of  
23                  what's flowing through it is really I guess not  
24                  addressed or at least I haven't seen it addressed.

25                  Maybe a different thought would be if we

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1 were comparing it to a steam generator. We would  
2 take water in and we heat it up and we change its  
3 phase and we put steam out. Okay. What we've  
4 really done is we've made a break here. We're not  
5 passing water out. We're passing steam out. And  
6 yet that's a passive device.

7 JUDGE WARDWELL: Can I go back to Staff  
8 in regards to a statement you made in regards to the  
9 long-standing history of license renewal and how  
10 transformers are related to it? Can you point us to  
11 where the Staff guidance unequivocally states  
12 transformers are active devices?

13 MS. RAY: This is Sheila Ray of the  
14 Staff. It's in the SRP. It's in Chapter 2.

15 JUDGE WARDWELL: Do we have the exhibit  
16 number and everything if it's an exhibit in this  
17 hearing?

18 MR. TURK: Your Honor, the SRP is New  
19 York Exhibit 000195. That's Revision 1 of the SRP.

20 MS. RAY: This is Sheila Ray. It's  
21 Table 2.1-5 which is on page 2.1-26.

22 MR. WELKIE: And for clarification may I  
23 ask? Is Ms. Ray looking at Revision 1 or Revision 2  
24 of the SRP?

25 MS. RAY: I'm looking at Revision 2.

1 JUDGE WARDWELL: Mr. Welkie, are you  
2 pulling it up?

3 MR. WELKIE: 2.1-26?

4 MS. RAY: Yes, sir. I believe that's  
5 correct.

6 MR. WELKIE: I don't see that.

7 MS. RAY: It's Table 2.1-5.

8 MR. TURK: I'm sorry. I gave the  
9 exhibit number for Revision 1 of the SRP. Let me  
10 see if I have Revision 2.

11 MR. MATTHEW: This is Roy Matthew of  
12 NRC. Revisions 1 and 2 are the same. We haven't  
13 changed anything.

14 MR. TURK: The pagination has changed.

15 MR. MATTHEW: Okay.

16 MS. RAY: Maybe go onto the previous  
17 page.

18 JUDGE WARDWELL: I'm not looking. Don't  
19 look at me. Here we go.

20 MS. RAY: At the very bottom in Item No.  
21 104. It states "Transformers..." And then if you  
22 look at the heading it refers to whether or not  
23 these --

24 JUDGE WARDWELL: Well, they're --

25 MS. RAY: Components are active or

1 passive.

2 JUDGE WARDWELL: Right. Okay.

3 MS. RAY: And we are saying they're  
4 active components.

5 JUDGE WARDWELL: Is there anything in  
6 the Statement of Consideration that might lead us to  
7 the same conclusion or any other Commission position  
8 that this is the definitive calling for  
9 transformers?

10 MS. RAY: So this is the SRP. It's also  
11 in industry guidance which is an NEI 95-10. And  
12 that was endorsed by Reg Guide 1.188. And NEI 95-10  
13 also an exhibit.

14 JUDGE WARDWELL: Ninety-eight I believe.

15 MS. RAY: Yes, I believe so. And then I  
16 believe the reg guide is the next exhibit number.  
17 And furthermore I believe in the Seabrook ruling it  
18 stated that this was long-standing guidance.

19 JUDGE WARDWELL: So was that part of  
20 their ruling in Seabrook?

21 MS. RAY: No, I believe -- I would have  
22 to double check. It was a statement I believe in  
23 the ruling.

24 JUDGE WARDWELL: But it wasn't part of  
25 the -- It wasn't instrumental to the decision. They

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1 didn't state that as a position of their decision.  
2 They stated it in their ruling, but it wasn't a  
3 statement of their position.

4 MS. RAY: Correct.

5 MR. O'NEILL: This is Martin O'Neill for  
6 the Applicant. The Seabrook ruling I believe you're  
7 referring to is CLI-12-05.

8 JUDGE WARDWELL: We'll get back to NEI  
9 95-10 is the best way to do that. I have several  
10 other topic areas I want to cover. So I want to  
11 make sure we get to that because that is one that is  
12 of interest.

13 And was the Standard Review Plan, did  
14 that predate or post date the NEI document or the  
15 Grimes letter for that matter?

16 MR. TURK: If I may help for a moment.  
17 Sherwin Turk. The SRP Rev 1 is dated September  
18 2005.

19 JUDGE WARDWELL: And the Grimes letter  
20 is dated --

21 MS. RAY: This is Ms. Ray. Dated in  
22 September 19, 1997.

23 JUDGE WARDWELL: And the Grimes letter  
24 is a Staff letter. Is that correct? He was -- He  
25 or she, I can't remember which, was a Staff member.

1 MS. RAY: Yes.

2 JUDGE WARDWELL: Okay. Well, we've had  
3 a great discussion. Let's see if I can figure out  
4 where we started with all of this so we can get back  
5 on the normal track.

6 MS. MIZUNO: Excuse me. The Grimes  
7 letter -- This is Beth Mizuno. Just to make the  
8 record clear. The Grimes letter is an exhibit.  
9 It's Entergy Exhibit 000097.

10 JUDGE WARDWELL: Thank you. And I think  
11 it's also included in the NEI document also I  
12 believe in a more readable format.

13 MR. MATTHEW: This is Roy Matthew from  
14 NRC. This NEI letter is part of an NEI report which  
15 is 95-10 which is endorsed in regulatory guidance  
16 188. So therefore it's a Staff regulatory guidance  
17 for implementing Part 54 requirements.

18 JUDGE WARDWELL: And that's what the  
19 Grimes letter is you say.

20 MR. MATTHEW: Yes.

21 JUDGE WARDWELL: Yes.

22 MS. MIZUNO: The regulatory guidance to  
23 which -- This is Beth Mizuno -- Mr. Roy Matthew was  
24 referring can be found at Entergy Exhibit No.  
25 000099.

1 JUDGE WARDWELL: Thank you.

2 MR. TURK: I'm sorry. Sherwin Turk.

3 For further clarification, Mr. Matthew referred to  
4 Reg Guide 188. Is that 1.88?

5 MR. MATTHEW: Yes.

6 MR. TURK: And also I believe the  
7 question was whether the Grimes letter is Reg Guide  
8 1.88 and I think you said yes. Is that what you  
9 meant?

10 MR. MATTHEW: Yes. It's endorsed  
11 through the NEI guidance which is 95-10.

12 JUDGE WARDWELL: Let me take a slightly  
13 different tact to see if this works. I'll start  
14 with Dr. Dobbs. Would you have been more  
15 comfortable with the statement that says that the  
16 electrical energy going through a transformer  
17 changes anymore than you would the electricity  
18 changes?

19 DR. DOBBS: I'm sorry. I don't  
20 understand the point we're trying to get to here.

21 JUDGE WARDWELL: I'm not sure. But you  
22 stated that electricity is a charge. And that's  
23 your belief.

24 DR. DOBBS: Correct.

25 JUDGE WARDWELL: By not focusing on just

1 the charge but the total energy if there is a  
2 difference, I assume there would be a difference  
3 between. Is there a difference between energy and  
4 charge?

5 DR. DOBBS: Definitely.

6 JUDGE WARDWELL: So there's a difference  
7 between electrical energy and a charge. So an  
8 electrical charge is redundancy. Is the word  
9 "electrical charge" a redundancy then?

10 DR. DOBBS: Charge is electrical. So in  
11 some sense, yes.

12 JUDGE WARDWELL: Oh, that's right.  
13 You're claiming a charge is electricity.

14 DR. DOBBS: Correct.

15 JUDGE WARDWELL: And there's a  
16 difference between electrical energy and electricity  
17 then. Is there?

18 DR. DOBBS: Electricity is charge.  
19 Electrical energy is energy that has to do with  
20 charge I would say. So they are related, but  
21 they're not the same.

22 JUDGE WARDWELL: And energy is work. Am  
23 I correct if I remember my mechanics?

24 DR. DOBBS: Yes. Energy is work which  
25 is typically a force over a distance like foot-

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1 pounds or newton-meters.

2 JUDGE WARDWELL: In the electricity  
3 world it is? What's it expressed as?

4 DR. DOBBS: It's expressed as joules.

5 JUDGE WARDWELL: And so could this  
6 electrical energy moving through a transformer have  
7 the properties of voltage and current?

8 DR. DOBBS: Dobbs for Entergy. No, it  
9 does not have the properties of voltage and current.  
10 If we -- Could I direct our attention to -- Let's  
11 see which figure it is -- Figure 2, Entergy Tab  
12 000091, figure 2 on page 43.

13 JUDGE WARDWELL: It will be up in a  
14 minute.

15 DR. DOBBS: It's Exhibit 000091, page  
16 43, figure 2. Okay. It seems that we're getting  
17 hung up on this idea of is the voltage and current  
18 properties of electricity or is it properties of the  
19 component. If we're going to have consistent  
20 classification then let's look at this figure for a  
21 moment.

22 If we accept the idea that voltage and  
23 current are properties of the electricity that just  
24 flows through the transformer -- the transformer is  
25 like a pipe that just allows this flow-through --

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1 then you'd want to classify a transformer as a pipe  
2 which just the water flows through it. And it would  
3 require AMR.

4 But if we accept that position, then  
5 we're forced to how do we deal with these items  
6 shown on the right-hand side of this figure. For  
7 example, the power inverter. In this case, if we  
8 say that the voltage and current are --

9 JUDGE WARDWELL: Can we start with the  
10 battery? Let's start with the top one.

11 DR. DOBBS: Start with the battery. And  
12 in that there's no flow-through. So it's not like a  
13 pipe. That's the reason why I skipped over it.

14 JUDGE WARDWELL: But doesn't the battery  
15 change its state inside? The properties of that  
16 electrolytes in there change so that if I wanted to  
17 could, in fact, monitor that on a real time basis,  
18 couldn't one?

19 DR. DOBBS: The point I'm trying to make  
20 does not apply to the battery.

21 JUDGE WARDWELL: Okay.

22 DR. DOBBS: Okay. Because the battery  
23 is a one port device with two terminals. A  
24 transformer is a two port device with four terminals  
25 and allows flow. What we've been talking about is

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1 flow through a pipe and comparing it to flow of  
2 electricity through a transformer.

3 JUDGE WARDWELL: That's why I thought  
4 you had this diagram and the first one you had on  
5 the top was a battery.

6 DR. DOBBS: I know, but this --

7 JUDGE WARDWELL: So I wanted to discuss  
8 -- I think the premise is here are all these that  
9 are excluded and here's a transformer, i.e., I'm  
10 going to make some conclusions about that. So I  
11 wanted to start with the battery. And you say it's  
12 not relevant now. And that's fine.

13 DR. DOBBS: This was prepared for a  
14 different approach than what I'm taking right now.

15 JUDGE WARDWELL: Okay.

16 DR. DOBBS: Okay. So the approach we're  
17 considering right now is that water flows through a  
18 pipe and it's passive. And electricity flows  
19 through a transformer and therefore it is passive.  
20 And the voltage and current are just properties of  
21 the electricity that is just flowing through the  
22 transformer.

23 Now if we take that approach, then how  
24 do you separate that the current and voltage just  
25 flow through the power inverter and the power

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1 inverter is a conduit? The power supply or battery  
2 charger would apply the same way and so would the  
3 circuit board and a transistor in which case then  
4 all of these components would have to be classified  
5 like a pipe.

6 I believe this shows a basic logical  
7 contradiction in this idea that power just flows  
8 through an item. You cannot take that approach.

9 Now if you look at these and try to come  
10 up with some idea that it's because of something  
11 internal to these components such as the power  
12 supply and circuit board, that there's something  
13 internal that is producing some active component,  
14 you can't take that position because these are in  
15 the AMR excluded list without any description.

16 That is there is no description of  
17 what's inside, how they operate or anything else.  
18 So you cannot use the idea that they have a  
19 transistor in them as an argument as to why they are  
20 excluded.

21 JUDGE WARDWELL: Are there also in the  
22 regulations those components that are definitively  
23 designated as included for Aging Management Review?

24 DR. DOBBS: Yes, there are several.

25 JUDGE WARDWELL: Do you think it would

1 be possible to provide a list of those on a diagram  
2 like that and show how similar they are to  
3 transformers? I'm not saying to do it. I'm saying  
4 would it be possible to do that. Do you think one  
5 could do that and demonstrate that transformers are  
6 very similar to some of those?

7 DR. DOBBS: In my opinion, no. I looked  
8 through -- We have an exhibit that lists --

9 JUDGE WARDWELL: That's fine. That's  
10 all we need to know because we're getting close to  
11 lunch.

12 DR. DOBBS: Okay.

13 JUDGE WARDWELL: I'll say it because we  
14 will do that later this afternoon.

15 DR. DOBBS: When I was asked to give my  
16 profession opinion, I looked at that list. And in  
17 my profession opinion, there is nothing in the  
18 included list which we are calling passive that is  
19 in any similar to the way a transformer operates.

20 JUDGE WARDWELL: Okay. Thank you.

21 Well, finish off with Dr. Degeneff. Do  
22 you want to quickly comment on this? We are going  
23 to pursue at some point this afternoon, possibly  
24 right after lunch. I just have to check my notes to  
25 see how far ahead we've gotten from where I am on my

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1 notes. Look at a change of properties related to  
2 this electrical charge and how it may relate to  
3 something else. We are also going to compare it to  
4 the included and excluded list. So we'll have time  
5 to do that.

6 But I just wanted to see if you wanted  
7 to have some initial comments on this particular  
8 figure in regards to the arguments that Dr. Dobbs  
9 brought up in regards to everything here except the  
10 battery.

11 DR. DEGENEFF: Bob Degeneff. Actually,  
12 if we go down the list or the components on the  
13 right, I think a very solid discussion could be made  
14 for each of those that they are, in fact, internal  
15 and active devices just by the very nature of their  
16 doing what they need to do. And we're not talking  
17 about the energy that passes through.

18 As an example for the inverter, it's  
19 taking DC and turning it into AC. But we're not  
20 using that as an idea of it being an active device.  
21 We're actually talking about the characteristics or  
22 the arrangement of that device internally to do what  
23 it needs to do. It's active. And I think we can  
24 do that with each of these components.

25 JUDGE WARDWELL: That might be a good

1 place to stop for lunch.

2 JUDGE McDADE: Does anyone have anything  
3 housekeeping to take up before we break for lunch?  
4 It's right about 12:00 noon. If we break until 1:00  
5 p.m. is that adequate? Entergy?

6 MR. O'NEILL: Yes, Your Honor.

7 JUDGE McDADE: New York, 1:00 p.m.?

8 MS. HESLIN: Yes, Your Honor.

9 JUDGE McDADE: Mr. Turk, is your seating  
10 selection this morning based on an unwillingness to  
11 adopt the agency position?

12 MR. TURK: Not at all, Your Honor. I  
13 think as the week has gone on the number of papers  
14 that need to be open and that are referred to has  
15 expanded. And I've been moved to the side.

16 MR. SIPOS: I thought he had joined  
17 Riverkeeper, Your Honor.

18 MR. TURK: And I have to say I'm amazed  
19 to look over at Entergy's table and see how many of  
20 those lawyers can sit at one table where we have  
21 such problems with the Staff.

22 JUDGE WARDWELL: We can't see under the  
23 curtain. That's what we need to see.

24 JUDGE McDADE: Anything before we break?  
25 I have nothing from the Staff.

1 MS. BRANCATO: No, Your Honor.

2 JUDGE McDADE: And from Clearwater?

3 MS. RAIMUNDI: No, Your Honor.

4 JUDGE McDADE: Or Westchester?

5 MR. INZERO: No, Your Honor.

6 JUDGE McDADE: Okay. We're in recess  
7 until 1:00 p.m.

8 JUDGE WARDWELL: One of the Westchester.  
9 There is somebody there.

10 MR. INZERO: I'll just mention Chris  
11 Crane, staff for Westchester County Board of  
12 Legislators.

13 JUDGE McDADE: Thank you. We're in  
14 recess until 1:00 p.m. Off the record.

15 (Whereupon, at 12:05 p.m., the above-  
16 entitled matter recessed to return at 1:00 p.m. the  
17 same day.)

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1 A F T E R N O O N S E S S I O N

2 1:12 p.m.

3 JUDGE WARDWELL: Go ahead and do your  
4 housekeeping things for a few minutes, please.

5 JUDGE McDADE: We don't have any.

6 JUDGE WARDWELL: Okay, thanks. Picking  
7 these, talking about the Grimes letter, in that  
8 letter, staff states that "Transformers perform  
9 their intended functions through a change in state  
10 by stepping down voltage from a higher to a lower  
11 value, stepping up voltage to a higher value, or  
12 providing isolation to a load."

13 Staff, in your testimony, Exhibit 31,  
14 page 6, Answer 8, and on page 11, Answer 19, takes  
15 the position that transformers perform their  
16 intended functions through a change in state; that  
17 is, a change in voltage, current and magnetic flux."  
18 In other words, a transformer changes its state by  
19 transforming electrical energy into magnetic energy,  
20 and then back again into electrical energy.

21 The Grimes letter also states that  
22 "Transformers perform their intended functions  
23 through a change in state, similar to switch gear,  
24 power supplies, battery chargers and power  
25 inverters, which have been excluded as part of

1 54.21(a)(1)(i), from an aging management review."

2 And staff in their testimony, again  
3 Exhibit 31 on page 12, A20, states this same  
4 position, almost verbatim, I believe, that was in  
5 the Grimes letter. Why don't I start with staff,  
6 whoever would like to answer this.

7 Doesn't 54.21(a)(1)(i) also list system  
8 structures and components that are considered, using  
9 the nomenclature, and everyone else has adopted as  
10 passive, even though that's not in the regulations,  
11 but we use that as a coin phrase.

12 And included in aging management review,  
13 including electrical cables and connectors, heat  
14 exchangers, steam generators, piping, pump casings,  
15 valve bodies and ventilation ducts?

16 MS. RAY: This is Ms. Ray. Yes, those  
17 are listed in 10 C.F.R. 54.21 as passive devices, as  
18 components.

19 JUDGE WARDWELL: And why are  
20 transformers similar to these items, in regards to  
21 no change in configuration properties or state?

22 MS. RAY: This is Ms. Ray. We would say  
23 that the transformer experiences a change in flux.  
24 In order for the transformer to operate, there has  
25 to be a change in flux, and that changing magnetic

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1 flux is the change in state. And also, per the  
2 Statements of Consideration, a transformer's  
3 degradation is regularly monitorable, through some  
4 of the tests we have discussed earlier.

5 JUDGE WARDWELL: But wouldn't the  
6 electrical cable and connector, what's the  
7 difference between the transformer and electrical  
8 cable?

9 MS. RAY: This is Ms. Ray. So  
10 electrical cable, the purpose is to transmit power,  
11 essentially voltage and current. But a transformer  
12 provides isolation, in addition to supplying voltage  
13 and current to a load.

14 So for the two windings on the  
15 transformer are separate. So the voltage and  
16 current coming in is not the same as the voltage and  
17 current coming out.

18 JUDGE WARDWELL: What about a heat  
19 exchanger? Isn't that separate? There's a transfer  
20 of state there, and there's also a break in the  
21 exchange of the heat. Wouldn't that be similar to a  
22 transformer?

23 MS. RAY: This is Ms. Ray. Yes, but the  
24 performance is not readily monitorable. You'd have  
25 to do specific tests. Whereas with a transformer,

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1 there is a battery of tests that you can perform, to  
2 track the aging degradation.

3 JUDGE WARDWELL: And would you say the  
4 same thing in regards to a steam generator?

5 MS. RAY: This is Ms. Ray. Yes, I  
6 would.

7 JUDGE WARDWELL: How about piping?

8 MS. RAY: This is Ms. Ray. Yes.  
9 Similar to piping, the transformer provides again,  
10 similar to the cables, electrical isolation, whereas  
11 with a pipe, the fluid coming in is the same as the  
12 fluid coming out. But the transformer, in addition  
13 to providing power, also provides electrical  
14 isolation, and in that way it's different than a  
15 pipe.

16 JUDGE WARDWELL: Well certainly these  
17 items perform differently, but yet in regards to how  
18 they're being achieved, isn't it very similar? I  
19 mean piping can be readily monitored too, can't you,  
20 just by increasing the number of tests, keep on  
21 sampling the wall thickness to assure that it's  
22 maintaining its integrity?

23 MS. RAY: This is Ms. Ray. You can  
24 monitor the wall thickness of a pipe, but you'd have  
25 to do a test. On transformers, it's continuously

1 monitored. There are alarms, there are indications  
2 of voltage and current. In addition, there are also  
3 other tests that you can do.

4           Somewhere we have discussed some of the  
5 tests that can be performed online, and then some  
6 tests are performed offline.

7           JUDGE WARDWELL: Thank you. Dr.  
8 Degeneff, would you like to comment on why you  
9 believe transformers are similar to -- I can't think  
10 of my list now -- oh yeah. Electrical cables, heat  
11 exchangers, steam generators, piping, pump casing,  
12 valve bodies and ventilation ducts?

13           Would you like me to go through each one  
14 of them, one at a time, rather than you trying to  
15 remember to go through each of them, because I would  
16 like you to testify --

17           DR. DEGENEFF: It would help me.

18           JUDGE WARDWELL: Yeah. Why do you  
19 believe they are -- transformers are similar to  
20 electrical cables, after hearing what Ms. Ray says  
21 in regards to why electrical cables aren't similar  
22 to transformers?

23           DR. DEGENEFF: In my -- Bob Degeneff.  
24 In my submission, I made the point that electrical  
25 cables and transformers can be represented by

1 exactly the same system of equations, and they  
2 perform essentially the same way. A two-lining  
3 transformer, two cables in a cable tray can be  
4 configured to perform exactly the same function.

5 The only difference might be the  
6 coupling factor between the cables and the  
7 transformer, and if you remove the core on a  
8 conventional transformer, then the coupling  
9 coefficient would be similar. So the reason that I  
10 would say a transformer and a cable are similar is  
11 because both conduct power from one place to  
12 another.

13 But neither the cable nor the  
14 transformer changes its state or changes its  
15 configuration.

16 JUDGE WARDWELL: Do you, after hearing  
17 this morning's testimony, from what Entergy's doing  
18 as part of its current licensing basis, do you  
19 believe that the types of tests that are run on  
20 transformers, in an effort to monitor its functional  
21 degradation, could be performed on cables? Which I  
22 believe is the heart of the argument. Ms. Ray led  
23 to why cables are different.

24 DR. DEGENEFF: Well, as an example, on a  
25 -- well, it would be -- probably would be

1 inappropriate on a cable, to take a turns ratio  
2 test, but I mean you certainly could do that.

3 On the other hand, a transformer, you  
4 would perform a Doble measurement, to look at the  
5 capacitance of the bushing, or the capacitance  
6 structure of the winding, and see if that's changed  
7 over time.

8 With a cable, you could do exactly the  
9 same type of measurement, to look -- to see what  
10 the, if the capacitance of the insulating structure  
11 has changed. You'd look at resistivity  
12 measurements, resistivity of the transformer or  
13 resistivity of the cable. You could certainly could  
14 do that, and so a critical component of the  
15 transformer is the bushing. A cable might be more  
16 easily measured in a similar fashion as we would  
17 look at a bushing.

18 JUDGE WARDWELL: How about the heat  
19 exchanger? Any comments in regards to that?

20 DR. DEGENEFF: Well --

21 JUDGE WARDWELL: Specifically focused  
22 into what she claimed was the difference between a  
23 transformer and at heat exchanger? Why are they the  
24 same? I believe their phrase that that was also  
25 hard to monitor; is that correct?

1 MS. RAY: Correct, that's right.

2 DR. DEGENEFF: Bob Degeneff. The  
3 discussion is that a transformer is easy to monitor  
4 and a heat exchanger is difficult to monitor. I  
5 would submit that based on the performance of  
6 transformer failures, the industry in general  
7 doesn't do a very good job of measuring the  
8 condition of the transformers.

9 So to say it's easy to measure, and yet  
10 in all of the failure reports, it indicates that the  
11 -- the write-ups indicate that the transformer  
12 presents a difficult device to measure its  
13 condition.

14 JUDGE WARDWELL: So if I can paraphrase  
15 it into some regulatory phraseology that I have run  
16 across in the nuclear industry, you would -- it's  
17 your position that while transformers are maybe more  
18 easily monitored than heat exchangers, transformers  
19 still wouldn't rise to the level of being readily  
20 monitorable?

21 DR. DEGENEFF: No, I wouldn't say that  
22 they're readily monitored, no.

23 JUDGE WARDWELL: Steam generators, same  
24 thing? Transformers are readily monitored, and even  
25 though it monitorable, so therefore it's similar to

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1 a steam generator?

2 DR. DEGENEFF: Well, the reason I would  
3 say a transformer is similar to a steam generator is  
4 because the neater change state, as they perform  
5 their intended function. I am not familiar with the  
6 monitoring of the steam generator.

7 JUDGE WARDWELL: What about piping? How  
8 do you counteract the fact that we seem to have a  
9 break in the flow of the process? Stuff coming out  
10 isn't necessarily the stuff going in, and there is a  
11 break with a transfer to a different form of energy,  
12 at least the magnetism and back into an electrical  
13 energy?

14 DR. DEGENEFF: Bob Degeneff. We seem to  
15 point to that, the break. If we would take the pipe  
16 and, if you will, turn the pipe into a steam  
17 generator, where water would be coming in at one  
18 end, and steam would be coming out the other, in  
19 effect we have the same material passing through,  
20 but the phase has changed, and yet that pipe would  
21 still be a passive device.

22 JUDGE WARDWELL: I'll go back to staff,  
23 because I don't think I've -- we've covered the last  
24 three. If you have any comments in regards to the  
25 pipe pump casing, valve bodies and ventilation

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1 ducts.

2 MS. RAY: This is Ms. Ray. Could you  
3 repeat those one more time?

4 JUDGE WARDWELL: Pump casings. It's  
5 right -- no, I guess it's in my question. Sorry,  
6 you're right. Yeah, pump casings, valve bodies and  
7 ventilation ducts.

8 MS. RAY: This is Ms. Ray. They don't,  
9 those components don't experience a change of state,  
10 whereas we believe the transformer is an active  
11 component, based on the change in state, which is  
12 the changing magnetic flux.

13 JUDGE WARDWELL: Would you like to make  
14 any comment on that, Dr. Degeneff?

15 DR. DEGENEFF: Bob Degeneff. If we take  
16 it in reverse order, a ventilation duct would, in a  
17 similar fashion, be thought of the same way as a  
18 pipe, and the same comparison that I've made with a  
19 pipe and a transformer, I think, would be valid.

20 A valve body would surround an active  
21 device, but in itself not change phase or change  
22 shape. In other words, the process, the fluid is  
23 passing through it, and yet the device, the pump  
24 part of the valve casing, is not changing.

25 I would suggest that a transformer is

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1 the same. The electrical power is flowing through.  
2 There is some activity, but the transformer itself  
3 is not changing, and the pump case would be the  
4 same.

5 JUDGE WARDWELL: A pump and a valve  
6 casing is what you're saying?

7 DR. DEGENEFF: Yes.

8 JUDGE WARDWELL: Thank you. Back to  
9 where we ended up just before lunch, with the  
10 diagram. Could we get the diagram back up again,  
11 where I probably should have started there? That's  
12 the one. I think that's where we ended. Would you  
13 like to go through each individual component there,  
14 starting right with the battery, in regards to why  
15 isn't the transformer similar to a battery, and in  
16 the excluded list?

17 DR. DEGENEFF: Are you talking to me?

18 JUDGE WARDWELL: Yes.

19 DR. DEGENEFF: All right. Bob Degeneff.  
20 The battery, interimly in doing what it does, the pH  
21 of the fluid will change, okay. So there is -- in  
22 accomplishing what the battery needs to do, there is  
23 a measurable change of state, okay. The power  
24 inverter, we're taking DC in and creating AC out.

25 JUDGE WARDWELL: Again, I think we

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1 covered that before lunch, didn't we?

2 DR. DEGENEFF: Okay.

3 JUDGE WARDWELL: Do we do the same with  
4 the power supply?

5 DR. DEGENEFF: The power supply is just  
6 the other way around. We're taking AC in and  
7 putting DC out. In both cases, in both cases for a  
8 commercially available device, what we're interested  
9 in is having a device which will take a variable  
10 input, and putting out a relatively constant output.

11 So on a power supply, I may put in 110  
12 volts or put in 120 volts, but what I'm interested  
13 in getting out is 5 volts DC, to do what the power  
14 supply does. So inside the structure, the  
15 configuration of that device will change, so it can  
16 accomplish its mission, its electrical mission.

17 So that's the difference between it and  
18 a transformer. As an example, the power supply is  
19 active. If the input voltage changes and you desire  
20 a constant output voltage, what you do, the  
21 structure inside that device will adjust itself.  
22 That's how it's designed.

23 A transformer, on the other hand, if the  
24 input changes, the output changes. It's determined  
25 by the turns ratio on it and the structure of the

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1 transformer.

2 JUDGE WARDWELL: So why it's not  
3 necessarily the same electrons, then, coming out of  
4 the transformer, you're saying it is a fixed output  
5 that is going to be --

6 DR. DEGENEFF: Yes, yes.

7 JUDGE WARDWELL: It is as a result of  
8 the action of the transformer?

9 DR. DEGENEFF: Yes.

10 JUDGE WARDWELL: What about a circuit  
11 board?

12 DR. DEGENEFF: Well, a circuit board,  
13 depends on what the design of the circuit board is  
14 to do. But you're taking, you may be taking five  
15 volts in and depending upon some conditions, some  
16 measurements, adjusting the output. Maybe it's  
17 running a machine, maybe it's firing a thyristor.

18 But the input and the output will be  
19 changed, and the reason that you've constructed this  
20 circuit board is actually to perform some active  
21 function. As an example, the little company that I  
22 have builds transformers with electronic on-load tap  
23 changers.

24 What the circuit board will do is  
25 measure the output voltage, and then adjust which

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1 taps, on an electronic tap changer, are gated or  
2 fired, okay. So the circuit board is constantly  
3 active. It's constantly, as the input is adjusted,  
4 the output's adjusted.

5 And then the last is the transistor, and  
6 I think we talked about this earlier this morning.  
7 In the simplest way, it's on or it's off. If we  
8 give it some information, it will decide whether to  
9 conduct or whether to block, or whether to have a  
10 high impedance. So it is an active device, because  
11 it's changing state.

12 Its function is independent of the  
13 input. What we're looking to do is measure or  
14 determine the input, and then based on something,  
15 determine what output to provide. In all of these  
16 cases, the device itself changes, other than the  
17 transformer, where the transformer just passes  
18 through in a predictable and constant ratio.

19 JUDGE WARDWELL: Thank you. Dr. Dobbs,  
20 I think when you first brought this up, it was for a  
21 different analogy, and now let's go back and address  
22 the ones that you didn't cover when we first talked  
23 about it. I think batteries are one, and I don't --  
24 I may have even cut you off from talking about  
25 transistors. So now is the time to talk about them.

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1 I'm not sure we talked about circuit  
2 boards either. But any of those that you want to  
3 talk about, on why you think transformers match this  
4 on the exclusion set, and then I might as well get  
5 my other question out of the way. I'll do the same  
6 thing with those of why you feel transformers are  
7 different than those in the included list.

8 DR. DOBBS: Dobbs for Entergy.

9 JUDGE WARDWELL: I'll go through one at  
10 a time. You don't have to --

11 DR. DOBBS: Dobbs for Entergy.

12 Basically, what this diagram is to do is it's a  
13 graphical representation of the similarities, and  
14 one of the things that I was trying to illustrate  
15 here is the fact of the terminal voltages and the  
16 current on each one of these devices, that is easily  
17 monitorable as they perform their function.

18 Admittedly, a battery can be as it  
19 performs its function, it will have a change in  
20 specific gravity and those things. But the voltage  
21 will also change. If you go over and looked at the  
22 discharge curve on a battery, you can see that the  
23 voltage output will change.

24 A good example is your cell phone. At  
25 some point it tells you you need to recharge me.

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1 How it does that there's a circuit in there that  
2 monitors the output voltage of that battery, and it  
3 knows when it reaches a certain voltage level it's  
4 time to recharge that battery, okay.

5 So it is the terminal characteristics  
6 that you can monitor, that tells you what is going  
7 on inside that battery, and all of these items that  
8 are on the right side have those terminal  
9 characteristics, as does the transformer, which are  
10 an indication of how it's performing its intended  
11 function, and whether that is being done  
12 appropriately.

13 Now let's go into a little bit more  
14 detail on specifically the power inverter, power  
15 supply, battery charger and circuit board. Dr.  
16 Degeneff, in explaining how he comes up with this,  
17 has to rely on some assumed performance within these  
18 devices, like power inverter. Something's going on  
19 in there that it's actively changing to account for  
20 something. The power supply and battery charger, he  
21 essentially explained voltage regulation.

22 And yet none of these items are  
23 mentioned in the SOC nor the regulation. Since  
24 they're not mentioned, they cannot be a reason for  
25 classification. Let's look at the circuit board.

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1 This is where it really comes out. On the circuit  
2 board, there is no explanation. It's just a circuit  
3 board. So it can be any circuit.

4 So let's imagine a circuit board that  
5 contains nothing but resistors, capacitors and  
6 inductors, and what it does is it creates a low pass  
7 filter, which allows low frequencies to pass, but  
8 rejects high frequencies. If you look in the table  
9 provided in, I believe it's Exhibit 5, Degeneff  
10 report, you will see that that table lists  
11 resistors, capacitors and inductors all as passive  
12 components, okay.

13 However, I've constructed a circuit  
14 board, which is a low pass filter, and you can tell  
15 whether or not it's performing its intended function  
16 of filtering at the terminals.

17 Yet it's classified as active, and there  
18 is no active function, by Dr. Degeneff's definition,  
19 performed by the board, nor is there any active  
20 component on the board. Yet the board is still  
21 considered active by the regulation.

22 Therefore, the terminal characteristics  
23 that can be easily monitored and project the health  
24 of the component, must be the reason why it was  
25 classified as AMR --

1 JUDGE WARDWELL: That leads you to  
2 believe that is the only reason why it's on that  
3 list. Did the Statement of Consideration amplify  
4 why those were?

5 DR. DOBBS: The only reference to  
6 circuit board is in the list and the regulation.

7 JUDGE WARDWELL: And so why you have  
8 conjectured one potential reason --

9 DR. DOBBS: I can give you any number.  
10 Let's imagine another one. Let's imagine you take  
11 that circuit board, and replace --

12 JUDGE WARDWELL: How about one I can  
13 come up with?

14 DR. DOBBS: Certainly.

15 JUDGE WARDWELL: And tell me whether, in  
16 your reading of the Statement of Consideration,  
17 which I gather you have read that?

18 DR. DOBBS: Yes.

19 JUDGE WARDWELL: That this would not be  
20 impossible reason, that we have too many circuit  
21 boards and too many transistors, that it would be  
22 virtually impossible to try to monitor those, in any  
23 reasonable way, and that it's just not practicable.

24 We're going to have to live with  
25 whatever failures occurred, and then they looked and

1 saw what failures might lead to that, and thought it  
2 was still within the safety bounds. So they  
3 excluded it from a practicality reason more than  
4 anything else.

5 Is there anything in the Statement of  
6 Consideration that would rule out that hypothesis?

7 DR. DOBBS: Dobbs for Entergy. That's  
8 beyond the scope of anything I understand about the  
9 NRC operation, the SOC or the regulation. I don't  
10 think there's any evidence of that occurring or not  
11 occurring.

12 JUDGE WARDWELL: Right. So it could  
13 just as easily occur -- I'm not saying it is, but  
14 I'm saying you can come up with -- based on the  
15 Statement of Consideration, you can come up on a  
16 pretty wide range of things, if in fact there's some  
17 head-scratching of why is it on the list of those  
18 excluded.

19 And is it also fair to say that you  
20 could probably come up with a big, wide range of  
21 things for those that are included too?

22 DR. DOBBS: Dobbs --

23 JUDGE WARDWELL: There's no reasoning in  
24 the Statement of Consideration of why they  
25 necessarily chose one or another.

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1 DR. DOBBS: Dobbs for Entergy. I have  
2 to look at this from a technical background as an  
3 electrical engineer, okay. I can't comment on what  
4 the NRC did or why they did it.

5 But when I look at it from an electrical  
6 engineering standpoint, I know and understand that  
7 in electrical engineering, all components are used,  
8 understood and basically analyzed by methods that  
9 use their terminal characteristics.

10 I taught college for a number of years,  
11 and if you take a circuit that has sources such as  
12 batteries and other components such as resistors and  
13 transistors and stuff, and what you're always  
14 interested in doing is you must know the terminal  
15 characteristics of each component, and then you  
16 calculate voltages and currents in the circuit,  
17 based upon those.

18 Okay. Now if I take that experience and  
19 translate it into the current proceedings, then what  
20 I come up with is Figure 2. When I look at that  
21 figure, I look down there and I see a power inverter  
22 as a component, that I don't really care what goes  
23 on inside it.

24 But by definition of power inverter, I  
25 know that it has a voltage and a current that is DC

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1 as input, and it has a voltage and a current that is  
2 AC as an output, and that those voltages and  
3 currents can be different. That is, they're  
4 transformed in the process of moving through it.

5 If I looked at a power supply, I see an  
6 AC voltage and current going in, processing through  
7 it, and it comes out changed. It's been transformed  
8 to a DC voltage and current at probably a different  
9 value.

10 When I look at those things and look at  
11 a transformer, what I see is a component that that  
12 an AC voltage and current input, that has been  
13 transformed to a different voltage and current  
14 output at the output.

15 So I look at that and say those are very  
16 similar. They're components. They have very well-  
17 defined electrical functions, and those functions  
18 can be monitored at the electrical terminals.  
19 Therefore, I say a transformer is very much like the  
20 components that are AMR-excluded, as shown on this  
21 diagram.

22 JUDGE WARDWELL: For those, the  
23 inverter, power supply and circuit board, are those  
24 monitoring of the output voltages and current --  
25 don't want to use the word "conductive" -- I guess

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1 conducive for tracking impending failure of that, or  
2 is it just the fact that they're a constant common  
3 output, similar to what comes out of a transformer  
4 in your argument?

5 DR. DOBBS: It's the fact that the  
6 performance of these components are defined in terms  
7 of their terminal characteristics. For example, a  
8 battery charger will take -- let's take one for your  
9 home, like your car, okay. A battery charger for  
10 your car is defined that it will take 110 volts AC  
11 from your outlet, and it will convert that to --

12 Actually, it's more than 12 volts. It's  
13 about 14.2 volts DC that you connect to your battery  
14 and charger. Then it will put it out at some  
15 amperage, and most battery chargers you can say at 2  
16 amps or 10 amps, something like that.

17 So it's very well-defined, in terms of  
18 its terminal characteristics. I know that it's 110,  
19 with a certain current draw, and it's 12 volts out  
20 at a certain current supply. Those are very easily  
21 monitored, to tell whether or not that battery  
22 charger is performing its intended function, which  
23 meets the readily monitorable, directly measured or  
24 observed.

25 JUDGE WARDWELL: But will it also

1 monitor -- will it start gradually degrading in the  
2 output, as the device ages and degrades internally?

3 DR. DOBBS: As electrical components  
4 age, typically outputs do show some degradation in  
5 their performance.

6 JUDGE WARDWELL: But is it sufficient  
7 enough to really track, to predict impending  
8 failure?

9 DR. DOBBS: It can be.

10 JUDGE WARDWELL: Thank you. Let's now  
11 go to those ones that are on the included list, and  
12 talk about why you think they're different than  
13 transformers.

14 DR. DOBBS: Okay. I'm referring to the  
15 Table 1 on page 17 --

16 JUDGE WARDWELL: Let's just go through  
17 the list I had, and I'll go through them one at a  
18 time.

19 DR. DOBBS: Okay. That will be fine.

20 JUDGE WARDWELL: We don't have to go --  
21 I don't know if I got all of them. In fact, I don't  
22 even know where I got this from, tell you the truth.  
23 But I'm pretty sure they're on the list. I assume I  
24 cut and paste, but I don't know that for sure.

25 Electrical cables and connections. Why

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1 are they different than a transformer?

2 DR. DOBBS: Electrical cable serves one  
3 purpose. It's transport. It doesn't change what  
4 it's transporting in any way, and connections have  
5 the same function. It's just to transport,  
6 transport electricity.

7 JUDGE WARDWELL: But it does develop  
8 that same magnetic flux, doesn't it?

9 DR. DOBBS: It does develop a magnetic  
10 flux, but the flux is not inside in the cable, nor  
11 is it required for the cable to perform its intended  
12 function.

13 JUDGE WARDWELL: Speaking of that, I'd  
14 like to back up a little bit, to make sure I fully  
15 understand how a transformer works. Is that  
16 magnetic flux in a cable constant at all times at a  
17 given point?

18 DR. DOBBS: No.

19 JUDGE WARDWELL: It increases and  
20 decreases as the alternating current passes through  
21 it; is that correct?

22 DR. DOBBS: Yes.

23 JUDGE WARDWELL: And that's the same  
24 thing with a transformer?

25 DR. DOBBS: Yes. A transformer's quite

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1 different, okay. A cable has a magnetic field  
2 around it, simply because of the current flowing  
3 through it. The cable in no way manipulates that  
4 magnetic flux. When you get to a transformer, it's  
5 quite different.

6           The conductor is put into a coil, so as  
7 to manipulate the intensity. What happens is by  
8 putting it into a coil, the magnetic fields on the  
9 inside of the coil add up, they vectorially add. A  
10 magnetic field is a vector field, and so they add,  
11 because they're in the same direction.

12           But on the outside of the coil, the  
13 field is larger in opposite directions, and they  
14 cancel out. Now because you have to have  
15 conservation of energy, the same amount of energy  
16 has to still exist. But since it's been leaking on  
17 the outside of the coil, it is increased on the  
18 inside of the coil.

19           So there out there, the transformer has  
20 manipulated the magnetic field to increase its  
21 intensity. Now to furthermore manipulate the  
22 magnetic field, the transformer takes that coil and  
23 puts it around a ferromagnetic material such as  
24 iron.

25           Since iron is a good conductor of

1 magnetism, like copper is a good conductor of  
2 electricity, the magnetic field is essentially  
3 trapped inside that iron core, and will flow around  
4 the iron core without leaving it into the air very  
5 much. That's how you attain the high coupling into  
6 the secondary.

7           So in the case of a cable, it's just a  
8 magnetic field. In the case of a transformer, the  
9 magnetic field has been amplified and configured.  
10 So that particular configuration and magnitude of  
11 magnetic fields would not exist were it not for the  
12 presence of a transformer.

13           Since that magnetic field only occurs  
14 because of the construction of that transformer,  
15 that magnetic field must be considered a property of  
16 the transformer.

17           JUDGE WARDWELL: And does -- and again,  
18 this is strictly for me to understand the function  
19 of a transformer; you don't need to compare it to a  
20 cable in answering my question. That trapping of  
21 the magnetism drives it around the core; is that  
22 correct?

23           DR. DOBBS: It doesn't really drive it  
24 around. It's just that in nature, things take the  
25 path of least resistance, and since iron is much

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1 less resistance than air, the magnetism just  
2 naturally follows the iron.

3 JUDGE WARDWELL: And but that then  
4 decreases back down to zero and goes the other  
5 direction, with the alternating current; is that  
6 correct?

7 DR. DOBBS: Yes, it will change  
8 direction.

9 JUDGE WARDWELL: I want to make sure I  
10 understand it. I didn't want to have people walk  
11 away from here thinking there's a set magnetic field  
12 just sitting there inside the transformer. It's  
13 collapsing and expanding and it's going and flowing  
14 one way and then going flowing the other way?

15 DR. DOBBS: It's doing that, but it's  
16 also changing with changes in the load too, because  
17 as you draw power out of it, you're taking energy  
18 out of the magnetic field and putting it into the  
19 secondary winding.

20 So that will create a vector magnetism  
21 inside the core, which is fighting the magnetism in  
22 the primary, and then those have to readjust. So  
23 there's lots of changes going on, probably beyond  
24 the scope of this hearing.

25 JUDGE WARDWELL: That's what I wanted to

1 make clear. And in fact, transformers don't work on  
2 DC power, because you don't have that?

3 DR. DOBBS: It will work momentarily.  
4 When you first turn it on, you have that surge and  
5 you'll get an output, and you have what's called  
6 pulse transformers that work on that, because  
7 transformers require the time rate of change of the  
8 magnetic field, as I've shown in Faraday's law.

9 JUDGE WARDWELL: Dr. Degeneff, I would  
10 like to stay with him and finish up on these. So  
11 just take some notes on what you want to cover,  
12 because I will be getting back to you, so you don't  
13 forget all the things you want to comment on.

14 Heat exchangers. Why aren't  
15 transformers very similar to heat exchangers?

16 DR. DOBBS: I believe I can shorten this  
17 considerably. Instead of stepping through them --

18 JUDGE WARDWELL: You're never required  
19 to lengthen it. You can shorten anything.

20 DR. DOBBS: Okay.

21 JUDGE WARDWELL: You are blessed.

22 DR. DOBBS: For me to state my position,  
23 I believe I can state it more generically, than  
24 stepping through all of them, okay. My technical  
25 position is that the field of fluid dynamics and the

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1 field of electromagnetics are very different fields,  
2 that they are not subject to the same rules, the  
3 same equations.

4 So therefore, comparison of electrical  
5 components with fluid components is superficial at  
6 best, okay. You may be able to draw these analogies  
7 at a very high level, but if you get down to the  
8 details of the actual operation, those will all fall  
9 apart. So that's Point No. 1. Point No. 2 --

10 JUDGE WARDWELL: Stop you right there.  
11 Can you remember your Point No. 2 for a minute?

12 DR. DOBBS: Sure.

13 JUDGE WARDWELL: Have you ever heard of  
14 Poisson's equation?

15 DR. DOBBS: Poisson's equation. I've  
16 heard of it, but I can't recall it --

17 JUDGE WARDWELL: I'm not asking you to  
18 recall it, but it's used in electrical engineering -  
19 -

20 DR. DOBBS: I've heard of Poisson's  
21 equation.

22 JUDGE WARDWELL: Laplace equation?

23 DR. DOBBS: I've heard of Laplace  
24 equation.

25 JUDGE WARDWELL: Effusion equation?

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1 DR. DOBBS: Which?

2 JUDGE WARDWELL: Effusion equation?

3 DR. DOBBS: I've heard of them.

4 JUDGE WARDWELL: Wave propagation?

5 DR. DOBBS: Wave propagation, yes.

6 JUDGE WARDWELL: Those are all used in  
7 electrical engineering?

8 DR. DOBBS: I can't say about Poisson's,  
9 because again, I'm not familiar with it at this  
10 point.

11 JUDGE WARDWELL: It basically is the  
12 same as Laplace, except rather than have it equal to  
13 zero, you're equal to a constant.

14 DR. DOBBS: Right.

15 JUDGE WARDWELL: So do you know whether  
16 those are used in fluid dynamics or not?

17 DR. DOBBS: I'm not really a fluids  
18 person, so I would have to say no.

19 JUDGE WARDWELL: Would you -- I guess  
20 you wouldn't be surprised, then, if I told you they  
21 were used?

22 DR. DOBBS: No, and when you talk about  
23 Laplace's equation, I'm more familiar with Laplace  
24 transformers as used in electrical, not Laplace's  
25 equation necessarily.

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1 JUDGE WARDWELL: So you -- we'll leave  
2 it at that. Go ahead. What's your second point?

3 DR. DOBBS: Okay. The second point is  
4 is that when we go down through the list of the  
5 fluid-type components, such as reactor vessel,  
6 reactor coolant system, pressurizer, piping, pump  
7 cases, valve bodies, core shroud, components,  
8 pressure-retaining boundaries, heat exchangers,  
9 ventilation ducts, or not ventilation but heat  
10 exchangers, all of those have a function of a  
11 pressure-retaining boundaries.

12 The SOC very specifically points out  
13 that pressure-retaining boundaries is a passive  
14 function. So once you classify those as a passive  
15 component, because they perform pressure-retaining,  
16 then any other details about what goes on inside,  
17 and it's really outside consideration.

18 You don't need to consider them, because  
19 they're pressure-retaining; therefore, they're  
20 passive. Therefore, in my testimony, I did not even  
21 consider them, okay.

22 I said there's no point in looking at  
23 these, because they are not close to a transformer.  
24 A transformer is not a pressure-retaining boundary,  
25 and therefore there is no comparison there.

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1           Okay. Now if we go down -- I've already  
2 covered electrical cable, and then I have  
3 electrical-mechanical penetrations, which it's not a  
4 penetration. It's not an equipment hatch. It's not  
5 a seismic structure, and we've covered electric  
6 cables, and it's not a cable tray or a cabinet.

7           So I look at those and I say there's  
8 nothing in this list that looks even similar to a  
9 transformer. Then I refer back to the figure we  
10 just left, and I see all those similarities, and it  
11 becomes immediately obvious to me that a transformer  
12 should be classified in the AMR-excluded category.

13           JUDGE WARDWELL: Thank you. Dr.  
14 Degeneff, before you start that list, do you know  
15 whether the equations used in fluid -- are you  
16 familiar at all with equations in fluid dynamics?

17           DR. DEGENEFF: The finite elements are  
18 based on that, and they use essentially the same  
19 solvers to solve the magnetic problems and heat  
20 transfer problems.

21           JUDGE WARDWELL: As what?

22           DR. DEGENEFF: I'm sorry, as modeling  
23 the performance of equipment under various  
24 conditions. You know, for a magnetic situation, we  
25 might be interested in giving a certain core and

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1 coil configuration, enclosed in a certain tank.  
2 We'd be interested in knowing where the magnetic  
3 flux goes, and how it impacts the various windings  
4 and core and clamping structure, for a heating point  
5 of view. That would be one way.

6 JUDGE WARDWELL: Can you say that's very  
7 similar to what's done in fluid dynamics, in your  
8 experience?

9 DR. DEGENEFF: The same, essentially the  
10 same solvers are used. Another example, heat  
11 transfer would be the heating of a thyristor under  
12 certain current loading, and you'd use these kinds  
13 of tools. So you'd be interested -- it's an  
14 electrical problem, but you're interested in what  
15 heats up where and what's the time constant of the  
16 devices. So --

17 JUDGE WARDWELL: And now I'll still get  
18 back to you, but I'm going to leave you for a  
19 second, for your other comments. Staff, would you  
20 like to comment on the relative similarities or  
21 dissimilarities between equations that model fluid  
22 dynamics compared to those of electrical phenomena?

23 MS. RAY: This is Ms. Ray. I'm not  
24 familiar enough with fluid dynamics.

25 JUDGE WARDWELL: Mr. Matthew, would you

1 have the same thing?

2 MR. MATTHEW: Yes.

3 JUDGE WARDWELL: Okay, that's fine.

4 Proceed with any other comments you have --

5 DR. DEGENEFF: Bob Degeneff. I have  
6 four, I guess, housekeeping comments. Back on Dr.  
7 Dobbs' discussion of the battery, I'm sorry, the  
8 battery charger, and he indicated that the battery  
9 charger would put out some voltage. In this case,  
10 above 12 volts, to charge the battery.

11 It also, in a well-designed battery  
12 charger, that device would change the output voltage  
13 as the level of current changed. In other words,  
14 you wouldn't want to overcharge your battery, do  
15 damage to the battery. So the battery charger will  
16 have some component, some active component in it to  
17 limit the amount of charging. So it's, I would view  
18 that as an active device.

19 The second, and talking about cables.  
20 Yesterday, there was a fair amount of discussion of,  
21 I guess, design of cable systems, and one of the  
22 considerations in designing a cable was what other  
23 cables were in the cable tray, because of the  
24 proximity effect between the two cables.

25 Two adjacent cables carrying current,

1 one would, because of the proximity effect, heat up  
2 the other, okay. That's transformer action, okay.  
3 There's no wire core, but the process is exactly the  
4 same.

5 So if we envision, or if we consider a  
6 cable as a passive device, and we recognize heating  
7 because of parallel cables and that whole process,  
8 then I would suggest that a transformer doing  
9 exactly the same thing is also a passive device.

10 Then the last point, Dr. Dobbs mentioned  
11 that the magnetic forks in the transformer, if I  
12 understood him correctly, was a function of the  
13 core, and that in fact is not true. A transformer  
14 will function perfectly well without a core.

15 Your exciting current may be  
16 substantially greater, and it may be an efficient  
17 design, but a number of small companies that work  
18 with super-conducting filaments have tried to design  
19 transformers without a core, and taking advantage of  
20 the ability of the super-conducting device to carry  
21 more current, okay. That was explored in the Albany  
22 area four or five years ago.

23 JUDGE WARDWELL: Thank you.

24 MR. MATTHEW: Your Honor, I want to make  
25 one point. Robert Matthew from NRC. We talked

1 about the devices that are listed as active devices  
2 or passive devices. We went through discussions of,  
3 you know, the passive devices, active devices. The  
4 active devices listed in the regulation, 54.21, if  
5 you compare the active components listed there  
6 versus the transformer, one can --

7 JUDGE WARDWELL: I'm sorry, compared to  
8 what?

9 MR. MATTHEW: If you compare it to the  
10 transformer, one key factor is really monitoring its  
11 performance or operational function of those  
12 components. All those components listed as active,  
13 either you get an alarm or an indication, showing  
14 clearly what's the function of those devices.

15 So I look at the transformer,  
16 transformer has the same kind of monitoring. Say  
17 for instance, if there is a fault or there is an  
18 arcing inside the transformer, there are protective  
19 devices installed. Say for Indian Point or any  
20 other nuclear power plant, you have differentiated  
21 relays; it will alarm.

22 If you have oil temperature, you know,  
23 because of the overloading or any kind of phenomena  
24 that degrades the transformer, you get a  
25 transformer, you know, trouble alarm in the control

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1 room. Also, you have over-current, under-voltage.  
2 You can monitor through more parameters that the  
3 transformer either is functioning properly, is not  
4 functioning properly.

5 So I want to make the point that it's  
6 really monitored, the operational function of the  
7 plant, of an active device. So it's just the  
8 transformer. So I can probably conclude all those  
9 devices listed as active in 54.21 are all monitored,  
10 and the function can be, whether it's operable or  
11 it's not operable or degraded and it's not producing  
12 its intended function --

13 JUDGE WARDWELL: So that's a question I  
14 would have for you. Are all those devices capable  
15 of being monitored for functional degradation, as  
16 opposed to functional failure?

17 MR. MATTHEW: Functional? I would say  
18 functional performance. Well, its intended  
19 function, yeah. Say for instance a transformer is  
20 supposed to produce 480 volts from a 38 kV. It's  
21 not producing anything, and there is voltage  
22 fluctuation and the alarm comes in.

23 JUDGE WARDWELL: Yeah, but that's the  
24 transformer not performing at all, and that's  
25 sometimes too late, isn't it?

1 MR. MATTHEW: No. No, no, transformer  
2 is not functioning properly. So you have to take  
3 action.

4 JUDGE WARDWELL: You went from 480 down  
5 to zero, did you say?

6 MR. MATTHEW: No, no. 480 to some  
7 value.

8 JUDGE WARDWELL: Oh, okay. I'm sorry.  
9 I thought you said -- sorry.

10 MR. MATTHEW: Say if you look at a  
11 cable. The passive device is listed. There is no  
12 indication for the operator or anybody who knows the  
13 function of that cable, unless it is acted upon to  
14 call a safety function and then it doesn't perform.  
15 So there is no monitor, readily monitorable function  
16 there.

17 JUDGE WARDWELL: Back to the active  
18 devices. The alarms you're referring to, are those  
19 alarms that are some critical level, where attention  
20 needs to be brought to that prior to failure?

21 MR. MATTHEW: Yeah.

22 JUDGE WARDWELL: In all cases?

23 MR. MATTHEW: That should be the basis  
24 for that.

25 JUDGE WARDWELL: And so it is for all

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1 these?

2 MR. MATTHEW: It is, yeah.

3 JUDGE WARDWELL: Thank you. I have some  
4 loose ends to cover, and then one major last topic.  
5 But it will take us a while, I think, to get through  
6 some of the loose ends. In Entergy's -- I can't  
7 find my notes now.

8 Entergy Testimony 091, page 50, Answer  
9 65, it discusses electrical reference is a problem  
10 on which New York State relies, and Entergy states  
11 that "As evident from their titles, all of the cited  
12 documents identify standards that concern general  
13 transformer engineering principles, or electrical  
14 terms used within the electrical engineering  
15 community. None of the cited documents is germane  
16 to NRC regulation of nuclear power plants."

17 And I'd ask Entergy, whoever would like  
18 to answer this, would you characterize these  
19 references as standard references in the electrical  
20 engineering community, or at a minimum valid  
21 references within the electrical energy community?

22 DR. DOBBS: Dobbs for Entergy. I don't  
23 dispute that these references are valid electrical  
24 engineering text, but they are an academic text.  
25 They do not necessarily apply to regulations,

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1 especially the textbooks. The IEEE standards are  
2 probably closer to applying, since IEEE standards  
3 are sometimes used in the nuclear industry.

4 A point that I think this testimony in  
5 here makes is that of these six cited references,  
6 only five of these references refer to transformers  
7 as static, and if you look at the IEEE dictionary,  
8 they also refer to transistors as static and power  
9 supplies as static.

10 So we're left with the fact that  
11 although they may be relevant, they prove nothing,  
12 because a transistor is a static, active device. So  
13 just because these references refer to a transformer  
14 as static, it does not help us in classifying a  
15 transformer. Static, from the perspective of these  
16 references, simply means it has no moving parts.

17 The only reference of the six that  
18 mention passive is the Flanagan, the second one. In  
19 the Flanagan reference, it refers to transformers as  
20 passive.

21 However, this particular reference was  
22 copyrighted in 1992 and 1993, which is before the  
23 regulation was published in 1995, and therefore its  
24 definition of passive cannot possibly take into  
25 account the regulation definition of passive, as

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1 given in the SOC.

2 JUDGE WARDWELL: Do the NRC regulations  
3 define what a transformer is?

4 MR. CRAIG: This is John Craig for  
5 Entergy. I don't believe so.

6 JUDGE WARDWELL: Thank you, and given  
7 this void, can you refer us, either of you two,  
8 either Mr. Craig or Dr. Dobbs, to a better reference  
9 used to just define what a transformer is, than  
10 what's in these references? Because I believe this  
11 was as a context of what was there. But if not, in  
12 the context of just defining what a transformer is.

13 MR. CRAIG: This is John Craig for  
14 Entergy. With respect to how the transformers  
15 perform the basic function of transformers, I'm  
16 going to leave aside the classification of passive,  
17 active, static. I don't think there's much  
18 disagreement on how transformers, the basic  
19 function.

20 I think the fundamental issue here is  
21 the use of the term "passive," and as discussed in  
22 the Statement of Consideration, a number of  
23 commenters suggested to the Commission they use  
24 various definitions in use in industry. The  
25 Commission determined that none of those were

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1 suitable completely.

2 So they created, my word, a unique  
3 definition for passive, in the context of 10 C.F.R.  
4 54. They cautioned people that their use of the  
5 term passive is only applicable in the context of  
6 license renewal Part 54.

7 JUDGE WARDWELL: What do you consider to  
8 be that definition of passive in Part 54?

9 MR. CRAIG: Pardon?

10 JUDGE WARDWELL: What do you consider to  
11 be passive, the definition of passive in Part 54?

12 MR. CRAIG: It's as stated in the  
13 Statement of Considerations, where there's a change  
14 in configuration, a change in properties, a change  
15 in state. Oh, I'm sorry. Thank you. I did that  
16 the other day.

17 So passive would be that when a  
18 structure component performs its intended function.  
19 There is not a change in configuration, properties  
20 or state.

21 JUDGE McDADE: Right, and that's what  
22 we're trying to determine, you know, exactly what  
23 are the characteristics, what are the properties  
24 that are applicable to the transformer, and from our  
25 standpoint, we have to decide what the regulations

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1 say and what they mean. We're looking for technical  
2 expertise and technical help, and Dr. Dobbs, the  
3 question.

4 That cite talking about transformers as  
5 passive, from a technical standpoint, as say an  
6 experienced electrical engineer, do you disagree  
7 with that description of it as passive, and if so,  
8 why?

9 DR. DEGENEFF: Academic. The academic  
10 world has a somewhat different perspective on what  
11 constitutes active and passive. I think Dr.  
12 Degeneff has at times relied on that academic-type  
13 definition, because the academic definition has a  
14 tendency to say that it controls or that it  
15 amplifies the voltage or something like that.

16 Since the transformer doesn't have some  
17 of those characteristics that are generally  
18 considered active in academia, you might find  
19 references in there that refer to it as passive.

20 However, that classification is  
21 academic, is irrelevant in the proceedings, because  
22 we must rely upon our classification, upon the  
23 definition of passive given in the SOC. So when I  
24 started this, I put aside all of my electrical  
25 engineering references to textbooks and stuff, and

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1 said --

2 In fact, I even put aside the other  
3 references. I tried to do my testimony based upon  
4 only the regulation and the SOC, and in my technical  
5 understanding, and the reason because those two  
6 documents are the closest tied together.

7 So my testimony is based upon the  
8 regulation, the SOC, and my technical understanding  
9 of how a transformer operates.

10 JUDGE McDADE: So, and let me just  
11 summarize here to make sure I'm hearing what I think  
12 you're saying, which is you don't take issue with  
13 the use of the word "passive," but you think in  
14 context there, it's somewhat limited. In that  
15 context, it means a representation that it doesn't  
16 have moving parts.

17 When you're testifying that it's not  
18 passive, you're saying that in your opinion, there  
19 are properties that change in operation of the  
20 transformer, and that, from a technical standpoint,  
21 is what you're offering it, is your expert opinion  
22 that in your view, there are properties of the  
23 transformer that change in operation?

24 DR. DEGENEFF: Dobbs for Entergy.  
25 That's very close, but there was one point in there.

1 I believe you said that passive means no moving  
2 parts, and it is static that means no moving parts.  
3 Passive has a different meaning, either in academia  
4 or in the regulation space. What I'm saying is --

5 JUDGE McDADE: In the context of that  
6 site from the text, what did you understand passive  
7 to be from that author?

8 DR. DEGENEFF: Pardon me. Would you  
9 repeat?

10 JUDGE McDADE: As an electrical  
11 engineer, what did you understand that author to  
12 mean by passive?

13 DR. DEGENEFF: There isn't -- there's  
14 just like two pages there, and it just, he just says  
15 "it's passive." So there is nothing to draw a  
16 conclusion of exactly what he means from that.

17 JUDGE McDADE: Okay, thank you.

18 JUDGE WARDWELL: Can we step in now to  
19 maybe take a look at what IEEE, just to piggyback on  
20 what Judge McDade was questioning on, on their  
21 definitions, to see if we glean anything out of  
22 that. This is in reference to, if I could orient  
23 you back to -- it was on this same set of questions.

24 On page 51 of your testimony, that's  
25 Exhibit 091, it I believe still Answer 65, I'm

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1       sorry.   that on page 51, you say "The IEEE defines  
2       the terms transformer, static and passive devices as  
3       follows:   that a transformer," and the IEEE, I  
4       believe, is Energy Exhibit 106, and this definition  
5       is at page 1131, that "A transformer is a static,  
6       electric deice consisting of a winding or two or  
7       more coupled windings, with or without a magnetic  
8       core, for introducing mutual coupling between  
9       electric circuits."

10               Static is defined in IEEE at page 1041,  
11       as referring to "a state in which the quantity  
12       exhibits no appreciable change with an arbitrary,  
13       long time interval."   Then it defines passive device  
14       at 750 of this same reference, "a device that does  
15       not require power or contains no active components."  
16       That's what IEEE did, based on your testimony.

17               DR. DEGENEFF:   Correct.

18               JUDGE WARDWELL:   Would you agree that  
19       the IEEE definition of passive does not directly  
20       relate to the way, and that the term "passive" has  
21       historically been used in license proceedings?   I  
22       think you will say yes, because you just said it  
23       earlier.

24               DR. DEGENEFF:   Dobbs for Entergy.   Yes.  
25       In fact, this section of testimony is to illustrate

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1 that exact fact, is that the IEEE definitions do not  
2 align with the regulatory definitions, and therefore  
3 we can't really use them.

4 JUDGE WARDWELL: When combining the  
5 definitions of static with transformer, doesn't this  
6 reference define transformers as a device with no  
7 appreciable change in state? Because static refers  
8 to a state, and transformers refer to a static  
9 electric device, and --

10 (Witness reviewing document.)

11 DR. DEGENEFF: Dobbs for Entergy. If  
12 you read the definition of static below, it says  
13 "Referring to a state in which a quantity exhibits  
14 no appreciable change within an arbitrary long time  
15 interval." I read that to mean moving parts. But  
16 if you want to include internal changes, then I  
17 would say that static doesn't apply to a  
18 transformer.

19 So if you're going to apply this  
20 definition to a transformer, then I think you have  
21 to apply it in terms of moving parts. The same  
22 holds for passive device. If you look at the  
23 definition of passive device there, it says "it does  
24 not require power."

25 So obviously, this does not apply to a

1 transformer, because a transformer must have power  
2 applied to it.

3 JUDGE WARDWELL: And you can see what  
4 they're talking, and all that. They've defined  
5 passive device as something that really doesn't fall  
6 under our bailiwick, because it doesn't require  
7 power --

8 DR. DEGENEFF: Yes.

9 JUDGE WARDWELL: So and that's what I  
10 just said. It's obvious that that doesn't relate to  
11 what we're doing. So the two aren't so obvious.  
12 Just because one's not obvious doesn't mean that the  
13 other two aren't relevant, are there? Don't they  
14 provide some information?

15 I mean we don't have any definition in  
16 the regulations, correct, on what a transformer is?

17 DR. DEGENEFF: There is no --

18 JUDGE WARDWELL: Even have it in the  
19 Statement of Consideration, do we?

20 DR. DEGENEFF: Dobbs for Entergy. That  
21 is correct.

22 JUDGE WARDWELL: So we're left  
23 floundering around, trying to grasp this area.  
24 Maybe we'll get some insight from staff, I see.  
25 Yeah, we'll cancel that question to you and we'll go

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1 right to staff with that question.

2 MR. MATTHEW: Roy Matthew, NRC. If you  
3 look at the IEEE definition, they say static.  
4 They're not talking in terms of license renewal of  
5 Part 54 space. That statement static is accurate  
6 probably for other purposes.

7 That's why the Statement of  
8 Consideration specifically said that active and  
9 passive, you know, the functions are used  
10 specifically for license renewal application. If  
11 you look at the NRC documents, these IEEE guidance  
12 is not referenced in any of the documents.

13 JUDGE WARDWELL: But there's -- but  
14 likewise, if we just look at the definition of  
15 static, is there anything wrong with that? It's  
16 just a matter of now defining what state is, and I  
17 put the underline there. That's my emphasis.

18 MR. MATTHEW: And also if you look at  
19 "battery charger," from an IEEE perspective, it  
20 makes sense. There are battery chargers which are  
21 rotating machines. Actually a DC generator is used  
22 as a battery charger. That's an active device  
23 probably. That's not static.

24 So if you have an electronic version of  
25 battery charger, that's a static battery charger,

1 and if you compare that to Part 54, it doesn't make  
2 any sense.

3 JUDGE WARDWELL: Dr. Degeneff, do you  
4 have any comments in regards to these definitions of  
5 IEEE and why they should or shouldn't be used?

6 DR. DEGENEFF: Well, in the -- Degeneff.  
7 In the six documents that I listed, the last two  
8 were works edited by Jim Harlow, that were  
9 essentially written. There were 22 chapters in the  
10 book, if I remember correctly, but all written by  
11 senior members of the IEEE.

12 And so they would work very closely with  
13 the IEEE dictionary and the IEEE standards. So the  
14 reason I included that was to give a sense of what  
15 the engineering community or how the engineering  
16 community views a transformer.

17 I think whether we use the word static  
18 or passive, it meets the criteria of its properties  
19 being constant while it's operating.

20 JUDGE WARDWELL: Thank you. Entergy  
21 exhibit, Testimony on 091, Exhibit 091, page 95.  
22 Bear with me for a second here. All right, that's  
23 good. Yeah. The Entergy Exhibit 091, page 95, Q  
24 and A on 106. Question 106 says "Has the NRC ever  
25 concluded that transformers are components that

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1 require aging management review in accordance with  
2 Section 10 C.F.R. 54.21(a)(1)(i).

3 Answer 106 says "No. The revised  
4 license renewal rule was issued in June of 1995,"  
5 and goes on later in the paragraph to say "In the 13  
6 years since the first license renewal application  
7 was received by the NRC, every one of the license  
8 renewal applications approved by NRC for the 71  
9 reactor units has defined electrical transformers as  
10 not being subject to aging management review."

11 And I assume this was you, Mr. Craig,  
12 that did this? You are the JWC in this; is that  
13 correct?

14 MR. CRAIG: Yes.

15 JUDGE WARDWELL: Do you know that in the  
16 17 -- do you know if in the 17 years since the  
17 revised license renewal rule was issued, has there  
18 ever been a regulation or a Commission order that  
19 specifically declared transformers to be an active  
20 system structure or component and exempt from aging  
21 management review?

22 MR. CRAIG: To my knowledge, no, and I'm  
23 quite sure they haven't. They rely on the language  
24 in 10 C.F.R. 54, and I'll note that the 71's wrong.  
25 I believe it's now 73 units.

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1 JUDGE WARDWELL: It's not wrong. It was  
2 just, it's outdated.

3 MR. CRAIG: It's updated, yes.

4 JUDGE WARDWELL: Do you know, and if you  
5 don't, that's fine, whether in the -- I'm not even  
6 going to ask you that. Staff, in the 13 years of  
7 license renewal, do you know if there's been any  
8 times where the issue of transformers has been  
9 challenged in a license renewal proceeding,  
10 resulting in a resolution that the transformers are  
11 indeed active devices and exempt from aging  
12 management review?

13 MS. RAY: This is Ms. Ray. I would have  
14 to get back to you on that. I'm not positive.  
15 There may have been a few rulings.

16 JUDGE WARDWELL: That's fine, yeah.

17 MS. RAY: But we have been consistent in  
18 our review, that transformers are active components  
19 and not subject --

20 JUDGE WARDWELL: Yeah. It's clear it's  
21 your position at it. It's just I wondered whether  
22 that's ever been challenged and whether there's been  
23 a definitive decision that yes, transformers are  
24 active. That's all, and if you don't, that's fine.  
25 You're not aware of it. So you're not aware of one

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1 that has said that either?

2 MR. MATTHEW: Roy Matthew, NRC. We are  
3 not aware of anything, except the Seabrook  
4 proceeding.

5 JUDGE WARDWELL: I'm sorry. Say that  
6 again.

7 MR. MATTHEW: We are not aware of  
8 anything except the Seabrook proceeding, where it  
9 was challenged.

10 JUDGE WARDWELL: Was that adjudicatory  
11 hearing conducted in regards to a challenge of a --

12 MR. MATTHEW: No.

13 JUDGE WARDWELL: Thank you, challenge of  
14 whether a transformer is active or passive. No, it  
15 wasn't.

16 MR. TURK: Your Honor, could we get --  
17 I'm sorry, Sherwin Turk. I don't know if the  
18 witness understands the question the way you  
19 intended. Could you ask him more clearly what the  
20 proceeding was that he's referring to?

21 JUDGE WARDWELL: I'm sorry, Mr. Turk.

22 MR. TURK: I think there's a disconnect  
23 between your question and the answer, because I  
24 think your understanding of what a proceeding is may  
25 be different from his. So if you would just ask him

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1 what it is he's referring to, that might clarify it.

2 JUDGE WARDWELL: You want me to ask him  
3 what he's referring to?

4 MR. TURK: Yes, please.

5 JUDGE WARDWELL: What are you referring  
6 to? I'm very easy. I'll ask anything.

7 MR. MATTHEW: I am referring to the  
8 Seabrook contention regarding transformer as an  
9 active device.

10 JUDGE WARDWELL: And are you referring  
11 to the Commission decision on the contention  
12 admissibility portion of that proceeding?

13 MR. MATTHEW: Yes, that's true.

14 JUDGE WARDWELL: And --

15 JUDGE McDADE: Do you know if that's  
16 CLI12-05? Do you have the cite for that?

17 MR. MATTHEW: Yes, yes. That is  
18 correct.

19 JUDGE McDADE: That's the one you're  
20 referring to?

21 MR. MATTHEW: Yes.

22 JUDGE WARDWELL: And my question to you  
23 was was that an adjudicatory -- was that a decision  
24 on an adjudicatory portion of that hearing, the  
25 actual trial of that hearing, and do you agree that

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1 it was part of the contention admissibility stage  
2 that that decision was discussing?

3 MS. MIZUNO: Your Honor, Beth Mizuno for  
4 the staff. I think maybe we're treading into an  
5 area where legal analysis would be called for, and  
6 I'm not quite sure this witness, as a technical  
7 expert, has the legal background to answer that  
8 question.

9 JUDGE WARDWELL: But I'm going -- this  
10 question is again derived around a statement in the  
11 testimony, of which we are proceeding with this, the  
12 question and answer 106, and so -- and if they don't  
13 want to, that's fine.

14 They don't have to. They brought up  
15 Seabrook, I didn't. So I'm asking them what was  
16 involved with Seabrook in the answer to that  
17 question, as we're discussing the answer to that  
18 question in 106.

19 JUDGE McDADE: But CLI12-05 is what it  
20 is. The question is whether or not this witness, as  
21 an engineer, can add insight into the meaning of  
22 that, as opposed to what we have to decide.

23 JUDGE WARDWELL: And that might be an  
24 excellent way to word it.

25 MR. MATTHEW: Yes. I was referring the

1 CLI.

2 JUDGE WARDWELL: I'm sorry?

3 MR. MATTHEW: I was referring to the CLI  
4 reference that you were just mentioning.

5 JUDGE WARDWELL: Yes. From a technical  
6 perspective?

7 MR. MATTHEW: From a technical  
8 perspective, I have no comment.

9 JUDGE WARDWELL: Thank you.

10 MR. MATTHEW: It's a legal matter.

11 MS. SUTTON: This is Kathryn Sutton for  
12 the Applicant, Your Honor. We do agree that that is  
13 a legal matter, and we will be happy to fully brief  
14 the relevance of that decision in this proceeding.

15 JUDGE WARDWELL: Thank you.

16 (Pause.)

17 JUDGE WARDWELL: I'm now on the section  
18 that I had set aside for comparison of the  
19 transistors. I'm not, I haven't gone through all  
20 the sections and the questions I had. I'm not sure  
21 they haven't already been covered, so I think the  
22 easiest way to present that now, is there anything  
23 else, Mr. Dobbs, you would like to say in regards to  
24 comparison of transformers with transistors, that  
25 hasn't already been covered?

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1 DR. DEGENEFF: Yes. I'd like to just  
2 make a summary statement.

3 JUDGE WARDWELL: Sure.

4 DR. DEGENEFF: Okay. Transistors and  
5 transformers are similar, in that they are simple  
6 components that cannot be simplified further. That  
7 is, they do not contain any internal components.  
8 They are both characterized by their terminal  
9 characteristic. It is the voltage and current that  
10 occur at their terminals.

11 In the case of a transistor, the  
12 function that has been described by New York State  
13 is the change in resistivity. That is internal to  
14 the transistor, and cannot be directly measured or  
15 observed.

16 In the case of a transformer, it has a  
17 magnetic field inside the core which is similar. It  
18 cannot be directly measured or observed. However,  
19 both the change in resistivity of the transistor and  
20 the magnetic field in the transformer, the effects  
21 of those changing properties can be measured at the  
22 terminals, which in my opinion, makes the VI, the  
23 voltage and current measured at the terminals of  
24 both the transformer and of the transistor,  
25 properties of those components.

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1 JUDGE WARDWELL: Thank you. Dr.  
2 Degeneff, would you like to comment on that or make  
3 any other statements in regards to transistors?

4 DR. DEGENEFF: Yes, Degeneff. I guess I  
5 would have to respectfully disagree. As we've  
6 talked about before, a transistor has simply two  
7 states. It's a conductor or it's an insulator.  
8 It's open or closed, in the simplest point of view.

9 A transformer, on the other hand, is a  
10 device which will pass power, dependent upon what's  
11 connected to its input terminals, and what kind of a  
12 load is on the output terminals.

13 A transistor or a thyristor, on the  
14 other hand, the power passing through it is in fact  
15 independent of the power source connected to it and  
16 the load it's serving. So they're two entirely  
17 different kinds of devices.

18 JUDGE WARDWELL: Thank you. I think  
19 we're at the point now where it's kind of one of the  
20 last set of questions, and I'm referring to  
21 Entergy's statement in their testimony 091, on pages  
22 14 to 24. It says that "New York State's claim that  
23 transformers are subject to aging management review  
24 because they are components for which periodic  
25 replacement is not generally scheduled is

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1 irrelevant," and I'll ask anyone from Entergy, why  
2 do you believe that is irrelevant?

3 MR. McCAFFREY: Is that the answer for  
4 Question 24?

5 JUDGE WARDWELL: Sorry?

6 MR. McCAFFREY: I just want to make sure  
7 I get the correct reference. Is it Question 24  
8 testimony?

9 JUDGE WARDWELL: Yes. Oh yeah. The  
10 answer and the question is 24. Yeah, we can put  
11 that up if you want, of your testimony, yes.

12 MR. RUCKER: This is Roger Rucker for  
13 Energy. I mean that's part of the real, as far as  
14 54.21. I mean one of the criteria for 54.21 is the  
15 screen criteria. So you're screening out components  
16 that have been put in scope by 54.4. So you know,  
17 one of the screening --

18 JUDGE WARDWELL: Say again which? What  
19 are you referring to again? I'm sorry.

20 MR. RUCKER: This statement is referring  
21 to 10 C.F.R. 54.21.

22 JUDGE WARDWELL: Okay.

23 MR. FAGG: I'm sorry to interrupt. Brad  
24 Fagg. Can we just go down one page, so we get the  
25 reference? It would be the next page.

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1 MR. O'NEILL: I think it may actually be  
2 page 14.

3 JUDGE WARDWELL: I have it as page 14.

4 MR. FAGG: And if we could highlight the  
5 whole sentence?

6 MR. RUCKER: That's the last paragraph.

7 JUDGE WARDWELL: Yeah, there you go.  
8 It's under -- there you are.

9 MR. RUCKER: Okay. What this statement  
10 implies or what this statement is making, 10 C.F.R.  
11 54.21 is what we consider screen, okay. 54.4 is  
12 scoping. That's the components you put in scope.  
13 54.21 is screen.

14 So for this criteria, we're saying that  
15 one of the characteristics is that you're screening  
16 out components that are periodically replaced, you  
17 know, based on a qualified life.

18 That definition is applied by us, as  
19 well as the staff. I believe you could ask them  
20 this question as well. It's typically for  
21 electrical, only applicable to EQ components.  
22 Therefore, any statement based upon this, because  
23 transformers have no qualified life. The only thing  
24 that has a qualified life is going to be an EQ  
25 component. So the statement is not relevant, you

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1 know, for consideration.

2 JUDGE WARDWELL: I see. Do you know of  
3 any SSCs that have fallen under this part, because  
4 they are routinely replaced prior to failure? Can  
5 you give some examples of that?

6 MR. RUCKER: EQ cable.

7 JUDGE WARDWELL: So all the EQ cables  
8 are periodically replaced?

9 MR. RUCKER: They're subject to  
10 replacement, based upon a qualified life, that is  
11 correct.

12 JUDGE WARDWELL: Thank you. That's all  
13 the questions I have.

14 JUDGE McDADE: Good. I know that's  
15 going to come as a surprise to you, but we are done,  
16 at least for right now. It is now about --

17 JUDGE WARDWELL: And can I interrupt,  
18 because I'll just forget later, in a couple of  
19 seconds possibly. The reason we are is because of  
20 the efficiencies with which this panel has answered  
21 questions, and we certainly appreciate it, and I'm  
22 sure I know the audience appreciates it, and  
23 possibly even counsel does. So thank you. Thank  
24 you for your efforts.

25 JUDGE McDADE: At this point, what we

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1 would allow are questions by the various parties.  
2 What I would propose to do, it's now about 25  
3 minutes of 3:00, is to recess until three o'clock,  
4 and then come back and to allow the parties, with  
5 the same instructions we've given in the past with  
6 regard to questioning of witnesses. Is that going  
7 to be enough time, until three o'clock?

8 MR. SIPOS: Your Honor, this is John  
9 Sipos for the State of New York. May I respectfully  
10 suggest that we go to 3:15? Speaking on behalf of  
11 myself, I find the amount of time for -- at this  
12 period, following the Board's question, before we  
13 start cross, to be very useful, and I think it would  
14 help us organize our questions and streamline them,  
15 and perhaps eliminate some.

16 But it's a function of us not being in a  
17 highly compressed time frame, and 25 minutes, I  
18 would suggest --

19 JUDGE McDADE: No. 3:15. I mean I  
20 would anticipate that questioning by the parties  
21 would not last more than an hour, in any event. So  
22 if we did come back at 3:15, we would still be able  
23 to finish at a reasonable time here. So you're  
24 asking until 3:15. Is adequate for Energy?

25 MR. FAGG: That's more than adequate for

1 Energy.

2 JUDGE McDADE: The staff?

3 MS. MIZUNO: Yes, Your Honor.

4 JUDGE McDADE: Okay. So we'll stand in  
5 recess then until 3:15?

6 MR. SIPOS: Thank you, Your Honor.

7 (Whereupon, a recess was taken.)

8 JUDGE McDADE: Is New York ready to  
9 proceed?

10 MS. HESLIN: Yes, Your Honor. This is  
11 Laura Heslin from the State of New York. I'd like  
12 to ask Dr. Degeneff some questions. Dr. Degeneff,  
13 I'd like to ask you about the April 6, 2007  
14 transformer failure at Indian Point Unit 3.

15 Entergy's expert testimony attributes  
16 the cause of that failure to a design flaw in the  
17 transformer Phase B bushing, and not the effects of  
18 aging on the transformer. Do you agree with that  
19 assessment?

20 DR. DEGENEFF: Degeneff. No. The  
21 failed bushing, it was installed in 1976, and it  
22 failed in 2007. So the bushing was, in round  
23 numbers 31 years old. It had not been inspected for  
24 six years. It was inspected on a six-year  
25 inspection interval. The readings were -- the

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1 readings at that time were high but deemed  
2 acceptable.

3 In New York State 40, Energy's report on  
4 aging, on page one they talk about the GE bushing  
5 type exhibiting slow degradation, leading to an  
6 eventual failure.

7 So they were, if you will, aware that  
8 these types of bushings exhibited this kind of  
9 conduct. Then item, the fourth item is on Energy  
10 Report 00347, on the page iii. The NRC criticized  
11 Energy for not picking up the condition of the  
12 bushing.

13 MS. HESLIN: Could we please bring up  
14 that exhibit? It's EN-TR-00347. It's at page, PDF  
15 page 7. Dr. Degeneff, could you read the sentence?  
16 It's in the paragraph with green. It's the second  
17 line. It says "Energy failed."

18 DR. DEGENEFF: Okay. "Energy failed to  
19 identify and in the Corrective Action Program as an  
20 adverse condition associated with the B phase high  
21 voltage bushing on 31 main transformer (MT), that  
22 was discovered during testing."

23 MS. HESLIN: And the next sentence.

24 DR. DEGENEFF: Okay. The data from that  
25 testing indicated potential degradation of the B

1 phase high voltage bushing."

2 MS. HESLIN: And the sentence after that

3 --

4 DR. DEGENEFF: "As a result, the  
5 condition was not adequately evaluated before  
6 placing the transformer back in service, and the  
7 bushing subsequently failed." It failed about three  
8 weeks later.

9 MS. HESLIN: Thank you. Next, I'd like  
10 to ask you another question. Dr. Degeneff, in your  
11 December 2011 report, you gave a list of recent  
12 transformer failures to nuclear plants around the  
13 country. Have there been any transformer failures  
14 since that time?

15 DR. DEGENEFF: I think this morning I  
16 mentioned the failure at Fitzpatrick on 11/11 this  
17 year. It resulted in a fire that lasted about 2-1/2  
18 hours.

19 MS. HESLIN: Was that fire, was that at  
20 the transformer?

21 DR. DEGENEFF: At the transformer. As I  
22 understand it, with the information we have at hand,  
23 the failure was in the winding, inside the  
24 transformer.

25 MS. HESLIN: And is that plant owned by

1 Energy?

2 DR. DEGENEFF: Yes, yes. It's one of  
3 three in New York State.

4 MS. HESLIN: And where did the problem  
5 initiate?

6 DR. DEGENEFF: In B phase of the main  
7 transformer.

8 MS. HESLIN: And in your opinion, does  
9 the fact that this transformer was only four years  
10 old diminish the significance of this event?

11 DR. DEGENEFF: Degeneff. No. In my  
12 opinion, and again we talked about that this  
13 morning, transformers, because they're a complicated  
14 piece of equipment, their failure rate is typified  
15 by a bathtub shaped curve. So at the beginning of  
16 its life, for a number of reasons, you tend to have  
17 failures, and then towards the end of its life, that  
18 rate of failure will increase.

19 So it would seem that a prudent owner  
20 would measure, monitor the condition of the  
21 transformer at the beginning of its life and  
22 certainly towards the end of its life. There were  
23 two documents that I looked at. It was New York  
24 State 000473 and New York State 000471.

25 MS. HESLIN: Do you mean New York State

1 000470 and New York State 000471?

2 DR. DEGENEFF: I'm sorry. 470 and 471,  
3 yes.

4 MS. HESLIN: Thank you. I have another  
5 question for you. On page 107 of Entergy's  
6 Testimony, its witnesses state that "A significant  
7 loss of functionality in the large power  
8 transformers at Indian Point would likely be  
9 detected immediately by station operators."

10 DR. DEGENEFF: I'm sorry, I didn't.  
11 Would you repeat?

12 MS. HESLIN: Yes. On page 107 of  
13 Entergy's Testimony, its witnesses state that "A  
14 significant loss of functionality in the large power  
15 transformers at Indian Point would likely be  
16 detected immediately by station operators." Do you  
17 agree with that assessment?

18 DR. DEGENEFF: Not always. In New York  
19 State document 000468 and 469, the NRC identifies  
20 design vulnerabilities or situations where the  
21 protective relaying in an open conductor situation  
22 doesn't pick up the fault situation, and a  
23 transformer failure then could get, could lead to a  
24 safety problem. So the system isn't foolproof.

25 MS. HESLIN: And you've heard Dr. Dobbs'

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1 opinion today on why he thinks transformers are  
2 active components. Based on your 40-year experience  
3 in the industry, do you consider his opinions to  
4 reflect the views of the electrical engineering  
5 community?

6 DR. DEGENEFF: Degeneff. I've been in  
7 the transformer business 40 years. I've been  
8 associated with every major, most every major  
9 transformer manufacturer worldwide. I've served  
10 for, on working groups and sessions for creating  
11 IEEE standards, and I've worked internationally with  
12 Sigre to create standards.

13 So as politely, but as firmly to say  
14 that what I've heard as far as the explanation of  
15 what's going on electrically with the transformer, I  
16 have to feel it's, or have to say that it's over the  
17 top and my background says that this is not a  
18 reasonable position to take.

19 MS. HESLIN: There has been testimony  
20 that the transformers involved with station  
21 blackouts are not operated under the same conditions  
22 as the main transformers, and therefore they do not  
23 degrade in the same manner as the main transformers.

24 In your opinion, does this mean that  
25 aging degradation is not an issue for these station

1 blackout transformers?

2 DR. DEGENEFF: No. A device, even  
3 though it's not used frequently, will age and  
4 degrade, and in fact often, it will age and degrade  
5 more quickly, because it is not being monitored or  
6 maintained properly.

7 So whether a transformer is being used  
8 continuously or loaded at 100 percent, or in stand-  
9 by, ready to be used, there needs to be an active  
10 program to assure that the transformer is healthy.

11 MS. HESLIN: And finally, Energy  
12 testified that there are 20 large transformers at  
13 Indian Point. Is it safe to say that there are many  
14 times this number of transistors, batteries, circuit  
15 boards and other such electrical devices at Indian  
16 Point?

17 DR. DEGENEFF: Yes. I mean depending  
18 upon if you're talking about batteries, there might  
19 be several hundred batteries on site, depending upon  
20 what kind of relaying system is there in a backup  
21 system. As far as thyristors and transistors, there  
22 might be thousands of times as many of those  
23 devices.

24 So the aging management program or the  
25 maintenance program that you have on a transformer,

1 simply because of the numbers, could be much more  
2 effective and much more focused on those  
3 transformers.

4 MS. HESLIN: Great, thank you. I now  
5 have some questions for Energy. This is for Mr.  
6 McCaffrey. Do the transformers involved with  
7 bringing the reactor back online after a station  
8 blackout have continuous online gas monitoring?

9 MR. McCAFFREY: No, they don't.

10 MS. HESLIN: Are all the transformers at  
11 Indian Point energized at all times?

12 MR. McCAFFREY: Yes, they are.

13 MS. HESLIN: And this question is for  
14 Mr. Craig. You said that under the maintenance  
15 rule, some components are inherently reliable and  
16 can be run until failure. Are transformers such  
17 components?

18 MR. CRAIG: They can be.

19 MS. HESLIN: They can be run until  
20 failure? Thank you. I now have some questions for  
21 staff.

22 JUDGE McDADE: Excuse me one second. I  
23 just want to make sure I understood. You didn't say  
24 all transformers; you said "some transformers may  
25 be; correct?"

1 MR. McCAFFREY: Who are you asking?

2 JUDGE McDADE: The question was asked  
3 whether transformers could be run until failure?

4 MS. HESLIN: Yes. That was -- yes.  
5 That was to Mr. Craig.

6 JUDGE McDADE: Okay and Mr. Craig, your  
7 answer was "some," or is it --

8 MR. CRAIG: And it would depend on how  
9 each individual plant implemented the maintenance  
10 rule. For components that are highly reliable, are  
11 the subject of little or minimal maintenance, and  
12 they have no safety-significance, then those  
13 components are potentially placed in a category  
14 called A2 under the maintenance rule.

15 If the performance, if they see failures  
16 with those components, then there's a requirement,  
17 also part of the maintenance rule, that's either in  
18 performance or condition that requires once every  
19 two years for the licensee to go back, and to review  
20 the effectiveness of their maintenance program, to  
21 determine whether or not these components should be  
22 moved to Category A1, which requires more extensive  
23 performance and condition monitoring.

24 JUDGE McDADE: But there are some  
25 transformers that fall in the category of A1 and

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1 some that fall in A2?

2 MR. CRAIG: I believe that's correct.

3 JUDGE McDADE: Okay, and the ones that  
4 fall in A2 would be those that do not operate in  
5 connection with a safety component?

6 MR. CRAIG: Yes, yes. They would be  
7 more likely candidates. I can't say with absolute  
8 certainty that there's not a safety-related  
9 transformer that has been categorized as an A2.

10 JUDGE McDADE: Okay. There may be; you  
11 just can't say one way or the other?

12 MR. CRAIG: I just don't know the  
13 answer.

14 MS. HESLIN: I just have one follow-up  
15 question, Mr. Craig. If aging degradation wasn't  
16 detected before the failure of the transformer,  
17 wouldn't that conflict with the purpose of the  
18 maintenance rule, which is to maintain  
19 functionality?

20 MR. CRAIG: Well, as I attempted to  
21 explain earlier today, it's a gradation, if you  
22 will. The purpose of the maintenance rule is to  
23 ensure components perform as intended, and the  
24 activities are graded based on safety significant,  
25 past performance and other parameters.

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1           And to the extent practical, then the  
2 goal was achieved. If there are components --  
3 components are going to fail in nuclear plants.  
4 It's a complex machine. So in the unlikely event  
5 that you see failures, or in the context where the  
6 staff wrote the Information Notice for the  
7 transformer failures in 2009, there were a number in  
8 a short time period.

9           So they looked at what the cause was and  
10 reminded the licensee to look at their treatment of  
11 transformers in the context of the maintenance rule,  
12 and that was a polite suggestion to the next time  
13 they look at the effectiveness, to make sure they're  
14 categorized properly and that the maintenance  
15 activities that affect and monitor the performance  
16 or condition of transformers are accurately and  
17 properly categorized.

18           MS. HESLIN: And in your mind, what is  
19 an acceptable failure rate for transformers?

20           MR. CRAIG: I can't give you a number.  
21 Transformers, safety-related transformers rarely  
22 fail. The main transformers that we've been talking  
23 about here, there were a sporadic number of failures  
24 that happened, but they don't fail very often.  
25 Maybe the NRC staff has a better sense for that.

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1 MS. HESLIN: Yes. What is your opinion  
2 on what's an acceptable failure rate for  
3 transformers?

4 MS. RAY: This is Ms. Ray. I wouldn't  
5 be prepared to give you a number.

6 MS. HESLIN: Ms. Ray, I have two more  
7 questions for you. Can you assess the internal  
8 health of a transformer, simply by monitoring the  
9 current and voltage exiting the transformer?

10 MS. RAY: This is Ms. Ray. I would say  
11 that there are a number of tests that are performed  
12 to monitor the internal components of the  
13 transformer. The voltage and current are not the  
14 only things.

15 MS. HESLIN: So you have to conform  
16 condition monitoring to assess the internal health  
17 of the transformer?

18 MS. RAY: This is Ms. Ray. The voltage  
19 and current can give you some indication of a  
20 problem. But yes, I would believe that tests would  
21 be required to determine exactly internal  
22 components.

23 MS. HESLIN: Thank you. I have no more  
24 questions.

25 JUDGE McDADE: Okay, thank you. Energy.

1 MR. FAGG: If we could just pick up with  
2 a couple of questions that were just asked. Let's  
3 talk about the 2007 Unit 3 event. Mr. McCaffrey, I  
4 guess, what transformer was that?

5 MR. McCAFFREY: That was in 31 main  
6 transformer, so it should be Unit 3. That was the  
7 main step up transformer for the output of the  
8 generator.

9 MR. FAGG: Okay. Just so that I  
10 understand, does that transformer have anything at  
11 all to do with license renewal?

12 MR. McCAFFREY: That transformer would  
13 have no intended license renewal function.

14 MR. FAGG: Did you, and by you I mean  
15 the company, take any corrective actions in response  
16 to that event?

17 MR. McCAFFREY: Yes, we did, and we  
18 describe this in our testimony, which is ENT 91,  
19 page 105. It lists the couple, the five actions we  
20 did take to rectify the corrective actions from that  
21 root cause we did for that failure.

22 MR. FAGG: Okay. Another event that I  
23 think Dr. Degeneff was asked about was the  
24 Fitzpatrick event. Are you familiar with that one,  
25 Mr. McCaffrey?

1 MR. McCAFFREY: I am familiar that the  
2 transformer did fail at Fitzpatrick.

3 MR. FAGG: Okay, and I think I heard  
4 within four years of it being installed?

5 MR. McCAFFREY: That's correct. There  
6 was a new transformer installed four years ago.

7 MR. FAGG: Did failure have anything at  
8 all to do with age issues?

9 MR. McCAFFREY: Right now, we do not  
10 believe so. The root cause is not completed yet  
11 though, for that transformer failure.

12 MR. FAGG: Okay. Dr. Dobbs, did you  
13 hear the testimony by Dr. Degeneff just a moment ago  
14 about views of the electrical community, and the  
15 characterization of your opinions as not a  
16 reasonable position to take? Did you hear that?

17 DR. DEGENEFF: Yes, I did.

18 MR. FAGG: I'd like to give you a chance  
19 to respond, Dr. Dobbs. Is there anything that  
20 you've said today or in any of your pre-filed  
21 testimony, that is contrary to the knowledge that a  
22 competent expert in the electrical field would have?

23 DR. DEGENEFF: No. I think my testimony  
24 has been accurate. I think the problem arises in  
25 that Dr. Degeneff wants to rely on the academic

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1 community for support, and the academic community's  
2 opinions do not apply in the case of nuclear power.

3 MR. FAGG: Okay. I'd like to, for a  
4 series of, a couple of questions here, if we could  
5 pull up Energy 91, which is the testimony, and if we  
6 could go to Answer 15. Unfortunately, I didn't  
7 write down the page number, but it's there. And if  
8 we could highlight the quoted passage for the  
9 contention NYS 8, as admitted, right up at the top,  
10 starting at the end of the first line of Answer 15?  
11 And just highlight that in the cite there. All  
12 right. That's -- I just want the contention, yes.

13 I guess I would like to ask Mr.  
14 McCaffrey a series of questions about this  
15 contention. Are you with me, Mr. McCaffrey?

16 MR. McCAFFREY: Yes, I am.

17 MR. FAGG: Okay. First question, and  
18 we'll unpack this a little bit later. But I wanted  
19 to be real precise and clear if I can here, for the  
20 record.

21 Read literally, to the extent that it  
22 questions the need for an AMP for safety-related  
23 electrical transformers that are required for  
24 compliance with 10 C.F.R. Sections 50.48 and 50.63,  
25 how many transformers at Indian Point fit that

1 description?

2 MR. McCAFFREY: None.

3 MR. FAGG: Zero?

4 MR. McCAFFREY: Zero.

5 MR. FAGG: Null set?

6 MR. McCAFFREY: Null set.

7 MR. FAGG: Okay. I want to unpack that  
8 a little bit and understand it. Let's take it one  
9 at a time. Can you highlight the phrase "safety-  
10 related electrical transformers"? Mr. McCaffrey,  
11 are there any safety-related electrical transformers  
12 at Indian Point?

13 MR. McCAFFREY: None.

14 MR. FAGG: Can you elaborate or explain  
15 a little bit why that is?

16 MR. McCAFFREY: At Indian Point Unit 2  
17 and Unit 3, the emergency safeguard loads are fed  
18 from the 480 volt bus. That is where our diesels  
19 are also fed, at 480 volt bus. So all of our 480  
20 volt loads are directly fed from our diesel, and  
21 there's no step up or step down transformers that  
22 perform the intended safety function.

23 MR. FAGG: Okay. Let me try to  
24 translate that, and make sure I understand it. So  
25 the power coming into the plant is at the same level

1 that the plant uses; is that --

2 MR. McCAFFREY: I would characterize it  
3 a little differently. The power that we're required  
4 to have for, in the case of an accident, is as the  
5 same level that the loads are used.

6 MR. FAGG: Okay.

7 MR. McCAFFREY: The offsite power supply  
8 is at a different voltage level, but that's not  
9 required or relied upon as an accident mitigator.

10 MR. FAGG: So the power that you're  
11 required to use, you don't have to transform that  
12 power?

13 MR. McCAFFREY: That's correct.

14 MR. FAGG: And so hence, there's no  
15 safety-related transformers?

16 MR. McCAFFREY: That's correct.

17 MR. FAGG: Is that true in most nuclear  
18 power plants?

19 MR. McCAFFREY: That's not -- from my  
20 experience, there are -- some do have safety-related  
21 transformers.

22 MR. FAGG: Okay, but not the case at  
23 Indian Point?

24 MR. McCAFFREY: Not at Indian Point.

25 MR. FAGG: Okay. Let's go to the other

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1 part of the admitted contention. There's a  
2 reference to two C.F.R. provisions, 10 C.F.R. 50.48  
3 and 50.63. Do you see that?

4 MR. McCAFFREY: Yes, I see that.

5 MR. FAGG: Are there just generally,  
6 this is for the yes or no, are there transformers  
7 that are required for compliance with these  
8 regulations?

9 MR. McCAFFREY: Yes, there are.

10 MR. FAGG: Okay. Let's nail down the  
11 numbers, if we could, and let's do it unit by unit.  
12 So let me first ask you with respect to Unit 2, are  
13 there any transformers that are required for  
14 compliance with 10 C.F.R. 50.48 and 50.63?

15 MR. McCAFFREY: Yes, there are.

16 MR. FAGG: Okay, and I should have asked  
17 you this a moment ago. Let's just define. 50.48 is  
18 what?

19 MR. McCAFFREY: That's alternate safe  
20 shutdown.

21 MR. FAGG: And 50.63 is what?

22 MR. McCAFFREY: Station blackout.

23 MR. FAGG: Okay, and I think you just  
24 told me -- oh, we have it right there. Thank you.  
25 You just told me there were seven at Unit 2? Did I

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1 hear that right?

2 MR. McCAFFREY: I did not say, but there  
3 are seven transformers at Unit 2 that would be  
4 station blackout transformers at Unit 2.

5 MR. FAGG: Okay, so those are all 50.63?

6 MR. McCAFFREY: That's correct, and  
7 there are none for alternate safe shutdown.

8 MR. FAGG: Okay. How many transformers  
9 are required for compliance with either of these two  
10 provisions at Unit 3?

11 MR. McCAFFREY: At Unit 3, there's a  
12 total of nine transformers.

13 MR. FAGG: And can you break those up as  
14 between 50.48 and 50.63?

15 MR. McCAFFREY: There are two associated  
16 with 50.48 and seven associated with 50.63.

17 MR. FAGG: Okay. Of the transformers  
18 that you've just identified, do you know how many  
19 are air-cooled versus oil-cooled?

20 MR. McCAFFREY: At Unit 2, one of the  
21 transformers is oil-cooled, the other six are air.  
22 At Unit 3, there is two transformers that are oil-  
23 cooled and seven that are air-cooled.

24 MR. FAGG: Okay. The large transformer  
25 failures that we've spent a good bit of the morning

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1 and some of the afternoon talking about, are those  
2 oil or air cooled?

3 MR. McCAFFREY: The ones in Exhibit 3AR  
4 are oil-filled transformers.

5 MR. FAGG: Thank you, Mr. McCaffrey.  
6 Dr. Degeneff? Very early this morning, I wrote down  
7 it about nine o'clock, we still had our morning  
8 coffee, and we were talking about monitoring, and  
9 you were, I think very careful to draw a distinction  
10 between two different types of monitoring. Do you  
11 recall the two different types?

12 DR. DEGENEFF: Yes.

13 MR. FAGG: And what were those?

14 DR. DEGENEFF: Condition and  
15 performance, or performance and condition.

16 MR. FAGG: Okay, thank you, Dr.  
17 Degeneff. Mr. Craig, are you familiar with the  
18 maintenance rule?

19 MR. CRAIG: Yes, I am.

20 MR. FAGG: Do you happen to know the  
21 cite of the maintenance rule off the top of your  
22 head?

23 MR. CRAIG: 10 C.F.R. 50.65.

24 MR. FAGG: Okay. Does the maintenance  
25 rule, by its terms, and I guess we can pull that up

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1 if we need to, but if you know, does the maintenance  
2 rule explicitly call out both performance and  
3 conditioning monitoring?

4 MR. CRAIG: Yes, it does. It calls out  
5 performance and condition monitoring, both with  
6 respect to routine maintenance activities, and it  
7 also says it's specifically required to be evaluated  
8 as part of the biannual review of the effectiveness  
9 of the maintenance program.

10 MR. FAGG: Okay, thank you. Dr. Dobbs,  
11 I want to come back to you and just make clear for  
12 the record what we talked a bit about right before  
13 the lunch break, and that's whether the electricity  
14 going into a transformer is on the primary side, is  
15 the same electricity that comes out on the secondary  
16 side.

17 So let me just ask, so we're again,  
18 we're crystal clear. For the typical transformers,  
19 of the type we've been talking about all day here  
20 today, is it the same electricity going in that's  
21 coming out?

22 DR. DOBBS: Dr. Dobbs for Energy. None  
23 of the current, none of the electrons or current  
24 that flows into the primary comes out of the  
25 secondary.

1 MR. FAGG: Okay. So let me again state  
2 it in what may be simple terms, but that I can  
3 understand. If I were able to paint all the  
4 electrons red that were going into the primary,  
5 again for the typical sort of transformer that we're  
6 talking about, would any electron on a working  
7 transformer that came out the secondary side be red?

8 DR. DOBBS: No.

9 MR. FAGG: Thank you. Mr. Rucker?

10 MR. RUCKER: Yes.

11 MR. FAGG: You've been involved in this  
12 industry how many years?

13 MR. RUCKER: Over 22 years.

14 MR. FAGG: Have you had occasion to buy  
15 or be involved in the purchase of transformers?

16 MR. RUCKER: Yes, I have.

17 MR. FAGG: Okay. If I were to call up a  
18 transformer store or company, and want to buy a  
19 transformer, how would I identify the transformer I  
20 needed or wanted?

21 MR. RUCKER: You would tell them the  
22 voltage you needed on the primary of the  
23 transformer, the voltage you needed on the  
24 secondary, and tell them the current rating or the  
25 volt amps you need for the transformer.

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1 MR. FAGG: Is it fair to say those are  
2 the properties of the transformer you need?

3 MR. RUCKER: Yes. I believe those to be  
4 the properties of the transformer.

5 MR. FAGG: Thanks, Mr. Rucker. Thank  
6 you and thank you to the Board. We have no further  
7 questions.

8 JUDGE McDADE: Staff.

9 MS. MIZUNO: Earlier today -- Mr.  
10 Matthew, earlier today you testified about the  
11 regulation at 54.21; correct?

12 MR. MATTHEW: Yes.

13 MS. MIZUNO: I want to revisit that.

14 MR. MATTHEW: Yes, that's correct.

15 MS. MIZUNO: What does that regulation  
16 talk about?

17 MR. MATTHEW: The regulation I was  
18 referring to was 54.21(a)(1)(i), which states that  
19 perform intended function as described in 54.4,  
20 without moving parts or without a change in  
21 configuration, all properties.

22 MS. MIZUNO: And this describes what  
23 kind of components? Components that are subject to  
24 an AMR or not?

25 MR. MATTHEW: The components that are

1 not subjected to AMR.

2 MS. MIZUNO: When you spoke about this  
3 earlier, did you talk about these components as  
4 defined by a change in state?

5 MR. MATTHEW: Yes. I did that during my  
6 briefing. I was referring to the Statement of  
7 Consideration. I wasn't particularly talking about  
8 the regulation itself.

9 MS. MIZUNO: Right. So the phrase  
10 change in state doesn't actually show up in the  
11 regulation; correct?

12 MR. MATTHEW: Yes, that is correct.

13 MS. MIZUNO: And you were thinking about  
14 the Statement of Considerations behind this rule;  
15 correct?

16 MR. MATTHEW: Yes, that is correct.

17 MS. MIZUNO: There was discussion  
18 earlier also, Mr. Roy, about Regulatory Guide  
19 1.188. Do you remember that?

20 MR. MATTHEW: Yes.

21 MS. MIZUNO: And what exhibit is that?

22 MR. MATTHEW: My understanding is  
23 Exhibit Energy 0099.

24 MS. MIZUNO: Right.

25 MR. MATTHEW: Which is Regulatory Guide

1 1.188, and the title of the regulatory guide is  
2 "Standard Format on Content for Applications to  
3 Renew Nuclear Power Plant Operating Licenses."

4 MS. MIZUNO: I have some questions for  
5 Miss, for Sheila Ray. Do you recall some -- I want  
6 to turn your attention to some testimony earlier  
7 today about the windings and interior parts of  
8 transformers. Do you recall that testimony?

9 MS. RAY: Yes.

10 MS. MIZUNO: And what do you recall  
11 about what New York's witness said about the  
12 windings in the transformer?

13 MS. RAY: This is Ms. Ray, that the  
14 windings in the turns ratio does not change in the  
15 transformer, for the transformer to operate.

16 MS. MIZUNO: How does that compare with  
17 some of the components that the Commission has  
18 identified as active components or components that  
19 don't require an AMR?

20 MS. RAY: This is Ms. Ray. For example,  
21 a circuit board, the wires don't change. For an  
22 inverter, similarly the wires don't change, in order  
23 for these components to perform their functions.

24 MS. MIZUNO: What about battery  
25 chargers?

1 MS. RAY: Same for battery chargers.

2 MS. MIZUNO: So do these components that  
3 the Commission has identified as not requiring aging  
4 management review, do these components have moving  
5 parts?

6 MS. RAY: No, they do not.

7 MR. TURK: Your Honor, Sherwin Turk for  
8 the staff.

9 JUDGE McDADE: Yes.

10 MR. TURK: If I may, I just have a  
11 clarification for Ms. Ray. Ms. Ray, earlier today  
12 we were talking about the listing of transformers in  
13 the standard review plan, and I'd like show you two  
14 documents, Revision 1 and Revision 2 of the SRP,  
15 which are respectively New York Exhibit 195 for  
16 Revision 1, and New York 161 for Revision 2.

17 I'd like you to look at Item 104 that  
18 appears for transformers. In Revision 1, that  
19 appears at page 2.1-24. In Revision 2, that appears  
20 at page 2.1-26. I'd like you to look at those two  
21 items and tell the Board if they are identical.

22 (Witness reviewing documents.)

23 MR. TURK: With your permission, Your  
24 Honor.

25 JUDGE McDADE: Would you like us to pull

1 it up?

2 MR. TURK: Yes.

3 JUDGE McDADE: It's New York 195.

4 MR. TURK: Okay. We can start -- no.  
5 It's -- yes, Revision 1 is New York 195, and that's  
6 page 2.1-24. That would be the prior page. I'm  
7 sorry. It's Item 104.

8 JUDGE McDADE: The previous page.

9 MR. TURK: I think the pagination is a  
10 little bit different on the screen from the current  
11 volume.

12 JUDGE McDADE: 2.1-23 then?

13 MR. TURK: Yes.

14 JUDGE McDADE: And you're looking at  
15 Item 104.

16 MR. TURK: Yes. Do you see that at the  
17 bottom of page 2.1-23 as it appears on the screen?

18 MS. RAY: Yes.

19 MR. TURK: And if you look at that  
20 description of transformers, and the last column  
21 indicates "no."

22 MS. RAY: That's correct.

23 MR. TURK: And what does the no  
24 indicate?

25 MS. RAY: That it is not within the

1 scope of license renewal. Specifically, it says  
2 "Structure, component or commodity group meets 10  
3 C.F.R. 54.21(a)(1)(i), yes or no."

4 MR. TURK: I'm sorry. Were you looking  
5 at -- what does the "no" indicate? Maybe look at  
6 the top of the list there?

7 MS. RAY: That it's an active component.

8 MR. TURK: Okay. If you could just, Mr.  
9 Welkie, scroll to the top. So "no" in that column  
10 indicates --

11 MS. RAY: That it's an active component.

12 MR. TURK: So it is therefore screened  
13 out?

14 MS. RAY: Correct.

15 MR. TURK: Okay, and if you would, could  
16 you now look at Revision 2 to the SRP, for that same  
17 provision?

18 MS. RAY: Yes. It's the same as  
19 Revision 2.

20 MR. TURK: Right. Your Honors, I  
21 believe that's New York 161.

22 JUDGE McDADE: And it's 2.1-26 was it?

23 MR. TURK: In the bound volume, yes, and  
24 I have to tell you I don't know how the PDF changes  
25 the pagination, but there it is. Go down one more.

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1 Yeah. So this on the screen, is that 2.1-26?

2 JUDGE McDADE: Six.

3 MR. TURK: If you would, read the  
4 definition of transformers, and then the indication  
5 in the final column, and tell us if that's the same  
6 thing that appears in the earlier iteration of the  
7 standard review plan?

8 MS. RAY: It's Item 104 in the category  
9 of electrical I&C, and the structure component or  
10 commodity grouping is transformers. These are the  
11 instrument transformers, low center transformers,  
12 small distribution transformers, large power  
13 transformers, isolation transformers, coupling,  
14 capacitor, voltage transformers.

15 Then structure component or commodity  
16 group meets 10 C.F.R. 54.21(a)(1)(i), yes or no, and  
17 it indicates no.

18 MR. TURK: So that is the same thing  
19 that appeared in the earlier iteration?

20 MS. RAY: Yes, that's correct.

21 MR. TURK: The staff has nothing  
22 further, Your Honor. Thank you.

23 JUDGE McDADE: Okay, thank you, and I  
24 thank the witnesses very much. You've been  
25 extremely helpful to us. We really appreciate the

1 testimony you've given, and all the time and effort  
2 you put into putting together both the pre-filed  
3 testimony and to prepare for your testimony here  
4 today. Thank you.

5           Before we break, there's some  
6 housekeeping matters that I want to go over, and  
7 then also to find out from the parties whether or  
8 not you have any additional housekeeping matters  
9 that we should take up. The first has to do with  
10 the possibility of transcript corrections, to be  
11 filed jointly by the parties.

12           According to our scheduling order, it's  
13 60 days after the end of the hearing. Back on our  
14 hearing on November 28th, there was discussions  
15 about the holidays intervening during that period of  
16 time. It was floated at that point as a proposed  
17 date of March 8th.

18           At this point, have the parties reached  
19 a consensus as to their recommendations as to the  
20 date for transcript corrections for both the  
21 November 28th and the December 10th transcript  
22 corrections?

23           MR. BESSETTE: Your Honor, this is Paul  
24 Bessette. Do you mean findings of fact and  
25 conclusions of law?

1 JUDGE McDADE: Well, first of all, just  
2 transcript corrections. Then we'll get to findings  
3 of fact and conclusions of law.

4 MR. BESSETTE: No, Your Honor. We  
5 haven't consulted on transcript corrections. We  
6 could certainly do it by 60 days as well. We,  
7 Energy. But we could, the parties could confer.  
8 But we have not conferred on transcript corrections.  
9 We did confer on findings of fact and conclusions of  
10 law.

11 JUDGE McDADE: And is there a consensus  
12 on that from the parties?

13 MR. BESSETTE: Yes, Your Honor. As I  
14 reported, I believe on November 28th, during our  
15 supplemental hearing, the parties have agreed to  
16 March 8th.

17 JUDGE McDADE: Okay. As I recollect it,  
18 the parties had discussed, but there had not yet  
19 been an agreement among the parties to recommend  
20 that.

21 MR. BESSETTE: The parties had discussed  
22 and agreed. They can speak for themselves, but I  
23 had heard no disagreement. I think that's still a  
24 reasonable date, the agreed-upon date.

25 JUDGE McDADE: Does any party have any

1 different view of it? Apparently not. Okay. The  
2 next, there had been some questions with regard to  
3 Judge Wardwell's question sheet, of whether or not  
4 that would be distributed to the parties, and it is  
5 not going to be.

6 The cites that he mentioned will be in  
7 the transcript. You'll be able to find them, and  
8 that's just basically viewed as a working document  
9 of the Board, of his particular notes.

10 The next has to do with the Track 2  
11 contentions. We had talked about New York 26, and  
12 then the consolidated New York 38, and Riverkeeper  
13 TC-1. Answers to motion for cross-examination due  
14 on February the 19th. Are there any other  
15 prerequisites that need to come in from the  
16 standpoint of the parties, before we would be able  
17 to move ahead towards hearing on those two  
18 contentions? From Energy?

19 MR. BESSETTE: No, Your Honor, but the  
20 recent change to the SER supplement date that Mr.  
21 Turk discussed earlier. I do think we need to  
22 confer a bit internally, before we can firmly answer  
23 that question, Your Honor. That's been a recent  
24 change in response to industry and Energy RAIs. So  
25 I wonder if we could just get back to you on that.

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1 JUDGE McDADE: Well, one of the things  
2 with regard to the supplement to the SER, it was my  
3 understanding that the staff believed that only New  
4 York 25 could be implicated by those proposed  
5 changes. Does the staff believe it could be broader  
6 than that at this point, Mr. Turk?

7 MR. TURK: The breadth of the SER  
8 supplement won't change. But I think what we had  
9 indicated before was that there are portions of  
10 Contention 38 that also are affected. So that  
11 remains the case.

12 JUDGE McDADE: And do we have a further  
13 update as to when realistically that document will  
14 be published?

15 MR. TURK: Mr. Bessette correctly notes  
16 that I had indicated there will be a slippage in the  
17 SER supplement. I don't have concrete information  
18 for you, because this past week we've been here, and  
19 I have not been able to consult with Washington.  
20 But my current understanding is that the staff  
21 intends to issue additional requests for  
22 information, not just to Energy but to other  
23 industry plants as well.

24 I believe the current expectation is  
25 that the SER supplement would be published

1 approximately July, and I can give you more specific  
2 information once I return to Washington. I can file  
3 an updated status report with you by mid-week the  
4 week coming.

5 JUDGE McDADE: Okay. Do that by the end  
6 of next week, no later than say one o'clock next  
7 Friday, and would it be the position of the parties,  
8 then, that as far as New York 38 and consolidated  
9 Riverkeeper TC-3, and New York 25, that we would not  
10 be able to prudently move ahead towards hearing on  
11 those until after the ROIs (sic) are submitted, are  
12 responded to, and that's incorporated into an SER  
13 supplement? Would that be the view of the staff?

14 MR. TURK: The staff would not be able  
15 to take a position until we conclude our review.  
16 The regulations don't bar the Board from going  
17 forward with hearings, taking the testimony of other  
18 parties. But I think as a practical matter, it  
19 would be hard for the other parties to take a  
20 position, until they see the results of the staff's  
21 conclusions and review.

22 For instance, Energy may not know how it  
23 will wrap up its compliance with staff requirements  
24 or requests until we come up with our position. So  
25 I think for practical purposes, it's probably best

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1 to hold the hearings until the SER supplement comes  
2 out.

3 JUDGE McDADE: Does Riverkeeper concur  
4 with that? Ms. Brancato?

5 PP Yes we do, Your Honor. Philip  
6 Musegaas from Riverkeeper.

7 JUDGE McDADE: And New York?

8 MR. SIPOS: Excuse me, Your Honor. John  
9 Sipos for the State of New York. Yes, Your Honor.

10 JUDGE McDADE: And Energy?

11 MR. BESSETTE: First, as it relates to  
12 New York State 25 and the related portions of New  
13 York State 38, yes, Your Honor.

14 JUDGE McDADE: Does any party think it  
15 would be advisable to move ahead on 26 separately?

16 MR. SIPOS: Your Honor, that's what I do  
17 need to confer with my colleagues back in the  
18 office. They are separate contentions. But I think  
19 it's just a matter of efficiency and just reviewing  
20 that in a bit more detail.

21 JUDGE McDADE: Okay. If the parties  
22 could consult, and again, I had given a next Friday  
23 date. If you could get back to us by next Friday as  
24 to the position of the parties. Not necessarily  
25 that the Board will accept it, but at least to state

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1 what the position of the parties are on the ability  
2 to move forward on 26.

3 The next has to do with the Riverkeeper  
4 Environmental Contention 8. Any further update on  
5 when to expect the FSEIS?

6 MR. TURK: Your Honor, as I mentioned on  
7 the first day of hearings this week, the  
8 consultation period between the NRC staff and NMFS,  
9 which also includes Energy, and by the way  
10 Riverkeeper has submitted comments as well, that  
11 consultation period has been extended to mid-  
12 January.

13 I will need to consult back in my  
14 office, to get you a more precise date for the FSEIS  
15 Supplement. It would probably -- my expectation had  
16 been that it might come out as early as February,  
17 and I think that may be optimistic. It could be  
18 several months after that.

19 So if you would allow me to give you a  
20 report end of next week on that as well, I would  
21 appreciate it.

22 JUDGE McDADE: Okay. The next, we had  
23 various exhibits, Energy Exhibit Revised 373, and  
24 new Energy Exhibits 595 to 601. Again, the date to  
25 make any objections to those is January 7th. The

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1 same for New York 468 to 471, and Staff Revised 15  
2 and 16.

3 The next thing has to do with the number  
4 of proprietary documents, the percentage of  
5 proprietary documents, and whether or not the  
6 parties have an opinion as to where those hearings  
7 should be held.

8 Now given the fact there's a strong  
9 probability those hearings are going to be put off  
10 for a while, this may not be pressing. But at this  
11 point in time, does Energy have a view as to whether  
12 or not it would be appropriate to, you know.

13 I guess the first question is what  
14 percentage of those contentions, a hearing on those  
15 contentions, would be open, could be open to the  
16 public?

17 MR. BESSETTE: Your Honor, based on our  
18 preliminary review, the majority of the documents,  
19 on New York State 25 and related issues and 38, we  
20 believe can largely be open, with specific  
21 proprietary discussions segmented.

22 However, for New York State 26 and  
23 related fatigue issues in 38, we believe potentially  
24 a substantial amount of that proceeding would be  
25 proprietary.

1 JUDGE McDADE: Does New York share that  
2 view?

3 MR. SIPOS: John Sipos for the State of  
4 New York. No, not exactly, and I would note, as I  
5 noted when we started, I think it was yesterday on  
6 the electrical cable contention, that there had been  
7 a set, albeit a small subset, I think it was four  
8 documents, that initially had been designated as  
9 proprietary.

10 There was a concern, at least on the  
11 State's part, that given the cross-the-board  
12 designation, I believe with respect to the PFT, the  
13 pre-filed testimony, that yesterday's hearing would  
14 not be open to the public. The State expended  
15 resources, went through it, reviewed the documents,  
16 consulted with Energy, and we came happily to a  
17 resolution on that.

18 So yesterday's hearing was able to be  
19 open to the public, without any limitation. The  
20 State, without casting in no way aspersions on  
21 Energy or Morgan Lewis at all, the State does have  
22 some concerns about perhaps the, from the State's  
23 perspective, an over-designation and over-breadth,  
24 and the State will endeavor to pursue that issue,  
25 and see if a resolution, an adequate resolution is

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1 possible.

2           Otherwise, we may, speaking for the  
3 State, the State may seek Board assistance. But I  
4 think that is something off in the future.

5           MR. BESSETTE: Your Honor, we'd be glad  
6 to work with New York on that. We remind the Board  
7 that the majority of the documents that were  
8 designated as proprietary were designated not by us  
9 but by Westinghouse.

10           So there may be some disagreement.  
11 Westinghouse ultimately has the decision on a  
12 proprietary document. So we will gladly work with  
13 New York, but I'm not necessarily confident we'll be  
14 as successful as we were on the cables issue.

15           JUDGE McDADE: Ultimately, the Board's  
16 going to have the decision on whether to hold it  
17 publicly or privately, and we do want the input of  
18 the parties. But given the delay, we're not going  
19 to be letting a contract to either rent this room or  
20 to keep other boards out of the hearing room down at  
21 Rockville for a particular schedule.

22           So we will be able to work on that over  
23 the next months, and as we come closer to having a  
24 hearing, make a better estimate and a better  
25 decision as to whether or not significant portions

1 of the hearing on that contention should be closed.

2 The only remaining thing that I have is  
3 just to note that responsive pleadings with regard  
4 to the declaratory, proposed Motion for Declaratory  
5 Order regarding the Coastal Management Zone, I have  
6 down are due January 14th. Are there any other  
7 matters that we should take up before we go our  
8 separate ways here today?

9 MR. SIPOS: John Sipos for the State of  
10 New York. Your Honor, in the last day or so, I've  
11 been in contact with my colleagues, who -- with my  
12 colleagues in the office, and I'm not sure if the  
13 Board is aware, but there have been some additional  
14 developments in that area.

15 Energy has filed an Article 78. Under  
16 New York Civil Practice Rules, there's a provision  
17 in there to challenge governmental action. So the  
18 shorthand is Article 78. That's what we call it in  
19 the State of New York.

20 That's challenged by Energy, and it is a  
21 challenge, I believe, to various aspects of the  
22 Coastal Zone Management Act, as administered by the  
23 State. This came about, I believe, subsequent to  
24 the July Motion for Declaratory Ruling to Your  
25 Honors, that we had previously discussed.

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1                   That litigation and also I believe  
2                   there's a request for a declaratory order, to the  
3                   New York State Department of State. That is also  
4                   out there. With the Board's indulgence, I would  
5                   like to, when I return to Albany tomorrow, consult  
6                   with my colleagues about our resources and about our  
7                   ability to meet that January 14 date on similar  
8                   issues.

9                   I'm choosing my words very carefully.  
10                  Similar. I don't believe there's 100 percent  
11                  overlap. But that is an issue that has come up,  
12                  from the State's perspective.

13                  JUDGE McDADE: And what I would ask is  
14                  for a report back no later than a week from Friday,  
15                  and the first question would be is the Article 78  
16                  petition and the Motion for Declaratory Order to the  
17                  Department of State of New York, are they of a  
18                  nature that we should hold in abeyance the  
19                  proceeding on the Motion for Declaratory Order  
20                  before us, or should those move forward as parallel  
21                  proceedings?

22                  In other words, can they both go forward  
23                  at the same time, or if not, which should go forward  
24                  first, in the interest of economy for all of the  
25                  parties? You know, it probably is in the interest

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1 of not only New York but also Energy, if it's going  
2 to be basically the same proceeding, it may be  
3 worthwhile to have them go seriatim. It may or may  
4 not.

5 But in any event, if you could report  
6 back to us by a week from Friday and let us know  
7 one, you know, if it is the consensus of going  
8 forward with that, whether or not New York would be  
9 able to go forward by the January 14th date, or  
10 would be filing for an extension, and if there is --  
11 and then whether or not there's a consensus among  
12 the parties, as to whether or not we should hold the  
13 declaratory order motion in our proceeding in  
14 abeyance, or whether we should move forward with it.  
15 Ms. Sutton.

16 MR. SIPOS: Just one other -- I'm sorry,  
17 Kathryn. Just one other point that I neglected to  
18 mention. I believe in the Article 78 proceeding,  
19 there is a, what is called in New York practice a  
20 return date, and I believe it is in the latter part  
21 -- so that's an oral argument for a New York County  
22 Supreme Court Justice.

23 And I believe it is on or about the  
24 21st, thereabouts, in January. I'm sorry. I  
25 neglected to mention that before.

1 JUDGE McDADE: Okay, and the declaratory  
2 order with the New York Department of State, does  
3 that go to a New York ALJ? Does that go an  
4 administrative official within the department?  
5 Where does that go?

6 MR. SIPOS: Sitting here before Your  
7 Honors right now, I'm sorry, I can't answer that  
8 question. I don't know.

9 JUDGE McDADE: Okay. But you will by a  
10 week from Friday?

11 MR. SIPOS: I sure will, Your Honor.

12 JUDGE McDADE: And so will we?

13 MR. SIPOS: Yes.

14 JUDGE McDADE: Okay.

15 MR. SIPOS: I'm sorry, Ms. Sutton. I  
16 didn't mean to interrupt.

17 MR. GLEW: Your Honor, this is Bill Glew  
18 for Energy. I'm, of all our team, the one who's  
19 most involved in the proceeding that Mr. Sipos just  
20 referred to. The date that is currently scheduled  
21 for the hearing is January 25th.

22 We have, you know, I don't -- we believe  
23 that the Article 78 that we filed, that's pending in  
24 the New York State Supreme Court is, you know,  
25 fundamentally different from the motion that we

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1 filed before the Board.

2 But we certainly can appreciate that  
3 some of the same team at the State would be working  
4 on both, even though, from our point of view,  
5 they're wholly separate and apart. So we'll  
6 certainly work with New York and staff and the other  
7 parties to prepare a report for you by the deadline  
8 that you set.

9 JUDGE McDADE: Okay. Just so at least  
10 it's clear, and perhaps in looking back, what I said  
11 wasn't all that clear, but Item No. 1 would be  
12 whether or not the State of New York is going to  
13 file a Motion for Extension of Time within which to  
14 submit its pleadings on the motion for declaratory  
15 order in our proceeding.

16 The next is in the event one or more of  
17 the parties believed that the declaratory order  
18 proceeding here should be stayed until the other  
19 matters were resolved, then there would either be a  
20 joint motion, if there was a consensus, or if only  
21 one or more parties, they would then file a motion  
22 with the Board, to stay the proceeding, to which the  
23 opposing parties would then have an opportunity to  
24 respond.

25 But at this point in time, as we sit

1 here right now, we're expecting the responsive  
2 pleadings on the 14th. By a week from Friday, we  
3 will get a preliminary statement from New York, if  
4 they anticipate filing for an extension of time, and  
5 by when they would be prepared to file that motion  
6 for an extension of time.

7 Then we would also ask the parties by  
8 the end of next week to notify us of whether any  
9 party or parties anticipated moving for a stay of  
10 the Motion for Declaratory Order in this case,  
11 pending resolution of either the State Article 78 or  
12 the State Department of State proceeding. Are there  
13 any questions with regard to that?

14 MS. SUTTON: We have no questions, Your  
15 Honor.

16 JUDGE McDADE: Is there anything else  
17 that we need to take up? Mr. Turk.

18 MR. TURK: Just on that last point, Your  
19 Honor, the staff has not yet had an opportunity to  
20 review the new filings in the state proceeding, the  
21 two filings that Energy referred to. So that may  
22 affect our ability and/or willingness to file our  
23 pleadings on the Motion before you, by that  
24 scheduled date of January 14th.

25 So I'd like to have an opportunity to

1 look at what has been filed in the New York  
2 proceedings, to see if that affects our ability to  
3 file on January 14th.

4 JUDGE McDADE: And just as we said with  
5 New York, and in the event that that is an issue, if  
6 you could notify us by the end of next week, if you  
7 think that there is a possibility that you will be  
8 moving for an extension of time. If that's the  
9 case, we can then set a deadline, both for New York  
10 and the staff, to file that motion.

11 We understand there are other things  
12 going on, that you've been here for the past week.  
13 You'll have other things back in the office next  
14 week, and we're in the holiday season. But you  
15 know, we will get a report back from you by the  
16 close of business next week, and if it does include  
17 an estimate that you will be moving for an extension  
18 of time, we would like a representation from the  
19 parties as to when reasonably they would be able to  
20 file, without undue hardship.

21 MR. BESSETTE: Your Honor, we just have  
22 one more matter.

23 JUDGE McDADE: And just as an aside, if  
24 the answer is we can file by December 23rd, you  
25 know, obviously Energy will get some extra time to

1 respond. But yes, Mr. Bessette.

2 MR. BESSETTE: Your Honor, Paul  
3 Bessette. Just looking ahead, we were wondering,  
4 given the Track 1 and Track 2 sort of bifurcation,  
5 would the Board be willing to let us know if they  
6 plan on issuing a partial initial decision on Track  
7 1 issues?

8 JUDGE McDADE: I think the answer to  
9 your question, as phrased, is yes. You know, we  
10 would be willing to tell you. I don't think at this  
11 point the Board has decided whether or not it will  
12 issue Track 1 as an interim initial order or not, or  
13 wait until Track 2.

14 You know, I think we need to digest what  
15 was said here about the delay, and digest that and  
16 consider it among ourselves. I think given the  
17 delay, that certainly increases the probabilities  
18 that there would be an interim order on the Track 1  
19 contentions.

20 But we're not in a position right now to  
21 make a definitive statement on that.

22 MR. BESSETTE: Thank you, Your Honor.

23 MR. TURK: Your Honor, Sherwin Turk.

24 JUDGE McDADE: Yes, Mr. Turk.

25 MR. TURK: Related to Mr. Bessette's

1 question, as the Board knows, there have been  
2 filings in the recent past to supplement the record,  
3 on a contention that has been heard in the past  
4 Track 1 hearings.

5 We would appreciate it if the Board  
6 could indicate whether it is willing to close the  
7 record on the Track 1 contentions, now that the  
8 hearings have concluded, so that we would be clear  
9 on what is the standard that must be met for the  
10 introduction of additional evidence on those  
11 contentions.

12 JUDGE McDADE: Okay. I am not right now  
13 predisposed to do that. If any of the parties file  
14 a motion to close the record, we will certainly  
15 consider it. We did have a number of late filings.

16 I anticipate as the parties put together  
17 their proposed findings of fact and conclusions of  
18 law, there may be, you know, and I realize this is a  
19 remote possibility, but there may be a realization  
20 that you missed something, and as a result, that you  
21 would want to either supplement or correct the  
22 record.

23 And the standards for receiving  
24 additional evidence, once we've closed the record,  
25 are significantly higher. So at this point in time,

1 and I'm just speaking for myself, not for the Board,  
2 I would be reluctant to close the record until the  
3 parties have had an opportunity to sit down, prepare  
4 their proposed findings of fact and conclusions of  
5 law, and that way, in the event you feel it  
6 necessary to correct or supplement the record, that  
7 would be an easier proposition.

8 But as I said, if there's a motion, we  
9 could be -- I'm not saying we couldn't be persuaded  
10 otherwise.

11 MR. TURK: I appreciate that. I think  
12 that's a great way to resolve it or to address it.

13 JUDGE McDADE: With that, are we ready  
14 to call it a week?

15 MR. SIPOS: I believe so, Your Honor.

16 JUDGE McDADE: Okay. Then we are in  
17 recess until an undetermined date. Thank you.

18 (Whereupon, at 4:21 p.m., the hearing  
19 was recessed, to reconvene sine die.)  
20  
21  
22  
23  
24  
25

CERTIFICATE

This is to certify that the attached proceedings  
before the United States Nuclear Regulatory  
Commission

Proceeding: Entergy Nuclear Operations, Inc.  
Indian Point Units 2 and 3

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

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

Location: Tarrytown, New York

were held as herein appears, and that this is the  
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