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NUCLEAR REGULATORY COMMISSION

Title: Amergen Energy Company
Oyster Creek Evidentiary Hearing

Docket Number: 50-0219-LR; ALSBP No. 06-844-01-LR

Location: Toms River, New Jersey

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1 UNITED STATES NUCLEAR REGULATORY COMMISSION

2
3 ATOMIC SAFETY AND LICENSING BOARD
4

5 EVIDENTIARY HEARING

6
7 IN THE MATTER OF: ||

8 AMERGEN ENERGY COMPANY, LLC || Docket No.: 50-0219-LR

9 (License Renewal for Oyster || ASLBP No.: 06-844-01-LR

10 Creek Nuclear Generating ||

11 Station) ||
12

13 Ocean County Administrative Building

14 Room 119

15 101 Hooper Avenue

16 Toms River, New Jersey 08754
17

18 Tuesday,

19 September 25, 2007

20 The above-entitled matter came on for
21 hearing, pursuant to notice at 8:04 a.m.

22 BEFORE:

23 THE HONORABLE E. ROY HAWKENS, Chairman

24 THE HONORABLE PAUL B. ABRAMSON

25 THE HONORABLE ANTHONY J. BARATTA

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P R O C E E D I N G S

8:03 A.M.

1
2
3 CHAIRMAN HAWKENS: Good morning. We are
4 on the record. Welcome back again this morning. This
5 is a hearing in the case of AmerGen Energy Company,
6 Docket No. 50-0219-LR. For the benefit of those in
7 the audience who were not with us yesterday, AmerGen
8 in this case has applied to renew its operating
9 license at Oyster Creek Nuclear Generating Plant for
10 a 20-year period and AmerGen's application is opposed
11 by six groups. They refer to themselves collectively
12 as Citizens.

13 The issue that Citizens has raised is that
14 they argue AmerGen's commitment to take ultrasonic
15 testing measurements of the width of the drywell shell
16 every four years during the renewal period is not
17 sufficient to ensure an adequate safety margin in that
18 shell.

19 My name is Roy Hawkens and I'm joined by
20 Judge Tony Baratta, Judge Paul Abramson. We're
21 members of the Atomic Safety and Licensing Board
22 Panel, a judicial component of the Nuclear Regulatory
23 Commission. It's our job to resolve the issued raise
24 by Citizens.

25 I indicated yesterday that prior to the

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1 commencement of the hearing, the Board had received
2 three rounds of legal briefs from parties, three
3 rounds of written testimony from their expert
4 witnesses and numerous exhibits, over 125 exhibits
5 were submitted into evidence.

6 Yesterday, we heard opening statements by
7 parties' counsel. Following that we started
8 questioning their expert witnesses. Each party has
9 designated the identity and the number of their expert
10 witnesses. AmerGen and the NRC staff have several
11 expert witnesses. Citizens elected to go with a
12 single expert witness, Mr. Hausler. We have six
13 topics that the Board identified that it was
14 interested in exploring. We got through two of those
15 topics yesterday. Those two topics were the drywell
16 physical structure, history, and the commitments by
17 AmerGen. The second topic was the acceptance
18 criteria. The third topic, we got to it in a very
19 advanced stage of discussion was available margin, but
20 we're going to finish up on that topic today and we
21 have three additional topics to discuss. They are
22 sources of water, the epoxy coating, and future
23 corrosion.

24 Would counsel for the parties please
25 identify themselves for the record?

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1 MR. POLONSKY: This is Alex Polonsky with
2 Morgan, Lewis & Bockius, counsel to AmerGen.

3 MR. SILVERMAN: Don Silverman, also with
4 Morgan, Lewis & Bockius.

5 MS. SUTTON: Kathryn Sutton, Morgan, Lewis
6 & Bockius.

7 MS. BATY: For the NRC staff, Mary Baty
8 and Mitzi Young.

9 MR. WEBSTER: For Citizens, I'm Richard
10 Webster, Eastern Environmental Law Center. I teach at
11 Rutgers Environmental Law Clinic.

12 CHAIRMAN HAWKENS: Thank you. And is it
13 true that the expert witnesses you brought to today's
14 session are the same witnesses that were introduced
15 yesterday?

16 MR. POLONSKY: This is Mr. Polonsky for
17 AmerGen. For Panel 3 those witnesses have remained
18 the same.

19 CHAIRMAN HAWKENS: The witnesses, I
20 believe you introduced 14 yesterday. They remain the
21 same?

22 MR. POLONSKY: Yes, actually it was 15
23 with the addition of Dr. Mehta from GE. Yes, those
24 witnesses remain the same and they should all be
25 present here right now and they were sworn yesterday.

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1 CHAIRMAN HAWKENS: And we will introduce
2 them as we go from topic to topic.

3 NRC staff, is that correct, you also have
4 the same witnesses from yesterday?

5 MS. BATY: Yes.

6 CHAIRMAN HAWKENS: Thank you. I see Dr.
7 Hausler. He is for Citizens.

8 Before paneling our expert witnesses, are
9 there any evidentiary matters that need to be raised.

10 Amergen?

11 MR. POLONSKY: None, Your Honor.

12 CHAIRMAN HAWKENS: NRC staff?

13 MS. BATY: No.

14 MR. WEBSTER: Maybe I misunderstood. I
15 had a discussion with AmerGen's counsel about the
16 availability of written records for the UT scanning.

17 MR. POLONSKY: There was some question
18 after Mr. Jon C. or Chris Hawkins gave his testimony
19 yesterday about confirmatory UT measurements taken in
20 the external sand bed region during the 2006 refueling
21 outage. There was some question whether that follow
22 up or confirmatory UT measurement thickness,
23 measurement readings resulted in any additional
24 documentation that would be in addition to what had
25 already been previously disclosed to the parties.

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1 We confirmed with Mr. Hawkins that no
2 record, written record, was made of those confirmatory
3 readings at the time and so it is AmerGen's position
4 that the documentation that's already been produced
5 and the exhibits already submitted accurately
6 represent the documentation that was taken by Mr.
7 Hawkins.

8 MR. WEBSTER: And Citizens is very happy
9 to stipulate to that fact that the documents in the
10 record reflect the records taken for the external UT
11 measurements.

12 CHAIRMAN HAWKENS: Thank you. Are there
13 any other evidentiary matters?

14 Mr. Webster?

15 MR. WEBSTER: Well, we're still awaiting
16 confirmation on one document which we expect. AmerGen
17 said they would get it to us today.

18 CHAIRMAN HAWKENS: All right, I note that
19 two of the parties provided Ms. Wolf with additional
20 proposed questions which she gave to the Board, the
21 confidential questions NRC staff and Citizens. Did
22 AmerGen provide any additional questions?

23 MR. POLONSKY: We did not provide any,
24 Your Honor, and we don't believe any are necessary.

25 CHAIRMAN HAWKENS: All right, thank you.

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1 Let's empanel the third panel please and would each
2 party please introduce their expert witnesses on this
3 panel?

4 MR. POLONSKY: This is Mr. Polonsky for
5 AmerGen. For Panel 3 we have Mr. Fred Polaski, Mr.
6 Peter Tamburro, Dr. David Gary Harlow, Mr. Martin
7 McAllister and behind me, Mr. Julien Abramovici.

8 MS. BATY: For the NRC staff, we have Dr.
9 Davis, Dr. Hartzman, Hansraj Ashar, Arthur Salomon,
10 and Tim O'Hara.

11 MR. WEBSTER: And for Citizens, we have
12 the ubiquitous Dr. Hausler.

13 CHAIRMAN HAWKENS: Thank you. The
14 witnesses are reminded they were sworn yesterday and
15 they do remain under oath or affirmation for the
16 testimony they will provide today.

17 For the benefit of members of the audience
18 who were not with us yesterday, and as a reminder to
19 counsel, under the informal hearing procedures, it is
20 the Judges who are tasked with doing the questioning.
21 We've had the benefit of written suggested questions
22 by the counsel and we do appreciate that. We've also
23 had the benefit, as I indicated earlier, of the very
24 thorough briefing and reams of documents and expert
25 testimony already. So this is the Board's opportunity

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1 really to pursue the line of questioning where issues
2 remain in their own mind.

3 And regulations do provide that no party
4 may submit proposed questions to the Board except upon
5 request by and at its sole discretion of the Board.
6 So they're reminded that interjections should be few.
7 To the extent counsel does raise a question and is not
8 interrupted by a Judge and requested to refrain from
9 questioning, the other counsel may assume, by
10 inference, that the Board is permitting that
11 individual, that counsel to raise a question. So I
12 would expect questioning to be rare and objections to
13 be even rarer. With that in mind, let's proceed.

14 JUDGE BARATTA: In response to the Board's
15 questions, there was a statement or there was a
16 question concerning providing a table which showed the
17 95 percent confidence interval for all the data.
18 AmerGen, I believe, responded that they had not only
19 calculated that interval for the 2006 data, however,
20 in the discussion yesterday, it was mention of
21 projections to determine the thickness in the future.
22 That's how you came up with that .736 thickness and
23 that was based on a 95 percent confidence estimate.
24 I wasn't sure what the 95 percent referred to.

25 Could somebody respond to that as the --

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1 were there other data, earlier data like the 1980s
2 data that was analyzed to obtain a confidence
3 interval?

4 MR. TAMBURRO: This is Peter Tamburro.
5 Prior to 1992, when we removed the sand, we did apply
6 a 95 percent confidence interval on the curve fit of
7 the mean over time. The averages of each grids were
8 trended over time. We then established a curve fit of
9 those averages over time. We performed statistical
10 tests on the curve fit to ensure that the curve meets
11 the data with 95 percent confidence. Then we
12 calculated a lower, 95 percent confidence interval.
13 This is a curve that bounds the original curve fit
14 with 95 percent confidence, Your Honor.

15 JUDGE BARATTA: And is that provided any
16 place in any of the exhibits?

17 MR. TAMBURRO: In the ACRS testimony there
18 is a --

19 JUDGE BARATTA: It's Exhibit 40, I think,
20 is that correct?

21 (Pause.)

22 MR. WEBSTER: I think page 79 gives a
23 schematic.

24 MR. TAMBURRO: That's AmerGen Exhibit 40
25 which is the January 18th ACR presentation. Starting

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1 at page 77, Your Honor.

2 JUDGE BARATTA: Seventy-seven?

3 MR. TAMBURRO: Page 77 provides a
4 schematic on the trending. The points represent the
5 average of the grids and the Y axis is the thickness.
6 If you go to page 78.

7 MR. POLONSKY: Mr. Tamburro, hang on.
8 Just a clarification.

9 Judge Baratta, are you looking for how 95
10 percent confidence interval was applied prior to 1992?

11 JUDGE BARATTA: Well, I was curious as to
12 -- in response to the Board's questions, there was a
13 statement made that the confidence interval was not
14 calculated. And it appears that that was done, taking
15 this curve, at least, that that's what I'm trying to
16 get at is was it or was it not calculated and if so,
17 what did it show?

18 MR. POLONSKY: And I was just trying to
19 clarify so that you get an answer in the proper time
20 frame of what you're looking for, that's all.

21 MR. TAMBURRO: Prior to 1992, we
22 calculated confidence intervals on the corrosion rate
23 because there was a large corrosion rate. After 1992,
24 with respect to the corrosion rate, we did not
25 calculate the confidence interval because we could not

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1 establish corrosion rate.

2 JUDGE BARATTA: To obtain that 95,
3 specifically, how was the confidence interval
4 calculated and what was it calculated on? Could you
5 go through the details of that?

6 MR. TAMBURRO: I would like to. I was
7 going to, if I could continue with the --

8 JUDGE BARATTA: Sure, yes. Please. I
9 thought you were done, sorry. Didn't mean to cut you
10 off.

11 MR. TAMBURRO: Again, I apologize. Again,
12 on page 78 of Exhibit 40, it's a schematic. The round
13 circles are the mean. The squares around the round
14 circles are the standard error and then the line is a
15 curve fit using least squares fit. We then performed
16 a test on that curve fit using the f-test to 95
17 percent confidence. If the curve fit met the data
18 with 95 percent confidence, prior to 1992, the staff -
19 - we then concluded that the slope of that curve was
20 the corrosion rate.

21 Once that slope was established as being
22 indicative of corrosion, we went, if you look at page
23 79, we calculated the lower 95 percent confidence
24 interval on the curve fit. That confidence interval
25 takes into account how many data points, how many

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1 means the standard error and the duration that the
2 data was collected.

3 The projections prior to 1992 when we had
4 corrosion were then the intersect of the 95 percent
5 confidence interval with the time of interest or the
6 minimum thickness.

7 JUDGE BARATTA: The more recent data that
8 you've obtained, have you done a detailed analysis of
9 variance to see whether or not the means are in fact
10 the same. In other words, there's no corrosion rate
11 occurring?

12 MR. TAMBURRO: Yes, sir.

13 JUDGE BARATTA: Where is that document?

14 MR. TAMBURRO: Exhibit 20, AmerGen Exhibit
15 20 is a calculation which evaluated all of the
16 internal grids.

17 JUDGE BARATTA: Do you have any comments
18 that you want to make about it?

19 MR. TAMBURRO: Yes, sir. The exhibit,
20 this calculation concludes that there is no
21 statistical observable corrosion. We only had four
22 data points since 1992. Although the data is fairly
23 well behaved, the variance on the data is large enough
24 to where we cannot pick up the corrosion rates we
25 would have expected, which would be less than the mil

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1 per year, if any. Therefore, we did not have enough
2 data to confirm an observable corrosion rate.

3 JUDGE BARATTA: Did you get an estimate of
4 what the minimum observable corrosion rate would be
5 based upon the variance, did you not?

6 MR. TAMBURRO: Yes, sir.. We performed a
7 study based on a Monte Carlo simulation using the
8 bounding area, grid 19A, using the mean of that
9 bounding area, 1992, and the variance as measured by
10 the standard area. That simulation told us that a
11 rate of 6.9 mils per year would have been observable
12 with only four observations from 1992 to 2006. Any
13 rate less than 6.9 mils per year would have not be
14 observed and would have been within the scatter of the
15 data.

16 Therefore, we have based our next
17 inspection based on that 6.9 mils per year as if this
18 hypothetical rate, as if it were really there and we
19 are inspecting prior to any hypothetical degradation
20 in the dry well. We will inspect prior to that time.

21 JUDGE BARATTA: Now how did you obtain the
22 four year? You say it was based on the hypothetical
23 rate of 6.9 mils? How was the four year obtained, the
24 four year interval obtained?

25 MR. POLONSKY: I think maybe there's some

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1 confusion, Your Honor. The four year UT frequency is
2 for the license renewal period. Mr. Tamburro I think
3 is talking about the next inspection in 2008, which
4 would have been two years later.

5 MR. TAMBURRO: Independent of our
6 commitments, this calculation was performed and at the
7 limiting location with this highly conservative
8 corrosion rate, we would have not violated 736
9 criteria until, I believe, 2014. I need to review
10 this to give you a better date.

11 JUDGE BARATTA: Go ahead. Feel free to go
12 ahead and do that. Let me just ask while you're doing
13 that Dr. Hausler, do you have any comments on what you
14 heard?

15 DR. HAUSLER: I have a question. I have
16 a question. I was wondering if in the correlation
17 calculation of the old data, the means were used for
18 the correlation or the means of the individual
19 averages or the lower 95 percent confidence limit?

20 JUDGE ABRAMSON: Before we go too far down
21 that path and spend a lot of time, let's all remember
22 that those calculations were only used to develop the
23 .736 criteria, that they have no other meaning. Is
24 that right, Mr. Tamburro? That slope was used to come
25 up with a .736, which was your estimate of where you

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1 would be in the worst case?

2 MR. TAMBURRO: Yes, sir. And that was the
3 lower curve, the lower 95 percent confidence, so not
4 the curve fit.

5 JUDGE ABRAMSON: And that has no
6 significance here other than it is the number that
7 they use to come up with a guidance to General
8 Electric, tell them what to use for a fully, a
9 uniformly degraded shell. So while it is nice to have
10 this academic discussion, we're spinning wheels.

11 MR. WEBSTER: Judge Abramson, I think it
12 was, maybe I'm wrong, but I thought it was also used
13 to calculate the measurement interval.

14 MR. POLASKI: This is Fred Polaski. I
15 think we need to be clear, like Judge Abramson is
16 saying, is what went on before 1992 is totally
17 different than what happened after 1992. Before 1992,
18 there was corrosion occurring and the previous owner
19 was doing calculations of projecting corrosion rates
20 based on actual data and things that were going on and
21 that's how they projected with the lower 95 percent
22 confidence of 736 mils.

23 After 1992, the data radically changes
24 because there is no corrosion occurring and so the
25 analysis takes on a totally different approach because

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1 you're getting essentially zero corrosion rate when
2 you look at the actual measurement data that was
3 taken. But AmerGen does do conservative calculations
4 to project forward a, you know, 95 percent lower
5 corrosion rate that could occur to look at what would
6 the interval be that we could go to before we would
7 exceed 736 if corrosion was occurring.

8 JUDGE ABRAMSON: And that was the Monte
9 Carlo calculations and the statistics had indicated
10 that you couldn't detect anything less than 6.9 mils,
11 do you just used the worst case scenario assuming it
12 would be as bad as you could not detect. Is that --

13 MR. TAMBURRO: Yes.

14 MR. POLASKI: That's correct.

15 MR. TAMBURRO: Exhibit 40, page 86,
16 provides, which was the ACRS presentation, provides
17 the results of that study. And in the most limiting
18 locations were 19A and 17D. If one were to project
19 forward that this very high, hypothetical, unrealistic
20 corrosion rate from 2006, we would not reach the
21 minimum required thickness of .736 until 2016.

22 JUDGE BARATTA: The technique that was
23 used there was a Monte Carlo sampling from the
24 distributions of the mean of each data point.

25 MR. TAMBURRO: Yes, sir.

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1 JUDGE BARATTA: That's how you did that as
2 opposed to just a curve fit like you did previously,
3 correct?

4 MR. TAMBURRO: Yes, sir.

5 MR. POLASKI: I'd also like to point out
6 that that in that analysis when we did that, we did
7 that for 19A, is that the correct one, Pete?

8 MR. TAMBURRO: We did them for all. The
9 two bounding grids are 19A and 17D.

10 MR. POLASKI: 17D. But when you look at
11 the overall data, I mean this is very hypothetical.
12 Is that corrosion would be going on on only that
13 location and not show up. You've got 19 locations
14 we're monitoring and we're not seeing any corrosion on
15 any of those locations in the sand bed region. That's
16 why we believe, you know, as Mr. Tamburro said, this
17 is hypothetical and it's very conservative bounding
18 type analysis.

19 JUDGE BARATTA: Would you say -- I think
20 you said already that if you, in fact, do statistical
21 tests on the means, there is no statistically
22 significant difference between those, is that correct?

23 MR. TAMBURRO: Yes, sir.

24 JUDGE BARATTA: So that basically backs up
25 what you've said.

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1 MR. TAMBURRO: Yes, that's correct.

2 JUDGE BARATTA: Dr. Hausler, do you have
3 any comments on that?

4 DR. HAUSLER: I would just like to add
5 that these data and the 6.6 NPY actually refer to the
6 grid measurements. And I believe we have established
7 yesterday that that is not likely the place where the
8 most corrosion will occur in the future.

9 JUDGE ABRAMSON: I have three. Actually,
10 my first question is in the nature of a request of
11 Citizens. Yesterday, Dr. Hausler mentioned briefly
12 and I think, you, Mr. Webster, supported it, that
13 Citizens has raised an issue of how much remaining
14 margin there is for the pressure failure. Would you -
15 - can you provide for us where in the testimony you
16 have raised this? You don't need to do it right away,
17 just give it to us by noon today or something like
18 that. We would just like to know where in the
19 prefiled testimony you've raised this so we can take
20 a closer look at it.

21 MR. WEBSTER: Certainly. I think it was
22 in response to the Board's request on extreme value
23 statistics.

24 JUDGE ABRAMSON: Thank you. That's my
25 first request. My second request is Dr. Mehta, once

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1 again, would you come up, please?

2 Dr. Mehta, we heard yesterday a lot about
3 the GE calculations. As I understand it, so the
4 record is perfectly clear, GE did two types of
5 calculations, one assuming that the entire drywell
6 shell was degraded to .736 and looked to see what
7 safety margin that would provide. Is that correct?

8 DR. MEHTA: Yes, Your Honor.

9 JUDGE ABRAMSON: And the other was that
10 and superimposed on top of that this tray of
11 additional erosion at the midpoint between the
12 downcomers. Is that correct?

13 DR. MEHTA: Yes, Your Honor.

14 JUDGE ABRAMSON: Okay, and those are the
15 only calculations you've done. You have not, GE has
16 not been asked to analyze anything that looks like --
17 -- estimates the current configuration, i.e., one
18 inch, 1.15 inch most everywhere with degradation as
19 measured. Is that correct?

20 DR. MEHTA: That is correct, sir.

21 JUDGE ABRAMSON: You've calculated for the
22 uniform degradation of .736 that the safety margin
23 would be 2.0. And I think you said yesterday you
24 would expect if you did the as measured or current
25 configuration, you'd get -- you would get a higher

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1 safety margin. Am I accurately remembering that?

2 DR. MEHTA: Yes, sir. That is my
3 engineering judgment. That's what I stated.

4 JUDGE ABRAMSON: Well, you're the only one
5 here who's done this sort of work, so we're sort of
6 stuck asking you or stuck -- we're happy to have you
7 here to answer the question.

8 But okay, that's -- I just wanted to make
9 sure we were all on the same page, that in fact,
10 you've done two very hypothetical calculations which
11 are being used by the Applicant and the staff as
12 bounds for when this shell would reach certain
13 criteria that are called the current licensing basis.
14 But we've never analyzed, nobody has analyzed what the
15 buckling safety factor would be for the actual
16 configuration. Is that correct?

17 DR. MEHTA: That is correct, sir.

18 JUDGE ABRAMSON: Thank you. The next one
19 is for Dr. Harlow who is not related to the famous
20 Harlow from Los Alamos National Lab, I'm told.

21 Dr. Harlow, we heard a lot of testimony
22 yesterday about the sparseness of this data. And yet
23 we're using this data, the Agency is using the data to
24 try to confirm and the Applicant is using the data to
25 establish that this drywell shell is not approaching

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1 either of these failure criteria.

2 Can you just take a few minutes and give
3 us your view on how statistically one can or should
4 use this data and whether the approach taken by the
5 Applicant of looking at a few points and seeing
6 whether they fit under the tray. Is there a rational
7 approach when there's a limited amount of data?

8 DR. HARLOW: So I'm assuming you're
9 talking about the external data or the internal or
10 both?

11 JUDGE ABRAMSON: Let's talk about -- well,
12 first of all, the internal data is what -- let me come
13 back to Mr. Tamburro.

14 Which data is being used to determine
15 whether you're approaching the -- either of these
16 buckling criteria?

17 MR. TAMBURRO: The internal data is being
18 used for comparison to the uniform thickness.

19 JUDGE ABRAMSON: Okay.

20 MR. TAMBURRO: And is being used to
21 demonstrate margin.

22 JUDGE ABRAMSON: It's being used to
23 demonstrate margin vis-a-vis the uniform degradation?

24 MR. TAMBURRO: Yes, sir.

25 JUDGE ABRAMSON: And what data is being

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1 used to demonstrate compliance?

2 MR. TAMBURRO: The external data was used
3 to demonstrate compliance with the local buckling
4 criteria.

5 JUDGE ABRAMSON: So let's focus on the
6 external data because I think we understand that it is
7 not uniformly degraded, the .736. There's what, 90
8 percent, 95 percent of this shell is not degraded at
9 all? Give me a ballpark estimate, Mr. Tamburro. What
10 percentage is not corroded?

11 MR. TAMBURRO: A large percentage, Your
12 Honor, greater than 80 percent.

13 MR. WEBSTER: Not corroded? Does that
14 mean not corroded at all, no wall thickness loss
15 whatsoever?

16 JUDGE ABRAMSON: We've taken -- you've
17 taken measurements in some areas, right?

18 MR. TAMBURRO: Yes, sir.

19 JUDGE ABRAMSON: And in those areas where
20 in the sand bed region you observed material
21 corrosion?

22 MR. TAMBURRO: Yes, sir.

23 JUDGE ABRAMSON: Perhaps I can rephrase
24 this question. What percentage of the shell does not
25 show material degradation? What percentage is still

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1 over an inch thick, let's say?

2 MR. TAMBURRO: In my estimation, over 80
3 percent.

4 MR. WEBSTER: Judge, could we clarify that
5 within the sand bed region?

6 JUDGE ABRAMSON: No, no. The entire
7 shell.

8 MR. WEBSTER: Okay.

9 JUDGE ABRAMSON: And the reason I'm
10 interested is because the uniform degradation
11 calculation, as soon as the entire shell is thinned.
12 I'm just trying to get a handle on it.

13 MR. TAMBURRO: Your Honor, I misunderstood
14 the question. I thought you were only talking about
15 the sand bed.

16 JUDGE ABRAMSON: No.

17 MR. TAMBURRO: If you're talking about the
18 entire drywell, then 95 percent would be more
19 appropriate in my opinion, a more appropriate --

20 MR. WEBSTER: Judge, I think maybe there
21 is also some misunderstanding. I think the GE
22 analysis does it, assumes .736 in the sand bed region,
23 not over the whole shell.

24 JUDGE ABRAMSON: Dr. Mehta, which way is
25 it?

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1 DR. MEHTA: Your Honor, in the sand bed
2 region, we used 736 mils. The rest of the other areas
3 were different thicknesses.

4 JUDGE ABRAMSON: Okay, I'm glad we got
5 that clarified. So the uniform degradation is not the
6 whole shell, it's just in the sand bed region.

7 DR. MEHTA: That is correct, sir.

8 JUDGE ABRAMSON: So in any case, so let's
9 come back and let's address what you think is the
10 situation of degradation in the sand bed region. What
11 percent, and now I can see why Mr. Webster said wait
12 a minute, it's not such a big number. What percentage
13 of the sand bed region does the Applicant estimate is
14 not materially degraded, say still remains greater
15 than an inch?

16 MR. TAMBURRO: Okay, my previous 80
17 percent. I was assuming that you were talking about
18 within the 800 to 900 hundred mil range. If you're
19 saying what percentage of the sand bed is still at its
20 nominal thickness --

21 JUDGE ABRAMSON: Or near.

22 MR. TAMBURRO: Or near its nominal
23 thickness then there are four bays which have evidence
24 of no wastage at all. So 50 percent would have no
25 wastage.

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1 JUDGE ABRAMSON: And other bays have a
2 variation of ways of degradation, and we've heard
3 about that.

4 MR. TAMBURRO: Yes, sir. That's why I
5 originally said 80 percent.

6 JUDGE ABRAMSON: So anyway, the point I
7 would like to clarify for the record is I don't, it
8 seems to me that nobody, and I thought I heard
9 Citizens say this, nobody argues we're really
10 approaching the uniform degradation barrier at this
11 point. Is that correct?

12 MR. WEBSTER: We have in pre-trial
13 testimony, we have actually put in testimony that
14 shows for the external data, the 95 percent confidence
15 limits do approach or in some cases go below the
16 uniform.

17 JUDGE ABRAMSON: Based on the external
18 data?

19 MR. WEBSTER: Based on the 95 percent
20 confidence limits, the lower 95 percent confidence
21 limits.

22 JUDGE ABRAMSON: From the external?

23 MR. WEBSTER: For the external, that would
24 be, yes.

25 JUDGE ABRAMSON: And your calculations are

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1 based on the internal data. Is that correct, Mr.
2 Tamburro?

3 MR. TAMBURRO: Yes.

4 JUDGE ABRAMSON: Okay, I think I
5 understand that. So now to come back to what I want
6 to hear from Dr. Harlow. The big focus yesterday was
7 on the, why can I never remember this, the small area
8 criteria.

9 MR. POLONSKY: Local buckling criteria.

10 JUDGE ABRAMSON: The local buckling
11 criteria, which is being computed on a basis of the
12 external data. So talk to us for a few minutes about
13 the statistical significance, the fact that there is
14 limited data and how that should affect our
15 interpretation of the meaningfulness of that data.

16 DR. HARLOW: Well, it's my understanding

17 --

18 JUDGE ABRAMSON: Get a little closer to
19 the mic, please?

20 DR. HARLOW: It's my understanding that
21 all of that data, the way it is being used by AmerGen
22 is to look at each point individually. So as a
23 result, you're looking at the pressure criterion or
24 membrane criterion, or you're using this local
25 buckling criterion. So as a result, statistics, the

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1 way you normally think of it doesn't really come into
2 play.

3 However, if you were to assume that the
4 106 data points were representative of thin areas, so
5 they're biased thin, you could do statistics on that
6 amount of data and 106 data points is a reasonably
7 fair number of points. But again, the distribution
8 and the statistics that you would do would be a
9 conditional distribution, conditioned on the fact that
10 you're looking at thin areas. It is not
11 representative of the whole region or any bay or the
12 whole sand bed region. So you would have to keep that
13 caveat there.

14 JUDGE ABRAMSON: Okay, but I am
15 particularly struck by your first comment that we're
16 looking at it point by point and we're using the, each
17 particular measurement to make a comparison to the
18 local buckling criteria or to the pressure criteria.

19 Is there any information that you can gain
20 from the fact that there are 106 instances of that
21 measurement that helps you understand the accuracy of
22 any one measurement?

23 DR. HARLOW: I actually did sort of to
24 satisfy my own curiosity, I did do statistical
25 analysis on those data comparing the 1992 measurements

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1 with the 2006 measurements. Turns out that you have
2 a couple of options. You can use a Gaussian or normal
3 distribution, and it represents that data quite well.
4 Or you can actually use extreme value statistics to
5 characterize that data.

6 In both cases, if you do that, just
7 looking again at these conditioned on being thin data,
8 you really are not close to the 736 or the 490 for the
9 pressure criterion.

10 JUDGE ABRAMSON: 530? What's a -- oh, the
11 pressure criterion. Okay.

12 (Pause.)

13 MR. WEBSTER: Just as a point. If that
14 analysis hasn't been disclosed, we would like
15 disclosure of that analysis.

16 JUDGE ABRAMSON: Well, I am asking, I'm
17 asking Dr. Harlow to describe what one could learn
18 from this so if there is any written -- is there a
19 written product anywhere?

20 DR. HARLOW: Not with me.

21 MR. WEBSTER: Sorry, but is there written
22 product at your office?

23 DR. HARLOW: Yes.

24 JUDGE ABRAMSON: Is it written in a way
25 that it can be usefully understood by us or is it a

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1 set of notes?

2 DR. HARLOW: It is primarily a set of
3 notes and it is a figure. It is a graph.

4 JUDGE ABRAMSON: I think what I'm trying
5 to understand is we had a lot of arguments yesterday
6 about whether this external data is accurate. Can you
7 tell us, if I looked at one particular, let's take one
8 particular point. Let's say we took the point where
9 this was closest to the local buckling criteria and we
10 took that measurement. Does the fact that you have
11 all these other measurements give you some idea of the
12 uncertainty in that particular local measurement,
13 which is what I thought I heard. I'm not sure what I
14 heard now.

15 Your first answer was, well, you're
16 looking at each point locally and so you can't tell
17 much from the fact that there are other measurements.
18 Maybe what I should ask is this: do you have any
19 information that tells you about what uncertainties
20 associated with each individual measurement?

21 Obviously, this is what we're worried
22 about, right? They measure one point. They're using
23 that to compare it to a certain criteria. What can we
24 tell?

25 From one measurement, there is whatever is

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1 the instrument of uncertainty and what they did by
2 noodling around with where the probe was.

3 DR. HARLOW: Yes, so as a result if you
4 are only looking at one exterior point, I don't think
5 you would be able to hone in on that very well.
6 However, because again, it is my limited
7 understanding, the way that they do the measurements
8 internally, there are roughly 49 measurements in a
9 small grid, you can better assess what that
10 uncertainty is and for internal measurements on those
11 grids, the amount of scatter is relatively small so --

12 JUDGE ABRAMSON: The internal measurements
13 are fine. But if the calculations for whether we're
14 approaching, what this panel is all about is how much
15 margin do we have left before we get to the local
16 buckling criteria, because that's going to be used in
17 combination with a corrosion rate, whatever that is,
18 to compute what's an appropriate frequency of
19 measurement.

20 So we need to have this first value tied
21 down reasonably well. It is our starting point, and
22 the starting point is current condition which is based
23 on these measurements and as I understand it, Mr.
24 Tamburro, correct me if I've got this wrong, but as I
25 understand it, our starting point for local buckling

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1 criteria is these external data point measurements
2 only. Is that right?

3 MR. TAMBURRO: And their spatial
4 relationship where they are located, where they are
5 located from each other.

6 JUDGE ABRAMSON: Right, because you used
7 several sometimes to determine. Okay, we understand
8 that part pretty well.

9 So what information do we have? Is it
10 each of these points is in a different location and
11 each of these points, we don't, yes, you said if you
12 make the assumption they're in locally thinned areas
13 and they were all ground down to be able to put the,
14 is that right? These were all ground down, the
15 surface was ground to be able to put the probe in and
16 that creates, what's the right word, it biases the
17 data toward a thin site because you took some material
18 off, but it also, Mr. Tamburro, is there any way to,
19 do we know whether the grinding is uniform from spot
20 to spot?

21 MR. TAMBURRO: No, sir.

22 JUDGE ABRAMSON: So there is a huge
23 variation in the grinding which could account for
24 variation in the data from point to point. So if we
25 tried to use these data, these thickness measurements

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1 from point to point, what information would we be
2 gaining about any individual point when we don't know
3 how much was ground off to begin with?

4 DR. HARLOW: I think you would have to
5 trust the UT measurement and the operator to try to
6 estimate how much variability there is in the true
7 measurement. And like I said, the only way that I
8 know to check that would be to compare it with
9 internal measurements where you have a sufficiently
10 large number to hone in on that.

11 JUDGE ABRAMSON: So what you're suggesting
12 is that for an individual measurement, we can get some
13 information about how accurate that is by looking at
14 how accurate the external thickness measurement was by
15 looking at the internal measurements where there were
16 a lot of points close together, so we can estimate
17 what actually was going on in a measurement itself.

18 DR. HARLOW: Yes, sir.

19 JUDGE ABRAMSON: So that leaves us now
20 with 106 external points, each measured in area that
21 was ground down and ground in a way that we don't know
22 how much material was taken off in any point. And
23 we're talking mils here, so I think I heard yesterday
24 that the grinding was somewhere between 100 and 200
25 mils based on testimony from Mr. Hawkens or somebody

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1 who had done the measurements. Is that correct?

2 MR. TAMBURRO: That was my testimony.

3 JUDGE ABRAMSON: Your testimony?

4 MR. TAMBURRO: Yes, sir.

5 MR. WEBSTER: Judge, could just clarify.
6 The foundation of the testimony was from measurements
7 taken around the grinding spot, but I don't think it
8 shows that the thinnest spot was ground by one to two
9 hundred mils.

10 JUDGE ABRAMSON: No, it doesn't. What I'm
11 trying to get a handle on is how much variation is
12 there in the amount of grinding from point to point,
13 because we're trying to get some statistical
14 information out of 106 measurements which are trying
15 to measure the thickness of something down to mils and
16 we've got a variation of something like a 100 mils in
17 the amount of grinding.

18 If I told you I had 100 points and I
19 didn't know any of them to within a 100 mils, Mr.
20 Harlow, what would it tell you about the statistics
21 that I could gather from that? I would have to put in
22 100 mils uncertainty on each point. Isn't that
23 right?

24 DR. HARLOW: Yes, if you were trying to
25 compare the thickness to the original thickness.

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1 JUDGE ABRAMSON: Or if I'm trying to get
2 statistical information about the actual thickness of
3 the nearby unground material, which is what this is
4 being used for. Right? We're trying to estimate the
5 actual remaining thickness of the liner, and it is not
6 what's been, it's not what's left after you grind 100
7 mils off or 200 mils off. It's what is there. They
8 had to grind it to get this. So now we're being told
9 that you get 100 points and they ground off between
10 100 and 200 mils to get the surface flat enough to
11 make a measurement.

12 MR. WEBSTER: Judge, could I just clarify?
13 I don't think that's, maybe you can clarify. I don't
14 think the testimony is that they grind the thinnest
15 point thinner by 100 to 200 mils.

16 JUDGE ABRAMSON: The testimony is that
17 they don't know how much they ground off at any point.
18 Is that --

19 MR. POLONSKY: I think that's correct,
20 Your Honor. I just want to make sure we're all clear,
21 because I think you just mentioned it. But the Carbon
22 UT measurements were taken after the grinding, so the
23 measurements currently taking already take into
24 account the removal of whatever metal was removed,
25 even though we don't know the amount at each spot that

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1 was removed.

2 JUDGE ABRAMSON: Yes, that's the point.
3 The point I'm making is we've got 106 measurements and
4 they vary, they vary from each other because the
5 thicknesses, the original thickness varied and because
6 there was 100 to 200 mils ground off and we don't know
7 how much.

8 MR. WEBSTER: Judge, I guess I would
9 characterize the testimony that it is between 0 and
10 100 mils ground off.

11 JUDGE ABRAMSON: I think it may be between
12 0 and 200.

13 MR. WEBSTER: Well, okay.

14 MR. POLASKI: Your Honor, just to try to
15 elucidate on this a little more. In 1992, when they
16 took the original readings, there were 19 or 20 of
17 those external readings that measured less than 736.
18 Those were --

19 JUDGE ABRAMSON: Those were 736 after some
20 grinding.

21 MR. POLASKI: After some grinding, because
22 they had to grind and then they took the UT readings.

23 JUDGE ABRAMSON: I'm sorry, let me
24 interrupt one more time. Do we know how much they
25 ground off?

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1 MR. POLASKI: Those that were less than
2 736 were measured in 1992 were, micrometer readings
3 were taken of the depth of the depression and those
4 were the ones that we discussed yesterday and the
5 numbers range from 100 to 200 mils and specifically
6 Mr. Tamburro has the information in Calc 24?

7 MR. TAMBURRO: Exhibit 16, Your Honor.
8 That's the Calc 24, revision 2.

9 JUDGE ABRAMSON: Okay, and those numbers
10 indicate that the amount, this is based on micrometer
11 readings of the depth. Now, let's all remember that
12 you've got a rough surface to begin with and you're
13 putting a ruler basically against the rough surface
14 and then you're pushing a probe into the hole and
15 you're trying to measure how deep that probe goes in.
16 Well, a lot of that depends on how well you get it on
17 the surface too and how rough the surface is.

18 So what we're finding is numbers that vary
19 between 100 and 200 mils from that. Maybe you ground
20 off 200 mils from the highest point on the rough
21 surface and maybe you only ground off 20 mils from the
22 lowest point on the rough surface because you're
23 laying a ruler on the rough surface.

24 So what I'm trying to understand is we've
25 got 100 data points and I'm trying to get a handle on

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1 whether there's any statistically meaningful way to
2 compare these things when we've introduced error of
3 something like 0 to 200 mils on these points to begin
4 with and whether statistical analysis of these points
5 will have any meaning at all for us.

6 I guess that's my real question, Dr.
7 Harlow, and I think you sort of said that in your
8 first comment and then you came back and said well,
9 you've done some statistical analysis, but what I'm
10 wondering is it useful?

11 DR. HARLOW: No, not relative to what's
12 remaining in the dry well thickness. What that data
13 tells you and what you can do is to measure what
14 exists today which means it has been ground and
15 etcetera, etcetera.

16 JUDGE ABRAMSON: So you can use it to look
17 at continuing degradation or something, but to compare
18 these 106 points you'd have to get meaningful
19 comparison, you'd have to know how much was ground off
20 of each one. But let me come at it at another way.
21 If I asked you how much variation there was between
22 these 106 points in thickness, can you give me a
23 ballpark number which led you to try to do statistical
24 analysis? Was there variation by more than 100 mils?

25 DR. HARLOW: No.

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1 JUDGE ABRAMSON: So there's variation
2 among these 106 points by less than 100 mils, and yet
3 we ground off 100 to 200 mils to begin with and we
4 don't know how much. So the variation among the
5 points could well be caused by differences in the
6 grinding and not by differences in remaining thickness
7 at all.

8 MR. WEBSTER: Just to give you a range on
9 the external measurements, I think the maximum
10 external measurements are around the nominal thickness
11 and the minimum measured data is around .06.

12 JUDGE ABRAMSON: Is that accurate?

13 MR. POLASKI: Yes, that's accurate. The
14 thinnest point was about 602 mils and the thickest,
15 there were some readings taken at the higher
16 elevations in the sand bed region where corrosion had
17 not occurred, just to check thickness. So --

18 JUDGE ABRAMSON: Let's talk about the
19 corroded region which is where we're trying to do.
20 Okay, I appreciate that. If you include the non-
21 degraded areas in the non-degraded -- the measurements
22 in the non-degraded areas when you do this
23 calculation, then you introduce additional what do you
24 want to call it, additional variability in data which
25 is intended to look at thinned areas.

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1 MR. WEBSTER: I think that's another
2 misapprehension is that some of this data is taken
3 deliberately at the nominal thickness areas.

4 JUDGE ABRAMSON: It makes sense because
5 you want to know where --

6 MR. WEBSTER: That's right. I'm not
7 saying it doesn't make any sense. I'm saying that
8 it's important when you look at these 104 points or
9 whatever they are to remember they're not all in the
10 thin spots. Some of them are designed to be in the
11 thick spots and some of them are designed to be in the
12 thin spots.

13 JUDGE ABRAMSON: I think that's good. So
14 in the end what it sounds like is we really can't get
15 any statistically meaningful information out of the
16 fact that we have a data set because the variation
17 introduced in individual measurements is quite
18 significant. In fact, it's -- it could be as much as
19 a third of the threshold that you were worried about,
20 right? Two hundred mils out of 700. It's almost a
21 third. Certainly more than a quarter. Two hundred
22 out of 800 would be a quarter. So 200 out of 700 is
23 more than a quarter. So in the end when we're trying
24 to understand the meaningfulness of the external data, it
25 comes back up to Harlow to looking at individual data

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1 points and trying to understand the error in that
2 data.

3 DR. HARLOW: Yes, sir.

4 JUDGE ABRAMSON: By comparing it to the
5 error in measurements from clustered internal data
6 which tells us something about how accurate the
7 instrument is and how accurate the instrument user is.

8 DR. HARLOW: Yes, sir.

9 JUDGE ABRAMSON: Okay, that's very
10 helpful. Thank you. I'm sorry for this long
11 diversion, but Dr. Hausler, do you want to add
12 anything to this? Does this all make some sense to
13 you? It seems to me to be consistent with what you
14 were talking about yesterday about the paucity of data
15 and the difficulty of interpreting it?

16 DR. HAUSLER: Yes, sir. Your Honor, what
17 I would like to add is this, that I think we did talk
18 yesterday I think with Judge Baratta about the
19 reproduceability of the measurement. We do have an
20 idea as to what the variability of a single
21 measurement point might be. We do not know, however,
22 as you clearly pointed out, that we have no idea how
23 much was ground off.

24 The other thing that I would like to add
25 is that again, we talk about the 106 points or 109

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1 points, not all of them have been ground. That's the
2 first comment I would like to make.

3 The second point is that they represent a
4 relatively small area, again, of the entire bay. Just
5 to put this in perspective, Mr. Tamburro has
6 calculated that the internal grids represent roughly,
7 I believe, a half of a percent of total sand bed area
8 and that the external areas that have been explored by
9 UT measurements are not more than five percent. I
10 think it's perhaps of the order of two percent.

11 So when we talk about trying to project
12 maybe maximum damage from a relatively small area of
13 exploration, we may be able to use extreme value
14 statistics as Dr. Harlow pointed out, but again, we
15 would have to use it with some caution. In that
16 context, I would like to perhaps, this is the moment
17 to do it, to bring to your attention an example of
18 extreme value statistics.

19 JUDGE ABRAMSON: I think you've provided
20 some examples in your written testimony.

21 DR. HAUSLER: That's correct.

22 JUDGE ABRAMSON: So if you just want to
23 repeat that, that's not necessary. We have it in
24 writing.

25 DR. HARLOW: Okay.

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1 MR. WEBSTER: Would you like to know where
2 that is, Judge?

3 JUDGE ABRAMSON: Yes, if you want to show
4 us where that is in your testimony, you can just give
5 us the reference and we can look at it. But I
6 remember seeing it --

7 DR. HAUSLER: No, I have it in front of
8 me. It is Exhibit C, Attachment, I believe 2.

9 JUDGE ABRAMSON: Okay, thank you very
10 much.

11 DR. HAUSLER: We probably might be able to
12 project --

13 JUDGE ABRAMSON: That's okay. We don't
14 need to go through it again. We have it in writing.
15 The purpose here is to try to fill in some gaps in our
16 understanding, not to repeat what we've already seen
17 in writing.

18 DR. HAUSLER: I think there is perhaps a
19 point that I might make and that is how one comes from
20 a relatively small amount of data to a project that
21 would indicate that -- I mean an estimate that would
22 indicate a value if one had, in fact, made more
23 measurements.

24 JUDGE ABRAMSON: We're familiar with that
25 technique, Dr. Hausler, but I would ask is how

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1 affected would those projections be by an uncertainty
2 of 200 mils in each data point caused by the grinding,
3 the variability in grinding? In other words, what
4 would it do to the projections?

5 DR. HAUSLER: Well, that is something that
6 we have explored in the statistical calculations, but
7 my estimate is by that very same amount, which seems
8 like a good first guess.

9 JUDGE ABRAMSON: Okay, thank you very
10 much.

11 MS. BATY: Judge Abramson, if I may, you
12 were asked about whether there was a finite element
13 analysis of the current condition of the drywell
14 shell. Would you like the staff to address that issue
15 and how it was treated during the license renewal
16 review?

17 JUDGE ABRAMSON: Yes, that might be very
18 useful to us. Is Mr. Ashar who has done that?

19 MR. ASHAR: Hansraj Ashar. Yes, sir.

20 JUDGE ABRAMSON: Do you want to --

21 MR. ASHAR: Yes, I had a contract with
22 Sandia National Lab which did the independent study,
23 it was a confirmatory study.

24 JUDGE ABRAMSON: Okay, we've seen the
25 Sandia study.

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1 MR. ASHAR: Oh, you have seen it.

2 JUDGE ABRAMSON: So that's --

3 MR. ASHAR: If you want to know something
4 more about it, I can --

5 JUDGE ABRAMSON: I think we've read the
6 report and we've had comments about it and we
7 appreciate the comments that Sandia made about it, so
8 --

9 MS. YOUNG: Judge, may I hand the staff's
10 SER to Mr. Ashar to refer to?

11 JUDGE ABRAMSON: For what purpose?

12 MS. YOUNG: To refresh his recollection,
13 because I don't believe he answered the question
14 correctly.

15 JUDGE ABRAMSON: Okay.

16 (Pause.)

17 MR. ASHAR: I think, Mitzi, you are
18 thinking about the feature performed by -- is that what
19 you are --

20 MS. YOUNG: Yes.

21 JUDGE ABRAMSON: That's not where we're
22 going.

23 MR. ASHAR: That's not where we are going.

24 JUDGE ABRAMSON: We're only interested in
25 did somebody look at the -- in the current condition

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1 and I understand that Sandia did that.

2 MS. YOUNG: I don't believe this is on.
3 I don't know if you can hear me.

4 JUDGE ABRAMSON: I hear you.

5 MR. ASHAR: And if you read the Sandia --

6 MS. YOUNG: There's a commitment by the
7 licensee that they made during the review to do a
8 future analysis. And as part of the ACRS report, the
9 ACRS specifically asked the staff to include a license
10 condition, asking the licensee to do that future
11 finite element analysis using the current condition of
12 the --

13 JUDGE ABRAMSON: Oh, I see.

14 MS. YOUNG: That's the only --

15 JUDGE ABRAMSON: When is the --

16 MS. YOUNG: I'm not trying to testify, I'm
17 trying to --

18 JUDGE ABRAMSON: That's okay, because in
19 the ACRS report -- is that okay, Mr. Webster?

20 MR. WEBSTER: Absolutely. That's
21 absolutely a license condition that requires a fire
22 element analysis.

23 JUDGE ABRAMSON: Does anybody recall when
24 that is to be done? Is that before the renewal?

25 MS. YOUNG: The condition is summarized

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1 very succinctly on page 1-18 of the SER. And the ACRS
2 report is Exhibit 3 of the staff.

3 JUDGE ABRAMSON: Thank you.

4 MR. GALLAGHER: Judge Abramson, this is
5 Mike Gallagher from AmerGen. Yes, that analysis --
6 our commitment is to complete that analysis before the
7 period of extended operation.

8 JUDGE ABRAMSON: Before the commencement
9 of the extended operation.

10 MR. GALLAGHER: That's correct.

11 JUDGE ABRAMSON: Okay. Thank you. That's
12 very helpful.

13 I assume that somebody is going to have to
14 do a lot of measuring to be able to do that, right?
15 Wasn't one of Sandia's comments that a lot of unknown
16 information in order to do the calculation, is that --

17 MR. GALLAGHER: Well, we're going to use
18 the existing measurements we have. We feel we have --

19 JUDGE ABRAMSON: For that degradation.
20 You have enough other measurements about the rest of
21 the shell and the loads and such?

22 MR. GALLAGHER: Yes, we have all that. So
23 it will be a complete 3D model.

24 JUDGE ABRAMSON: Great.

25 CHAIRMAN HAWKENS: Could you please

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1 explain to a layman, I am familiar with that
2 commitment and I've been curious as to what exactly a
3 three dimensional analysis is and if you would explain
4 to me what, after performing it, and this will be done
5 before the renewal period, what you'll have and what
6 that will tell you?

7 MR. GALLAGHER: Yes, Judge. Our
8 expectation is, and if you looked at the -- if you can
9 look at the ACRS transcript, it's very clear that our
10 expectation is that it would show in the current
11 condition that we have more margin than a safety
12 factor of two.

13 MR. WEBSTER: Judge, I object to this. I
14 think this is speculative.

15 JUDGE ABRAMSON: It is.

16 MR. WEBSTER: It is speculative.

17 JUDGE ABRAMSON: We agree that it's
18 speculative. Nobody knows what will be the result.
19 It will give you -- it will computer a safety margin.

20 MR. GALLAGHER: It's not inspeculative
21 because just as we've been testifying here, the
22 current model which is conservative, is a uniform
23 thickness of 736 mils in the sand bed region. This
24 would take account of the thicknesses that we actually
25 have.

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1 MR. WEBSTER: I'll object to that
2 characterization.

3 MR. GALLAGHER: If you have above the area
4 of corrosion --

5 CHAIRMAN HAWKENS: Objection is overruled.
6 What I'm looking for I want to know exactly what
7 you're going to use to create this three-dimensional
8 model. Are they additional data points you're going
9 to get or are the data points from the prior points
10 you've already taken them which you'll take again in
11 2008 to create this 3D model?

12 MR. GALLAGHER: The inputs are the
13 thicknesses we've already measured.

14 CHAIRMAN HAWKENS: Which you'll retake in
15 2008.

16 MR. GALLAGHER: We will retake those in
17 2008.

18 CHAIRMAN HAWKENS: To create this model.

19 JUDGE ABRAMSON: Well, and also there are
20 a lot of other measurements they'll need to use.

21 MR. GALLAGHER: There's other factors they
22 need and Dr. Mehta can go into that. GE is not doing
23 the analysis, but a 3D model, it's all the things you
24 need in there. You need the thicknesses of all the
25 other plates in the drywell. You need the loads that

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1 are on all the penetrations and things like that. The
2 actual geometries and it's a 360 degree model so that
3 we don't have to make asymmetry assumptions. We can
4 model it exactly and it will have a finer mesh because
5 the computers today are able to do that better.

6 JUDGE ABRAMSON: Just let me comment Mr.
7 Webster. Part of the reason we're all comfortable
8 with letting this kind of information in in addition
9 to the fact that it gives us some information is as we
10 have said in numerous of our written orders, we give
11 testimony the weight we think it deserves and we
12 understand what this is saying to us, so did you get
13 what you needed, Judge Hawkens, about a 3D model?
14 Okay, thank you. Thank you, Mr. Gallagher.

15 CHAIRMAN HAWKENS: I have a question for
16 AmerGen regarding Dr. Hausler's testimony that in his
17 opinion there's at least one area in the drywell shell
18 that will exceed the pressure criteria. Can you
19 address that? Are you aware of any locations that
20 approach that limiting criteria?

21 MR. TAMBURRO: This is Peter Tamburro.
22 None of the data even comes close to or approaches the
23 490 mil criteria.

24 CHAIRMAN HAWKENS: And can you tell me why
25 -- what problem then do you see in Dr. Hausler's

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1 analysis?

2 MR. TAMBURRO: This is Peter Tamburro
3 again. He extrapolates data. He uses improper
4 statistics to look at only the lowest hypothetical
5 measurements and that's not supported by the data.

6 CHAIRMAN HAWKENS: Did you provide written
7 testimony to that effect or can AmerGen point to where
8 in their written testimony, so we can have easy access
9 to that?

10 MR. POLONSKY: Are you asking us
11 specifically about the 490?

12 CHAIRMAN HAWKENS: Yes.

13 MR. POLONSKY: We'd have to look at the
14 Exhibit C, attachment 2. I don't think we were given
15 a page reference and then look where we responded to
16 in our testimony.

17 JUDGE ABRAMSON: What we're interested in
18 is we asked Dr. Hausler and his counsel to advise us
19 where they raised this question.

20 MR. POLONSKY: Yes.

21 JUDGE ABRAMSON: And rather than go in
22 depth into it in this proceeding, unless there's some
23 specific questions we have, if you've already
24 addressed that -- those assertions by Dr. Hausler,
25 we'd like to just know where and if it takes you some

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1 time, you can tell us at noon.

2 MR. POLONSKY: We can provide that. I
3 think Mr. Tamburro in pretrial testimony certainly has
4 said that the thinnest measured point in 2006 was
5 somewhere above 600. We don't have any single point
6 below that. So that's, I think --

7 MR. TAMBURRO: The thinnest point measured
8 in 2006 was in bay 13.7 and it was measured at 602
9 mils.

10 MR. WEBSTER: I don't think that was your
11 question, was it, Judge?

12 JUDGE ABRAMSON: I'm not sure --

13 MR. POLONSKY: That's in the testimony.
14 So that's the response to 490, then that's the
15 response. We can identify that answer for you.

16 MS. BATY: Your Honors --

17 CHAIRMAN HAWKENS: It would be helpful if
18 there's anything additional that he wants to provide
19 a reference to later on in this hearing, we'd
20 entertain that. Thank you.

21 MS. BATY: Your Honors, may I interject
22 that it could be that the issue of the .490, the
23 challenging of the -- whether they meet the pressure
24 criteria might have been addressed in a motion in
25 limine as well as exceeding the scope of the

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1 contention, of the admitted contention which was
2 buckling, the buckling criteria. So that might be
3 just another -- I just wanted to interject that that
4 might be a place to look for --

5 JUDGE ABRAMSON: Unfortunately, looking at
6 motions in limine isn't going to answer a technical
7 question, if a technical question was raised earlier
8 and that's why I'm looking to see whether the record
9 has, what we're hearing from Citizens now is that
10 they've raised this question and the question for us
11 is has it been technically addressed.

12 I understand that part of the answer is
13 that there are -- that part of the reason that Dr.
14 Hausler got that number is the statistical approach he
15 took to analyzing the data and that I understand is in
16 the record. Is that correct or is it not? Is it only
17 in motions in limine because motions in limine to
18 exclude testimony don't help us understand if it's a
19 technical question that's been addressed, then we need
20 to deal with it. And if what you're saying is we've
21 already excluded that, then show us where we've
22 already excluded it or if it's one of those things
23 that we said we'll give it the weight we think it's
24 worth, which seems -- which I believe is our general
25 approach to things, since we think we can understand

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1 technical matters reasonably well.

2 MR. WEBSTER: Well, let me -- this is part
3 of the record. It was not one of the elements on the
4 few elements that was redacted from Dr. Hausler's memo
5 so it's definitely raised in the record.

6 JUDGE ABRAMSON: Okay, and so if it's been
7 addressed --

8 MR. POLONSKY: At a break or lunch we will
9 provide --

10 JUDGE ABRAMSON: Why don't you see what
11 you can find and then we'll move from there. Thank
12 you.

13 MS. BATY: Yes, because Your Honors, it
14 may be a matter of an argument that it was outside the
15 scope of the admitted contention.

16 JUDGE ABRAMSON: We understand. We
17 understand, Ms. Baty.

18 MS. BATY: That's why we would like to get
19 back to you on that. Thank you.

20 JUDGE BARATTA: I think we've found it.
21 If you look at our order of August 27th, there's a
22 reference -- I'm sorry AmerGen's motion of August
23 27th, there's a reference there, although it looks
24 like the cite might be incorrect on page 7. Citizens'
25 argument that there's likely to be a spot thinner than

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1 0.49 is impermissible. And it goes on to discuss why
2 and the .49 appears to come from his analysis of
3 extreme value, using the extreme value statistics
4 where you project out.

5 Answer 17.

6 MR. WEBSTER: To be clear, AmerGen moved
7 to strike this testimony and that motion was denied.
8 So the testimony is therefore admitted.

9 JUDGE ABRAMSON: That's the way it usually
10 works.

11 MS. BATY: Your Honor, we would like the
12 opportunity to verify that it was -- you said you'd
13 give it due weight. Because I think that might be a
14 more accurate reflection of what the Board's decision
15 was.

16 JUDGE ABRAMSON: Ms. Baty, let's let the
17 parties move on. As we said, let's at a break or by
18 lunch, let's see what there is in the record and then
19 we'll come to grips with it from there.

20 JUDGE BARATTA: For Dr. Harlow, have you
21 had a chance to look at his -- Dr. Hausler's analysis
22 that was done using extreme value statistics?

23 DR. HARLOW: The answer to that is no,
24 because although there has been repeated mentions of
25 extreme value statistics, it was never really

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1 explained what that meant statistically. So I don't
2 have any idea what they mean when they say extreme
3 value statistics.

4 MR. WEBSTER: Well, could I refer Dr.
5 Harlow to the record? Again, it's Exhibit C,
6 attachment 2, page 12 provides the graph. And that
7 tells you precisely what is meant by --

8 JUDGE ABRAMSON: And Dr. Harlow's answer
9 was crystal clear. He hasn't looked at it.

10 MR. POLONSKY: Could I follow up with a
11 question with Dr. Harlow, Mr. Abramson?

12 JUDGE ABRAMSON: You may. Judge Abramson.

13 MR. POLONSKY: I'm sorry, Judge Abramson.

14 JUDGE ABRAMSON: Or Dr. Abramson.

15 Or Your Honor, not Mister.

16 MR. POLONSKY: My apologies. Dr. Harlow,
17 is the question that you don't know what distribution
18 he used in his extreme value statistics? Is that the
19 question that you had?

20 DR. HARLOW: The question is -- there is
21 a well-documented old area of statistics called
22 extreme value statistics. It was started in 1928 by
23 Fischer and Tippit. There are three classical
24 distributions for maxima. There are three classical
25 distributions for minima. None of those had been used

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1 that I have seen in any of the written record, so when
2 you talk about doing extreme value statistics, those
3 just have not been used.

4 JUDGE BARATTA: Dr. Hausler, would you
5 care to explain how you obtained the curve that
6 appears in Exhibit C2?

7 DR. HAUSLER: From my understanding, the
8 extreme value statistics approach that has been used
9 in the oil field, for instance, in order to correlate
10 pitting are based on the double logarithmic
11 distribution. This is described in the literature.
12 We have discussed it in the exposé that we wrote for
13 the panel of Judges with respect to question about
14 statistics. We've mentioned in there. We've
15 presented a graph here that can easily be -- well,
16 it's not easily explained because the parameters are
17 although they're mathematical correlations, to put it
18 in layman's terms is not an easy thing to do.

19 JUDGE ABRAMSON: Did you provide a
20 reference where in your testimony, is there a
21 reference to the analytical techniques so that -- in
22 a way that could be understood by somebody?

23 DR. HAUSLER: I believe we did.

24 DR. HARLOW: Your Honor, I'm looking at --
25 this is Figure 4. It's called extreme value

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1 statistics for external UT measurements in bay 13.
2 This is their Exhibit 3B.

3 MR. WEBSTER: It's also -- it occurs
4 twice. It's Exhibit 38.

5 DR. HARLOW: Yes. On the screen there.
6 If you notice on the horizontal axis, there's no
7 indication of what that is. Also, on the vertical
8 axis, there's no indication of what that is. There's
9 a linear least square regression put through points,
10 but you don't know where those points came from. So
11 typically in corrosion, the two extreme valued
12 distributions that are most popular are the Gumbel
13 distribution for maxima and the Weibull distribution
14 for minima. So I'm not quite sure looking at that how
15 you could determine which of those has been used.

16 There are no double logarithmic
17 distributions. Gumbull distribution has two
18 exponentials in it. So again, I'm not sure what has
19 been done at this point.

20 JUDGE ABRAMSON: Mr. Webster, did you say
21 there was a reference to the technique or the
22 methodology somewhere in this report?

23 MR. WEBSTER: Yes, on page 7 of this
24 report, there's a description of the methodology.

25 DR. HARLOW: Well, again, there's no

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1 equation there, so it's kind of hard to tell what
2 distribution is being used. There's a lot of verbiage
3 again about extreme value statistics, but again, we
4 don't know whether we're talking about maxima or
5 minima and if so, which of those distributions are
6 being used.

7 MR. WEBSTER: Perhaps we can ask. Dr.
8 Harlow did say he did some extreme value statistics
9 himself earlier.

10 JUDGE ABRAMSON: Let's go back to Dr.
11 Baratta who -- or Judge Baratta who has been pursuing
12 this line of inquiry and see whether he's got what he
13 wanted or needs some more.

14 MS. BATY: Your Honor, could I -- do you
15 want to hear from the staff on this --

16 JUDGE ABRAMSON: Let's have Judge Baratta
17 pursue this. This is his issue.

18 JUDGE BARATTA: I'd like to hear from the
19 staff because I'm still as confused as I was when I
20 asked the question.

21 MR. SALOMON: I'm Art Salomon with the
22 staff. Your Honors, I believe either in a response to
23 your Board questions or in some previous testimony
24 regarding extreme value statistics we provided a
25 response that essentially agrees with what Dr. Harlow

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1 said, although I never heard of him or met him until
2 today, so this was developed independently.

3 The Weibull distribution was essentially
4 one of the first limiting -- it's a limiting value of
5 the minimum of a sample which was what would be used
6 in this case and I also agree with him that I saw no
7 evidence of the Weibull distribution used in it.
8 That's the typical extreme value distribution used
9 when you're talking about the minimum and I assume
10 that in this case since they're referring to
11 thickness, they would be looking at the minimum of a
12 distribution.

13 JUDGE BARATTA: I am familiar with Weibull
14 distribution and it looks -- it should give you a
15 straight line when you do plot it on the Weibull graph
16 paper. But I was confused by your double logarithmic
17 as well. Are you referring to either the
18 distributions that were mentioned like Dr. Harlow?

19 DR. HAUSLER: I believe the procedure we
20 used is based on the Weibull distribution.

21 JUDGE BARATTA: Based on it.

22 DR. HAUSLER: Yes, I believe so.

23 JUDGE BARATTA: You're shaking your head.

24 DR. HARLOW: Well, if it is based on the
25 Weibull distribution, this is not the way you present

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1 that data. Typically, a Weibull distribution on
2 Weibull graph paper, the slope is positive. And
3 again, you would label the coordinates and if it's
4 Weibull probability paper, the horizontal axis would
5 be a log scale and the vertical axis would not be a
6 linear scale. So again, on this figure 4 you've got
7 a linear vertical scale, a linear horizontal scale and
8 neither one of those would be appropriate unless there
9 has been some transformation of the data and again,
10 there's no indication of what that transformation is.

11 DR. HAUSLER: The transformation is in
12 what's called the reduced variant. And whether the
13 slope is positive or negative, simply depends on how
14 you position the vertical axis. The vertical axis and
15 the graph is pretty clear. It is, in fact, the
16 residual wall thickness. The horizontal axis is what
17 is called the reduced variant. It is a double
18 logarithmic expression for the ranking of the data
19 which in the end comes out exactly the same thing as
20 what you described as Weibull graph paper. We haven't
21 used the graph paper. We have used Excel in order to
22 perform the calculations necessary to (a) ranking the
23 data; and (b) calculating what is called the reduced
24 variant.

25 It was my understanding that these are in

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1 the statistical community pretty standard procedures.

2 JUDGE BARATTA: Any comment from the staff
3 or from AmerGen on that?

4 DR. HARLOW: Well, my only comment is
5 there's a variety of distributions that you can do
6 this kind of analysis with. You have to specify which
7 distribution you're applying when you do this kind of
8 analysis.

9 JUDGE BARATTA: It appears that he has,
10 namely used the Weibull distribution.

11 JUDGE ABRAMSON: As I recall, he says he
12 thinks it's the Weibull distribution or to his
13 recollection it's the Weibull distribution.

14 MR. WEBSTER: I think that's appropriate.
15 I mean I think if we would like Dr. Hausler to confirm
16 that, I think he can revisit his calculations perhaps.
17 I'll discuss it with him at the break whether we can
18 actually look at the calculations and double check.

19 JUDGE BARATTA: That would be helpful if
20 you could do that at the break.

21 I believe staff had -- and I apologize.
22 Would you give me your name? I have a terrible memory
23 for names.

24 MR. SALOMON: Art Salomon. Salomon is the
25 last name.

1 I just wanted to say that this notion of
2 the reduced variant at a minimum, the formula or
3 expression that was used to compute that should have
4 been presented. Reduce variant can mean any number of
5 things, depending on the particular distribution and
6 when I saw it I had no idea what he was talking about
7 and I've used the Weibull distribution for perhaps 25
8 years or so and didn't recognize it from his --

9 MR. WEBSTER: Judge, I can provide some
10 clarification. I think what's happened is that we
11 presented this information at an earlier time and then
12 there was some issue about whether it was or wasn't
13 within the scope of the contention. And then we
14 revived this work when the Board asked us about
15 extreme value statistics. So I think if we on the
16 break, we can probably go back to the earlier more
17 full explanation of this material and then move on.
18 Perhaps we might -- I admit that was an additional
19 exhibit, if it's not admitted as an exhibit already,
20 then that would provide us a basis to go forward on
21 this.

22 CHAIRMAN HAWKENS: Thank you. We're going
23 to go off the record for one moment.

24 (Off the record.)

25 CHAIRMAN HAWKENS: We are back on the

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1 record.

2 DR. HARLOW: Your Honor, if I could
3 please. This is Gary Harlow. I would just like to
4 clarify something that I may have given you the wrong
5 impression about. When I said I had not seen Dr.
6 Hausler's work, I meant the underlying computations.
7 I have read his testimony and their exhibits. I had
8 seen that, but I had not seen the underlying work that
9 he performed.

10 JUDGE BARATTA: Thank you for that
11 clarification.

12 I would like to leave this topic now and
13 go back to something we heard yesterday relative to
14 the inclusions that were apparently observed during
15 the UT measurements. I know this was discussed
16 somewhat yesterday, but again, what we're trying to
17 determine was what is the margin, hence the questions
18 about the statistics that were used in predictions and
19 such.

20 I think Dr. Hausler, you mentioned that
21 some of the UT measurements were discarded because of
22 some inclusions that were encountered.

23 DR. HAUSLER: That is what I understood,
24 yes.

25 JUDGE BARATTA: Are you at all familiar

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1 with any of the standards as to whether, I mean,
2 typically I think this is the case. We'll have to ask
3 the Staff and the Applicant to confirm this, you know,
4 inclusions are expected. Are you at all familiar with
5 any of the specs on that or anything like that?

6 DR. HAUSLER: I'm not sure I understood
7 your statement. Your conclusions are what?

8 JUDGE BARATTA: You seem rather surprised
9 that there were some inclusions in there, and I was
10 just curious as to how familiar you are with the ASTM
11 specs that are used to purchase the material. In
12 other words, did they, do you know if they allow for
13 inclusions or not?

14 DR. HAUSLER: I can't comment on that. I
15 was surprised. I think my comment was that I was
16 surprised at the frequency of inclusions, but I do not
17 know what the standard is for purchasing the material.
18 No, sir, I don't.

19 JUDGE BARATTA: Is there somebody on the
20 staff or the Applicant can maybe shed some light on
21 that?

22 MR. McALLISTER: This is Martin
23 McAllister. I'm not a metallurgist, but I have done
24 ultrasonic inspections on rolled plate for laminations
25 and typically, that spec is like a three-inch circle.

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1 A lamination is allowed a not exceed.

2 JUDGE BARATTA: Three inch diameter.

3 MR. McALLISTER: Yes.

4 JUDGE BARATTA: Do you have any idea,
5 though, on the number that are allowed or anything
6 like that?

7 MR. McALLISTER: No, I'm only aware of the
8 one criteria.

9 JUDGE ABRAMSON: Let me follow this up for
10 a second.

11 As I understand it, when a plant is being
12 designed and built there are specifications provided
13 for the materials, and the materials have to meet
14 those specifications when they are delivered. Is that
15 correct?

16 MR. POLASKI: Yes, that's correct.

17 JUDGE ABRAMSON: And do those
18 specifications include a specification on the maximum
19 number and size and distribution on inclusions to your
20 knowledge? Does anybody know that?

21 There are very specific kinds of
22 specifications for nuclear power plant components and
23 materials. Let me have somebody who can speak to
24 that.

25 MR. WEBSTER: Judge, to be clear, are we

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1 talking about in 1969 or --

2 JUDGE ABRAMSON: We can talk about the
3 time this was purchased. That's when it is relevant.
4 We should probably talk about that.

5 MR. OUAOU: Your Honor, my name is Ahmed
6 Ouaou, and typically the specifications do not call
7 for inclusions. When you specify is the material you
8 want to use.

9 In this case, the drywell is SA212. It's
10 a type of material and you would expect inclusions if
11 you do not want inclusions in the material. You
12 specifically -- then you would have to specify I
13 believe a vacuum de-gas type of a plate which is not
14 this material.

15 JUDGE BARATTA: Okay, so in other words,
16 you would expect to see some?

17 MR. OUAOU: That is correct.

18 JUDGE BARATTA: That's what I was trying
19 to get at.

20 MR. OUAOU: Yes, sir.

21 MR. DAVIS: This is Jim Davis from the
22 staff. The material was probably ordered in the '60s
23 and the standard steelmaking practice in that time you
24 would expect to see inclusions. What the
25 specifications normally would be, these are ASTM

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1 specifications. Now we use SA which are ASTM
2 specifications in Section 2 of the code and they're
3 very similar to the ASTM standards. But what you'd
4 normally specify as minimally yield strength, tensile
5 strength, elongation, a lack of cracks or laps, lack
6 of delamiantions, things of that type. But you
7 normally would not specify the number of inclusions.
8 But that would be normal in steelmaking.

9 JUDGE ABRAMSON: And if the inclusions
10 were of a character to affect the physical strength
11 that then the material would be out of spec, right?
12 You have specs that require that certain physical
13 properties of this material, right?

14 MR. DAVIS: That's right. But they would
15 be -- you would expect to have these inclusions in
16 there and you would still meet the specifications.

17 You'd have to meet the --

18 JUDGE ABRAMSON: Physical strength, its
19 ability to withstand a membrane stress, its ability to
20 withstand buckling load. Those properties, the
21 physical properties are part of the specifications and
22 if the material, if the number of inclusions caused it
23 to be nonconforming from those specs, then it wouldn't
24 be accepted. Is that correct?

25 MR. DAVIS: That's correct, it would be

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1 rejected.

2 MR. WEBSTER: Just to be clear, Judge, I
3 think Dr. Hausler's testimony is going primarily to
4 the reason why the ASME code has a safety factor of
5 two which is partly taken account of these inclusions
6 and other defects in the material.

7 CHAIRMAN HAWKENS: Thank you to Panel 3.
8 We'll now sit Panel 4.

9 Panel 4 is dealing with sources of water.

10 MR. POLONSKY: Judge Hawkens, I noticed
11 that Judge Abramson has stepped away, but there was a
12 follow-up that we had before we move off of Panel 3 to
13 specifically address a question that Judge Abramson
14 had asked. So if we could wait until he returns and
15 then we could quickly dispense with that, addressing
16 that question, we could then move to Panel 4.

17 CHAIRMAN HAWKENS: That would be fine. It
18 will be somebody, an individual on Panel 3?

19 MR. POLONSKY: Yes, Fred Polaski and
20 potentially Pete Tamburro, if there is follow up.

21 MR. WEBSTER: Judge Hawkens, may we have
22 a moment? We had said that we believe there's some
23 work from Dr. Hausler that wasn't submitted as an
24 exhibit, but was submitted during the course of the
25 proceedings. I haven't actually been able to find

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1 that work in the break.

2 Would you be interested in having that
3 submitted later or are you happy with the state of the
4 record as it is.

5 CHAIRMAN HAWKENS: You say you have not
6 found it in the record yet?

7 MR. WEBSTER: It is definitely --

8 CHAIRMAN HAWKENS: You believe it's in the
9 administrative record, but you haven't located it yet?

10 MR. WEBSTER: I believe it's not in the
11 record as an admitted exhibit.

12 CHAIRMAN HAWKENS: I understand.

13 MR. WEBSTER: But it is probably part of
14 the administrative proceedings.

15 CHAIRMAN HAWKENS: When you locate it,
16 just bring it to the Board's attention, please, some
17 time during today's proceeding.

18 MR. POLONSKY: Judge Abramson, we have one
19 further thing to follow up with you, if we could,
20 regarding Panel 3 before we move to Panel 4.

21 You had asked specifically whether there
22 was any information about the thickness of the drywell
23 shell near the bottom of the sand bed region because
24 you were investigating what the margin, available
25 margin would be at that location?

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1 JUDGE ABRAMSON: Yes, if you have
2 information that would be helpful.

3 MR. POLONSKY: Yes, Mr. Fred Polaski -- I
4 would just want him to address that before he ends his
5 participation in Panel 3.

6 MR. POLASKI: This is Fred Polaski, Your
7 Honor. We looked at the availability of thickness
8 measurement data in the lower elevations of the sand
9 bed region near the floor and if you remember we had
10 shown in Exhibit 28 a map of all of the UT thickness
11 data taken. This is the one with the green rectangles
12 and yellow spots. And there was very few data points
13 in the lower elevations.

14 However, there are two areas where there
15 is UT information down at those lower elevations.
16 This is the trench data taken from the inside. And in
17 bay 17 which is the trench data that was more -- in
18 the area that was more severely corroded compared to
19 bay 5, we took a look at the lowest 6 inches of data,
20 the 6 by 6 grid at the bottom of that trench. And we
21 were able, in the calculations that have been
22 performed, and they're AmerGen's Exhibit 19 which is
23 eval 09, that the average thickness of the 6 by 6 grid
24 at the bottom of that trend was 965 mils average
25 thickness, which comparing to the general buckling

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1 criteria 736 gives you 229 mils of margin at that
2 elevation.

3 We'll note that the bottom of that trench
4 is at elevation 9 feet 3 inches. The floor is 8 feet
5 11. So it's close to the bottom. It's not exactly at
6 the floor level. But those are the lowest readings
7 we've got elevation-wise. They're representative of
8 the corrosion in the most severely corroded bays.

9 JUDGE ABRAMSON: When we talk about
10 measurements that are in those trenches, that then is
11 a region where the drywell shell is supported on one
12 side by concrete except for the trench. Is that
13 correct?

14 MR. POLASKI: Yes, that correct. It's
15 filled with -- actually during the construction, the
16 steel was welded in place and then the floor was
17 poured on the inside.

18 JUDGE ABRAMSON: So from a structural
19 point of view, let me ask Dr. Mehta, where the drywell
20 shell is supported on one side by concrete, what is
21 the effect of that concrete on the propensity to
22 buckle in that location, i.e., is this a relevant
23 failure location?

24 DR. MEHTA: Your Honor, we have bonding
25 conditions of the floor and as you can see in the

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1 buckling evaluation, the way it forms where the fixed
2 bonding condition, that's one point in that --

3 JUDGE ABRAMSON: So we have a floor on one
4 side of the shell in this region, but am I correct
5 that one side is not -- that the concrete level on one
6 side of the shell is lower than the concrete level on
7 the other side. Is that correct?

8 Both of you stay up there, because we've
9 got to see if we can --

10 MR. POLASKI: You are correct, Judge
11 Abramson. The drywell has concrete on the inside up
12 to elevation 10.3 inches which is the floor level on
13 the inside.

14 JUDGE ABRAMSON: Okay.

15 MR. POLASKI: On the outside, the concrete
16 only comes up to elevation 11 feet -- 8 feet 11
17 inches.

18 JUDGE ABRAMSON: And the trench was below,
19 it was down below, into that area, right?

20 MR. POLASKI: It goes close to the bottom,
21 the bottom of the trench in bay 17 is elevation 9 feet
22 3 inches. So it's a couple inches above the floor in
23 the external surface.

24 JUDGE ABRAMSON: So now Dr. Mehta, when
25 you did the calculation, where was the fixed boundary

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1 condition? Was it at the top of the inside concrete
2 or was it at the top of the outside concrete?

3 DR. MEHTA: Your Honor, I think it was 8
4 feet 3 inch which is at the lower level.

5 JUDGE ABRAMSON: Okay. Thank you. Okay,
6 so now come back to that. Sorry, come back to that.
7 So the fixed boundary condition is that the bottom
8 where both sides are embedded, right? The inside has
9 cement, and we've got some measurements on the inside
10 below the top of the inside cement, but above the
11 fixed boundary condition. Is that an area where
12 buckling failure is where the shell is likely or less
13 likely, more or less likely to fail in bucking than
14 say a midplane area where it's not supported?

15 DR. MEHTA: Your Honor, when we looked at
16 the lowest buckling mode which is the lowest single
17 wave, that is -- that forms at the top of the sand bed
18 and then one complete wave coming back to the bottom.
19 So essentially --

20 JUDGE ABRAMSON: So the maximum amplitude
21 is several feet off that floor, is that right?

22 DR. MEHTA: Several inches. Because the
23 height is about 40 inches, so 40 inches or so forms
24 one wave.

25 JUDGE ABRAMSON: A full wave. So a half

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1 wave is 20 inches and to the peak amp is like 10
2 inches off the floor. And these measurements were
3 where, how high off the floor?

4 MR. POLASKI: These measurements were from
5 four inches off the floor to ten inches off the floor.

6 JUDGE ABRAMSON: Okay, so it's in an area
7 where there is a peak.

8 So it is relevant from a buckling point of
9 view and the numbers are -- this is -- how many
10 measurements to get this number?

11 MR. POLASKI: Well, this was a six by six
12 inch grid, so there's --

13 JUDGE ABRAMSON: So there's 49
14 measurements.

15 MR. POLASKI: With an average of 965.

16 JUDGE ABRAMSON: Thank you very much.
17 That's very helpful.

18 MR. WEBSTER: To be clear, Judge, the bays
19 where the external measurements show the lower 95
20 percentile confidence limit at or below the general
21 buckling criteria is not at bay 17.

22 CHAIRMAN HAWKENS: Will counsel please
23 introduce the expert witnesses on topic four, sources
24 of water?

25 MR. POLONSKY: Yes, Your Honor, this is

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1 Mr. Polonsky for AmerGen. For Panel 4, seated to my
2 right is Mr. John O'Rourke. Seated to his right is
3 Francis H. or Howie Ray. Seated to his right is Jon
4 C. or Chris Hawkins. Seated to his right is Scott
5 Erickson. And behind them is Mr. Ahmed Ouaou.

6 CHAIRMAN HAWKENS: Thank you.

7 MS. BATY: For the NRC staff we have Mr.
8 Hansraj Ashar, Dr. James Davis, and Timothy O'Hara.

9 CHAIRMAN HAWKENS: Thank you.

10 MR. WEBSTER: And for Citizens, we have
11 Dr. Hausler, who will be wearing disguises so it makes
12 it look like we have more witnesses.

13 CHAIRMAN HAWKENS: Thank you, Mr. Webster.

14 Once again the witnesses are reminded they
15 were sworn yesterday and remain under oath or
16 affirmation for the testimony they are about to
17 provide.

18 (Pause.)

19 I'd like to hear from Dr. Hausler in what,
20 in his view, the most likely source of water would be
21 and the duration of it.

22 DR. HAUSLER: Well --

23 CHAIRMAN HAWKENS: And we have all of your
24 -- the testimony you've previously provided, so if you
25 could summarize it, that would be great.

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1 DR. HAUSLER: Well, I don't think, Judge,
2 that they can go very much beyond as to what has been
3 already stipulated by AmerGen as to where the water
4 comes from.

5 I have nothing further to add than that
6 the water comes from the refueling bay.

7 MR. WEBSTER: The other element in the
8 prefile is condensation. Perhaps I could ask for
9 comment.

10 DR. HAUSLER: There are two things. When
11 we talk about condensation, there may be condensation
12 on the inside of the drywell shell. I am not sure
13 that we can really speculate a great deal about
14 condensation on the outside.

15 In other words, I don't think that
16 condensation on the outside is really a source of
17 water that we might have to worry about.

18 CHAIRMAN HAWKENS: So condensation on the
19 outside is not a real problem?

20 DR. HAUSLER: I don't think so.

21 CHAIRMAN HAWKENS: For a source of
22 corrosion in your judgment.

23 DR. HAUSLER: That's correct.

24 CHAIRMAN HAWKENS: Thank you.

25 JUDGE ABRAMSON: Let me ask AmerGen folks

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1 and this not so much source of water as to what water
2 was there for how long in the old days when you had
3 corrosion. AS we understand it, the sand bed was
4 holding water that got there during refueling. Is
5 that correct?

6 MR. O'ROURKE: Yes, it is. This is John
7 O'Rourke.

8 JUDGE ABRAMSON: Thank you, Mr. O'Rourke.

9 And in your estimate, was that water there
10 continuously once it got there and not just
11 evaporating and as a source of corrosion, do we have
12 any evidence once way or the other?

13 MR. O'ROURKE: We don't have specific
14 evidence, but our best guess is that the sand held the
15 water against the shell and that whatever evaporated
16 the next time there was a refueling outage would have
17 been replenished until the issue was resolved.

18 JUDGE ABRAMSON: So your best engineering
19 judgment is that there was a kind of -- more or less
20 continuous source of corrosion from the beginning of
21 the leak until it was -- until the situation was
22 corrected?

23 MR. O'ROURKE: Until the sand was removed
24 in 1992.

25 JUDGE ABRAMSON: 1992, okay. And during

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1 a normal -- during normal operation of the plant
2 today, since the sand bed has been removed, how long
3 does a refueling outage take on average?

4 MR. O'ROURKE: On average, refueling
5 outages at Oyster Creek, the last two have averaged 26
6 days.

7 JUDGE ABRAMSON: And they occur every
8 other year?

9 MR. O'ROURKE: Every other year, that's
10 correct.

11 JUDGE ABRAMSON: And are there any other
12 ordinary operational conditions during which there
13 would be water in the refueling bay?

14 MR. O'ROURKE: None that we're aware of.

15 JUDGE ABRAMSON: So the maximum time there
16 could be any source of water, whether or not it gets
17 down to this liner would be 30 days every two years?

18 MR. O'ROURKE: It would be less than 26
19 days because the cavity is not filled during the
20 entire time that the plant is off-line.

21 JUDGE ABRAMSON: Okay, thank you.

22 JUDGE BARATTA: There was discussion about
23 forced outages where if you had to go in and replace -
24 - maybe it wasn't manufactured correctly or something
25 like that. That has occurred in the industry, has it

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1 not?

2 MR. O'ROURKE: Yes, it has.

3 JUDGE BARATTA: It is a rare event though,
4 as well?

5 MR. O'ROURKE: Absolutely rare event.

6 JUDGE BARATTA: Can you give us a
7 guesstimate on over the life of the plant how many
8 times that might occur, based on industry experience?

9 MR. O'ROURKE: I reviewed the outages at
10 Oyster Creek since 1990 and the reasons for them.
11 None of those reasons required the reactor cavity to
12 be filled. And none of them involved removal of
13 damaged fuel bundles or any reason why we would have
14 to go into the reactor.

15 I can't speak to the periods prior to
16 1990. I had no data on that. I was at Limerick for
17 a number of years and I recollect one time where we
18 took the reactor down to replace a damaged fuel
19 bundle.

20 JUDGE BARATTA: So maybe, would it be your
21 --

22 MR. O'ROURKE: Once or twice over the
23 lifetime of a plant would be my best guess.

24 JUDGE BARATTA: And the time that would be
25 required to do that -- that would be 30 days, 25 days,

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1 10 days or --

2 MR. O'ROURKE: If the plant were being
3 removed for the sole purpose of removing a failed fuel
4 bundle, and the plant does testing, prior to removing
5 the plant from operation to try to pinpoint the
6 location of the failed fuel bundle, it would be on the
7 order of five to six days.

8 You would come off and remove the bundle
9 and replace it with a fresh bundle and come back up
10 again.

11 JUDGE BARATTA: So in other words, at
12 most, let's -- if we had a failed fuel bundle, we
13 might have had maybe five or six days to the --

14 MR. O'ROURKE: At most and keeping in mind
15 that the cavity is not again, is not filled. You have
16 to take shield blocks off and get down to the cavity
17 before you can put the strippable coating on and then
18 fill it.

19 JUDGE BARATTA: Really, it's almost an
20 insignificant amount of time, then.

21 MR. O'ROURKE: I would say so.

22 JUDGE BARATTA: An insignificant amount of
23 time in an extremely unlikely event.

24 MR. O'ROURKE: That's correct.

25 JUDGE BARATTA: Okay, and spread -- and if

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1 you look at the statistics, spread over the life of
2 the plant, not every year.

3 MR. O'ROURKE: That's correct.

4 MS. BATY: Yes, Your Honor, if you mind,
5 would the Board like to ask AmerGen how long on
6 average the reactor refueling cavity is filled with
7 water? They said 26 days outage, but how many days
8 it's actually filled with water.

9 JUDGE ABRAMSON: So asked.

10 MR. O'ROURKE: Thank you for that
11 question. We have Mr. Howie Ray will -- has the data
12 from the most recent refueling outage.

13 MR. RAY: Yes, this is Howie Ray and the
14 cavity was filled October 18, 2006 and it was emptied
15 November 3, 2006. So it was less than 30 days.

16 JUDGE BARATTA: You mentioned in one of
17 the testimony that you do observe a light, I think it
18 was referred to something like a light skin film of
19 rust on the inside of the drywell. Am I correct in my
20 recollection?

21 MR. POLONSKY: I am just going to consult
22 with my witness to see if this is the correct panel to
23 answer that.

24 JUDGE BARATTA: Okay. Well, I was trying
25 to get to the source of the water for that light film.

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1 MR. POLONSKY: Judge Baratta, if you'd
2 like to understand whether there is water and what the
3 source of water on the inside is?

4 JUDGE BARATTA: Yes.

5 MR. POLONSKY: We can clearly address
6 that.

7 JUDGE BARATTA: That's what I was trying
8 to get at, that there was a statement that someone
9 made that there's a light film of rust that were
10 adequately formed. So what's the source of water for
11 that that might cause that?

12 MR. O'ROURKE: The source of water was
13 leakage inside the drywell during operation from any
14 number of sources that drips on to the floor. And
15 this light film of rust was in one of the trenches.
16 When the filler material was removed from the
17 trenches, they observed a light film of rust that was
18 brushed off very easily.

19 CHAIRMAN HAWKENS: When you say any
20 sources of water are we talking about reactor coolant,
21 nonreactor coolant and what volume?

22 MR. O'ROURKE: I don't have an estimate of
23 the volume. It could be either reactor coolant from
24 leakage or it could be other water inside. I don't
25 have numbers on those.

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1 MR. RAY: This is Howie Ray, if I may add
2 to that, in 2006 outage we did go in and investigate
3 some of this water source. We did find a defect in
4 the trough that runs underneath the subpile room.
5 Some of the water was getting down into the concrete
6 and we did repair that and validated that it
7 significantly reduced any source of water into the
8 concrete.

9 JUDGE BARATTA: Where was this trough? Do
10 you have that model or would that be helpful to look
11 at that?

12 MR. O'ROURKE: I am referring to the
13 troughs that were cut into the concrete.

14 JUDGE BARATTA: Oh, okay.

15 MR. POLONSKY: Do you mean trough or the
16 trenches, the two trenches?

17 MR. O'ROURKE: The bay 5 and bay 17
18 trenches that --

19 JUDGE BARATTA: You had a filler material
20 that was to project those to keep any water from
21 getting into there, is that what that water was?

22 MR. O'ROURKE: Yes. And there was some
23 water that was found when the filler material was
24 removed in -- it was bay 5.

25 And there was an observation of wetness in

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1 bay 17, but no standing water.

2 JUDGE BARATTA: And what you've done now
3 is try to seal that water so that when any
4 condensation or whatever, whatever the source of that
5 water was --

6 MR. O'ROURKE: That's correct. In the
7 2006 outage, not only was the concrete around the
8 periphery to the shell seal, but also the concrete to
9 the trenches was sealed. It was totally sealed to
10 prevent any water from getting into those trenches.

11 JUDGE BARATTA: Did you put like a caulk
12 between the concrete and the steel like you have on
13 the outside, is that what you did as well?

14 MR. O'ROURKE: I can't say that it was the
15 exact -- it was caulk, yews.

16 JUDGE BARATTA: Similar.

17 MR. O'ROURKE: Similar. I can't say it was
18 the exact material that was used on the outside, since
19 that material was placed in 1992.

20 JUDGE BARATTA: And the amount of leakage
21 that you see as you account for make up and such into
22 the primary system or into the feed system as such,
23 it's not something that's significant from operational
24 standpoint?

25 MR. O'ROURKE: That's correct. The plant

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1 tech specs allow for certain unidentified and
2 identified leakage. There are some leaks that are
3 designed from the recirculation pumps, for instance,
4 are design leakage. Unidentified leakage is limited
5 to an amount that once we exceed that amount we would
6 have to go in and find where that was coming from.

7 MR. POLONSKY: Your Honor, for the record,
8 Panel 6 will be testifying and they will be assuming
9 that the interior shell that is embedded in concrete
10 on the inside is saturated, that there's water
11 continually present there as a normal condition. Just
12 if that helps to put this in perspective.

13 JUDGE BARATTA: I was more interested in
14 that film that was -- in what the origins might be of
15 that, just to confirm.

16 CHAIRMAN HAWKENS: Is it AmerGen's view
17 that its commitment regarding the application of
18 strippable coating and tape to the reactor cavity
19 applies not only to refueling outages, but to forced
20 outages also?

21 MR. O'ROURKE: Yes, it is.

22 CHAIRMAN HAWKENS: Does the NRC staff
23 share that understanding of the commitment?

24 MS. BATY: Could you repeat the question
25 and I think then we can get someone to address it.

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1 CHAIRMAN HAWKENS: AmerGen said that it
2 understood and would apply its commitment to apply the
3 strippable coating and tape to the reactor cavity both
4 to refueling outages as well as forced outages.

5 MR. O'ROURKE: And to clarify, Judge,
6 that's forced outages where we would need to flood the
7 cavity in order to get into the vessel?

8 CHAIRMAN HAWKENS: Yes, correct.

9 MR. ASHAR: Hansraj Ashar. Yes, I have
10 seen the commitment as part of our appendix A and SER.

11 CHAIRMAN HAWKENS: Thank you.

12 MS. BATY: Your Honors, would you -- there
13 are additional commitments. Would you like to hear
14 from the staff about additional commitments related to
15 water and sources of water?

16 JUDGE BARATTA: I have no questions.
17 We're familiar with them. Thank you. We need not
18 hear further on that.

19 MS. BATY: It is a license condition -- a
20 proposed license condition in Appendix A.
21 And discussed in our testimony. Not Appendix A,
22 excuse me. 1.7.

23 CHAIRMAN HAWKENS: Thank you. Citizens,
24 you've heard the questions we've posed to the NRC
25 staff and to AmerGen regarding sources of water. Do

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1 you have anything to add or to rebut regarding what
2 they've said, regarding our questions?

3 DR. HAUSLER: Not with respect to what
4 they have said, but there are some -- it appears to us
5 there are some open questions. And particularly with
6 respect to the frequency of the water, whether it's
7 always there on the outside of the drywell. For one,
8 we're wondering about on-going corrosion that has been
9 apparently documented yesterday. You do need water
10 for that. So where does the water come from.

11 CHAIRMAN HAWKENS: May I ask you a
12 question? Do you have any evidence that a source
13 other than the reactor cavity when it's filled would
14 be the source of water on the external shell?

15 DR. HAUSLER: No, I don't have the
16 evidence. I have the question where it comes from.

17 CHAIRMAN HAWKENS: Do you have the answer
18 where it comes from?

19 DR. HAUSLER: No, no --

20 CHAIRMAN HAWKENS: You say you just wonder
21 where it comes from?

22 DR. HAUSLER: I just wonder where it comes
23 from.

24 JUDGE ABRAMSON: Did I understand you
25 correctly, Dr. Hausler, that you believe we heard

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1 yesterday that there is on-going corrosion on the
2 outside and you --

3 MR. WEBSTER: Can i just clarify this? I
4 think, Dr. Hausler, that the testimony was there's
5 ongoing corrosion, the upper drywell on the outside.

6 JUDGE ABRAMSON: The upper drywell, not in
7 the --

8 MR. WEBSTER: And Dr. Hausler's point is
9 that the upper drywell is hotter than the bottom and
10 if there's ongoing corrosion, there must be water
11 there.

12 JUDGE ABRAMSON: Let's ask the Applicant,
13 what's the source of the water? Is there on-going
14 corrosion in the upper drywell and if so, what's the
15 source of the water? That's a straightforward
16 question.

17 MR. POLONSKY: Judge Abramson, I think we
18 had detailed questions and answers on this primarily
19 with Judge Baratta yesterday, and we went through the
20 extremely low hypothetical and only statistically
21 based corrosion rate. I think it was .66 mils in the
22 one point in the upper region.

23 We don't believe that that was real --
24 that there's actually corrosion ongoing. The
25 testimony walked through what the actual measurements

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1 are from those -- that, I think it was location --

2 JUDGE ABRAMSON: Let's rather than have
3 the lawyer -- let's put on the individual who did this
4 analysis and let's refresh everybody's memory on it
5 and be done with it. Let's get the information right
6 back. I don't think it's going to take all that long.

7 MR. GALLAGHER: Yes, this is Mike
8 Gallagher. AmerGen.

9 JUDGE ABRAMSON: Mr. Gallagher, what I
10 think your counsel is trying to tell us is that we
11 discussed yesterday what sort of analysis one could do
12 with the measurements and from those measurements
13 because of the uncertainty, the worst case within the
14 bounds of the uncertainty would lead one to project
15 6.6 mils. Can you tell me, have we got this right?

16 MR. WEBSTER: Judge, I think the analysis
17 you're referring to is the analysis of the external
18 measurements in the sand bed. That wasn't the
19 analysis of the -- these are grid measurements in the
20 upper drywell.

21 JUDGE ABRAMSON: Let's talk about it.

22 MR. GALLAGHER: I believe we did discuss
23 this yesterday, but this was a question that Dr.
24 Baratta had about the upper drywell. Okay, which is
25 outside the scope of what we're talking about.

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1 JUDGE ABRAMSON: Right.

2 MR. GALLAGHER: What we have there, we
3 have a grid system we measure. There's 13 grids we
4 measure. And we do -- if you look at the data, and
5 see the exhibit, Exhibit 3, what page, John?

6 JUDGE ABRAMSON: We went through this
7 yesterday.

8 MR. GALLAGHER: I'll just summarize. All
9 the data is flat lined. It's the same situation.
10 There's a grid system. We take the average, the mean.
11 It's all flatlined, meaning there's no on-going
12 corrosion.

13 In one area, we -- and we have data since
14 the late 1980s, and in one area we conservatively
15 called a corrosion rate, based on statistics, okay?
16 And that was .66 mils per year. It's basically flat
17 lined.

18 JUDGE ABRAMSON: But that estimate of
19 corrosion was based purely on statistics, not on
20 observation of any actual corrosion?

21 MR. GALLAGHER: That's correct. And it's
22 uncoded, the upper drywell is uncoded and the other
23 thing I said yesterday is the original water source,
24 which we're monitoring for, was from the reactor
25 activity, would come from the reactor cavity, a leak

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1 behind the plate and then go into the gap. So it
2 passes through the upper drywell area.

3 So what I said yesterday, it was the
4 source would have been the same source, but there is
5 no onrgoing source since we control that leakage now.
6 It goes in the trough and goes down the drain into the
7 rad waste system.

8 MR. WEBSTER: Judge, could I just --

9 MR. GALLAGHER: That's what I said
10 yesterday.

11 JUDGE ABRAMSON: Quiet, please.

12 MR. WEBSTER: Okay, fine.

13 MR. GALLAGHER: That's what I had said
14 yesterday and that's --

15 JUDGE BARATTA: And that's what you said.

16 MR. GALLAGHER: Yes, that's correct.

17 JUDGE BARATTA: I pulled up the transcript
18 and that's exactly what you have. For future
19 reference, it's on page 108.

20 JUDGE ABRAMSON: Mr. Webster, is there
21 something you want to add?

22 MR. WEBSTER: Well, a couple of things.
23 One is I think it would be useful to know the level of
24 statistical significance with which this corrosion has
25 been observed. The second thing is the reason there's

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1 no visual measurement, no visual observations of
2 corrosion at this point I think is because there's an
3 insulating material and there's a three-inch gap. And
4 so these measurements are taken on the inside of the
5 upper drywell. It's not possible to do visual as far
6 as I understand.

7 JUDGE ABRAMSON: Thank you. We understand
8 where you're coming from. I don't have any further
9 questions. Do you, Dr. Baratta?

10 JUDGE BARATTA: Nothing more.

11 CHAIRMAN HAWKENS: We will take a 10-
12 minute break and hear from the next panel.

13 (Off the record.)

14 CHAIRMAN HAWKENS: You are missing a
15 critical partner, Mr. Webster, we will wait for him to
16 return.

17 MR. WEBSTER: I am and actually I was just
18 going to say that he does have one thing to add to the
19 last panel, if he could, which is not in his file
20 testimony.

21 CHAIRMAN HAWKENS: We will hear from him
22 first.

23 MR. WEBSTER: Thank you very much.

24 CHAIRMAN HAWKENS: Let's go back on the
25 record. While we are awaiting Dr. Hausler, let's have

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1 the counsel, please, introduce the witnesses for Panel
2 5, which deals with the epoxy coating.

3 MR. POLONSKY: This is Mr. Polonsky for
4 AmerGen. Panel 5 consists of Jon Cavallo, sitting to
5 my right. To his right is Mr. Ahmed Ouaou. To his
6 right is Jon C. or Chris Hawkins. To his right is
7 Scott Erickson. And behind that panel in the second
8 row is Mr. Martin McAllister.

9 CHAIRMAN HAWKENS: Thank you.

10 MS. BATY: For the staff we have Mr.
11 Hansraj Ashar, Dr. Davis and Mr. Tim O'Hara.

12 CHAIRMAN HAWKENS: Thank you.

13 MR. WEBSTER: And for Citizens yet to be
14 disguised is Dr. Hartzman.

15 CHAIRMAN HAWKENS: Thank you. The
16 witnesses once again are reminded they are sworn and
17 they remain under oath or affirmation for the
18 testimony they are about to present. Before asking
19 questions on the -- regarding the topic of the epoxy
20 coating, Dr. Hausler would like to say something
21 regarding the prior topic, sources of water.

22 MR. HAUSLER: Well, there has been, you
23 know, comments and I believe it was in a document that
24 had been generated by Mr. Tamburro about the plugging
25 of the drains. In the latest outage, the drains from

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1 the drywell area have been plugged, at least three of
2 them. My question was how did they get plugged? You
3 know, we do know that due to vibration the concrete,
4 you know, in that area has a tendency to degrade, you
5 know, chunks of concrete have been found in that area
6 before.

7 Now, my question, of course, is how does
8 that get into the drains?

9 MR. POLONSKY: Now, for the record, just
10 could we get an exhibit number, so we can accurately
11 respond?

12 MR. WEBSTER: We are having trouble
13 finding the exhibit number. Maybe Mr. Tamburro can
14 confirm with Dr. Hausler's recollection is correct?

15 MR. POLONSKY: Perhaps we could come back
16 to this after this panel is over, so after Mr.
17 Tamburro has an opportunity to review the exhibit that
18 you are alleging he wrote.

19 CHAIRMAN HAWKENS: That would be fine.
20 Let's do that and that question will remain on the
21 table. We will not only address it, but find out the
22 corrective actions that have been done and the
23 commitments that are in the record to prevent its
24 recurrence. Let's now proceed to Topic 5, the Epoxy
25 Coating, with a question for AmerGen.

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1 Is there a possibility that some portion
2 of the exterior area in the drywell region has not
3 been coated with the epoxy?

4 MR. HAWKINS: This is Jon Hawkins. The
5 sand bed region, the elevation goes from 8 foot 11 to
6 12 foot 3 inches, which is a total of 3 feet 4 inches.
7 That entire area is completely coated. There are
8 areas above that where the gap gets smaller to the 3
9 inches where they could not reach or could not access.

10 CHAIRMAN HAWKENS: Thank you. No, my
11 concern was the sand bed region. Thank you.

12 MR. HAWKINS: That's completely coated.

13 CHAIRMAN HAWKENS: Thank you.

14 JUDGE ABRAMSON: All the way down to the
15 floor?

16 MR. HAWKINS: That's correct.

17 MR. HAUSLER: Could we perhaps revert to
18 Citizen's Exhibit 63, which is a diagram of that
19 particular region? And we have a question with
20 respect to how far the coating actually goes.

21 MR. WEBSTER: Actually, it's an
22 administrative matter that is now referred to damage
23 in Exhibit 7. It's the same figure.

24 CHAIRMAN HAWKENS: Yes, we'll consider
25 that. Again, what exhibit is it?

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1 MR. WEBSTER: It's AmerGen Exhibit 7.

2 JUDGE ABRAMSON: Is there something about
3 what we just heard from AmerGen that you dispute or
4 that's unclear?

5 CHAIRMAN HAWKENS: What I think we heard
6 was that the entire sand bed region from the floor up
7 to a certain elevation was coated period.

8 MR. HAUSLER: Yes, and there is a gap
9 between the vent pipe and the concrete. There is a
10 gap there and we're wondering that is subject to, of
11 course, accumulation of water that was also subject to
12 accumulation of sand there, you know, when the sand
13 bed was poured and we don't know whether, in fact, the
14 sand has been removed from there or whether in fact
15 that area, the rust has been removed from that area
16 and whether, in fact, it was coated.

17 That area would be severely subject to
18 corrosion if, in fact, you know water comes down the
19 outside of the drywell.

20 JUDGE ABRAMSON: So let's ask AmerGen. A)
21 is there sand remaining in that gap region?

22 JUDGE BARATTA: Could we get that up, if
23 you don't mind, before we ask that?

24 MR. WEBSTER: Yes, it would be helpful.

25 JUDGE BARATTA: Because I'm not sure what

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1 region you are talking about.

2 MR. WEBSTER: It's AmerGen Exhibit 7.

3 JUDGE BARATTA: I have it here, but I
4 don't know exactly where you're talking about on
5 the --

6 MR. POLONSKY: Your Honor, if we could
7 also just renew our objection on this. We don't know
8 what this has to do with UT frequency., even if we
9 took UT frequency at the points that currently are
10 designated every single second, it would not relate to
11 an area that is on the side.

12 JUDGE BARATTA: I can tell you're not an
13 engineer then. If you would, continue, please.
14 Sorry.

15 MR. POLONSKY: I agree. I am not.

16 JUDGE BARATTA: Could you --

17 MR. POLONSKY: The area I'm talking about
18 is that gap just immediately to the right of No. 6.
19 That is between the concrete and the vent pipe, that's
20 the area, that's exactly right.

21 MR. HAUSLER: Is that the area, the
22 drywell?

23 UNIDENTIFIED SPEAKER: The drywell shell
24 is this piece, right?

25 ALL: No.

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1 UNIDENTIFIED SPEAKER: No? Where is the
2 drywell shell?

3 MR. OUAOU: The dark black line, Your
4 Honor, that's correct, yes.

5 JUDGE BARATTA: And what is this?

6 MR. OUAOU: That's -- this is on the --

7 MR. POLONSKY: On this figure, the drywell
8 shell is the dark line running diagonally up from the
9 6.

10 MR. OUAOU: Your Honor, that's the drywell
11 shell and as Mr. Hawkins stated that we consider the
12 sand bed region from this level, that's 8 foot 11 to
13 12 foot 3, that's the elevation here. That's all
14 coated. This gets into the gap and it is accessible
15 for coating. This is a gap between the vent pipe and
16 the concrete and the vent pipe is not part of the dry
17 well shell itself. Ordinarily, there is no sand in
18 this gap. This is all clear.

19 JUDGE ABRAMSON: And it is not structural
20 for the -- from the perspective of adding to the
21 ability of the drywell shell to withstand buckling.
22 Is that correct? It's just a vent pipe.

23 MR. OUAOU: The vent pipe was modeled as
24 part of the model that GE did, but it's -- my belief
25 is it's not all they credit it.

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1 MR. WEBSTER: Well, I would like Dr.
2 Mehta. I had thought that the structure to the vent
3 pipe was created for buckling.

4 JUDGE ABRAMSON: Dr. Mehta, once again,
5 when you modeled the drywell shell for buckling, how
6 did you treat the vent pipes?

7 DR. MEHTA: In the vent pipes nominal
8 thicknesses were used to include in this model.

9 JUDGE ABRAMSON: Okay. And how do they --
10 how are they susceptible to the buckling loads you
11 were looking at? Are they relevant to considering
12 buckling of the drywell shell or does it take much
13 greater loads to cause the vent pipes themselves to
14 buckle? What's the relative relationship?

15 DR. MEHTA: Your Honor, they are somewhat
16 relevant, but given that the buckled wave is in the
17 middle between the two bays, it will have some
18 insignificant effect or a very small effect if there
19 is any.

20 JUDGE ABRAMSON: An effect on the buckling
21 of the drywell shell itself, but are the pipes
22 themselves susceptible to buckling prior to buckling
23 of the drywell shell? Which is going to fail first?

24 DR. MEHTA: Your Honor, the vent pipes are
25 very thick, so they are not susceptible to buckling.

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1 JUDGE ABRAMSON: Thank you.

2 MR. POLONSKY: Your Honor, if we can put
3 on the record an objection that the contention is
4 about the drywell shell and UT of the drywell shell
5 and we believe Citizens are trying to expand this to
6 an area outside of the drywell shell.

7 CHAIRMAN HAWKENS: Thank you. We
8 understand the contention is limited to the drywell
9 shell. NRC staff?

10 MS. BATY: We just wanted to join in with
11 AmerGen's objection.

12 MR. WEBSTER: May I respond to that
13 objection, which is the reason this area is relevant
14 is twofold. One is that those vent pipes are in
15 regard to structural in the model for buckling the
16 drywell shell. There is a boundary condition put on
17 which does -- is -- assumes that those vent pipes have
18 normal thickness.

19 Second, AmerGen has claimed air flow
20 through this gap contributing to evaporation. So it's
21 relevant when this gap is full of corrosion products
22 or not.

23 JUDGE ABRAMSON: Okay. So let's come back
24 to I think we heard from AmerGen that there is no sand
25 in this gap. Is that correct?

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1 MR. OUAOU: Yes, Your Honor.

2 JUDGE ABRAMSON: And that the drywell
3 shell is coated up to this gap, but can you show us
4 with a pointer where it is not coated?

5 MR. HAWKINS: It's coated from the floor
6 up the drywell shell, the bottom of the vent header,
7 approximately, up to here on both sides of the vent
8 header coming up each side. So it goes up much higher
9 than the 12.3.

10 JUDGE BARATTA: Here is a photograph in
11 Exhibit 40. It's on page 91. I don't know whether it
12 shows any of this region, but if you could just grant
13 me, because on that photograph, I would appreciate it,
14 because it looks like we are actually looking -- it's
15 labeled Bay 13, Drywell Shell. And it is --

16 MR. POLONSKY: That's page 91, Your Honor?

17 JUDGE BARATTA: Yes, yes. I think it
18 looks like there is something in the background there.
19 I was wondering whether that was a vent header or not.

20 MR. HAWKINS: Yeah, the vent header is out
21 of the picture, but the support ring that surrounds
22 the vent header, it's an 18 inch -- from the vent
23 header itself to the bottom of the support ring is 18
24 inches.

25 JUDGE BARATTA: Um-hum.

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1 MR. HAWKINS: That is like I said above
2 the --

3 JUDGE BARATTA: Is that what is visible in
4 the background there, that?

5 MR. HAWKINS: This is a weld that welds
6 the support ring to the vent header and the vent
7 header to the drywell shell.

8 JUDGE BARATTA: So you can see that that's
9 coated there.

10 MR. HAWKINS: Yes, all the way up here.

11 JUDGE BARATTA: And there is also no
12 evidence of any corrosion. In fact, that looks like
13 it is in good condition. Is that correct?

14 MR. HAWKINS: It appeared to me to be a
15 red painted surface, not a corroded rusty surface.

16 JUDGE BARATTA: Right. There's no -- like
17 the area that's below that where the external UT
18 inspection location is.

19 MR. HAWKINS: In this picture here?

20 JUDGE BARATTA: No, further down. It's
21 clearly corroded.

22 MR. HAWKINS: Yes.

23 JUDGE BARATTA: And that looks almost like
24 it's an as-built condition above that.

25 MR. HAWKINS: Correct.

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1 JUDGE BARATTA: Is that correct?

2 MR. HAWKINS: Yes, that's the bathtub ring
3 right here. So above that we did take some thickness
4 readings there also and that was -- there was no
5 corrosion and we also have these areas here, which are
6 the prepped areas that we performed the UT
7 inspections.

8 JUDGE BARATTA: And is this photograph
9 fairly typical of -- this is for one bay. Are the
10 other bays --

11 MR. HAWKINS: Yes.

12 JUDGE BARATTA: Are they typical of that?

13 MR. HAWKINS: Very typical, if not more
14 coating up even higher.

15 MS. BATY: For clarification of the
16 record, can we put in where the witness was pointing
17 to on that photograph, as far as like the upper right
18 hand corner, to point out how high the epoxy coating
19 goes and where the vent line, support ring -- the
20 support ring and the vent line attaching to the
21 drywell shell? If we could put that in the record?

22 CHAIRMAN HAWKENS: You go ahead and
23 describe it again and verbally describe where you're
24 placing the pointer on the picture.

25 MR. HAWKINS: Okay. This is the drywell

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1 shell. This is the weld that attaches --

2 CHAIRMAN HAWKENS: Right. If you are the
3 -- the laser is in the top right hand corner.

4 MR. HAWKINS: Oh, okay. The laser is
5 pointing to the top right hand corner of the screen
6 and that is the vent header penetration. Just below
7 that into the gray painted surface is the vent header
8 support ring, which is attached by a weld to the
9 drywell shell which is just below it. And I'm
10 pointing to a flat surface on the screen, which is the
11 drywell shell above the bathtub ring, near the top of
12 the screen or the picture.

13 JUDGE ABRAMSON: Let the record reflect
14 that the witness has been describing the upper right
15 hand corner of this picture where there are weldments,
16 one running apparently circumferentially across the
17 upper right hand corner of the picture and describing
18 it in an arc. And below that arc there is what
19 appears to be a relatively shiny flat area. And then
20 coming down to the left, lower left from that, one
21 sees a rough surface. I think that ought to be enough
22 to get this in the record.

23 MS. BATY: Thank you. I also pointed --
24 I believe the witness also pointed to the one area
25 that is located on -- that's pointed to on the caption

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1 of the picture saying external UT inspection location.
2 That was also described.

3 JUDGE ABRAMSON: We have enough
4 information. It's in the record.

5 MS. BATY: Okay. Thank you.

6 MR. WEBSTER: Judge, I think I have a
7 comment on this photograph. If you can't see a
8 feature on the projection, but in the original
9 photograph there is a feature which has it coming.

10 MR. HAUSLER: There appears to be an area
11 just below the B as in bed and R as in reach, and in
12 other words, in the center of the photograph on the
13 upper boundary. There appears to be a region that is
14 corroded or is full of corrosion products and it has
15 not been identified as being coated.

16 MR. WEBSTER: Just a clarification. You
17 cannot see it on the projection. You have to look at
18 the original photograph, which is reproduced on the
19 AmerGen Exhibit 40, page 91.

20 MR. HAWKINS: He is talking about an area
21 on the original picture that's in this area over here
22 in the upper left hand side of the picture.

23 MR. WEBSTER: Well, it's in the center
24 below the B in bed as Dr. Hausler described.

25 MR. HAWKINS: This was below the D in bed?

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1 JUDGE ABRAMSON: Yes, it's right in there.
2 Right there. If you look at the picture, the actual
3 photograph there is some odd geometry in there or
4 irregular geometry which we can't tell what it is.

5 MR. HAWKINS: In my opinion, that is the
6 concrete wall beyond the shell. Because we are
7 looking at an arc surface as you get off to the --
8 now, you are seeing the concrete wall that's behind
9 you.

10 MR. POLONSKY: Can we have one moment,
11 please, Your Honor?

12 CHAIRMAN HAWKENS: Yes.

13 MR. POLONSKY: Your Honor, Mr. Tamburro
14 previously testified that he physically was in Bay 13
15 during the 2006 outage, so I thought you might want to
16 hear, you know, as opposed to a picture, what he saw.

17 CHAIRMAN HAWKENS: All right. Bring Mr.
18 Tamburro forward.

19 MR. TAMBURRO: This is Peter Tamburro. I
20 was in Bay 13. I was able to look up in those areas
21 and I did not see any evidence of corrosion on the
22 drywell vessel. There were different colors,
23 different discolorations on the concrete areas on the
24 interface between the drywell and the concrete, but
25 there was no evidence of corrosion in that area.

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1 MR. WEBSTER: I think the question was
2 what was the feature that's on the photograph?

3 JUDGE ABRAMSON: Yes, and I think the
4 answer we heard from the expert who was describing it
5 is that he thinks that feature is, he thinks, the
6 concrete behind in the background. And one can't
7 tell. And so I think the answer is one can't tell and
8 we'll leave it at that. That's his expert opinion.

9 MR. HAWKINS: I can clarify my statement
10 by saying that no where on the drywell shell in the
11 area of examination looked like that.

12 MR. WEBSTER: Well, I mean, I guess the
13 question is when we're talking about the drywell
14 shell, what about this area Dr. Hausler is pointing
15 out between the vent header and the concrete.

16 MS. BATY: Your Honor, the staff has
17 something. One of our inspectors was there and has
18 something that they would like to share on this.

19 MR. O'HARA: Tim O'Hara, Your Honor.
20 During the outage in the fall of '06, I entered Bay 13
21 and Bay 11, physically looked at the drywell. All the
22 regions on the outside of the drywell were coated.
23 Conditions like that exist on the shield wall opposite
24 the drywell shell itself. And all those conditions
25 were documented by AmerGen and they are taking

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1 corrective actions as needed on those conditions. But
2 the drywell shell was completely coated.

3 I also examined all the records both
4 visual and the video records that AmerGen made and
5 everything that we looked at on the external of the
6 drywell was coated.

7 JUDGE ABRAMSON: Mr. O'Hara, did you
8 observe any sand remaining in any of these gaps that
9 are in question here?

10 MR. O'HARA: No, I didn't, Judge.

11 JUDGE BARATTA: Did you see any corrosion
12 products in any of those gaps or anything like that?

13 MR. O'HARA: There was no corrosion
14 products visible on the outside of the drywell. On
15 the shield wall and the tendons running through there,
16 there was light rust. There was no visible signs of
17 any moisture in the -- in any part of the sand bed
18 area.

19 JUDGE BARATTA: Are those tendons concrete
20 or are they steel?

21 MR. O'HARA: Steel, I believe.

22 JUDGE BARATTA: The shield wall, is that
23 concrete?

24 MR. O'HARA: That's concrete.

25 JUDGE BARATTA: So what we're probably --

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1 it's difficult seeing is one of the tendons?

2 MR. O'HARA: That would be my guess. But
3 it is not on the drywell shell, in this particular
4 bay, which I did look at.

5 JUDGE BARATTA: Thank you.

6 CHAIRMAN HAWKENS: Dr. Hausler, you have
7 expressed concerns about pin holes in the epoxy
8 coating.

9 MR. HAUSLER: Well, the area that we're
10 pointing to on the vent pipe, on the down comer, you
11 know, in that gap, is, in fact, the pressure boundary
12 and we have been concerned about pressure boundaries
13 on the drywell shell. I believe that is, you know,
14 just, you know, the same area, the same problem with
15 the, you know, 49 or 490 mil limiting --

16 CHAIRMAN HAWKENS: Well, I'm talking about
17 pin holes in epoxy coating. Is that what you are
18 addressing right now?

19 MR. HAUSLER: No, I'm not.

20 CHAIRMAN HAWKENS: We're in the epoxy
21 coating topic. Here is my question.

22 MR. HAUSLER: I'm sorry.

23 CHAIRMAN HAWKENS: In your testimony you
24 expressed concerns about the possibility of corrosion
25 in the sand bed region which would occur at pin holes

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1 in the epoxy coating.

2 MR. HAUSLER: Yes, sir. The studies that
3 have been made prior to the application of the epoxy
4 took for qualification of the application procedure
5 and so on have clearly shown that there is a
6 possibility of pin holes forming, thus inclusions as
7 well as, you know, hairs from brushes and things of
8 that nature.

9 It is my understanding, you know, from
10 reading of the report that had been prepared by the
11 applicator of the epoxy that on the mark-up where the
12 panels were, you know, prepared, you know, for future
13 study, examinations have been done, you know, for the
14 detection of pin holes by, you know, electrical
15 methodology, you know, the way painters, in fact, you
16 know, do detect pin holes.

17 However, when the coating was applied in
18 the sand bed area, no such examinations or quality
19 control procedures have been applied. As a
20 consequence, you know, I think it is reasonable to
21 postulate that if pin holes, you know, can, in fact,
22 occur during the study of the coating procedure, it is
23 even more likely that pin holes occur in the actual
24 application, simply because you have more dust and it
25 is not as sanitary environment in the sand bed when

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1 you apply the coating as it is, you know, when you do
2 it on the mark-up.

3 CHAIRMAN HAWKENS: I understand now. I
4 understand that theory. Is there any evidence, based
5 on the record you have seen provided by AmerGen, that
6 pin holes actually exist?

7 MR. HAUSLER: No, there isn't, because
8 they haven't looked for them.

9 CHAIRMAN HAWKENS: Thank you. AmerGen,
10 could you respond to that?

11 MR. CAVALLO: I would be glad to, Your
12 Honor. Jon Cavallo. In all deference to Dr.
13 Hausler's observations, there is no evidence of any
14 pin holes after 14 years of service in this coating.
15 Pin holes would be evidenced by visual rust staining
16 in the area of the pin hole. In order to bet
17 corrosion and bear with me just a sec and also Barry
18 Gordon will testify on corrosion, we need anodes,
19 cathodes and an electrolyte as we discussed in the
20 previous panel and a path for that electrolyte to get
21 to the steel. That would be a pin hole or one to
22 occur.

23 In the years of experience I have and
24 probably personal observation in over 40 -- over 50
25 nuclear power plants in the U.S., plus China, plus

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1 Korea, plus Europe, when we have a pin hole in
2 atmospheric service, such as what we have here, and we
3 expose it to moisture, we would first see a rust
4 bleeding. Very similar to what you would see on your
5 lawn furniture in your home. You would see a rust
6 stain, which would be very large, very visible.

7 And I have had the opportunity to review
8 the visual inspection records done by the gentleman to
9 my right and there is absolutely no indication of any
10 visual indications of pin holes. So that allows me to
11 state unequivocally we do not have pin holes in the
12 coatings applied to the drywell in 1992.

13 CHAIRMAN HAWKENS: I would like to hear
14 from the gentleman on your right, who you said
15 actually performed them?

16 MR. CAVALLO: Please.

17 CHAIRMAN HAWKENS: The visuals.

18 MR. HAWKINS: That would be Mr. Erickson
19 and myself performed the majority of the examinations
20 on the drywell shell in those areas and we saw no
21 evidence of the rust seepage from anything at all. No
22 rust at all.

23 MR. ERICKSON: Scott Erickson and I concur
24 with Mr. Hawkins. I saw no evidence of any rust
25 seepage or any pin hole evidence of rust going on.

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1 JUDGE ABRAMSON: Mr. Cavallo, is there
2 anything unique about the epoxy that was used in
3 Oyster Creek that would make it less likely or more
4 difficult for the rust to show through, to be visible
5 compared to other -- these many other plants you have
6 looked at?

7 MR. CAVALLO: No, this epoxy is unique in
8 ways that would actually help us to prevent pin holes.
9 One reason is that all three coats that were applied
10 are 100 percent solvent free. Pin holes occur during
11 the application process or during the curing process.
12 Typically it has to do with solvent migration leaving
13 very small holes in the coating or --

14 JUDGE ABRAMSON: What's the relevance of
15 dust in the atmosphere when you are applying this?

16 MR. CAVALLO: None.

17 JUDGE ABRAMSON: Thank you.

18 MR. CAVALLO: These coatings are 100
19 percent solid, so we have no solvents in any one of
20 the three coats. That's a very common cause of pin
21 holes in epoxy coatings.

22 JUDGE ABRAMSON: And to come back to what
23 I asked, because what we are concerned about is
24 whether you would actually physically be able to see
25 the rust. Is there anything unique about this

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1 particular coating that would make it more difficult
2 to visually observe rust underneath if it were
3 occurring?

4 MR. CAVALLO: No actually, just the
5 opposite. The selection of the top coat color, which
6 is a grayish white would give you a very good visual
7 contrast to, in this case it would be, iron oxide or
8 red rust, so the staining would be very visible to,
9 particularly, trained UT-1 inspectors.

10 JUDGE ABRAMSON: And in your experience
11 when you have -- in cases where you have seen pin
12 holes, what -- can you describe the character of the
13 rust corrosion that was underneath the epoxy when you
14 have seen it? How big an area was it? How much was
15 being corroded? What was the relationship to the size
16 of the pin hole? Can you tell us anything about the
17 rate?

18 MR. CAVALLO: I'll speak to -- I won't
19 speak to the rate. I'll ask my colleague, Barry
20 Gordon, to address that in the next panel if you can
21 bear with me.

22 JUDGE ABRAMSON: Okay. That's fine.
23 That's fine.

24 MR. CAVALLO: As far as what we would find
25 were we to excavate the coating in the area of a pin

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1 hole, typically with a three coat epoxy such as the
2 one used in the Oyster Creek dry well. We would find
3 if there were no -- there was no carbuncle present, a
4 large swelling of the rust, we would find very
5 localized, very minimal corrosion at that point.

6 JUDGE ABRAMSON: And that would be at the
7 point where you had seen the color, but not had any
8 swelling underneath. Is that right?

9 MR. CAVALLO: That's correct, sir.

10 JUDGE ABRAMSON: Okay. And if it went so
11 far as to building a carbuncle as you call it, what
12 would be typical then? Give me an idea the diameter
13 of a carbuncle, how deep would it eat in?

14 MR. CAVALLO: The consensus in the
15 corrosion industry is that that carbuncle, the iron
16 oxide or oxide products form would occupy a volume and
17 actually swell and occupy a volume 7 to 10 times the
18 size of the steel that it was replacing. So we would
19 see an irregularly shaped fairly circular rough
20 surfaced deformation of the coating that would be
21 centered on the area of the pin hole.

22 JUDGE ABRAMSON: Okay. Now, we're mindful
23 that you are saying that there is no evidence of any
24 of these in Oyster Creek, but in the worst cases that
25 you have seen where things have been let go, how big

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1 carbuncles have you seen and how much did it eat in?

2 MR. CAVALLO: In a benign environment,
3 such as the Oyster Creek drywell, we have very low
4 temperature, air conditioned conditions. We have no
5 extensive moisture exposure as we saw in the previous
6 panel. I wouldn't expect to see carbuncles. I would
7 expect to see over a period of three or four years,
8 which is the frequency of inspection, staining only.
9 I would not anticipate seeing carbuncles.

10 CHAIRMAN HAWKENS: Does the NRC staff have
11 anything to add to that?

12 DR. DAVIS: Jim Davis with the staff. I
13 agree with what Jon says. That has been my
14 experience, too, with a lot of years of working with
15 coatings.

16 CHAIRMAN HAWKENS: Thank you.

17 JUDGE BARATTA: One thing that has
18 confused me about that is there was a discussion about
19 the environment that the coating is in and the
20 mechanisms that would degrade the coating. It was
21 mentioned that ultraviolet light degrades epoxy
22 coatings. Is that correct?

23 MR. CAVALLO: That's correct, sir.

24 JUDGE BARATTA: This area does have a not
25 tremendously, but some gamma radiation in it. Is that

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1 also correct?

2 MR. CAVALLO: That's correct.

3 JUDGE BARATTA: How come it doesn't
4 degrade the epoxy coating?

5 MR. CAVALLO: That's a good question. I
6 can testify that it does not in the doses that we are
7 talking about in the Oyster Creek drywell, based on
8 the plant numbers and I'll let AmerGen testify to
9 those numbers, if you would like. What we have found
10 in probably 50 years of testing is the epoxies are
11 quite resistant to gamma radiation, such as we see in
12 the Oyster Creek drywell. We would see some slight
13 chalking of the epoxy on the surface, but that's a
14 matter of surface oxidation.

15 There are a number of studies going on
16 right now to actually quantify that number, but we're
17 looking at fractions of a mil and it tends to be
18 surface oriented. It's a radio oxidation phenomena.
19 There is a study going on sponsored by Electrocar
20 Power Research Institute and Electricitas de France,
21 which is going to quantify that, but we're two years
22 away from that. But basically, it's a surface
23 oxidation phenomena.

24 MR. POLONSKY: Your Honor, if we could
25 just perhaps refresh Mr. Cavallo's memory? We do have

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1 specific testimony on this in AmerGen's direct
2 testimony on Part 5. It was part of the answer to A7,
3 which went from -- started on page 7 of 17.

4 MR. CAVALLO: What I would like to add is
5 the actual dose rates that were estimated in the
6 drywell, based on measurements that with a dose rate,
7 this is in the section that was just quoted by
8 counsel. 5.6 rads per hour and since the 1992 outage
9 when the coating was installed, we would have
10 estimated a dose of $1.1 \times 10^{6\text{th}}$ rads. Most of our
11 epoxy or all of our epoxy coatings used in nuclear
12 power today have been tested to $1 \times 10^{9\text{th}}$ rads per
13 hour. So we are three orders of magnitude higher.

14 JUDGE BARATTA: That was the number that
15 was missing was the $10^{9\text{th}}$.

16 MR. CAVALLO: Exactly.

17 JUDGE BARATTA: Thank you.

18 MR. CAVALLO: You're welcome.

19 CHAIRMAN HAWKENS: Dr. Hausler, you have
20 heard the testimony of AmerGen and the NRC staff. Is
21 there anything that they said that was error?

22 MR. HAUSLER: No. I haven't, you know,
23 seen anything that is in error. I am wondering how 50
24 years experience with a coating actually relates to
25 specifically to the coating life. You know, we're

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1 talking about a coating life here of, you know, 18 to
2 20 years. I expect it to last another 40 years. And
3 my question is, you know, how much experience do we
4 really have with respect to this coating going to last
5 for another 20 years?

6 CHAIRMAN HAWKENS: AmerGen, could you
7 respond to that, please?

8 MR. CAVALLO: Okay. Could you possibly
9 play the question, Judge Hawkens, to help me out with
10 answering, because AmerGen will answer part of this.

11 CHAIRMAN HAWKENS: Let me see if I can
12 rephrase it. Citizens are concerned because they
13 recall earlier in the record, it was suggested that
14 this epoxy life may have had a coating between 10 and
15 15 years. Given that that has expired, we're seeking
16 an extension of 20 years. How does past experience
17 with epoxy coatings give assurance that this epoxy
18 coating which arguably is at a very late stage in life
19 will maintain its integrity during the renewal period?

20 MR. HAUSLER: Thank you, Judge. You have
21 done better than I could.

22 MR. CAVALLO: Let us answer that in two
23 parts. One, could we first address the 18 to 20 year
24 question? And I would like Mr. Ouaou to address that
25 with AmerGen.

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1 MR. OUAOU: Your Honor, I think if we can
2 refer to Exhibit 16 which I believe that it says in
3 Exhibit 16, which I believe Dr. Hausler was referring
4 to, Citizens exhibit, Citizens, yes. This is a
5 transcript of our testimony before the ACRS. Citizens
6 Exhibit 16. I just want to refresh Dr. Hausler's
7 memory on what I said in the meeting.

8 What I said in the meeting is that there
9 were some original estimates initially when the
10 coating was specified that the expected life of the
11 coating was 8 to 20 years, something less than 20
12 years. And what I found out is that I spoke to the
13 supplier or the vendor of the coating is that the
14 vendor cannot really guarantee a life of any coating
15 beyond 8 years or something less.

16 However, the vendor suggested that the
17 setting, the environment the coating is in, we should
18 not expect it to last for a long time. And as far as
19 the life, the only way you would determine that is by
20 doing inspections and do repairs if you see anything
21 that comes up. And if you do that, the coating we
22 have will last for a long time. And this is reflected
23 in the --

24 JUDGE ABRAMSON: Do you have any
25 information that would lead you to believe there would

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1 be a relatively rapid deterioration at some point or
2 that therefore in between inspections there might be
3 some rapid deterioration and you might miss it?

4 MR. OUAOU: No, Your Honor, no.

5 JUDGE ABRAMSON: Nothing in your
6 experience with the vendor. How about Mr. Cavallo in
7 your experience, have you ever seen rapid
8 deterioration of epoxy coatings?

9 MR. CAVALLO: Not applied properly with
10 the degree of care and inspection that these coatings
11 were applied to. We have not seen end of life failure
12 in epoxy coatings in nuclear power plants due to age.

13 JUDGE ABRAMSON: Okay. Now, let me ask
14 the staff. If there were some deterioration observed
15 in the coating at some point and it got so severe that
16 the coating needed replacing, how would the staff
17 handle that sort of an incident?

18 DR. DAVIS: Well, through the inspections
19 they would have to replace it if they saw
20 deterioration in the coating.

21 JUDGE ABRAMSON: Thank you.

22 DR. DAVIS: But in -- to just add to what
23 Jon said, primarily the reason coatings fail is
24 because of poor surface finish. And then the second
25 factor is the application of the first layer and the

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1 failure normally occurs very quickly within the first
2 few years if it's going to occur. Once it gets past
3 the first few years, then it goes on to five or six
4 years. Then it is much likely to get a rapid failure
5 of the coating. It's much less likely to see a rapid
6 failure.

7 MR. WEBSTER: Judge, could Dr. Hausler
8 comment on this?

9 CHAIRMAN HAWKENS: Please, go ahead.

10 MR. HAUSLER: Well, I think this is, you
11 know, pretty much one opinion against another opinion.
12 I think it is well-known that the epoxy in particular
13 are, you know, subject to, you know, continued
14 hardening with life, particularly, if the temperature
15 is elevated, that is one thing. Another --

16 JUDGE ABRAMSON: Well, what constitutes
17 elevated, in your view?

18 MR. HAUSLER: You know, about 150 degrees.

19 JUDGE ABRAMSON: And have you seen this
20 type of epoxy in use, the type -- this three coat type
21 of this particular chemical composition in use in your
22 experience?

23 MR. HAUSLER: No, sir, I haven't seen it.
24 I know it from the literature, but this kind of thing
25 happens. I also know it from understanding of basic

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1 chemistry that is involved in forming it.

2 JUDGE ABRAMSON: Are you a chemist?

3 MR. HAUSLER: Yes, sir.

4 JUDGE ABRAMSON: Okay. You have
5 experience in the chemistry of epoxy coatings?

6 MR. HAUSLER: We did study the nature of
7 epoxy, you know, quite extensively, you know, along
8 with other, you know, polymers, you know, in -- you
9 know, during the, you know, education, that's right.

10 CHAIRMAN HAWKENS: Carry on.

11 MR. HAUSLER: Well, the point I wanted to
12 make is that embrittlement of a coating does, in fact,
13 occur. You know, that is known. It does depend on
14 the formulation of the specific epoxy, you know, that
15 there is no question about that. You know, you can
16 avoid the embrittlement with age by choosing the
17 different, you know, components, either, you know, the
18 epoxide itself or the hardener.

19 JUDGE ABRAMSON: And what can you tell us
20 about the chemical composition of this particular
21 epoxy that tells us whether, in your view, this is the
22 kind of epoxy composition that is subject or is not
23 subject to such embrittlement?

24 MR. HAUSLER: I cannot tell you anything
25 about that. I'm not familiar with this specific

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1 composition.

2 MR. WEBSTER: Perhaps Dr. Hausler can do
3 two things. One thing is he can identify something
4 where he positively knows something, but he also can
5 identify data gaps, where, in fact, a certain fact is
6 not known and I think there is a danger here that we
7 don't get to those data gaps if we just keep
8 positively asking do you know this. I could suggest
9 to him are you happy, Dr. Hausler, that the data that
10 we have leads to a reasonable certainty that it won't
11 be a rapid end of life failure of this coating?

12 MR. HAUSLER: I don't think that the data
13 will indicate that. I am particularly concerned about
14 the fact that this particular area is subject to not
15 only temperature variations, but, in fact, to
16 vibrations. We know that the floor, the sand bed
17 floor that was heavily coated with this epoxy has
18 broken up several times and had to be, you know,
19 repaired. We also know that concrete, parts of the
20 concrete from the, you know, concrete wall around the
21 drywell shell do come lose due to vibration and
22 temperature changes.

23 JUDGE ABRAMSON: So you are comparing the
24 epoxy that was applied to a concrete surface, the
25 floor, to the concrete that was applied to the carbon

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1 steel liner? Is that what --

2 MR. HAUSLER: No, I mentioned the example
3 in order to illustrate that, in fact, there are
4 vibrations and there are stresses.

5 MR. POLONSKY: Objection. Foundation for
6 vibration.

7 JUDGE ABRAMSON: Well, we understand.
8 Let's carry on.

9 MR. HAUSLER: And that can, in fact, you
10 know, with age of the epoxy, in my opinion, lead to,
11 you know, possible, you know, crack formation.

12 JUDGE ABRAMSON: And would you expect the
13 crack formation to be a function of how the material
14 to which the epoxy is applied responds to these
15 vibrations and stresses and would you expect there to
16 be a difference in the response of a steel vessel from
17 that of a concrete?

18 MR. HAUSLER: The process may be slower,
19 but in principle, I think, that if, in fact, the steel
20 has different coefficient of expansion around the
21 epoxy and the steel does expand with temperature and,
22 you know, on top of it we know that there are
23 vibrations there. We understand that. In fact, yes,
24 it can happen either on concrete or on steel.

25 JUDGE ABRAMSON: And would you expect

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1 there to be a difference in the response of the two
2 kinds of materials to vibrations? I mean, are you
3 familiar with how concrete in these circumstances in
4 this plant behaves? How it decomposes? How it
5 responds to vibration?

6 MR. HAUSLER: Let me answer the question,
7 counselor.

8 MR. WEBSTER: No, I'm very happy to answer
9 the question. I'm just going to suggest that,
10 obviously, Dr. Hausler is not as familiar with the
11 specific details of the plant as AmerGen's witnesses.

12 JUDGE ABRAMSON: We understand. He is
13 trying to draw an analogy between the way epoxy
14 coating on the cement floor might behave and how the
15 epoxy coating on this stainless -- on this carbon
16 steel membrane might behave. And I'm trying to
17 understand what the foundation is for that analogy or
18 comparison.

19 MR. HAUSLER: So just to clarify, Judge,
20 then you're asking in principle, rather than that
21 specific plant?

22 JUDGE ABRAMSON: Yeah. I'm asking in
23 principle, but I want to understand what his
24 understanding is of how concrete behaves under these
25 circumstances versus how carbon steel behaves under

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1 it, 1 inch thick carbon steel behaves under these
2 circumstances.

3 MR. HAUSLER: Okay. Well, you know, the
4 analogy is -- you know, was brought forth because, you
5 know, we know that the concrete floor has broken up.
6 And when we know that there is this sort of --

7 MR. WEBSTER: Does that leave epoxy
8 coating to the concrete floor?

9 MR. HAUSLER: The epoxy coated concrete
10 floor has broken up. We know that.

11 JUDGE ABRAMSON: And I'm saying, you think
12 that has broken up because of what happened to the
13 concrete or that has broken up because of the flaws in
14 the epoxy? What are you suggesting?

15 MR. HAUSLER: Actually, we don't know
16 that.

17 MR. WEBSTER: Judge, let's just say what
18 you are saying is that Dr. Hausler can testify to
19 things we don't know as well as things he does know?
20 And I think the things he doesn't know, since we don't
21 bear the burden of proof, things he doesn't know need
22 to be addressed.

23 JUDGE BARATTA: Could I ask if -- let's
24 say that for whatever reason that the epoxy cracked.
25 Would that be visible in such a way that it could be

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1 detected by a visual inspection, which is conducted
2 periodically?

3 MR. HAUSLER: It would eventually become
4 visible. There's no question about that, of course.
5 What we have suggested early on is that the inspection
6 could be much more effectively carried out by tools
7 that are specified, for instance, by name. These are
8 very simple and don't laugh now, but electric and
9 sponge type surface examinations.

10 MR. SILVERMAN: Your Honor, this does go
11 to the monitoring of the coating, which is outside the
12 scope of the proceeding.

13 CHAIRMAN HAWKENS: I do agree it's outside
14 the scope. I'll just let him finish his thought.

15 MR. HAUSLER: Well, I think, you know, any
16 damage to the coating could very easily be detected,
17 you know, prior to actually prior to serious damage
18 happening. That's what we have, you know, suggested
19 early on that, you know, the coating should undergo
20 rigorous quality control and not just a visual
21 examination. Such examination should be, you know,
22 more frequent than, you know, every 4 or 10 years.

23 MR. WEBSTER: Can I just clarify here that
24 I think Dr. Hausler -- can I just clarify, Dr.
25 Hausler? When you say it could be detected, do you

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1 mean by methods other than visual inspection?

2 MR. HAUSLER: That's correct.

3 CHAIRMAN HAWKENS: We understand that
4 argument and as AmerGen correctly said, this is
5 outside the scope.

6 MR. WEBSTER: I think it goes to the issue
7 of frequency of monitoring. If there is a danger that
8 the coating floors will not be identified through
9 visual inspection, then it effectively means that the
10 longer period where corrosion could occur.

11 JUDGE BARATTA: Thank you.

12 MR. SILVERMAN: Your Honor, could AmerGen
13 just follow-up on the issue of temperature effects,
14 which Dr. Hausler testified to?

15 CHAIRMAN HAWKENS: Please. Let's hear
16 from AmerGen on how the thermal -- how temperature
17 might affect the behavior of this concrete and its
18 embrittlement. I'm sorry, this epoxy coating.

19 MR. CAVALLO: Now, I'll address that
20 question, sir. Dr. Hausler mentioned a number of 150
21 degrees fahrenheit. In fact, the maximum exposure
22 temperature, which is in our direct testimony, is 130.
23 So this coating will never see anything about 130 plus
24 a little ever.

25 JUDGE ABRAMSON: And in your experience

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1 with epoxies, is his number of 150 a reasonable number
2 of where it might start to become embrittled or is it
3 --

4 MR. CAVALLO: No, no. The surface --

5 JUDGE ABRAMSON: -- that's a number out of
6 the air?

7 MR. CAVALLO: Excuse me, sir. I didn't
8 mean to interrupt you.

9 JUDGE ABRAMSON: That's okay.

10 MR. CAVALLO: The surface condition of
11 this coating, as in most of our epoxy polymers, is 250
12 F continuous.

13 JUDGE ABRAMSON: So it is designed to
14 handle 250 without embrittling?

15 MR. CAVALLO: Yes, sir. This coating was
16 originally intended for a tank lining, continuous
17 immersion, aggressive service at temperature up to and
18 including 250 F. So it's a much more robust coating
19 than would be needed under normal circumstances in the
20 sand bed region. This was selected to give an extra
21 order of confidence to the performance.

22 JUDGE BARATTA: And the only situation
23 that you could even approach those would have to be in
24 an accident condition or maybe you're not -- you can't
25 comment on that.

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1 MR. CAVALLO: I am not aware what the
2 temperature would be in an accident situation.

3 JUDGE BARATTA: Yeah.

4 MR. OUAOU: The temperature in an accident
5 condition, I believe, is around 281 degrees to 340.

6 JUDGE BARATTA: And that would be an
7 extreme?

8 MR. OUAOU: That's an extreme, yes.

9 MR. CAVALLO: But I believe, correct me if
10 I'm wrong, Mr. Ouaou, that temperature is inside the
11 drywell, so we may not -- the coating on the outside
12 might not see that.

13 MR. OUAOU: That is correct.

14 JUDGE BARATTA: And even under those
15 circumstances, you would probably -- would you do an
16 inspection? You would have to do an inspection on the
17 whole system.

18 MR. OUAOU: That inspection is required
19 after that.

20 MR. WEBSTER: Could we just clarify the
21 record a little bit? The testimony where the pre-fire
22 was 130, where was that?

23 MR. OUAOU: That is -- oh, I'm sorry.

24 MR. POLONSKY: That can be addressed in
25 Part 1 of the testimony, the temperatures, and it's

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1 also incorporated in Part 6 which we will hear from
2 next.

3 MR. WEBSTER: Okay. Well, I think Dr.
4 Hausler, do you have another comment on that?

5 MR. HAUSLER: Yes, I do.

6 MS. BATY: Excuse me, before we move on,
7 oh, sorry.

8 MR. WEBSTER: We're not moving on. We're
9 keeping -- there is no intention to move on. The
10 intention is to stick precisely with this question.

11 MS. BATY: Excuse me, can I ask my
12 witnesses if they have anything to --

13 JUDGE ABRAMSON: Not yet.

14 MS. BATY: -- add about --

15 JUDGE ABRAMSON: Not yet, counselor.

16 MS. BATY: -- epoxy coating on -- the
17 difference of epoxy coating on carbon steel versus on
18 the concrete floor?

19 JUDGE ABRAMSON: Yes, that's where I want
20 to go with AmerGen and with the staff.

21 MS. BATY: Okay. Thank you.

22 JUDGE ABRAMSON: AmerGen, do any of your
23 witnesses have experience or knowledge that might help
24 us understand the difference of the behavior of
25 concrete and carbon steel to the kind of vibration

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1 environment and how concrete can break up and what it
2 does to the epoxy? We would like to know whether this
3 analogy to -- of knowing that epoxy has appeared to
4 have broken up when the concrete broke up makes -- is
5 relevant.

6 MR. CAVALLO: I'll attempt to address that
7 properly. Two things to realize about the coating
8 system applied to the concrete versus applied to the
9 steel. The steel was pre-primed using a penetrating
10 epoxy seal, again 100 percent solid. That sealer was
11 not applied to the concrete. The second thing to
12 realize is this coating material can be applied, since
13 it is solvent free up to a quarter of an inch thick,
14 as recommended by the manufacturer.

15 The coating was applied to the concrete
16 less as a preventive measure, but more to slope the
17 coating, as you heard yesterday, towards the drains.
18 It was actually used as a surfacer to change -- to
19 correct the contours. When --

20 JUDGE ABRAMSON: So it was not designed to
21 prevent moisture penetration into the concrete. It
22 was designed to guide the water into the drains? Is
23 that --

24 MR. CAVALLO: That's my understanding.
25 But let me let AmerGen address that directly.

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1 MR. OUAOU: That is correct, Your Honor.

2 We --

3 CHAIRMAN HAWKENS: Please, identify
4 yourself.

5 MR. OUAOU: Ahmed Ouaou. The epoxy on the
6 floor is actually a putty that was used to fill in the
7 irregularities that were identified in the floor and
8 sent that back in in the late '80s, '90s time frame.
9 It's not just a coating. Actually, it's about -- in
10 some cases before to 8 inches thick. And it is not a
11 coating as we know it.

12 If I may just add, I'm not sure the source
13 of the vibration that, you know, Dr. Hausler was
14 talking about. I think in our testimony we indicated
15 that the irregularities or the defects in the floor of
16 the sand bed is actually a result of not having
17 finished during construction. It was never -- the
18 sand bed floor was never finished and it's, in my
19 opinion, not a result of live --

20 MR. WEBSTER: Might I clarify the record
21 with that. I think there's some confusion about what
22 the sand bed floor is, whether it is the concrete or
23 whether it's the epoxy. Dr. Hausler's testimony did
24 not relate to the concrete floor. It related -- which
25 is I think what Mr. Ouaou's testimony relates to. It

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1 relates to the epoxy.

2 JUDGE ABRAMSON: Yeah, we understand that.
3 Thank you, counselor.

4 MR. CAVALLO: And I think that again, the
5 thing to keep in mind is that the coating on the floor
6 has no connection with the coating on the corrosion
7 preventive coating on the concrete or the steel liner.

8 JUDGE ABRAMSON: When you say no
9 connection, you don't mean that there's no physical
10 connection?

11 MR. CAVALLO: No, no.

12 JUDGE ABRAMSON: You mean it's an entirely
13 different purpose and entire different material?

14 MR. CAVALLO: Thank you. Philosophical
15 connection, right.

16 JUDGE ABRAMSON: All right. Staff has an
17 expert who can add some information to this that I
18 understand?

19 DR. DAVIS: Jim Davis. I don't have
20 anything else to add. I agree with what they have
21 said.

22 MS. BATY: They who?

23 DR. DAVIS: AmerGen.

24 MR. WEBSTER: Judge, I do think Dr.
25 Hausler has another comment, if you have time.

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1 CHAIRMAN HAWKENS: Is it directly related
2 to what we just asked of the staff and AmerGen? And
3 if it's not, if you can be very brief, go ahead.

4 JUDGE ABRAMSON: And not get on your sand
5 box.

6 MR. HAUSLER: Let me just let it go at
7 that.

8 CHAIRMAN HAWKENS: I'm sorry, I didn't
9 hear you, Dr. Hausler?

10 MR. HAUSLER: I said let it just go at
11 that, since Judge Abramson doesn't like my sand box,
12 I think I'll just shut up.

13 JUDGE ABRAMSON: If you have technical
14 information to add that we haven't already seen in
15 written testimony and we haven't already heard, we
16 welcome it, but if it's just repetitive, we don't need
17 it.

18 MR. HAUSLER: There is --

19 MR. WEBSTER: I think perhaps the point
20 is --

21 MR. HAUSLER: -- a concern. There is a
22 lot of confusion about, you know, what the product
23 really is. The difference between the epoxy on the
24 floor and the epoxy on the shelf. It had not been
25 specifically, you know, pointed out. However, what I

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1 do want to point out is that I was not previously
2 aware of the fact that this is not a solvent
3 containing epoxy. That really makes it all the more
4 difficult.

5 It is more highly viscous epoxy and it
6 makes it more difficult for air bubbles to escape.
7 And I think that would have made it all the more
8 important and imperative to apply good quality control
9 to the epoxy coating after it had been applied in the
10 sense that -- in the same sense that this quality
11 control was applied to the test panels that, you know,
12 had been epoxy coated in the mark-up.

13 MR. WEBSTER: Could I also -- but I also
14 think it's useful to clarify the difference in 100 --
15 these various temperatures. I think it's useful for
16 Dr. Hausler to clarify whether these temperatures are
17 threshold temperatures, so there is no effect below a
18 certain temperature or whether they relate to the
19 right situation.

20 MR. HAUSLER: Well, you know, we are
21 talking about chemistry. And chemistry doesn't start
22 at 250 degrees or not. Chemistry is depending on
23 kinetics and, you know, kinetics are accelerated with
24 temperature. But that doesn't mean that the kinetics,
25 you know, are not prevalent at 130 or 150 degrees.

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1 And we have all the time in the world, you know, for
2 things to happen in the reactor over the next 20
3 years. And that, in my opinion, is a concern.

4 CHAIRMAN HAWKENS: I do want to give the
5 AmerGen and opportunity to respond, if it wishes to,
6 to the two points that he made about temperature and
7 about his concern about the epoxy did not contain a
8 solvent may have made it more susceptible to problems
9 at the application.

10 MR. WEBSTER: Let the record reflect that
11 counsel is consulting with the witness. He was
12 supposed to do that --

13 MR. POLONSKY: I'll do it on the record.

14 MR. WEBSTER: Thank you.

15 MR. POLONSKY: If your pre-file testimony
16 you believe already covers this, the Board has this in
17 front of them. If you think this is somehow something
18 new, you should address it.

19 MR. CAVALLO: There is a -- just one point
20 of clarification, one point of technical
21 clarification. One, the technical data sheets are in
22 the pre-file testimony and have been available since
23 the -- it's our -- AmerGen's Exhibit 35, I believe,
24 and I hate trusting my memory, but I believe it's 35.
25 Both the pre-prime and the epoxy have been available

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1 since the start of these proceedings.

2 Second, the use of a 100 percent solid
3 epoxy is preferable in that in Dr. Hausler's pre-file
4 testimony, he refers to things like shrinkage. There
5 is no shrinkage and equate that to cracking with 100
6 percent solid epoxy. That' -- in reviewing this after
7 the fact, the selection, I applauded, because it was
8 the proper way to go, because we eliminated shrinkage
9 as a potential defect producer.

10 I think that's all the clarification I
11 need to add.

12 MS. BATY: Your Honor, can I --

13 CHAIRMAN HAWKENS: Thank you.

14 MS. BATY: Could I ask that the Board as
15 both AmerGen and Dr. Hausler about Dr. Hausler
16 suggested that 20 -- things could happen over the next
17 20 years and then AmerGen did not respond. I'm
18 wondering the frequency is 4 years between inspections
19 and I wonder if there would be any effect on their --
20 on Dr. Hausler's testimony if he knew -- if he was
21 thinking in terms of the 4 year interval of
22 inspection.

23 MR. WEBSTER: Can I just clarify for the
24 record? I do believe Dr. Hausler said something that
25 reflects that he thinks that the coating end of life

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1 could occur during the next 20 years and, therefore,
2 it's relevant to try to understand.

3 MS. BATY: Could AmerGen address the 20
4 years and how likely it is to fail between inspection
5 intervals?

6 JUDGE ABRAMSON: Counselor, let me pick
7 this one up. First of all, we have asked the parties
8 about rapid deterioration. And the real question is
9 is there going to be deterioration that would occur so
10 rapidly that it wouldn't be detected in between
11 inspections? I don't see the need for any further
12 testimony on that from anybody. While we appreciate
13 your concern and your interest in our obtaining proper
14 knowledge, I think we have enough knowledge on this
15 point. If my colleagues disagree, they will certainly
16 speak up.

17 JUDGE BARATTA: No further questions.

18 CHAIRMAN HAWKENS: Thank you. We are done
19 with that Panel 5. We do have before we go to Panel
20 6 and we may hold off on Panel 6 until lunch, but Dr.
21 Baratta had a few questions for Dr. Hartzman. He is
22 an NRC staff witness.

23 JUDGE BARATTA: I want to go back and
24 revisit this ASME Code requirement for design.

25 CHAIRMAN HAWKENS: May I interrupt? Dr.

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1 Hartzman; as always, when you are testifying today,
2 you remain under oath.

3 DR. HARTZMAN: Yes, sir.

4 CHAIRMAN HAWKENS: Thank you.

5 JUDGE BARATTA: Okay. We're at the design
6 phase. The ASME Code requires a factor of 2. Is that
7 correct?

8 DR. HARTZMAN: That is correct.

9 JUDGE BARATTA: Now, for subsequent
10 modifications to the plant, what is required for a
11 factor of safety?

12 DR. HARTZMAN: The same factor of safety.

13 JUDGE BARATTA: Okay. When you are
14 dealing with modifications, does it also cover
15 resolution of discrepancies that they have occurred
16 due to construction errors or due to other factors?

17 DR. HARTZMAN: Any kind of physical
18 modification would require meeting the cold case, the
19 cold case specified factor of safety.

20 JUDGE BARATTA: All right. So if there
21 were a deviation that occurred due to construction
22 error, would that then have to be analyzed to
23 determine if that factor of safety would be met?

24 DR. HARTZMAN: It would have to be
25 checked, yes.

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1 JUDGE BARATTA: And what would be done if
2 it did not?

3 DR. HARTZMAN: It would have to be
4 submitted to the staff for review and for -- for
5 review and approval.

6 JUDGE BARATTA: And what would the staff
7 usually require in order to make an assessment?

8 DR. HARTZMAN: A thorough review of
9 whatever analytical evaluation was done of this
10 deviation.

11 JUDGE BARATTA: Would they require an
12 analytical evaluation typically? Would an analytical
13 evaluation be typically required?

14 DR. HARTZMAN: Yes, I would think so, yes.

15 JUDGE BARATTA: Okay. Thank you.

16 CHAIRMAN HAWKENS: We are going to take a
17 break before we sit the final panel, which will be on
18 future corrosion. We're going to make it an hour and
19 15 minutes, so we will reconvene at 12:45. During
20 that time, the parties will have another opportunity
21 to present this Board with any proposed questions
22 they may wish the Board to ask regarding the topics we
23 have just covered. And again, the proposed questions
24 should be linked to the line of questioning that were
25 asked by the Board Members.

1 MR. WEBSTER: Judge?

2 CHAIRMAN HAWKENS: I meant 12:45 we will
3 reconvene.

4 MR. WEBSTER: Judge, I think we are making
5 good progress today, but I think we do have quite a
6 lot of loose ends to wrap up during the break. I
7 think it would be helpful rather than taking another
8 break to wrap those loose ends up if we try to find
9 all the things that we said we would find and provide
10 the --

11 CHAIRMAN HAWKENS: Are you saying an hour
12 and 15 minutes is not enough?

13 MR. WEBSTER: An hour and a half I would
14 be happier with if that's possible.

15 CHAIRMAN HAWKENS: NRC staff and AmerGen,
16 do you require an hour and a half also?

17 MR. SILVERMAN: We don't require that much
18 time, Your Honor. I guess we wouldn't have a strong
19 objection.

20 MS. BATY: I don't think --

21 CHAIRMAN HAWKENS: You are accommodating
22 as always NRC staff.

23 MS. BATY: Yes.

24 CHAIRMAN HAWKENS: Given the limited
25 manpower that's available to Citizens, I think that's

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1 not an unreasonable request. We will go with an hour
2 and a half.

3 MR. WEBSTER: Thank you, Judge. We will
4 do our best to wrap up.

5 CHAIRMAN HAWKENS: And we'll march
6 through. Let's try to make sure we do have all loose
7 ends wrapped up in that time.

8 MR. WEBSTER: We will absolutely do our
9 best to do that.

10 CHAIRMAN HAWKENS: Thank you very much.

11 MS. BATY: Oh, Your Honor, there is --

12 CHAIRMAN HAWKENS: One second, please.

13 MS. BATY: -- a limitation of being able
14 to provide additional questions in writing or at least
15 in typed format.

16 MS. WOLF: I never said you need to type
17 one up. Just be clear it has to go into the docket,
18 so it has to be legible. My knowledge is that we
19 don't have a typed requirement, it has to go into the
20 docket. I never said it had to be printed.

21 CHAIRMAN HAWKENS: That is good. If it
22 can be typed up, great. If it is handwritten to the
23 extent it's legible, that would be fine. I am advised
24 the library does have a printer available. So we're
25 in recess.

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1 (Whereupon, at 11:34 a.m. the hearing was
2 adjourned, to reconvene at 1:04 p.m. this same date

3 CHAIRMAN HAWKENS: We are back on the
4 record.

5 Good afternoon. Before seating the final
6 panel, could we get Dr. Hartzman back up to the
7 microphone. A couple of questions we would like to
8 ask him.

9 Good afternoon, Dr. Hartzman. As a
10 reminder, you remain under oath.

11 DR. HARTZMAN: Good afternoon, sir.

12 CHAIRMAN HAWKENS: Prior to the recess,
13 Dr. Baratta was asking you some questions about the
14 safety margin required. Were you required to comply
15 with the ASME code of 2.0 at the design phase, at the
16 modification phase, and --

17 DR. HARTZMAN: And at the modification
18 phase.

19 CHAIRMAN HAWKENS: And you indicated that,
20 yes, you would be required to comply with that. That
21 would be part of the CLB?

22 DR. HARTZMAN: Yes.

23 CHAIRMAN HAWKENS: He also inquired
24 whether -- if there was a deviation -- deviation as
25 opposed to a modification?

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1 JUDGE BARATTA: Either a deviation or a
2 discrepancy.

3 CHAIRMAN HAWKENS: If there were a
4 discrepancy, whether you would be required to comply
5 with the code as part of the CLB, and I believe you
6 answered that in the affirmative as well. Is that
7 correct?

8 DR. HARTZMAN: It depends what kind of a
9 deviation you are referring to.

10 CHAIRMAN HAWKENS: Okay.

11 DR. HARTZMAN: What are you referring to?

12 CHAIRMAN HAWKENS: Here is my question.
13 Do you view the degradation in the sand bed region of
14 the drywell shell as a deviation or discrepancy that
15 would require compliance with the ASME code?

16 DR. HARTZMAN: It is -- You could consider
17 it as a deviation, yes.

18 CHAIRMAN HAWKENS: And to follow up with
19 that, do you as a representative of the NRC staff view
20 that as a deviation that requires compliance with the
21 ASME code which requires a safety margin of 2, and
22 that is viewed as part of the CLB?

23 DR. HARTZMAN: We have examined the way
24 the licensee has approached this deviation, and we
25 have concluded that in this case the factor of safety

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1 of the code case would not be required to be met.

2 JUDGE ABRAMSON: Let me pursue this for a
3 moment, because it seems like we are getting some
4 variation in the responses to our questions.

5 If it were a regular deviation, you would
6 require the 2.0 safety factor?

7 DR. HARTZMAN: You see, again -- Again,
8 what exactly is meant by deviation? Are you referring
9 to the corrosion that is --

10 JUDGE ABRAMSON: Yes.

11 DR. HARTZMAN: -- that has been measured?

12 JUDGE ABRAMSON: Yes.

13 DR. HARTZMAN: Okay. Ordinarily, the
14 licensee would be advising us that the -- a corrosion
15 situation has existed, and they would provide
16 analytical recommendation for us to review; and if the
17 basis for the analytical recommendation is acceptable,
18 we would say we will accept the deviation -- a
19 deviation would not -- and the factor of safety of 2
20 would not be required to be met.

21 JUDGE ABRAMSON: Okay. let's pursue this
22 a little further, because we have a lot of additional
23 information about the analysis that the applicant
24 provided to you -- licensee provided to you in this
25 case.

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1 They provided you with analysis that
2 indicated, if the entire sand bed region were degraded
3 to .736 --

4 DR. HARTZMAN: That is correct.

5 JUDGE ABRAMSON: If -- then that would
6 produce a safety factor of 2, but they also provided
7 the staff with information that the entire sand bed
8 region is not degraded to .736. Did that enter into
9 your thinking?

10 DR. HARTZMAN: That was part of it, yes.

11 JUDGE ABRAMSON: And they also provided
12 you with analysis that indicated, if the entire sand
13 bed region were degraded to .736 and there were
14 additional tray degraded along the lines of the -- oh,
15 why can't I -- What is the right phrase?

16 MR. POLONSKY: Local buckling criteria.

17 JUDGE ABRAMSON: Local buckling -- local
18 buckling criteria degradation -- Why is that a blank
19 in my brain? I don't know -- that that would produce
20 a somewhat lower safety factor, but that there was
21 evidence to indicate that the liner was not degraded
22 to that condition. So that was another piece of
23 information they gave you.

24 Did that enter into your thinking?

25 DR. HARTZMAN: That would be one

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1 consideration.

2 JUDGE ABRAMSON: Okay. So you've got two
3 sets of analyses that the applicant provided to the
4 staff, both of them based on hypotheticals, neither
5 representing the actual conditions, both of which
6 indicate -- one of which indicated that it would
7 produce a safety factor of 2, and one which indicated
8 it would produce a safety factor of something like
9 1.9, a little more than 1.9.

10 Those entered into your accepting this
11 configuration. Do you view yourselves as having
12 accepted a safety factor of less than 2 or not; and if
13 so, why do you believe there is a safety factor of
14 less than 2 when you don't have any analysis of the
15 current configuration?

16 DR. HARTZMAN: No. The licensee provided
17 an analysis of what you call the local buckling
18 criteria. We examined that analysis fairly
19 thoroughly. We came to the conclusion that that
20 analysis was detailed enough, was refined enough. The
21 basic assumptions on which that analysis is based is
22 refined and conservative -- and conservative to admit
23 the possibility that the factor of safety was indeed -
24 - that analytically, the factor of safety -- it was
25 less than 2, analytically.

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1 JUDGE ABRAMSON: The computed safety
2 factor, but even though it was less than two, as -- I
3 don't want to put words in your mouth, but to me there
4 is --

5 MR. HARTZMAN: The basis -- The basis for
6 the criteria -- The basis for the criteria, which is
7 that analysis that G.E. provided, and other
8 information, supported a lower factor of safety. In
9 addition to that --

10 JUDGE ABRAMSON: You mean the theoretical
11 lower safety factor?

12 MR. HARTZMAN: Yes, theoretical. This is
13 an analytical factor of safety. the actual factor of
14 safety of the as built structure is higher than the
15 factor of safety corresponding to the acceptance
16 criteria, for the simple reason that the actual
17 thickness, the wall thickness, is greater than what
18 was chosen for the acceptance criteria.

19 So, yes, it is very possible that the true
20 factor of safety may be as high as 2 or greater, even
21 today, even with degraded areas.

22 MR. WEBSTER: Judge, I don't think the
23 witness has quite answered the question of what is the
24 acceptable level factor of safety.

25 JUDGE ABRAMSON: We haven't answered it

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1 sufficient for our purposes.

2 CHAIRMAN HAWKENS: Thank you, Dr.
3 Hartzman.

4 Would AmerGen please introduce the
5 witnesses for the final panel.

6 MR. POLONSKY: Yes, Your Honor. This is
7 Mr. Polonsky. For Panel 6, seated to my right is --

8 MR. WEBSTER: Sorry. Before Mr. Polonsky,
9 just remind the panel that we do have a few loose ends
10 to sweep up from this morning with regards to debris
11 in the concrete -- concrete debris in the drains, and
12 a couple of other issues.

13 CHAIRMAN HAWKENS: Thank you for bringing
14 that to my attention. Why don't we tie up those loose
15 ends first before going to the final word.

16 MR. POLONSKY: If we could, AmerGen's
17 preference would be to get Panel Six out of the way
18 and then go back to the loose ends. Frankly, some of
19 the things we thought were going to be provided to us,
20 like specific citations, you know, we are still
21 looking at. So we would not be prepared to wrap up
22 those loose ends at this time.

23 CHAIRMAN HAWKENS: All right. If you are
24 not prepared to wrap them up, we will proceed with the
25 --

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1 MR. WEBSTER: Judge, I think we are
2 prepared to do at least the concrete debris in the
3 sand bed drains. That's very easy, and it will be
4 cogent with the testimony we had this morning.

5 JUDGE ABRAMSON: Why don't you let Judge
6 Hawkens run this proceeding.

7 MR. WEBSTER: Well, I am merely offering
8 a suggestion.

9 CHAIRMAN HAWKENS: And I appreciate that.
10 Let's go ahead and introduce the members of the final
11 panel and go forward with that.

12 MR. POLONSKY: Seated to my right is Mr.
13 Michael Gallagher. Seated to his right is Barry
14 Gordon. Seated to his right is Mr. Edwin Hosterman.
15 Mr. Gordon and Mr. Hosterman have not been on a
16 previous panel. So I guess I would just like to add
17 that Mr. Gordon is with Structural Integrity
18 Associates and is our proffered corrosion expert, and
19 seated to his right, Edwin Hosterman is with Exelon's
20 corporate group out of Kennett Square, Pennsylvania,
21 and he is more of a heat transfer evaporation expert.

22 CHAIRMAN HAWKENS: Thank you.

23 MS. BATY: For the NRC staff, we have Mr.
24 Hans Ashar, Dr. Jim -- James Davis, Dr. Mark Hartzman,
25 and Dr. -- excuse me, Mr. Timothy O'Hara and Mr.

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1 Arthur Salamon.

2 CHAIRMAN HAWKENS: Thank you.

3 MR. WEBSTER: And for Citizens,
4 metaphorically wearing his spandex and cape, we have
5 Dr. Hausler.

6 CHAIRMAN HAWKENS: Thank you very much.
7 For the record, the witnesses were sworn yesterday,
8 and the witnesses are reminded, those who have not
9 been empaneled yet today, that they remain under oath
10 or affirmation.

11 JUDGE ABRAMSON: I have no questions for
12 this panel. The beauty of being a Judge is you don't
13 have to be an expert. It's up to the experts to
14 educate us.

15 CHAIRMAN HAWKENS: Let me ask a question
16 to AmerGen. If the coating fails, and if there is
17 water in the sand bed region, what would the rate of
18 corrosion be?

19 MR. POLONSKY: Mr. Gordon is best to
20 answer that.

21 MR. GORDON: Assuming that situation, the
22 water -- source of water would be very high purity
23 water, and there have been studies performed,
24 corrosion rate as a function of temperature over this
25 range where the sand bed region is exposed to.

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1 Typically, at the temperatures of about, at the lower
2 end where the flaw is, where you would expect to have
3 the most amount of possible water, which is 93 degrees
4 Fahrenheit, the corrosion rate would be about 3 mils
5 per year.

6 JUDGE ABRAMSON: That's assuming no
7 coating?

8 MR. GORDON: No coating, fresh surface,
9 shiny steel where the corrosion rate would be at its
10 highest.

11 JUDGE ABRAMSON: And continuous exposure
12 to water?

13 MR. GORDON: Continuous exposure over that
14 period.

15 JUDGE ABRAMSON: Refresh my recollection.
16 In the old days when you had the sand bed, what was
17 the computed average corrosion rate over the period?

18 MR. GORDON: the highest identified
19 corrosion rate was about 39 mils per year. This is
20 water, saturated sand against bare carbon steel.

21 JUDGE ABRAMSON: What made that so much
22 greater than the situation you are suggesting here?

23 MR. GORDON: Well, it's a number of
24 things. You have a higher conductivity water.

25 JUDGE ABRAMSON: Because?

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1 MR. GORDON: You have chlorides present
2 and other impurities and stuff like that, but the only
3 water that would come down now will be very low
4 conductivity water.

5 JUDGE ABRAMSON: Why was that other water
6 -- Why did the water in the old days have chlorides
7 and such in it, and the water that one might expect
8 today to get down there be different?

9 MR. GORDON: Well, it traveled along the
10 shell. It traveled through the sand. The sand is
11 stored in a marine atmosphere outside the plant while
12 the plant was being constructed, and it was basically
13 sort of like marine sand. So it had a lot of
14 impurities in it, and so the conductivity was higher.

15 MR. GALLAGHER: I would like to add, Judge
16 Abramson, as far as that 39 mils per year, it is an
17 early-on corrosion rate before the corrective action.

18 If I can just point you to a graph that
19 shows the long term before the corrective action, look
20 at Exhibit 3, AmerGen Exhibit 3. And I'm sorry, there
21 doesn't seem to be page numbers. Let me see if I can
22 point you to it.

23 If you look at -- there is a page 6-22,
24 which is a title page.

25 CHAIRMAN HAWKENS: Are we able to put that

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1 on the screen? Let's see if we can get it up on the
2 screen.

3 MR. WEBSTER: Sorry. Which page?

4 MS. YOUNG: 6-22.

5 MR. POLONSKY: We are going to be going to
6 6-22, which is the beginning of Attachment 1, but then
7 there are a number of unnumbered graphs that are
8 within Attachment 1, and once we get to 6-22, we can
9 direct the projector to go to the specific page we are
10 trying to get to.

11 MR. GALLAGHER: So this is -- Go 15 --
12 This section has all the graphs. Go 15 slides
13 forward, 15 pages forward, and just -- I just wanted
14 to point out the biggest rate, which is -- It's Figure
15 18. It is labeled Figure 18 at the top. Okay.
16 That's it.

17 On the lefthand side where it has the
18 corrosion rate of negative-18 mils per year. So that
19 was the rate that was sustained through that period of
20 time before the corrective action was put in place.

21 JUDGE ABRAMSON: What is the relationship
22 between that 18 mils corrosion rate and the 39 you
23 gave me earlier? I'm lost.

24 MR. GALLAGHER: The 39 was an early
25 projection based on a few data points, and it would

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1 have been, you know, a --

2 MR. WEBSTER: Objection, Judge. That
3 witness didn't testify to the 39. So I don't know how
4 he knows what basis it was.

5 MR. POLONSKY: Mr. Gordon, can you please
6 respond to that?

7 MR. GORDON: If you can look at AmerGen
8 Exhibit 23, the second page, you will see a table of
9 corrosion rates, and you will see the 39 was the
10 highest rate on that page.

11 MR. POLONSKY: But, Mr. Gordon, could you
12 address why -- I mean, you started talking previously
13 about a shiny surface and why the corrosion would be
14 higher earlier. Could you address, I guess, that
15 question?

16 MR. GORDON: Yes, certainly. When you put
17 fresh metal into an environment, the iron wants to go
18 into solution, and if there is nothing there, no film
19 on the surface, it will go in very readily. As film
20 builds up, as rust builds up on the surface, it
21 becomes more and more difficult.

22 So the initial corrosion rates of fresh
23 metal in a solution is always the highest.

24 JUDGE ABRAMSON: So these corrosion rates
25 were indicated in the sand bed region when sand was

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1 there holding this water that had a lot of impurities
2 that could cause corrosion?

3 MR. GORDON: That is correct.

4 JUDGE ABRAMSON: And it was continuously
5 there. What is AmerGen's expectation for the presence
6 of water in the bottom of the sand bed region going
7 forward from today?

8 MR. GALLAGHER: Well, our expectation is
9 there wouldn't be. We have corrected the situation,
10 and we have the leak-off from the trough that handles
11 the water. We have also made commitments that, if
12 water was detected in there, we would take corrective
13 action.

14 JUDGE ABRAMSON: And as we understood from
15 the earlier panel's testimony, the maximum number of
16 days there would be water in the reactor cavity is
17 something like 15 days a year.

18 MR. WEBSTER: Objection, Judge. That is
19 not established.

20 JUDGE ABRAMSON: We were told that the
21 water in the reactor -- During refueling, the reactor
22 cavity -- Refueling took 26 days, and I think what we
23 heard was that it took something like -- and refueling
24 occurs every other year, and if you take 26 days and
25 divide it by two, you come up with 13. Is that where

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1 that comes from?

2 So I said 15. I'm sorry if I
3 overestimated it. In fact, we heard information that
4 the water in the reactor cavity is there for less than
5 26 days. It is there for something like three weeks
6 or less. So, in fact, it is a lower number than that.
7 So that is where that is coming from. Sorry if I am
8 able to do some of these calculations in my head.

9 MR. WEBSTER: I misheard you. My
10 apologies, Judge.

11 JUDGE ABRAMSON: If there were water there
12 and it were to leak during those 15 days, what would
13 happen to it in the bottom of the sand bed region,
14 once it got there?

15 MR. GALLAGHER: It would drain off into
16 the sand bed drains, and as we testified before, the
17 floor on the sand bed is shaped so that it goes away
18 from the shell and into the drains.

19 The other thing I would mention is we
20 daily -- During refueling outages, because there is
21 water in the reactor cavity at the time, we check
22 those drains daily, the sand bed drains, the five sand
23 bed drains. We check those daily.

24 JUDGE ABRAMSON: Oh, you check them daily.

25 MR. GALLAGHER: For leakage.

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1 JUDGE ABRAMSON: So if it drained off,
2 while there might be some residual, one could expect
3 some evaporation of the residual, and if there were no
4 protective coating on the drywell shell, then that
5 would be the time that there could be some corrosion.
6 Is that correct?

7 MR. GALLAGHER: Yes. As we testified, the
8 time that the water could be on the shell is only
9 during the refueling outage and when the plant starts
10 up, the shell is heated up and --

11 MR. WEBSTER: I object on foundation for
12 that.

13 MR. GALLAGHER: -- would quickly evaporate
14 off.

15 CHAIRMAN HAWKENS: Objection is overruled.
16 Please continue.

17 MR. GALLAGHER: I'm sorry. And one of the
18 things I do want to point out from Dr. Hausler's
19 testimony, he had indicated that there is no air flow
20 in this region.

21 MR. WEBSTER: Objection. This witness
22 doesn't have expertise in air flow.

23 MR. GALLAGHER: Yes, I do.

24 CHAIRMAN HAWKENS: Objection is overruled.
25 Please continue.

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1 MR. GALLAGHER: Between the bioshield and
2 the drywell shell, there is a one-inch air gap. Okay?
3 And so there is continuous air exchange between that
4 volume and the exterior, and also from the bioshield
5 is not airtight, because there are various
6 penetrations through the bioshield for the piping that
7 penetrates for the primary containment.

8 JUDGE ABRAMSON: Natural circulation air
9 flow?

10 MR. GALLAGHER: Yes.

11 CHAIRMAN HAWKENS: Does the 3 mil per year
12 include interior corrosion?

13 MR. GORDON: No, that's just based on the
14 exterior corrosion.

15 CHAIRMAN HAWKENS: Do you have any
16 estimate for interior corrosion?

17 MR. GORDON: It would be very low,
18 probably a value lower than that. You have -- Any
19 water that is present will be high pH concrete pour
20 water, which produces a protective film on the steel,
21 and the corrosion rate is essentially negligible.

22 CHAIRMAN HAWKENS: NRC staff, do you have
23 anything to add to that discussion?

24 MR. ASHAR: I am Hansraj Ashar. I wanted
25 to find out when you ask question that is it internal

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1 -- do you mean the corrosion on the inside surface or
2 the measurement is taken from inside?

3 CHAIRMAN HAWKENS: My latter question, I
4 was asking whether it be 3 mil per year included a
5 figure for corrosion on the interior.

6 MR. ASHAR: Interior. Thank you, sir.

7 CHAIRMAN HAWKENS: Thank you. Nothing
8 more from the NRC staff?

9 Dr. Hausler, could we hear from you your
10 response to AmerGen?

11 DR. HAUSLER: Yes. I have just a few
12 minor comments, really. With respect to the 3 mils,
13 I would like to comment that that was specified for 93
14 degrees Fahrenheit, and of course, we do know that
15 the corrosion rate is dependent on temperature. That
16 is the first thing.

17 The second thing is that the high
18 corrosion rate --

19 CHAIRMAN HAWKENS: Excuse me, Dr. Hausler.
20 So it is your view that it would be slightly higher
21 than 3 mil per year?

22 DR. HAUSLER: Well, specifically, the
23 corrosion rate is set to increase -- to double as the
24 temperature increases 10 degrees Centigrade. That is
25 more or less correct.

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1 So in other words, you know, if we go up
2 40 degrees Fahrenheit, you know, we can assume that
3 the corrosion rate more or less quadrupled.

4 JUDGE ABRAMSON: Mr. Gordon, is that
5 accurate?

6 MR. WEBSTER: Excuse me.

7 JUDGE ABRAMSON: This is our style, and if
8 you will just allow me to get answers to my questions.
9 Dr. Hausler has made an assertion about what the
10 corrosion rate -- what the effect of temperature is on
11 corrosion rate. I'd like to have an answer --

12 MR. WEBSTER: I object. My witness did
13 not have a chance to respond in full to AmerGen.
14 AmerGen had a chance to put their case in full, and I
15 think it would really be one-sided if AmerGen rebuts
16 each point, point by point, while we have to wade
17 through it in an interrupted fashion.

18 CHAIRMAN HAWKENS: As we informed you at
19 the beginning before we started this session, the
20 purpose of this session is for us to ask questions and
21 to get answers. We advised you in a telephone
22 conference, and we have advised you on numerous other
23 occasions, that our style is to get various experts
24 and to ask experts what they think of what other
25 people are saying.

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1 We've done that. We are doing it now, and
2 please, Mr. Gordon, just give us your view of whether
3 it is reasonable to expect the corrosion rate to
4 increase with temperature of this kind of magnitude
5 that we are --

6 MR. GORDON: Certainly, below a certain
7 temperature -- The corrosion rate goes through a
8 maximum. At about 160 Fahrenheit, you reach a maximum
9 corrosion rate in this environment of about 8 mils per
10 year. At 130 degrees Fahrenheit, it is about 5 mils
11 per year. So it does go up, but it doesn't go up by
12 10 degrees. It depends on the activation energy.

13 So it's close. It's like 15 degrees, 16
14 degrees, carbon steel.

15 JUDGE ABRAMSON: So now, Dr. Hausler, you
16 have what he has to say about this. What is your view
17 of this?

18 DR. HAUSLER: It's a number -- The
19 doubling of the corrosion rate or 10 degrees
20 Centigrade is a number that is quoted in practically
21 all textbooks on corrosion. I don't think we have to
22 go and establish that in great detail now.

23 CHAIRMAN HAWKENS: Fine. Carry on.

24 MS. BATY: Would you like to hear from the
25 staff?

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1 MR. WEBSTER: Well, again I would ask if
2 my witness could --

3 CHAIRMAN HAWKENS: We have asked who we
4 wanted to ask. Let's have Dr. Hausler keep -- If my
5 colleagues want more information, they will ask. This
6 is our style. This is our hearing. This is our
7 inquisition, if you will.

8 MS. BATY: Your Honor, it was just if you
9 wanted to hear from us on the -- our expert on the
10 corrosion rates for the temperature.

11 JUDGE ABRAMSON: We may.

12 MS. BATY: Okay.

13 JUDGE ABRAMSON: Please, Dr. Hausler.

14 DR. HAUSLER: Thank you very much. I do
15 appreciate it.

16 Let's also consider that the corrosion
17 rate -- you know, whether it is in oxygen or in acid
18 or another environment -- is highly dependent on the
19 nature of the metal. And in fact, there are different
20 types of steels. For instance, 533A which is a high
21 tensile strength steel, or there is, I think it is 210
22 or 218 that is being here is lower. There are
23 different alloys in these steels to achieve the
24 tensile strength of them. There are different heat
25 treatments, and all of these affect, in fact, the

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1 corrosion rate.

2 I don't need to go into the detail. I
3 don't need to, I think, give you a lecture on the
4 effects various parameters --

5 JUDGE ABRAMSON: Did I ask you if we need
6 it?

7 DR. HAUSLER: -- that affect the corrosion
8 rate. However, I would like to touch on a different
9 subject, and that is the nature of the water.

10 We have seen, in fact, a number of
11 analyses for the water, and that was drained out of
12 the sand bed, and it was accused for the corrosion
13 rates that were --

14 JUDGE ABRAMSON: This was during the --
15 before the sand was removed or after the sand was
16 removed? You say drained out of the sand bed.

17 DR. HAUSLER: Actually, those were before
18 the sand bed, because the corrosion rates that were
19 quoted of 39 mpy, 18 mpy and so on, were in fact
20 corrosion rates that were established in the sand bed.

21 JUDGE ABRAMSON: Okay. So you really
22 meant the water that was there at the time they had
23 the --

24 DR. HAUSLER: Yes. Your question was why
25 39 versus 3, you know, why 18, why the spread. The

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1 answer was from Mr. Gordon, I believe, because of the
2 amount of chloride that was in there.

3 Now it is a fact, of course, that chloride
4 does accelerate the corrosion under these -- corrosion
5 rate under these conditions. However, the numbers
6 that we have seen for chloride recently were of the
7 order of .04 ppm, and that is too low a number, too
8 low, in fact, a concentration to affect the corrosion.

9 JUDGE ABRAMSON: Was that water that was
10 taken out late, you know, in recent years as opposed
11 to water that was taken out in the early days when the
12 sand was pretty fresh? What I'm wondering is: These
13 chlorides come from salt in the sand, I assume.

14 DR. HAUSLER: Your Honor, we have seen
15 quite a number of water analyses that were, in fact,
16 passed on from AmerGen in the discovery process. Now
17 these --

18 MR. WEBSTER: Judge, can I just interrupt
19 my witness a little bit. I think we have to be
20 careful here to distinguish between chlorides on the
21 interior and chlorides on the exterior. I think the
22 record reflects that water was found that drained from
23 the sand bed region. After years of monitoring, water
24 was found in 1996, but I think the record reflects
25 that AmerGen threw that water away before they

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1 analyzed it.

2 JUDGE ABRAMSON: But we are talking about
3 the difference between the corrosion rate 20-some
4 years ago and the corrosion --

5 MR. WEBSTER: No, I understand that, but
6 what I'm saying is I don't think there are recent
7 measurements of the chlorides in the water that
8 drained from the sand bed region.

9 JUDGE ABRAMSON: That is-- But that is not
10 what we were asking. Dr. Hausler, I think, is
11 advising us what he thinks the chloride concentrate
12 was in the water that was coming through the sand.

13 DR. HAUSLER: Actually, I am trying to
14 advise you that we don't know what the chloride
15 concentration was for the very simple reason that the
16 analytical reports that presumably came out of the
17 laboratory from AmerGen did not indicate the
18 concentration associated with the numbers that were
19 presented there.

20 So there is a confusion whether this is
21 actually 48 parts per billion or 48 parts per million,
22 because, you know, at times we have seen in the
23 documentation ppm, and at times we have seen parts per
24 billion.

25 Nevertheless, the water that even was 40

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1 parts per million would be reasonably fresh, so that
2 we would not expect a great acceleration of the
3 corrosion rate.

4 JUDGE ABRAMSON: So to what do you think
5 one might attribute this higher corrosion rate when
6 the sand was there as opposed to what we are hearing
7 might be expected today?

8 DR. HAUSLER: I think it depends on where
9 you measure.

10 MR. WEBSTER: Judge, could I just help my
11 witness one second? I just remind the witness about
12 the 5rd material in the gap between the sand bed, and
13 whether that could be a source of chlorides.

14 DR. HAUSLER: Well, that was another sort
15 of confusion. I didn't want to touch on that, because
16 of the uncertainty there. But the 5rd at one point in
17 the testimony was, in fact, identified. In fact, I
18 think it is in the SER identified as magnesium
19 oxychloride, which I think is utterly impossible, but
20 that was the designation there.

21 In the beginning, I thought, yes, indeed,
22 you know, that's where the chloride comes from, but
23 later I think it was identified as different type of
24 fibrous material.

25 JUDGE ABRAMSON: Is it only chlorides that

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1 could cause this differential in the corrosion rate?

2 DR. HAUSLER: Well, you know, it is
3 halites, but the most abundant halite, of course, is
4 chloride. Chloride will not have the same effect, but
5 iodide and bromide would, but the most abundant is, in
6 fact, chloride.

7 So I don't think we can take these numbers
8 on face value. They do vary, and we don't really know
9 exactly what the parameters are -- the level of the
10 parameters are that affect the numbers that we are
11 talking about.

12 There was a thought that just escaped my
13 brain. I am sorry.

14 JUDGE ABRAMSON: You're not alone.

15 DR. HAUSLER: I do have a senior moment as
16 well.

17 Of course, you know, we also realize that
18 all of these corrosion rates were, as has been pointed
19 out, before corrective action was taken. So, you
20 know, they don't necessarily -- are not necessarily
21 valid anymore.

22 Judge Abramson, you asked why we would
23 expect a difference between -- a difference of 39
24 versus maybe 10 or 18 or whatever. I indicated that
25 that was most likely because of where the measurement

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1. was taken.

2. The sand is not uniform, as I have
3. indicated earlier. It is not necessarily level, and
4. in this particular case of corrosion that we identify
5. is crevice corrosion or under deposit corrosion.

6. It is very important to, in fact, specify
7. the location where the measurement was taken with
8. respect to the surface of the deposit, and the depths
9. that you go into the deposit to properly characterize
10. the measurement that has been taken.

11. Of course, we don't know that, really,
12. because when the measurements were taken, we assumed
13. that there was a sand bed there, but we didn't know
14. how high it was, what the surface at the sand bed was,
15. and so on. I think that should explain the
16. differences in these numbers.

17. MR. WEBSTER: I think I want to make sure
18. that AmerGen testified that because the epoxy on the
19. floor is there that the water would go to the drains.
20. Is that necessarily true?

21. DR. HAUSLER: Well, the floor was shaped.
22. I haven't been there. So I really can't testify
23. effectively as to what the slope of the floor really
24. was. However, I think I do want to come back to the
25. question of water being there in 2006.

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1 Some drains had, in fact, been found
2 plugged. Now if drains are plugged, you don't find
3 any water coming out from the sand bed, but that
4 doesn't mean that there is no water there. That is
5 the first point I wanted to make.

6 The second point is that the plugging had
7 been indicated by material -- and this, by the way, is
8 AmerGen's -- No, it is our Exhibit 52, on the third
9 page. The deposits or the plugging material had been
10 identified as most likely being cement.

11 Again, I do ask the same question I asked
12 this morning. How does the cement get into the
13 drains? There has to be water there to sweep it
14 there. Otherwise, we cannot assume that (just
15 fortuitously cement falls off the bioshield right into
16 the drain.

17 MR. WEBSTER: One other question. If
18 there were cracks in the floor, would that have an
19 effect on how the water flows?

20 DR. HAUSLER: Yes, of course, it would.
21 You know, there was a concern about -- as we had
22 indicated earlier, that the floor cracked. Now we do
23 know that in '92 the floor wasn't finished, etcetera,
24 and then it was built up.

25 We also know that more recently the floor

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1 had to be repaired again, because there were cracks
2 there. Now in my mind, those cracks would actually
3 cause the water to flow toward -- or could cause the
4 water to flow toward the shield rather than away from
5 it. But we get into an area that may not necessarily
6 be within the scope of this hearing, and so I don't
7 want to pursue it unless you urge me to do that.

8 CHAIRMAN HAWKENS: I'd like to hear from
9 the NRC staff on the correlation between temperature
10 and corrosion, please.

11 DR. DAVIS: Hi. This is Jim Davis from
12 the staff.

13 It is a little bit more complicated than
14 Dr. Hausler stated. It is very true that the
15 Arrhenius equation applies to all kinetic reaction,
16 and that's for every 10 degrees C increase in
17 temperature you get a tenfold increase in reaction
18 rate.

19 That assumes that all reactants are
20 constant.

21 JUDGE ABRAMSON: Tenfold?

22 DR. DAVIS: Or twofold. I'm sorry,
23 twofold.

24 What actually happens is, when you heat
25 water, of course, the oxygen solubility drops. So

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1 that Arrhenius equation does not hold in water, and
2 also you have to be extremely careful when you are
3 looking at a situation like this, because you may
4 actually be going from corrosion in an immersed
5 condition to atmospheric corrosion, which is a total
6 different ball game.

7 I think you would be more likely, although
8 I doubt if you would get much atmospheric corrosion
9 under the conditions, because the humidity is not high
10 enough in this area. So you would see very little
11 corrosion unless you were immersed in water, but it is
12 a little bit more complicated than what Dr. Hausler
13 expressed.

14 That's why you go through a maximum,
15 because -- and you even drop more, like I've done a
16 lot of experiments at higher temperatures where, when
17 you go above about 200 degrees in just a laboratory
18 experiment, your corrosion rate drops dramatically,
19 because your oxygen is almost insoluble. You no
20 longer have the oxygen driving force for the reaction
21 to occur.

22 So you have to make sure that nothing
23 changes when you are applying an Arrhenius equation,
24 none of the reactants change.

25 MS. BATY: May I ask the staff's witness

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1 to spell the name of the equation for the record?

2 DR. DAVIS: A-r-r-e-n-i-o-u-s, I believe.

3 JUDGE ABRAMSON: I think it is u-s.

4 MS. BATY: Someone spell it for the
5 record, please.

6 DR. HAUSLER: Well, it is A-r-r-h-e-n-i-u-
7 s.

8 MR. POLONSKY: If AmerGen could address
9 two issues, when the Judges are ready.

10 DR. HAUSLER: May I respond to the comment
11 from --

12 CHAIRMAN HAWKENS: Please, Dr. Hausler.
13 Go ahead.

14 DR. HAUSLER: What the witness just said
15 is entirely correct. I did not want to bother Judge
16 Abramson with a lecture on the kinetics of corrosion.
17 However, there is another --

18 CHAIRMAN HAWKENS: A quick interruption.
19 You have three Judges up here. One is not legally
20 trained. So please, don't hesitate to share your
21 knowledge with us.

22 DR. HAUSLER: I am perfectly prepared to
23 that, if you are willing to listen for the next 15
24 minutes.

25 CHAIRMAN HAWKENS: Well, that is a little

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1 bit long, but go ahead and summarize what you wanted
2 to say.

3 DR. HAUSLER: It is quite correct, of
4 course, that the oxygen eventually now will get out of
5 the water, and so you have competing effects. You
6 have less oxygen, but higher corrosion rate, and you
7 get into questions of mass transfer, how fast can you
8 get the oxygen to the surface of the metal. And so
9 you get into questions of flow rate or stagnant
10 situations and so on.

11 If you get to higher temperatures,
12 however, the water can, in fact, take the place of
13 oxygen, and the water can react with iron, you know,
14 forming hydrogen and hydroxide irons, in essence iron
15 hydroxide. That is why we often find magnetite on the
16 surface of corroded metals or magnetite-type corrosion
17 product.

18 So, yes, the witness was quite correct.
19 The situation is a lot more complicated than what I
20 ventured to explain in the first part of the
21 testimony.

22 CHAIRMAN HAWKENS: Based on your review of
23 the record, during the time the reactor cavity is
24 filled, what would the temperature range be during
25 that several week period?

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1 DR. HAUSLER: I am really confused on
2 that, Your Honor.

3 CHAIRMAN HAWKENS: Okay. Should I address
4 that to AmerGen or are you prepared to provide an
5 answer based on the record?

6 DR. HAUSLER: Let me tell you what it is
7 that I know. Originally, that there was a pressure
8 specification of 66 psi and the temperature
9 specification for the operation of the reactor
10 environment, the reactor housing of, I believe, 173 or
11 something like that. Later on, the pressure had been
12 lowered to 44 psi, and the temperature had been
13 increased to 273. This is actually in the record.

14 Now I just want to mention that I am kind
15 of confused as to what the temperature in that sand
16 bed region really was. I'm not sure anybody really
17 knows what the temperature there is during normal
18 operation.

19 MR. WEBSTER: Can I just clarify, Judge?
20 There are two questions: What's the temperature
21 during normal operation, and what the temperature
22 during the refueling outage?

23 CHAIRMAN HAWKENS: My principal concern
24 was during the refueling outage, because my
25 understanding is that's when the likelihood of water -

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1 - Well, if there is to be water, it is coming from the
2 reactor cavity, and that's when the water would be
3 expected to be there.

4 So my question was limited to during that
5 time period, what would you expect the range of
6 temperatures to be?

7 DR. HAUSLER: I don't know. I haven't
8 been around. I'm sorry.

9 CHAIRMAN HAWKENS: Well, that's all right.

10 DR. HAUSLER: I can't answer the question.

11 CHAIRMAN HAWKENS: Thank you. Let me see
12 if AmerGen can eliminate the confusion.

13 MR. POLONSKY: Your Honor, that was one of
14 the two points that I was hoping to get to. If we
15 could hand the mic, I guess, over to Mr. Edwin
16 Hosterman on heat transfer, I believe he has done
17 calculations about what the temperature would be
18 during refueling outages. And you are talking about
19 the exterior where the water would be present?

20 CHAIRMAN HAWKENS: That is correct.

21 MR. POLONSKY: Okay.

22 MR. HOSTERMAN: Well, just to be clear,
23 the calculation I did is normal --

24 CHAIRMAN HAWKENS: Can you identify where
25 in the record?

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1 MR. HOSTERMAN: Excuse me. Edwin
2 Hosterman, Exelon.

3 Just to clarify the record, the
4 calculation that I did for the purposes of calculating
5 evaporation rates was based on normal operation.
6 However, the starting point for that calculation would
7 be the expected temperature in the air space that
8 would occur during a refueling outage, and those would
9 be roughly the same temperatures that we would see in
10 the torus room, which can range up to about 90 degrees
11 Fahrenheit, which can range up to about 90 degrees
12 Fahrenheit, and that will vary, depending on when we
13 start the refueling outage and what the outside air
14 temperatures are at the time. But 90 degrees is
15 probably pretty typical for the upper range of
16 temperatures in that room during an outage.

17 CHAIRMAN HAWKENS: Thank you. And is that
18 in testimony in the record or otherwise in a record
19 exhibit?

20 MR. POLONSKY: Let me just quickly look
21 through the rebuttal and surrebuttal testimony.

22 CHAIRMAN HAWKENS: While you are looking,
23 Mr. Polonsky, is there another area you wanted to have
24 a witness address?

25 MR. POLONSKY: Yes. It was the allegation

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1 that the drains were plugged, which I guess we
2 interpret as no water could go through, since Dr.
3 Hausler suggested we wouldn't see the water. So I
4 thought I would have an AmerGen person answer that
5 question.

6 CHAIRMAN HAWKENS: All right.

7 MR. POLONSKY: Pete Tamburro.

8 JUDGE ABRAMSON: Almost as ubiquitous as
9 Dr. Hausler, Mr. Tamburro.

10 MR. TAMBURRO: I am not sure how to take
11 that. Pete Tamburro.

12 I have looked at Exhibit -- Citizens
13 Exhibit 52. This is an issue report that was issued
14 by myself during the 2006 outage.

15 During the 2006 outage, we inspected the
16 five sand bed drains. The way we inspected them was
17 by inserting the boroscopic device, and we snaked it
18 through the entire drains.

19 Three of the drains were completely empty
20 and had no debris in it. A fourth drain had some
21 debris in it, but we were able to push the boroscope -
22 - minor debris in it, and we were able to push the
23 boroscope through, completely through it.

24 The fourth one had some blockage, and I
25 described the debris as -- and I am reading from

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1 Exhibit -- Citizens Exhibit 52: Debris looks like
2 loose --

3 CHAIRMAN HAWKENS: What page?

4 MR. TAMBURRO: Page 3 of 5: Debris looks
5 like loose concrete.

6 CHAIRMAN HAWKENS: I'm sorry, what page?

7 MR. TAMBURRO: I apologize. It is
8 Citizens Exhibit 52, page 3.

9 MR. GALLAGHER: Upper righthand corner.
10 This is a corrective action report from AmerGen.

11 MR. TAMBURRO: Can I continue? Okay.

12 So in summary, one of the five drains was
13 blocked, and we could not pass our boroscope through.
14 I entered this corrective action, and we corrected the
15 situation by removing the blockage and clearing the
16 two drains that had any debris in it.

17 My opinion of this one drain that was
18 blocked physically so that the boroscope could not
19 pass through was that it was not clogged. There were
20 plenty of spaces between the loose pieces of what I
21 termed concrete that would have allowed flow. There
22 was no water in that line or any of the five lines,
23 and we have since resolved that and cleared the two
24 lines.

25 JUDGE ABRAMSON: Mr. Tamburro,

1 unfortunately, I'm having trouble finding the right
2 page in the exhibits that we have.

3 MR. GALLAGHER: It's Citizens Exhibit 52.

4 JUDGE ABRAMSON: Citizens 52? Okay. I'm
5 sorry. We were looking at your exhibit. Thank you.

6 CHAIRMAN HAWKENS: Mr. Tamburro, does
7 AmerGen have a practice in place for the future to
8 ensure the drains do not become clogged?

9 MR. TAMBURRO: Yes.

10 CHAIRMAN HAWKENS: Can you explain that to
11 me, please?

12 MR. TAMBURRO: We will perform the same
13 inspection periodically. In addition, we have looked
14 inside the sand beds for loose material that could end
15 up in the drains, and there was none. None was
16 reported in any of the inspections.

17 CHAIRMAN HAWKENS: Is that part of your
18 commitment, the drain inspection part of AmerGen's
19 commitment for the renewal period, or is that an
20 internal procedure?

21 MR. TAMBURRO: I'm not sure. I could ask
22 Mr. Gallagher to answer that.

23 MR. GALLAGHER: It's an internal
24 procedure.

25 CHAIRMAN HAWKENS: Thank you.

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1 MR. POLONSKY: Your Honor, I have
2 identified the page in the testimony, if I could just
3 confer to this with Mr. Hosterman.

4 CHAIRMAN HAWKENS: Please.

5 MR. POLONSKY: We may have to bring on one
6 other witness after this as well.

7 MR. HOSTERMAN: As I had specified, the
8 original calculations that I had done for the sand bed
9 region were for normal operations, and this is for an
10 internal drywell temperature of 130 degrees.

11 I calculated an air temperature in the
12 sand bed region of approximately 109-110 degrees,
13 109.5, to be precise, but that would be during normal
14 operations. Refueling outages would be lower
15 temperatures, because we do not have the heat sources
16 in the drywell.

17 MR. WEBSTER: What are we referring to
18 here?

19 MR. POLONSKY: I'm sorry. My apologies.
20 This is AmerGen's direct testimony, and it is Part 6,
21 and Mr. Hosterman was reading or referring to
22 refreshing his memory from answering 19, which is on
23 page 12 of 15.

24 CHAIRMAN HAWKENS: Does the NRC staff have
25 anything to add to that?

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1 MR. O'HARA: Yes, Your Honor. Tim O'Hara,
2 Region 1 inspector.

3 During the fall outage in 2006, I did note
4 that condition along with Mr. Tamburro. It is our --
5 my opinion that the drains did have debris in them,
6 but were not blocked, and we agreed with their
7 summation of handling it and cleaning it out.

8 CHAIRMAN HAWKENS: Thank you.

9 JUDGE ABRAMSON: Do you have any idea
10 where the debris came from, how it got there?

11 MR. O'HARA: My guess would be that it
12 came from the shield wall, spalled off the shield wall
13 inside the sand bed region.

14 JUDGE ABRAMSON: Is a swelling normal
15 under these circumstances, these physical conditions?

16 MR. O'HARA: It's not abnormal.

17 JUDGE ABRAMSON: Does AmerGen want to
18 comment on how the debris got there? Does that sound
19 like a sensible guess?

20 MR. GALLAGHER: Our analysis was that it
21 was historical, and it was probably from --

22 JUDGE ABRAMSON: That it had been there
23 for some while?

24 MR. GALLAGHER: It was just not cleared
25 out when the original drains were cleared out, and as

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1 we testified, it did not impact actual flow area.

2 MR. O'HARA: I would like to add, as we
3 had said before, we didn't see any evidence that there
4 had been water in there that had swept this into the
5 drain.

6 DR. HAUSLER: Let me just comment that,
7 when the floor in 1992 was repaired, so were the
8 drains. I think it is bit disingenuous to indicate
9 that the debris in those drains was historical. It's
10 the one point.

11 The other point said here in the
12 conclusions: Sand bed drains from elbow to sand bed
13 were agglomerated, thus preventing water from
14 draining, and have been cleared. That's the
15 conclusion on page --

16 MR. WEBSTER: Just to be clear, that is
17 Citizens Exhibit 25.

18 DR. HAUSLER: That is the conclusion on
19 the same page that we just looked at. I mean on the
20 same exhibit that we just looked at. That would be
21 page 4.

22 MR. WEBSTER: That's Exhibit -- Could you
23 just verify, Dr. Hausler, which exhibit that is.

24 DR. HAUSLER: That's Exhibit 22, I
25 believe.

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1 MR. WEBSTER: I'm sorry. My apologies.
2 That is Citizens Exhibit 22.

3 DR. HAUSLER: And that would be on page 2
4 that I just read from.

5 MR. WEBSTER: No, it's not the same.

6 DR. HAUSLER: Exhibit 22, and it is page
7 2 that I read from.

8 MR. TAMBURRO: May respond, Your Honor?

9 JUDGE ABRAMSON: Yes, please.

10 MR. TAMBURRO: Exhibit 22 is a report that
11 was performed prior to 1992 when we discovered these
12 drains were clogged and we repaired them then. This
13 was not -- This is not a report describing the 2006
14 condition.

15 MR. WEBSTER: Can I just say that Mr.
16 Tamburro is entirely correct. The witness is
17 providing response to the suggestion that these
18 concretes were historic.

19 JUDGE ABRAMSON: So the point is that this
20 debris was cleared out in 1988.

21 MR. WEBSTER: Ninety-two, I think.

22 JUDGE ABRAMSON: I thought this report
23 said 1988. The debris was there in '88. Right? Am
24 I reading this wrong?

25 MR. WEBSTER: Dr. Hausler, what date is on

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1 that exhibit?

2 DR. HAUSLER: The date is '89, I believe,
3 March 3, '89.

4 JUDGE BARATTA: Now, Dr. Hausler, what you
5 are saying is that there was debris in there in 1988,
6 which was cleaned out in 1989, based on that report.

7 DR. HAUSLER: Right.

8 JUDGE BARATTA: And that any subsequent
9 debris that was found, such as what was found later,
10 was not, therefore, historical?

11 DR. HAUSLER: Well, again, you know, the
12 sand bed floor was build up. The drains were repaired
13 in '92 as well, and I would be highly surprised if the
14 drains at that time were not cleaned up for the water
15 to flow.

16 I believe subsequently it has also been
17 observed that -- well, in fact, it was in 2006 that
18 water did flow out the sand bed drains and had been
19 collected in water bottles that subsequently were
20 discarded prior to an inspection by NRC. That has
21 also pretty well established, I believe.

22 JUDGE BARATTA: Thank you.

23 CHAIRMAN HAWKENS: AmerGen, do you have
24 any response, or the NRC staff? If not, I have a
25 question for AmerGen.

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1 How often during shutdown and how often
2 during operations are these drains checked for water?

3 MR. GALLAGHER: For the sand bed drains,
4 the sand bed drains are checked daily when there is
5 water in the refueling cavity, and quarterly during
6 other times.

7 CHAIRMAN HAWKENS: Again, I am non-
8 technically trained. Why only quarterly during
9 operations?

10 MR. GALLAGHER: There really is no source
11 of water to come into the sand bed region, because the
12 source is the refueling cavity when we fill that with
13 water during refueling outages. So what we did is,
14 again, as a belt and suspenders check, is to quarterly
15 look for the possibility of anything else going on.

16 We have done those inspections, and
17 there's no water.

18 CHAIRMAN HAWKENS: Do other factors
19 contribute to that? For example, is it a radiation
20 area that you want to keep people out of or is it
21 purely driven by the fact that, in your judgment,
22 there is no source of water that would contribute?

23 MR. GALLAGHER: In our judgment, there is
24 no source of water. Quarterly is fine. It is an area
25 that the operators would have to dress out in. It is

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1 a contaminated area.

2 CHAIRMAN HAWKENS: NRC staff?

3 MS. BATY: The NRC staff, if the Board
4 would like to hear about the commitments that AmerGen
5 has made regarding water, monitoring for water --

6 CHAIRMAN HAWKENS: I would like to hear
7 them, please.

8 MR. ASHAR: This is Hansraj Ashar. I just
9 want to point out that in the number of commitments
10 that are made and which are in the Appendix A of SER,
11 there is a line item 3 under commitment 27. Second
12 bullet says, "The sand bed region drains will be
13 monitored quarterly during the plant operating cycle.
14 If leakage is identified, the source of water will be
15 investigated." Otherwise, the following items will be
16 performed, and there is a lot of things that they will
17 do if they find water.

18 So what I am saying is -- I will get a
19 clarification from AmerGen as to what they are going
20 to do, because I heard the word periodically and not
21 the quarterly test.

22 CHAIRMAN HAWKENS: All right. Thank you.

23 MS. BATY: And just for the record, the
24 SER is Staff Exhibit 1.

25 MR. WEBSTER: I believe Dr. Hausler has a

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1 comment.

2 CHAIRMAN HAWKENS: Dr. Hausler.

3 DR. HAUSLER: You asked the question, you
4 know, why the investigation, the monitoring of the
5 water, was quarterly, and you asked whether this was
6 because of radiation.

7 I just wanted to add to this, and perhaps
8 this is not in scope. But monitoring of water can be
9 done differently than having to send persons into
10 areas that are contaminated.

11 CHAIRMAN HAWKENS: Thank you. My
12 understanding from his answer was that, although it
13 would require them to dress out because it is a
14 contaminated area, that was not the driving factor.
15 It was their judgment there was no source of water.

16 DR. HAUSLER: I don't think I want to
17 comment on that, but there is no certainty that there
18 is no water in 45 days, in three months. In fact --
19 I am sorry -- 90 days, in three months. There is
20 indeed a possibility during normal operation that, if
21 water is there, damage could be done.

22 This goes toward how well do we know
23 things, and how certain are we that things are under
24 control. The water could be monitored electronically,
25 and this has been done in other places as well.

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1 CHAIRMAN HAWKENS: Thank you.

2 That concludes the Board's questions for
3 this panel. I do have a couple of questions I would
4 like to pose to AmerGen and have the staff weigh in
5 on. And, AmerGen, I'll let you determine which
6 witness is most appropriate to respond.

7 In the absence of a corrosive environment,
8 could statistically significant corrosion in the upper
9 drywell occur?

10 MR. POLONSKY: We are a bit caught off
11 guard, Your Honor, because I thought the upper drywell
12 was outside the scope of the proceeding.

13 CHAIRMAN HAWKENS: We have discussed it
14 earlier, though, and you said there was minimal
15 corrosion. It was not -- It was significantly --
16 statistically significant, and the question is: In
17 the absence of a corrosive environment.

18 MR. POLONSKY: We can have Pete Tamburro
19 give an answer, I think, consistent with what he
20 testified before, but I think you may be
21 mischaracterizing. But, obviously, Mr. Tamburro can
22 address that. Pete?

23 MR. TAMBURRO: To be honest with you, I'm
24 not sure I understand the question. In the absence of
25 a corrosive environment -- which would indicate to me

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1 that --

2 JUDGE ABRAMSON: Let's see if I can
3 clarify that, to put it a little more directly. It
4 was a nice indirect question from a lawyer. To put it
5 as a scientist, I'll put my other hat on for a moment,
6 Your Honor.

7 How could there have been statistically
8 significant corrosion in the upper drywell, if there
9 was no corrosive environment?

10 That's the inverse of the question that
11 had been posed.

12 MR. TAMBURRO: The inspections of the
13 upper drywell started in the mid-Eighties prior to
14 many of the corrective actions that occurred, which
15 was the strippable coatings and monitoring water.
16 That series of inspections occurred from the mid-
17 Eighties until 2006, and as we do know, there were
18 outages where we did have water early on that were in
19 this environment.

20 The small corrosion rate, .6 mils per
21 year, is an indication, in my mind, that that occurred
22 early on and is a conservative judgment of what is a
23 rate in one location, using statistics.

24 MR. WEBSTER: Could I just clarify? The
25 record states this has been ongoing corrosion there.

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1 Is that incorrect?

2 CHAIRMAN HAWKENS: We would have to take
3 a look at the exhibit. Is that correct, AmerGen?
4 Does the exhibit indicate there is ongoing corrosion?

5 JUDGE ABRAMSON: We discussed this earlier
6 today ad nauseam.

7 CHAIRMAN HAWKENS: Well, if there is
8 ongoing corrosion -- Go ahead.

9 MR. POLONSKY: Mr. Tamburro, if the title
10 of that slide may have said statistically significant
11 observable corrosion, what is your answer to that?

12 MR. TAMBURRO: The rate of .66 mils per
13 year was, from a statistical standpoint, observable.
14 It met the f-test. However, that rate was measured
15 over a long duration, from the mid-Eighties to 2006.

16 MR. POLONSKY: Does that mean that there
17 is actually any ongoing corrosion?

18 MR. TAMBURRO: In my opinion, there is no
19 ongoing corrosion at this time.

20 CHAIRMAN HAWKENS: Thank you. That
21 answers my question.

22 DR. HAUSLER: Could I perhaps ask a
23 clarifying question? Over what period of time was
24 that corrosion rate of .6 mpy determined?

25 CHAIRMAN HAWKENS: Mr. Tamburro, could we

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1 hear from you again, please?

2 MR. TAMBURRO: That period of time was
3 from the late Eighties until 2006. We included all
4 data.

5 JUDGE ABRAMSON: So if the corrosion took
6 place over, say, the first 10 years, then can we
7 assume that the rate would have been higher than .6
8 mils per year, because you are dividing it by less
9 years?

10 MR. TAMBURRO: Yes, sir.

11 JUDGE ABRAMSON: Thank you. I think
12 that's where that goes. Thank you very much.

13 DR. HAUSLER: Well, the point, I think, is
14 -- You are looking at me questionably, Your Honor. So
15 I feel like maybe I have to add something.

16 JUDGE ABRAMSON: Not unless you think we
17 need more information on this.

18 DR. HAUSLER: No. The corrosion could
19 have occurred anytime, and it could have occurred at
20 a fairly high rate over a short period of time.

21 JUDGE ABRAMSON: Yes.

22 DR. HAUSLER: Or a very low rate over a
23 long period of time.

24 JUDGE ABRAMSON: Yes.

25 DR. HAUSLER: And I think that is perhaps-

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JUDGE ABRAMSON: We understand. Thank you very much. We don't know when it occurred or how long it took.

CHAIRMAN HAWKENS: Do the parties at this point have any -- I think Mr. Webster mentioned earlier that -- Oh, excuse me.

JUDGE BARATTA: I just was looking at the SER, and under -- On page A-28, Item number 13, it uses the term reactor cavity trough drain. Is that the same as the sand bed trough drain?

MR. GALLAGHER: No. There is -- Did you want me to show you in exhibit what drain that is?

JUDGE BARATTA: If you don't mind, yes. Please.

MR. GALLAGHER: Okay. If you go to AmerGen Exhibit 4.

JUDGE BARATTA: Is that those lines that come in underneath the vent pipes on either side? Is that what you are --

MR. GALLAGHER: No. If I can just point it out to you. So this is AmerGen Exhibit 4. The sand bed drains are in Detail C, down here, these little lines here -- okay? -- coming off of Detail C.

MS. BATY: Can you indicate more precisely

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1 for the record?

2 MR. GALLAGHER: I am pointing at Detail C.

3 CHAIRMAN HAWKENS: It is identified on the
4 diagram.

5 MS. BATY: Okay.

6 MR. GALLAGHER: Now the trough drain we
7 are talking about, Judge Baratta, is up here in Detail
8 B, and if I can take you to that exhibit, which is --

9 JUDGE BARATTA: Okay. So that is in
10 connection with the refueling cavity.

11 MR. GALLAGHER: Yes. Exhibit 8. Exhibit
12 8 shows the trough drain at the bottom of that bellow
13 seal, which is --

14 JUDGE BARATTA: A line labeled "drain for
15 concrete trough"?

16 MR. GALLAGHER: That's correct.

17 JUDGE BARATTA: Thank you. I have a
18 question for the staff.

19 Item Number -- Again referring to Appendix
20 A of the SER, page A-30, Item 18. This refers to
21 AmerGen will perform a 3-D finite element structural
22 analysis. What is meant by the last section -- I
23 guess it's the last sentence.

24 It says, "If the analysis determines that
25 the drywell shell does not meet required thickness

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1 values" -- What are the required thickness values? --
2 "the NRC will be notified in accordance with 10 CFR 50
3 requirements."

4 What are the required thickness values we
5 are referring to there?

6 MR. ASHAR: This is Hansraj Ashar. The
7 whole thing about the new analysis was to -- Your
8 question was what is required thickness. Correct?

9 JUDGE BARATTA: Yes, that's correct. I
10 think I understand the previous part, but it depends
11 upon what your answer is to this. I may not have.

12 MR. ASHAR: It was the thickness which was
13 being used during all the evaluations and thickness
14 which is required to meet the criterion that had been
15 placed together.

16 JUDGE BARATTA: Well, that is where I got
17 a little confused, because it says in the beginning of
18 this, AmerGen will perform a 3-D finite element
19 structural analysis of the primary containment drywell
20 shell using modern methods and current drywell shell
21 thickness data to better quantify the margins that
22 exist above the code required in minimum for
23 buffering.

24 In light of that, I didn't understand that
25 last sentence.

1 MR. ASHAR: As you know, in GE analysis
2 they used .736 as the uniformly corroded surface in
3 the sand bed area. Now it is possible that in the 3-D
4 analysis they might use the true depth at various
5 places in various ways to do the analysis.

6 So this is what they mean to say -- not
7 meaning to say, at least. Applicant is the one who
8 proposed it, and we accepted. So in that sense, that
9 is what we understand, that it does not meet
10 requirement, NRC would be notified in accordance.

11 So there the whole idea as to which
12 thicknesses they will meet, which thicknesses that are
13 existing, you know, and that is what we understand,
14 that true thickness are existing at present time.

15 JUDGE BARATTA: So you are taking the
16 required thickness values as the .736. Is that what
17 I understand?

18 MR. ASHAR: No. See, in the front that
19 you read, it stated that they might use the true
20 thicknesses in various ways to analyze the shell.
21 What we mean by required thickness means, if the
22 required thickness -- if they come out with a
23 conclusion that they cannot meet all the design
24 criteria that have been established for it, then it
25 could be sent to us for review.

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1 JUDGE ABRAMSON: So let's see if we can
2 clarify this with the applicant. Thank you, Mr.
3 Ashar.

4 As I understood what we heard about this
5 analysis, you are going to do a 3-D analysis using the
6 current configuration as best you can understand. Is
7 that correct?

8 MR. GALLAGHER: That's correct.

9 JUDGE ABRAMSON: And out of that analysis
10 will come buckling load safety factor?

11 MR. GALLAGHER: That's correct. If I
12 could just tell you what our intention was here,
13 obviously, the currently analysis is our current
14 licensing basis, and that is what we judge everything
15 to. This 3-D analysis we are performing, as I stated
16 earlier, our expectation is that it will show we have
17 more margin than we have in our current analysis. But
18 we put in here the flip side.

19 If we did this analysis and it showed a
20 problem with our current condition, then we are
21 obligated by Part 50 to notify the NRC, and that's all
22 we are saying here.

23 JUDGE ABRAMSON: And let me pursue this
24 for a minute, because I'm trying to understand how
25 this all fits together with some rather confusing

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1 testimony we have heard about how the safety factor
2 fits into the current licensing basis.

3 The design safety factor, we understand,
4 is 2.0. Is that correct? For buckling.

5 MR. GALLAGHER: That is correct.

6 JUDGE ABRAMSON: Okay. So let's talk
7 hypothetically. You do the analysis. You get a new
8 safety factor. The new safety factor is less than 2.0
9 with the existing thicknesses; you report to NRC. If
10 it's greater than 2.0, you don't need to. Is that
11 kind of the gist of this?

12 MR. GALLAGHER: That essentially it, yes.

13 JUDGE ABRAMSON: Okay. And therefore, one
14 might expect that that will lead into a review of the
15 frequency of your inspection of corrosion. Let's say
16 it turns out you have a safety factor of greater than
17 2.0. That would support the frequency of inspection
18 as proposed?

19 I am trying to understand sort of how this
20 fits together, what the agency could expect to happen
21 as a result of this analysis, other than just
22 reporting.

23 MR. GALLAGHER: Well, if I can back up to
24 say what was the intent. The intent of performing
25 this analysis was -- and you would have to look at the

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1 transcript of the ACRS meeting. It was really a
2 discussion of the current model, and the current
3 analysis you have now is very, very conservative. You
4 know, the uniform thickness in the sand bed -- you
5 don't have that. All the things that you --

6 MR. WEBSTER: Objection. Mischaracterizes
7 the ACRS.

8 JUDGE ABRAMSON: Well, we can read the
9 ACRS transcript.

10 MR. WEBSTER: Well, it is not entirely in
11 the record, Judge.

12 JUDGE ABRAMSON: The ACRS transcript is
13 not in the record?

14 MR. WEBSTER: The whole transcript is not
15 in the record.

16 JUDGE ABRAMSON: Is part of the transcript
17 in the record?

18 MR. GALLAGHER: It's a public record.

19 JUDGE ABRAMSON: We will access it and
20 look at it. Thank you.

21 MR. GALLAGHER: And the discussion that we
22 had with the ACRS was you are being very conservative
23 here; what are your real margins? And we said, we'll
24 explore that, and we will do this 3-D, find that out
25 in the analysis.

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1 JUDGE ABRAMSON: That was the origin.

2 MR. GALLAGHER: That was the origin, and
3 you know, we are very confident in our current
4 licensing basis that it is conservative and we can use
5 that as acceptance criteria, and this particular is
6 really a comfort level to show that there is much more
7 margin than we have.

8 So our expectation, it will show more
9 margin. But we put the flip side of it in this.

10 JUDGE ABRAMSON: So the flip side is, if
11 it shows less margin than you have, that it might well
12 lead to a shortening of the inspection frequency. Is
13 that --

14 MR. GALLAGHER: Well, we would enter in
15 our corrective action program, and we would take the
16 appropriate corrective action. The first step would
17 be to notify the NRC, because that would be a Part 50
18 requirement, and then the second step would be, you
19 know, the evaluations we would have to do, and that
20 type of thing.

21 JUDGE ABRAMSON: And you would interact
22 with the staff in deciding what the implications of
23 that were.

24 MR. GALLAGHER: Of course. We would be
25 obligated under Part 50 to take corrective action and,

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1 as appropriate, notify the NRC.

2 CHAIRMAN HAWKENS: Are there any
3 administrative matters or evidentiary matters that we
4 need to address now? Let's start with Mr. Webster.

5 MR. WEBSTER: I have a couple. We were in
6 the middle of discussing them with opposing counsel
7 and with NRC staff counsel. We can proceed with them
8 or we can take a short break. We could discuss them
9 further and see if we can reach --

10 CHAIRMAN HAWKENS: Is it something you
11 need to discuss before we can resolve it?

12 MR. WEBSTER: Well, let me go forward.
13 One issue has to do with the extreme value statistics,
14 exactly how those were done. Dr. Hausler has now
15 refreshed his memory on precisely how those were done,
16 and he can offer testimony on that.

17 The second issue is this what we are now
18 calling the Rosetta Stone, the translation between the
19 references for the internal buckling -- so the
20 internal grid locations and the exterior monitoring
21 locations.

22 We were provided an exhibit number by
23 AmerGen or a disclosure number by AmerGen. That
24 exhibit does not -- certainly does not enable us to
25 make this translation. It may enable AmerGen to make

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1 that translation.

2 CHAIRMAN HAWKENS: Why don't we proceed
3 with that right now. Let's start off with hearing
4 from Dr. Hausler.

5 It is about 2:22. Let's take a recess
6 until 2:45. During that period, if the parties have
7 any additional questions on the final topic they would
8 like the Board to address, please submit them to Ms.
9 Wolf.

10 Additionally, counsel can prepare, to the
11 extent it is necessary, for their closing statements,
12 and we will reconvene at quarter 'til. Thank you.

13 (Whereupon, the foregoing matter went off
14 the record at 2:26 p.m. and went back on the record at
15 2:45 p.m.)

16 CHAIRMAN HAWKENS: The Board is three
17 minutes late. I apologize for making the audience and
18 the parties wait. Did the parties provide Ms. Wolf
19 with any additional questions that they wish to have
20 asked?

21 MR. WEBSTER: Citizens don't provide any
22 additional questions.

23 MS. BATY: No questions from the staff.

24 MR. POLONSKY: None from AmerGen.

25 CHAIRMAN HAWKENS: Thank you. There are

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1 two administrative matters that Mr. Webster had
2 mentioned before we took the recess. One was what he
3 characterized as the Rosetta Stone which I think was
4 the data from AmerGen to make the internal grids
5 correspond to the external points. The other was some
6 of the underlying calculations for Dr. Hausler's
7 equations, the extreme value statistics.

8 One of the Board's significant concerns is
9 to allow additional data to come in from either party
10 at this point. It would expand the record. It would
11 open the door conceivably to additional briefings so
12 that the record could not be closed which would create
13 an extension as far as getting out a final decision.

14 With that in mind, let me ask AmerGen what
15 are its views on this administrative matter letting in
16 additional exhibits into the record.

17 MR. WEBSTER: Excuse me, Judge. If I
18 could just clarify. For the first issue, the extreme
19 value statistics, I don't think there is any need to
20 go beyond the record. I think we can do it by oral
21 testimony.

22 CHAIRMAN HAWKENS: All right. Thank you.

23 MR. WEBSTER: The second issue I think is
24 slightly more thorny.

25 JUDGE ABRAMSON: Frankly, counselor, I

1 don't agree with you. If we get additional
2 information in that I don't believe that either the
3 applicant or the staff has had a chance to review in
4 depth all that information. I, for one, am not
5 willing to make a ruling without hearing the parties
6 debate those at length.

7 MR. WEBSTER: Well, Judge, we have just
8 showed the calculations, rather simple calculations
9 actually, to both AmerGen and the staff and they have
10 staff witnesses and they have had opportunity to look
11 at the spreadsheet that Dr. Hausler used to make the
12 calculations to produce the points that were in the
13 chart.

14 MR. POLONSKY: Your Honor, I think Judge
15 Abramson characterized it well. I thought he used the
16 words "in detail review." We may have had about two
17 minutes to have Dr. Harlow look at the spreadsheet.

18 MR. WEBSTER: We are very happy to submit
19 -- I just want to clarify we have no objection
20 whatsoever to submitting the spreadsheet and having
21 further hearings on the issue. I just thought that
22 was a desire by the Board to move forward quickly.

23 MR. POLONSKY: If we can discuss it orally
24 that would certainly be our preference, AmerGen's
25 preference on the issue of extreme value statistics.

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1 We frankly already have the extrapolation and
2 interpolation plots as exhibits.

3 Dr. Hausler, I think, is just providing
4 what he believes is the underlying support for how
5 they generated some of those plots. AmerGen, I think,
6 is already on the record that the whole concept of
7 extrapolating and interpolating and treating the
8 internal/external data as representative of the shell
9 is improper.

10 MR. WEBSTER: Objection to that
11 characterization. Amergen's witness said he did do it
12 through value statistics on the data.

13 MR. POLONSKY: One moment, Your Honor. As
14 I said, I think limited oral testimony on the issue of
15 the underlying analysis of the extreme value
16 statistics is appropriate.

17 JUDGE ABRAMSON: Staff have a view? Is
18 there some fruitful oral discussion we can have?

19 MS. BATY: Your Honors, our expert,
20 AmerGen's expert, had just two minutes to peruse Dr.
21 Hausler's spreadsheet and so obviously we have not had
22 a chance to -- he's not had a chance to analyze the
23 material but we wouldn't object to an oral
24 conversation about the information.

25 JUDGE ABRAMSON: So let me ask applicant

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1 and the staff this question. Suppose that after this
2 oral discussion of what underlies Dr. Hausler's
3 information this particular Judge is not satisfied
4 that he has got adequate information to deal with it
5 and requires further briefing by all parties and
6 rebuttal of further briefing by all parties.

7 Do you think that is a likelihood or do
8 you think you can actually get to the end of this in
9 a few minutes of oral discussion? If you want to take
10 a couple minutes to discuss, do.

11 MR. POLONSKY: If we could have a couple
12 more minutes to discuss this. We would still like to
13 proceed. This is Amergen, Judge Abramson. We think
14 you won't have any follow-up required. If I can, I
15 think, remind us of why we came to this extreme value
16 statistics issue in the first place, I think --
17 Richard, please correct me if I'm wrong -- there was
18 an assertion about the pressure criterion being
19 exceeded and that pressure criterion is 490.

20 We were going to provide you with
21 citations where AmerGen had said in its testimony that
22 we thought there was no such location and Citizens
23 were identifying their use of extreme value statistics
24 to identify such a location. I don't know if --

25 JUDGE ABRAMSON: Please. Let's hear what

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1 the lawyers say in response to my inquiry and then
2 we'll deal with it.

3 MR. POLONSKY: So, frankly, we think we
4 can supply you with those citations.

5 JUDGE ABRAMSON: That's fine. I
6 understand. You are okay with going forward. How
7 about staff? Staff shouldn't have the dog in this
8 fight. It's the licensee's application. It will be
9 delayed if there is more information required.

10 MS. BATY: Actually, Your Honor, we
11 conferred with our expert and he does have some
12 concern that he shares your concern that this
13 discussion could open doors and require -- there is a
14 chance that there would be a need for further briefing
15 in rebuttal as you had suggested depending on how
16 clear the discussion can be. He hasn't had a chance
17 to review this. What he saw he asked questions that
18 he would like to have answered in addition.

19 I believe this -- correct me if I'm wrong
20 but the staff's understanding is the issue of extreme
21 value statistics arose at least partially out of the
22 Board's question in the August 9th order that you
23 asked us to address the use of extreme value
24 statistics and provide testimony.

25 MR. WEBSTER: Citizens also --

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1 MS. BATY: So Citizens had an opportunity
2 at that point to provide the necessary information for
3 the foundation of their use of extreme value
4 statistics.

5 MR. WEBSTER: Well, we have -- excuse me.
6 Citizens did provide --

7 MS. BATY: And they had another
8 opportunity in surrebuttal as well.

9 JUDGE ABRAMSON: Let's not go into who had
10 an opportunity when. I think it's the applicant who
11 has a dog in this fight. Applicant said there would
12 go on and take the risk that this may lead to further
13 briefing. I think, as far as I'm concerned, that
14 settles the question for me.

15 CHAIRMAN HAWKENS: Although I will ask
16 this one question. Citizens having had the
17 opportunity to address it and, in fact, did address
18 it, is there something material and new that you
19 didn't address in your prior submissions?

20 MR. WEBSTER: No. This is just a
21 clarification from the witnesses this morning. We are
22 saying they didn't quite understand what Dr. Hausler
23 said he used the log log distribution exactly what
24 that meant. Dr. Hausler is prepared to clarify
25 exactly what he means when he says he used the log log

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1 distribution.

2 This is not new -- this is not anything
3 new: This is the result of prefindings. In fact, the
4 problem is as a result of surrebuttal these questions
5 were not raised on surrebuttal. They could have been
6 dealt with on surrebuttal and we wouldn't be in this
7 position.

8 CHAIRMAN HAWKENS: We would like to hear
9 clarification from Citizens and a response by AmerGen
10 and the NRC staff, please.

11 DR. HAUSLER: I would like to add that I
12 don't think at any point we have stipulated that there
13 are areas that are less than 490 mils. I think we
14 have said in a previous study as well as the extreme
15 value statistics that there is a finite probability
16 that such areas exist, that we have used extreme value
17 statistics to extrapolate from 37 points to 50 points
18 or to 100 points.

19 Yes, that stipulation shows that there is
20 a finite probability that, in fact, such a point might
21 exist if enough measurements had been made. That is,
22 in fact, what the extreme value statistics are being
23 used for.

24 The other thing that we did in an earlier
25 memorandum to counsel was to analyze some of the data,

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1 some of the external data that had also been analyzed
2 by experts for AmerGen to show that if one were to use
3 the standard deviation for certain means that the
4 external data could actually also be as low, or the
5 points in the external data could be as low as 490
6 mils depending on how one wants to accept the standard
7 deviation that we have defined at that point.

8 We have extrapolated things. We have said
9 there is probabilities. We have never said that such
10 points exist. I needed to clarify that because I
11 think counsel misrepresented -- counsel for AmerGen
12 misrepresented what it is that we said. Thank you.

13 CHAIRMAN HAWKENS: Thank you.

14 JUDGE ABRAMSON: Sorry. Did you want to
15 clarify something about your extreme value statistics
16 or is that all you wanted to say? That's it?

17 DR. HAUSLER: The extreme value statistics
18 stand for themselves.

19 JUDGE ABRAMSON: So there is nothing more
20 you want to offer on this? That's it?

21 MR. WEBSTER: Actually, that's not quite
22 correct, Judge. There is something that Dr. Hausler
23 has to offer which is the equation that he's used or
24 the exact methodology that he's used to produce that
25 plot and he can go through that right now.

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1 JUDGE ABRAMSON: Has that been made
2 available to the parties?

3 MR. WEBSTER: Yes, it has. It was made
4 available just now, Judge.

5 JUDGE ABRAMSON: This is the material that
6 the licensee and the staff have looked at for a couple
7 of minutes. Is that correct?

8 MR. POLONSKY: That's correct, Your Honor.

9 MS. BATY: Yes. A two-minute perusal on
10 Dr. --

11 DR. HAUSLER: Let me describe it very
12 briefly what was done. We have a number of data
13 points. We rank the data points from the highest to
14 the lowest. This gives us a ranking from 1 through
15 37. The number may not be quite accurate. Anyway,
16 you know, we divide that ranking by the number of
17 observations plus 1 in order to get the relative
18 ranking.

19 We then calculate the logarithm of the
20 negative logarithm of that relative ranking which is
21 standard procedure in the statistics. We call that
22 the reduced variant. We plot the actual wall
23 thickness, or remaining wall thickness, against the
24 reduced variant in the linear plot. If we do get the
25 linear correlation, then that is an indication that

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1 extreme value statistics, as we just have defined
2 them, is applicable.

3 You get the correlation equation for that
4 straight line which is in our exhibit that we
5 mentioned earlier. You get the correlation equation
6 and you extrapolate that from 40 points, or 37 points,
7 to 90 points or 100 points or whatever.

8 In this particular instance we
9 extrapolated it to 37 points -- from 22 to 37 points
10 and found the number at 488 mils residual wall
11 thickness. Right? It's on that basis that we say if,
12 in fact, one had measured 37 points there is a very
13 good probability that one might have found a point
14 that is already at that limit.

15 JUDGE ABRAMSON: And all of those points
16 that you used for external measurements which had been
17 milled down to get a thickness. Is that correct? You
18 said you started for 22 and you extrapolated 37. The
19 22 points you used are external data points?

20 DR. HAUSLER: Correct, for bay 13.

21 MR. WEBSTER: Just to be clear, we don't
22 know if they were milled or not.

23 JUDGE ABRAMSON: Okay. I understand. But
24 there is an uncertainty of up to 200 mils.

25 MR. WEBSTER: There is plenty of

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1 uncertainty around here. There is no question.
2 Could I just make one other point, Dr. Hausler? Could
3 you just give us a correlation coefficient or the
4 linear plot?

5 DR. HAUSLER: The correlation coefficient
6 is .913. That is not a correlation coefficient.
7 Generally that is considered excellent but it is a
8 decent correlation coefficient. That's all we have.

9 CHAIRMAN HAWKENS: Thank you very much.
10 AmerGen.

11 MR. POLONSKY: Can AmerGen take three
12 minutes to go caucus? Five minutes to go caucus?

13 CHAIRMAN HAWKENS: Yes. Please do. We'll
14 reconvene at 10 after.

15 MR. POLONSKY: Thank you.

16 (Whereupon, at 3:07 p.m. off the record
17 until 3:16 p.m.)

18 CHAIRMAN HAWKENS: Back on the record.

19 MR. POLONSKY: Your Honor, AmerGen has no
20 testimony to provide in response. In response we
21 would just like to identify as the Board had requested
22 before those locations in the prefile testimony where
23 we argue that there are no measurements below 490 in
24 AmerGen's direct testimony, Part 3.

25 The answer to question 5 at the top of

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1 page 6 states what the thinnest UT measurement
2 obtained at any time between 1992 and the present and
3 it says it's 602 inches. Therefore, the pressure
4 criterion is also easily satisfied because there are
5 no single UT measurements below 490. I'm sorry, .602
6 inches or 602 mils.

7 The second citation is to AmerGen's
8 prefiled rebuttal testimony also in Part 3 starting
9 with the answer to question 40 which starts at the
10 bottom of page 31 and encompasses answers 40, 41, and
11 42.

12 CHAIRMAN HAWKENS: Thank you. NRC staff,
13 anything you wish to add?

14 MR. SALOMON: This is Art Salomon for the
15 NRC staff. Your Honors, not wanting to extend the
16 proceeding but if required to make a decision on the
17 applicability of the interveners exhibit or testimony,
18 I would prefer to have additional time and the
19 background equations and model and all the steps in
20 the procedure to review before saying that the
21 procedure is applicable and used properly.

22 CHAIRMAN HAWKENS: Thank you. So the NRC
23 staff does not endorse at this time this statement
24 made by Dr. Hausler.

25 MR. SALOMON: That is correct.

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1 CHAIRMAN HAWKENS: Thank you.

2 MR. WEBSTER: It also does not negate it
3 either.

4 JUDGE ABRAMSON: That's correct.

5 CHAIRMAN HAWKENS: Thank you.

6 MR. POLONSKY: Your Honor, that is
7 similarly the position for AmerGen.

8 CHAIRMAN HAWKENS: Thank you. I think a
9 final admin. matter deals with data points underlying
10 some of the internal and external points that were
11 graphed by AmerGen in an exhibit. Is that correct?

12 MR. POLONSKY: Yes, Your Honor. I guess
13 it's Exhibit -- Amergen's Exhibit 28 is that lovely
14 chart of green triangles, yellow triangles and green
15 rectangles which is provided as part of an ACRS
16 presentation.

17 The underlying document, which was the
18 basis for this, although this was not to scale
19 horizontally, is the same document that is the
20 underlying basis for AmerGen's Exhibit 44. That
21 document was produced in discovery. AmerGen provided
22 that OCLR Bates number to Mr. Webster at the break and
23 he now has that exhibit.

24 CHAIRMAN HAWKENS: You have what you need,
25 Mr. Webster? You are satisfied with that?

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1 MR. WEBSTER: Obviously not, Judge, or we
2 wouldn't be discussing it on the record here. While
3 it may be possible to translate from the document that
4 was disclosed to the coordinates that were used, in
5 fact, I think the sequence is that I asked Mr.
6 Polonsky for the coordinates of the external points
7 and the internal points all in the same relative
8 coordinate frame.

9 JUDGE ABRAMSON: When did you request
10 that?

11 MR. WEBSTER: I don't recall exactly,
12 Judge.

13 JUDGE ABRAMSON: Was it in the last few
14 days or was it many, many months ago?

15 MR. WEBSTER: It is subsequent to seeing
16 AmerGen plot. It's approximately two to three weeks
17 ago I would estimate.

18 JUDGE ABRAMSON: Does that sound accurate
19 to you, Mr. Polonsky?

20 MR. POLONSKY: I disagree with the
21 characterization but I'll let Mr. Webster continue
22 before I provide a reply.

23 MR. WEBSTER: Okay. So as to those
24 coordinates you said that -- I don't recall too
25 precisely what you said. He said something along the

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1 lines of that there wasn't any coordinates but if they
2 had disclosed something from which one could deduce
3 the coordinates but didn't tell me exactly where in
4 the record. I do believe Ms. Young can corroborate
5 this.

6 I complained to her at the time that it's
7 a pretty hard job looking at 40,000 sheets of paper to
8 try and find one document. I think there is -- well,
9 I think that certainly didn't help Citizens develop
10 their record because obviously we have limited
11 manpower and plowing through 40,000 pages is a
12 significant task.

13 Subsequently, AmerGen has produced Exhibit
14 44 on surrebuttal which attempts to do the same thing
15 again. It's actually to scale this time. Citizens
16 still have questions about whether these coordinates
17 are actually properly overlaid. We, therefore,
18 request AmerGen to provide the underlying coordinates
19 used for these plots and an explanation of how they
20 calculated those coordinates from the document that
21 was disclosed.

22 CHAIRMAN HAWKENS: Amergen.

23 MR. POLONSKY: First of all, the document
24 is not a new document. The document was provided in
25 the mandatory disclosure process. It has a Bates

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1 stamp and it obviously was produced before the close
2 of discovery. When was that? In June.

3 Secondly, the original document, which
4 should have raised this question in Citizens' mind was
5 provided as part of a presentation to the ACRS whether
6 it was in October or January or February. Mr. Webster
7 attended that ACRS meeting. He never at that time
8 asked AmerGen why or what the underpinning of that
9 document was.

10 In fact, my recollection of the first e-
11 mail that he sent to me, which I would agree was about
12 three weeks ago, said, "Perhaps it's too late for me
13 to be asking this but where is this document or was it
14 produced?" We then did some diligence to confirm --

15 CHAIRMAN HAWKENS: Excuse me, Mr.
16 Polonsky. The ACRS document you are referring to, is
17 that Exhibit 44?

18 MR. POLONSKY: No. The ACRS exhibit --
19 I'm sorry. ACRS presentation is Exhibit 40 but the
20 slide from that exhibit we had previously attached as
21 Exhibit 28. Exhibit 28 should be duplicated somewhere
22 within one of the presentations. It's Exhibit 40,
23 page 101. I believe it's in black and white there.
24 That document was available. He had a prior
25 opportunity, therefore, to raise the issue.

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1 Regardless of what transpired there is no
2 discovery allowed here now. There is no new document
3 that has been generated that Mr. Webster or Citizens
4 have not seen. In fact, what they would like us to do
5 is do the work for them it appears and we have given
6 them the document that my client spent weeks
7 correlating those coordinates and plotting them and
8 making various engineering adjustments.

9 This is not something that a lawyer can
10 do. This requires an engineer and QA and QC of that
11 internal and external correlation. The grid
12 measurements for each of the internal grids and their
13 coordinates from known welds are shown on the figure
14 that I identified the OCLR document for to Citizens
15 today.

16 CHAIRMAN HAWKENS: Thank you. Let me hear
17 from the NRC staff, please.

18 MS. BATY: The NRC staff doesn't have a
19 position on this other than our understanding was that
20 the request for this document, or at least AmerGen's
21 promise to provide the document, was made yesterday.
22 There was a request to have a correlation and the OCLR
23 number was identified.

24 MR. WEBSTER: I think generally most of
25 these things are quite correct. There have been two

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1 requests. One was made to Mr. Polonsky previously and
2 one was made yesterday for the specific OCLR number
3 since we did not have that previously. I think what
4 Mr. Polonsky is saying is basically that AmerGen wants
5 take advantage of the fact that they have far more
6 resources than we do.

7 Therefore, they want to hide the ball and
8 not identify where the locations were taken. They
9 criticized us for not putting the internal points upon
10 the contour plots. With a weld we could not do that.
11 I think this Board in the interest of fundamental
12 fairness should require this document to be disclosed
13 to us and give us an opportunity to check whether
14 Exhibit 44 really reflects the appropriate
15 coordinates.

16 CHAIRMAN HAWKENS: I want to for
17 clarification, AmerGen, you provided them with the
18 Bates number where the data is located. Is that
19 correct? Page numbers?

20 MR. POLONSKY: Essentially, yes. It's a
21 single figure and the figure has a depiction of the
22 entire drywell shell with weld locations, grid
23 locations, and then in the bottom left-hand it has
24 each of the grid numbers and associated coordinates
25 up, down, left, right from those welds.

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1 MR. WEBSTER: Judge, just to be clear, Mr.
2 Polonsky just said that it took weeks of work to go
3 from that figure to the actual coordinates of the use
4 for Exhibit 44.

5 DR. HAUSLER: Could I --

6 CHAIRMAN HAWKENS: No. I think I just
7 want to hear from the attorneys on this legal motion.
8 The motion is denied. I think Citizens has had ample
9 time to request this data. In addition, there is
10 simply no reason to think -- no reason that you have
11 provided.

12 You haven't had the data. You do have it
13 now but there has been no reason for this Board to
14 doubt the veracity of these charts to the extent once
15 you review this you determine that there is a problem
16 that may well provide a basis to reopen the record.
17 You are to otherwise petition the Commission for
18 relief but the motion at this late date to receive
19 that into the record as an exhibit is denied.

20 MR. WEBSTER: I would like to move for
21 reconsideration, Judge, and look at facts that will
22 led you to think about it some more.

23 CHAIRMAN HAWKENS: No. Motion is denied.
24 Thank you.

25 MR. WEBSTER: You won't allow me to add

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1 any facts that may be relevant to the motion?

2 CHAIRMAN HAWKENS: I gave you full
3 opportunity several times already.

4 MR. WEBSTER: I didn't realize there are
5 some additional facts. The reasons that we believe
6 this figure may be mistaken is because that exhibit
7 that AmerGen provided to the ACRS at the time we
8 thought it was accurate. What we find on the spectrum
9 is that it is not accurate.

10 I think the Board yesterday reviewed the
11 comparison between Exhibit 44 and that diagram that
12 was provided to the ACRS, which I think is Exhibit 28
13 which noted the significant discrepancies between the
14 two diagrams. Thus, I think there is no confidence
15 that -- well, we certainly don't know which of these
16 exhibits. One was not to scale and this one purports
17 to be at scale.

18 Now, furthermore, with Mr. Tamburro's
19 analyst, which is revision to the 24 count, there were
20 likewise significant -- maybe I wouldn't characterize
21 them as significant but there were errors in the
22 locations of the points and in the drawing of the
23 areas. I think this is a fundamental point, the
24 overlap of this areas. I really think it would be in
25 the strong interest of this Board, of the agency, and

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1 of nuclear safety to allow full discovery on this
2 point.

3 MR. POLONSKY: Your Honor, I think there
4 has been clearly full discovery on this point. The
5 Board cut off discovery and this document was produced
6 before that cutoff date. I believe the Commission has
7 a precedent although I cannot cite to you cases right
8 now which say the argument that we don't have enough
9 money or we don't have enough resources is not a
10 legitimate claim for a party in an NRC proceeding to
11 state that they cannot meet their burden. We don't
12 believe that is a convincing argument. In addition --

13 MR. WEBSTER: We have not --

14 MR. POLONSKY: I will finish, please. The
15 exhibit 28 I believe Mr. Webster is mischaracterizing
16 that. The footnote on the document explicitly states
17 that it is to scale in the vertical direction. We
18 have already had testimony on that. It is not in the
19 horizontal direction nor really could it since each
20 bay is 15 feet wide and we are trying to put it all on
21 a single piece of paper.

22 The mandatory disclosures have ended.
23 This document was provided. No discovery is allowed
24 in this proceeding. I will just echo again they are
25 asking us to do their work for them and we think that

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1 is fundamentally unfair. Thank you.

2 MR. WEBSTER: May I just, say, Judge, we
3 said yesterday that Exhibit 28 contains a mirror image
4 of some of the data locations on the horizontal scale.
5 That is not really not to scale. It's in error.

6 CHAIRMAN HAWKENS: Thank you. The motion
7 is denied. Are there any other administrative matters
8 the parties want to bring to the Board's attention?

9 MS. BATY: Your Honor, the date for
10 transcript correction submission, we need to set that
11 among the parties. I believe that was an item --
12 administrative item left open. The parties, I think,
13 have discussed this and I don't have a date in my head
14 but I believe there is a consensus now, an agreement
15 to Friday, October 5. Is that correct, Mr. Silverman?

16 MR. SILVERMAN: That is correct from
17 AmerGen's perspective.

18 CHAIRMAN HAWKENS: Citizens is October
19 5th?

20 MR. WEBSTER: Provided the transcript is
21 available on Monday that will be fine. Citizens
22 request five business days.

23 CHAIRMAN HAWKENS: If it is not available
24 to you at that time, please let us know.

25 MR. WEBSTER: Thank you, Judge.

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1 MS. BATY: Another point of that is we
2 were expecting to have the corrections in hand by
3 close of business. That was the deadline. We believe
4 that was the agreement. It wasn't close of business?

5 MR. SILVERMAN: That was what I understood
6 so I guess we are clear.

7 MR. WEBSTER: Well, I have never heard
8 that before. What is the purpose of close of business
9 Friday? Presumably no business will occur if we have
10 it sent in by midnight on Friday.

11 MR. POLONSKY: The purpose we thought,
12 Your Honor, of getting a corrected transcript was so
13 that when we cite to the transcript in our findings of
14 fact and quote the transcript that we are actually
15 quoting things that parties have reviewed. As long as
16 we can have them in our hands on close of business
17 midnight, whatever it is, on Friday, and only those
18 pages which have changes, could be sent to the
19 parties.

20 CHAIRMAN HAWKENS: I understand. Close of
21 business. Mr. Webster, if that poses a problem
22 because you didn't receive it in time, please let us
23 know.

24 MR. WEBSTER: Judge, my wife will be very
25 happy to hear that close of business is the deadline

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1 actually.

2 JUDGE ABRAMSON: I think the implication
3 from all this is that Morgan Lewis is going to work
4 over the weekend. I don't know about the staff.

5 MR. WEBSTER: We have seen a lot of
6 weekend work already, Judge.

7 CHAIRMAN HAWKENS: The Board's right hand
8 has brought to my attention that when they are
9 submitted the parties should have gotten together,
10 collaborated to make sure there is agreement on the
11 proposed revisions. Does that pose a problem? Why is
12 that, Ms. Young?

13 MS. YOUNG: Well, basically we have a very
14 abbreviated finding schedule in this proceeding and
15 I'm not sure we are going to be able to complete our
16 findings and do that but we will make an attempt to to
17 the extent we can to share our proposed corrections
18 between the parties but have an agreement on any
19 changes that are made to the transcript is not likely.
20 I believe you know the history of the participation
21 among the parties. There are areas which we have been
22 able to agree and there are many areas with which we
23 disagree.

24 CHAIRMAN HAWKENS: Those have generally
25 been substantive matters. I want to emphasize this is

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1 a motion for transcript corrections. That is not a
2 motion for transcript enhancements.

3 MS. YOUNG: Absolutely. Absolutely.

4 CHAIRMAN HAWKENS: And I think that is
5 very important. I don't want Ms. Wolf to have to be
6 going through and refusing to, you know -- we don't
7 want to make her job harder.

8 MS. YOUNG: Absolutely.

9 CHAIRMAN HAWKENS: So to the extent you
10 can make her job easier by simply insuring that any
11 suggested corrections you make are necessary endeavor
12 to get everybody's agreement and get the motions to
13 her by close of business on Friday I think we would
14 all be grateful.

15 Mr. Webster.

16 MR. WEBSTER: If I could give one possible
17 solution. We all have been suffering from a very
18 abbreviated schedule so far. At the time we agreed to
19 that abbreviated schedule this proceeding was the
20 critical part for relicensing. I believe that is no
21 longer the case because of the Coastal Zone Management
22 Act Consistency from New Jersey. I question whether
23 we need to adhere to this abbreviated schedule now
24 because this proceeding is no longer on the critical
25 path.

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1 CHAIRMAN HAWKENS: The Board is in favor
2 of going forward consistent with the schedule we have
3 already established. Again, let's shoot for Friday
4 unless the Board is willing. If parties are willing
5 to get their draft motions to each other on Friday and
6 then submit them by close of business on Monday that
7 would be an alternative. Monday is a federal holiday.
8 That would be Tuesday. Is your wife willing to accept
9 that, Mr. Webster?

10 MR. WEBSTER: Federal holidays do not have
11 an affect in my household I'm afraid.

12 MS. YOUNG: The staff is amenable to that.

13 MR. SILVERMAN: And AmerGen is amenable to
14 that.

15 CHAIRMAN HAWKENS: All right. Tuesday
16 close of business would be --

17 MS. YOUNG: Which is the day before the
18 findings are due. The staff does have one small
19 administrative matter.

20 MR. WEBSTER: Before we move on, I think
21 it's going to be very difficult for us to submit
22 proposed findings with full references to the
23 transcript.

24 CHAIRMAN HAWKENS: That's why initially we
25 were going with Friday.

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1 MR. WEBSTER: I know. Perhaps one
2 approach would be to submit it in draft and then tidy
3 up the transcript references later when the transcript
4 is finalized.

5 CHAIRMAN HAWKENS: Let's go with having
6 the motion submitted on Tuesday by close of business,
7 again emphasizing this is just to ensure the court
8 reporter has not misconstrued words. It's not to make
9 the parties, the witnesses, or the Judges sound more
10 articulate than we actually are and not to include
11 punctuation.

12 And to the extent that you find the
13 proposed findings of fact, conclusions of law require
14 some corrections because the transcript page cites are
15 incorrect, you can provide them subsequently.

16 MR. WEBSTER: Thank you, Judge.

17 CHAIRMAN HAWKENS: Ms. Young.

18 MS. YOUNG: This is a separate issue,
19 small administrative matter. I just wanted to thank
20 Mr. Donnie Ashley, the plant project manager for
21 Oyster Creek for his willingness of taking the
22 responsibility and the fantastic job he did in
23 accessing exhibits during this hearing. It was a last
24 minute request on my part that caused him to be in
25 that position. I just wanted to thank him definitely

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1 on behalf of the staff and possibly the Board and the
2 parties.

3 MR. WEBSTER: Absolutely. Citizens
4 concur.

5 CHAIRMAN HAWKENS: On behalf of the
6 audience especially who wouldn't have had the benefit
7 of having the exhibits in front of them so bravo.
8 Thank you very much. Anything else from the parties
9 before we go to closing statements? The Board has a
10 couple of more items

11 Directed towards AmerGen, I think it was
12 Mr. Tamburro who had indicated that internal
13 procedures govern the periodic checking of the sandbed
14 drains.

15 MR. POLONSKY: I think Mr. Gallagher
16 provided the final testimony on that.

17 CHAIRMAN HAWKENS: Okay. You testified
18 they were internal procedures as opposed to licensing
19 commitments.

20 MR. GALLAGHER: That's correct.

21 CHAIRMAN HAWKENS: The Board's question is
22 would AmerGen have any objection to making this a
23 commitment to be done at least every -- consistent
24 with your internal procedures?

25 MR. GALLAGHER: This is the sandbed --

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1 verifying the sandbed drains are clear?

2 CHAIRMAN HAWKENS: Correct.

3 MR. GALLAGHER: We would not oppose that.

4 CHAIRMAN HAWKENS: All right. Thank you.

5 JUDGE ABRAMSON: Okay. And,
6 unfortunately, we have one final clarification which
7 comes back to the new 3D analysis and what is going to
8 happen with it. Let me see if I can phrase this in a
9 way that we can come to grips with it. Here is the
10 Board's concern. I think this envelopes everything
11 that has been going on here at the proceeding. The
12 focus of this proceeding is the ultrasonic testing
13 frequency sufficient to detect a problem before the
14 corrosion creates a problem.

15 The purpose of the current condition full
16 3D analysis is to determine what the safety margin is.
17 What the Board is not clear on is what will happen
18 with that result.

19 First of all, we are not comfortable with
20 the way the language of the SER is stated and we would
21 like the staff and the applicant to rewrite that and
22 give us a draft rewrite so that it makes some sense to
23 us. We understand that the purpose of that is to
24 calculate a new safety -- to recalculate a safety
25 margin for the current configuration as degraded. Is

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1 that correct?

2 MR. GALLAGHER: That's correct.

3 JUDGE ABRAMSON: Okay. And we understand
4 that what the applicant has committed to do is to
5 comply with the law which is if there is a problem
6 reported to the staff and then come to grips with it
7 with the staff under the regs. That is fully
8 appropriate. We are wondering, however, how this
9 meshes with the issue at hand here which is what is
10 the ultrasonic frequency -- ultrasonic testing
11 frequency and is it adequate.

12 Here is the question we have and we're not
13 quite sure how to come to grips with it in the context
14 of 10 CFR 50 and the context of the regs and the SER
15 and the condition.

16 If you were to come up with a new current
17 condition safety margin that indicated you were on the
18 margin or right at the point where there could be a
19 problem, we presume you would then iterate with the
20 staff to figure out what that meant and that would
21 mean examining your -- since this whole thing is
22 brought about by corrosion, you would be examining
23 your look at the corrosion, your look at the epoxy and
24 your ongoing UT frequency. Is that correct? Is that
25 what you would expect would happen if you were in that

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1 mode? You want to talk about it? We are trying to
2 understand.

3 MR. GALLAGHER: I'm not sure that the
4 analysis would necessarily factor back into a UT
5 frequency because what we would be calculating is the
6 current condition we have now and the safety margin,
7 the safety factor.

8 JUDGE ABRAMSON: Suppose that safety
9 factor came in and let's say the current licensing
10 basis requires a safety factor of 2.0. Let's assume
11 that is the case. I'm not absolutely clear that's the
12 case but let's assume that's the case. Suppose you
13 did a calculation and you came in at 1.99 or 2.01.

14 I assume that even at 2.01 or 2.02 you
15 would feel some necessity to report to the staff given
16 their are some bounds of uncertainty in that kind of
17 analysis. You reported to the staff that you were on
18 the edge of having a -- you are satisfied but you
19 would be on the edge or you nearly satisfied the
20 safety margin requirement of the CLB.

21 The question is since that is what's at
22 issue here, i.e., the frequency of UT testing is being
23 driven by whether you are going to run into a problem
24 with the CLB or, to put it another way, the license
25 extension you have to demonstrate that you will meet

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1 the CLB for the period of the license extension.

2 This analysis is being done before the
3 license extension is granted and we are wondering how
4 this would play out between the applicant and the
5 staff if you came in on the margin. Now, you don't
6 expect you will. I don't know but certainly we have
7 heard indications that the current analyses are very
8 conservative and the number is likely to be even
9 larger. If you came in on the margin, what would
10 happen?

11 MR. GALLAGHER: Well, let me first start
12 out with in 2008 we are doing the full scope of
13 inspections so we will have additional data at that
14 point. The same data points but we will have the
15 additional data.

16 JUDGE ABRAMSON: And it's about that same
17 time you are doing this analysis. Is that right?

18 MR. GALLAGHER: We need to be done the
19 analysis by April of 2009. I think -- can I take a
20 minute to confer?

21 JUDGE ABRAMSON: Sure. Please.

22 MR. GALLAGHER: Okay, Judges. After
23 conferring with my colleagues here, let me talk about
24 both sides of the equation. Our expectation is that
25 we are going to have a greater safety factor than our

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1 current analysis shows. If that is the case, that is
2 good information. Just for clarity that doesn't
3 affect our CLB because if we wanted to change our CLB
4 with this new better case, this new model, we would
5 have to pursue that via staff review and approvals.
6 That is on the positive side.

7 On the side that you're pointing out, if
8 we had a calculated safety factor less than 2, as we
9 said, we would notify the NRC and we would take
10 corrective actions, one of which would be enhancing
11 our inspection program, the locations of inspection,
12 because we could characterize to determine we have
13 more metal and then factor that back into the
14 analysis. That's one possible solution.

15 The other is obviously other corrective
16 actions, you know, that we could pursue. The short
17 story of saying we put in a corrective action system
18 and pursue that. The staff we would obviously since
19 we notified the staff they would be involved in any
20 outcomes we come up with.

21 JUDGE ABRAMSON: Thank you. That is very
22 helpful. Does the staff have any comment?

23 MS: BATY: The comment is that the license
24 condition and the commitment is that AmerGen is
25 supposed to perform this 3D analysis prior to the

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1 period of extended operation which means that the
2 Board's decision, the Commission's decision about
3 license renewal, this analysis does not have to be
4 done prior to -- it doesn't have to be approved prior
5 to a Board decision, Commission decision on license
6 renewal the way it is written to say prior to the
7 period of extended operation which means before the
8 current license.

9 JUDGE ABRAMSON: Which is long after our
10 decision hopefully and that is the idea. I understand
11 that.

12 MS. BATY: Okay. We wanted to make it
13 clear. Also, this appears also as a proposed license
14 condition in the SER so that is the language. The
15 language is not identical between those two. I guess
16 the staff is saying there is no basis to reword the
17 commitment because there is a proposed license
18 condition.

19 JUDGE ABRAMSON: Right. It is the
20 proposed license commitment we would like to see
21 clarified. What's in the SER doesn't make any sense
22 to us so we would like to see that clarified to talk
23 about what the real result of this analysis which is
24 not going to be determination that you meet your
25 required thicknesses but that you meet your required

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1 safety factor which would be a function of the
2 thicknesses which will indicate where you are on
3 thickness.

4 Just give us a draft of a revised proposed
5 licensing condition and the two of you can work on
6 that. We just want it to be clear what it really is
7 and it's not clear. If that means messing with your
8 commitment, then mess with the commitment, too. Get
9 it right. That's all.

10 JUDGE BARATTA: One point of
11 clarification. What we are talking about is a license
12 condition. Not commitment, license condition.

13 JUDGE ABRAMSON: I think what I hear the
14 staff saying is this will be done before the license
15 extension so it's the commitment that needs to be
16 clarified. It becomes a condition in the SER that
17 this commitment is satisfied. It will all be fait
18 accompli I assume by the time the license is actually
19 issued so it's not a condition of the license itself.
20 It's a condition to issuance of the license.

21 MS. BATY: Your Honor, can we -- I'm going
22 to read the condition as it currently is stated.

23 JUDGE ABRAMSON: We've read it in the SER.

24 MS. BATY: We're confused about what is
25 unclear so we would like -- the staff would appreciate

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1 the Board's guidance in what we need to do to address
2 this. Right now it says, "The 7th license condition
3 requires the applicant to perform a 3D finite element
4 analysis of the drywell shell prior to entering the
5 period of extended operation."

6 JUDGE ABRAMSON: That's appropriate.
7 There's another sentence. Maybe it's in the condition
8 then that talks about to make sure that -- where was
9 that, Tony?

10 MR. GALLAGHER: It's in the commitment.

11 JUDGE ABRAMSON: It's in the commitment.
12 Okay. Then let's just fix the commitment. The
13 condition is fine.

14 MS. BATY: Okay. Thank you.

15 MR. GALLAGHER: Judge Abramson, just one
16 point of clarification. I think you had said
17 something like it would be a condition to issue the
18 license. Our understanding of what this is it's a
19 license condition. You are right the condition will
20 be satisfied before the period of extended operation
21 but it's not a condition to issue the license. It's
22 a condition within the license.

23 JUDGE ABRAMSON: I stand corrected.
24 That's fine. The license can be issued early but you
25 don't get your extension unless this condition is met.

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1 MR. GALLAGHER: We have to comply with the
2 condition.

3 JUDGE ABRAMSON: Okay. Thank you.

4 CHAIRMAN HAWKENS: Does that conclude
5 administrative matters before hearing final
6 statements? Citizens?

7 JUDGE ABRAMSON: Let me just plead with
8 the counsel who are going to give these closing
9 statements. You are going to have plenty of chance to
10 spell this out in your proposed finding so please keep
11 it brief.

12 CHAIRMAN HAWKENS: NRC staff, no final
13 administrative matters?

14 MS. BATY: No.

15 CHAIRMAN HAWKENS: AmerGen?

16 MR. POLONSKY: No final other
17 administrative matters.

18 CHAIRMAN HAWKENS: All right. Before
19 going into the closing statements, the Board would
20 just like to once again express its appreciation to
21 the Ocean County officials who allowed us to use this
22 and especially to Ms. Flynn back there. I wanted to
23 make sure I express my gratitude to you before you
24 stepped out. Thank you very much.

25 We also express our gratitude to the Under

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1 Sheriff's Office for all the support they have given
2 us both during the limited appearance sessions and
3 during this session. Thank you very much.

4 And to Rob. I don't know Rob's last name
5 but he's with Wolf Sound Company and he helped us out
6 with the sound system here today. We are very
7 grateful for that.

8 Closing statements. As per ordered, they
9 are limited to 20 minutes per party. The NRC staff
10 has declined the opportunity to provide a closing
11 statement. We will hear first from Citizens. The
12 parties need not use the full 20 minutes, although
13 they may.

14 MR. WEBSTER: Was there a hint there
15 somewhere?

16 CHAIRMAN HAWKENS: No, it's a plea.

17 MR. WEBSTER: Well, it's kind of hard to
18 be brief when so much has happened. I will do my best
19 but also please remember this is sort of an
20 extemporaneous summary of what has occurred so I'll do
21 my best to sort of produce some sort of wonders or
22 oratorical -- I lost the word already. Obviously I'm
23 going to fail at that. I'll try to keep it simple and
24 try to get it right.

25 There are six groups here, Citizens

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1 groups. These have been wrongly characterized as
2 anti-nuclear groups. In fact, they cover a very broad
3 range of interests. We have mothers who have found
4 their children's teeth with high levels of radiation
5 in them. We have citizens who have genuine and
6 serious safety concerns.

7 We have nuclear engineers who believe that
8 Oyster Creek is the first plant in the country and
9 should not be relicensed. We have citizens who
10 believe that the NRC is fundamentally failing to
11 properly regulate nuclear safety. And we have
12 citizens who are anti-nuclear so there is a broad
13 range of motivations for this intervention.

14 I don't think the motivations matter that
15 much. This is an arduous process, as we've seen.
16 Forty-four relicenses have been through with no
17 citizen intervention, no successful citizen
18 intervention. Thus, without a valid scientific point
19 citizens simply are unable to get to this point.

20 What we've heard over the last couple of
21 days I think has certainly troubled us and I think has
22 troubled people beyond this room. To use the
23 metaphor, the sea of uncertainty appears to have been
24 rising. I've got my snorkel out right now.

25 What we've seen is that really we don't

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1 know if the pressure criterion is met, we don't know
2 if the LOCA buckling criterion is met, and we don't
3 have 95 percent confidence that the generalized
4 corrosion criterion is met in every bay. I would call
5 that a pretty uncertain situation. The question is
6 what do we do with that uncertainty?

7 We have tried repeatedly. This is not a
8 situation where citizens have hid the ball here and
9 said AmerGen is springing on your this concern. We
10 have been to the ACRS with this issue and that is
11 where the requirement for the new final element
12 modeling came from. That was a commitment made at the
13 last minute by AmerGen to try to mollify the concerns
14 of the ACRS.

15 Since then we have done more data
16 analysis. We have finally managed to find coordinates
17 to scale. We have analyzed those. We have shown that
18 the characterizations of the measurements were
19 completely incorrect. The measurements have been
20 characterized by showing only severe errors of
21 degradation near the vent header. That's completely
22 wrong.

23 There are areas of very severe degradation
24 and that most -- well, it is most likely -- let's put
25 it this way. In a sea of uncertainty it's very

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1 difficult to make definitive statements about this
2 drywell.

3 If I phrase this as carefully as I can,
4 the best interpretation of the data that we can
5 produce shows there is a probability that there are
6 very severe areas of corrosion that go beyond the CLB
7 in the most sensitive areas of the drywell. They are
8 at the edge of the base.

9 AmerGen has never put the data for two
10 bays together and analyzed the two together and see
11 whether this nine square foot area actually extends
12 over the two bay. Each bay has been analyzed
13 completely separately from another.

14 The level of analysis has been -- I'm
15 struggling for the right word here -- has been, I
16 think, poor. Let's put it this way. If this was a
17 physics paper I think you would get a D, revision 2 of
18 the 24 Calc. I find that surprising because this was
19 a revision that was produced once this litigation had
20 already started.

21 If I was the largest nuclear company in
22 America, I might have taken some time to get that
23 calculation right but it appears that AmerGen didn't
24 do that. They put out a document that was riddled
25 with errors. It was simplistic and, at best, shows

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1 marginal compliance. At worst it shows they are
2 already by their own assessment beyond the CLB and
3 makes no attempt whatsoever to estimate margin.

4 Let's say a few words about NRC. As you
5 might have gathered by now I wasn't born within these
6 shores. I'm going to use a soccer analogy here.
7 Somebody said earlier this is like a baseball game.
8 Well, I'm not too familiar with baseball so I'm going
9 to stick with a soccer analogy.

10 As far as I'm concerned we have been
11 coming down the field here pretty strongly. We have
12 been reaching the penalty box which, for those who
13 don't know, is 18 yards from the goal. Just as we are
14 moving into the penalty box NRC suddenly grabbed the
15 goal post and ran off down the field with it.

16 The requirement to meet the ASME code
17 factor of 2 was acknowledged by the applicant
18 repeatedly and has been acknowledged again by the
19 applicant. It is an amazing situation where the
20 regulator is suggesting a less stringent criterion is
21 appropriate than the applicant.

22 This is a situation that I have spent many
23 years as both an environmental consultant and a few
24 years as a lawyer. I have never seen a situation
25 where the regulator is saying, "Oh, we think we have

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1 an exemption," or the applicant is saying they don't.
2 How can citizens appropriate intervene in a hearing
3 like this when we don't even know what the
4 requirements are.

5 The CLB is kind of like the Holy Grail.
6 Everybody refers to it. It can't be challenged. The
7 only thing is none of us know what it is. There's no
8 statement of it. Even now this Board is struggling to
9 try to figure out what it is after a year and a half
10 of litigation. That is an entirely ridiculous
11 situation.

12 How can you have public transparency of
13 nuclear regulation when citizens are unable to find
14 out without doing months of work on what the
15 requirements are? Even when citizens do figure out
16 what the requirements are, NRC staff then arbitrarily
17 changed them at the last minute.

18 Why does NRC say they can change the rules
19 just as we start to win the game? They say they know
20 more now about the drywell than they knew when it was
21 built. That is entirely wrong. When it was built the
22 drywell had a nominal thickness. There was presumably
23 some natural variation of nominal thickness but it was
24 very small.

25 When it was built they hadn't thrown away

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1 the files that they used to design it. When it was
2 built there was an allowance for inclusions and all
3 this other stuff. That was the safety -- well, the
4 safety factor 2 came in a little bit later. The
5 previous code actually required more analysis if a
6 thinning of 10 percent was observed. When it was
7 built the safety factor was something around 3.85.

8 Since then we have thrown away the files
9 and we've had severe corrosion. We have heard that we
10 don't know where the severe corrosion is. We don't
11 know how thin it is. We know very little actually.
12 I think that is the overriding theme. We know very
13 little about this drywell.

14 We have 100 points from the exterior and
15 we have these tightly-spaced grids, 12 grids with a
16 quarter of a square foot and three square foot on the
17 outside, three square foot of a 700 square foot
18 vessel. We know very little. NRC's explanation, NRC
19 staff explanation for now we can now relax this safety
20 factor 2 makes no sense whatsoever. If anything, NRC
21 should now require something greater than a factor of
22 two because the level of uncertainty has increased
23 since design, not decreased.

24 Likewise, this Board has characterized NRC
25 staff counsel in the role of amicus but at every stage

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1 -- not at every stage but more laterally NRC staff
2 counsel has more vigorously fought the citizens'
3 attempt to add documents to the record, has cited more
4 reasons for to strike documents that citizens have
5 provided and has generally put itself in an
6 adversarial position to citizens.

7 If the goal of the NRC in these
8 proceedings is to have issues fully aired, it's hard
9 to understand why NRC staff while spending their time
10 and Government money objecting to Citizens putting in
11 exhibits in a proceeding like this when the applicant
12 isn't objecting.

13 So now finally we reach the point, and I
14 think we are all very glad to be here, and certainly
15 my wife is very glad we are here, which is that we
16 know very little. AmerGen has to provide -- the legal
17 standard is AmerGen has the burden of showing that
18 they have reasonable assurance so they can meet the
19 requirement.

20 Now, there is a circuit court case out
21 there, I think it's North Anna, that interprets
22 reasonable assurance as a clear preponderance. What
23 we have here, for instance, let's take an example. On
24 the very LOCA pressure criterion .49 we don't have a
25 clear preponderance. We have Dr. Hausler's analysis

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1 saying there's a good chance that there are some areas
2 that are thinner than 4.9. We have no testimony from
3 the other parties. That's not a clear preponderance.

4 On the LOCA area criterion AmerGen hasn't
5 even sought to establish what the margin has been.
6 There is no evidence -- the best evidence is that
7 there is no margins so you can't find a clear
8 preponderance in favor of compliance with the LOCA
9 area criterion.

10 Now, moving from a legal term to a
11 statistical term, we have shown that federal courts
12 regard the 95 percent competence interval as the basic
13 cornerstone of sound science. In federal court you
14 cannot show, for instance, causation to less than 85
15 percent competence. The court will not allow you to
16 do that.

17 A single plaintiff cannot recover money
18 from a drug company, for instance, that cannot show to
19 95 percent competence. There has been causation.
20 It's hard for me, and I think it will be hard for
21 everybody else, and I hope the Board will find it
22 impossible to find that when the safety of thousands
23 of people is at stake and billions of dollars that a
24 lower level of competence than 95 percent would be
25 appropriate.

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1 In fact, citizens assert that 95 percent
2 competence is the absolutely minimum that is supposed
3 to require it legally and require it technically.
4 Here perhaps we have a happy coincidence of more than
5 technicalities which don't always occur where it
6 appears that sound science and the law are reasonably
7 coincident.

8 AmerGen has refused to plot these 95
9 percent competency rates. Again, it's hard to find a
10 clear preponderance that we know these margins are 95
11 percent competence when AmerGen has refused to even
12 evaluate the margins at 95 percent.

13 So the sea of uncertainty has been rising.
14 The Board is now faced with a question. Does it
15 decide that AmerGen had plenty of chance to dispel
16 this sea of uncertainty and didn't bother to do it.
17 Why didn't it both to do it? Presumably it figured
18 the NRC has exactly been the toughest agency in
19 nuclear the last few years.

20 They figure no intervenor has ever managed
21 to get through the process of actually intervening and
22 getting a hearing so why dispel the uncertainty? The
23 only danger if you dispel the uncertainty is you find
24 something you don't like. AmerGen adopted a don't
25 look, don't find policy. Amazingly NRC staff endorsed

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1 that policy.

2 So now the Board has to decide -- well,
3 let's say this. Based on the record before the Board
4 because there is no clear preponderance of evidence
5 showing that the margins are met, we cannot move
6 forward with relicensing based on this record.

7 Similarly because there is no showing what
8 the minimum margin is, it's impossible to determine
9 the ultimate question which is what is the appropriate
10 monitoring frequency. We've had testimony that there
11 is corrosion, that AmerGen's expert is assuming there
12 is some degree of corrosion. Therefore, what we have
13 to do, there is certainly corrosion on the interior.
14 There is no argument about that. There's no coating.

15 AmerGen's expert has assumed there is some
16 corrosion going on and that makes perfect sense. It
17 also makes sense to assume there is some corrosion
18 going on on the outside. We have some corrosion. The
19 question is what is the minimum margin? We don't
20 know. We don't even know there is a margin.

21 How am I doing, Judge Abramson on time?

22 CHAIRMAN HAWKENS: You are doing well.
23 You have another five minutes.

24 MR. WEBSTER: Another five minutes. I
25 should wrap up early in that case.

1 So the Board now has to decide. AmerGen
2 is struggling with this uncertainty. Do you want to
3 throw them a life ring or do you want to let them
4 drown? It's our assertion that by now the biggest
5 nuclear company in America should have got this right.
6 Their failure to get it right calls into question
7 their ability to operate this plant safely in the
8 future.

9 It's our assertion, therefore, that the
10 Board should not throw them a life ring. The Board
11 should decide that relicensing of Oyster Creek cannot
12 go forward. However, if as is the habit of the agency
13 the Board decides to throw them a life ring, then it
14 should lay down a number of conditions and it should
15 not close this proceeding. It should keep the
16 proceeding open so the Citizens can see how the issues
17 that we have put forward are.

18 What is required here are some
19 requirements. We have this promise of more analysis.
20 The problem is we don't know what the requirement is.
21 Dr. Hausler said, well, it could be 1.9, 1.8, 1.7. He
22 really doesn't know. I don't understand then how this
23 analysis can be useful. How will we know whether the
24 analysis shows that the drywell meets the requirements
25 if NRC doesn't have any requirements?

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1 If the Board decides to throw AmerGen life
2 ring, which we believe it should not, the Board will
3 have to decide what standard should apply. At minimum
4 the Board should apply ASME code safety factor of 2.
5 Actually because there is more uncertainty in this
6 case, well, we can go either way really but we have to
7 make sure there is also a known level of certainty
8 attached to either the condition of the drywell or to
9 the safety factor.

10 Secondly, should the Board take this
11 nonrecommended route citizens should have the chance
12 to submit a new contention after the analysis is
13 complete because this analysis would be new
14 information. Even AmerGen doesn't know what the
15 results are going to be.

16 Finally, I think the Board needs to be
17 clear with the staff that the staff should not allow
18 SERs to go out without a staff being able to assign
19 competence in the mix to the parameters that they are
20 judging to be in compliance. This is a fundamental
21 point. If you don't have 95 percent competence and
22 compliance, I don't know how many acceptance criterion
23 there are in a nuclear plant but I know there are more
24 than 40.

25 On a statistical basis if we have 95

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1 percent competence and compliance, of two-tailed
2 distribution, that is, and then we have 40 parameters,
3 one of those parameters would be out of compliance.
4 We questioned for the Board whether that's enough but
5 at minimum we should know what the competence
6 intervals are. It's utterly inappropriate for the
7 staff to go forward with the safety assessment when
8 they don't know the competence intervals on the
9 parameters that they are judging to be in compliance.

10 In summary, we wish we could trust NRC.
11 We wish we could trust AmerGen. Unfortunately -- NRC
12 staff, that is. Unfortunately, in the course of this
13 proceeding we found we cannot trust AmerGen, we can't
14 trust Exelon, and we have sadly lost trust in the NRC
15 staff.

16 We now place our trust in you, this Board,
17 to salvage from this sea of uncertainty some vestige
18 of legitimacy for this agency and make it clear that
19 the nuclear industry does not have the NRC in its
20 pocket, that NRC is a vigorous agency that will
21 vigorously uphold safety standards and safety
22 requirements and will not continually slip those
23 standards so that Oyster Creek today is a far less
24 safe plant than Oyster Creek was 40 years ago.

25 What that means is the NRC now is allowing

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1 a huge safety gap to emerge between new plants and 40-
2 year-old plants. I know it's not this Board's
3 position to make policy but at minimum it must ensure
4 that the 40-year-old plants actually meet some
5 reasonable standards of safety.

6 We put our trust in you, gentlemen. We
7 know that you are very intelligent. We know that you
8 are very inquiring. We know that you have a lot of
9 training and we know that you have a lot of
10 experience. We ask you to have a lot of courage.
11 Thank you.

12 CHAIRMAN HAWKENS: Thank you very much,
13 Mr. Webster.

14 NRC staff. Excuse me, AmerGen.

15 MR. POLONSKY: Thank you, Your Honor.
16 First and fundamentally, contrary to Mr. Webster's
17 statements, AmerGen's experts have acted
18 professionally, in good faith, and with a high degree
19 of technical competence, in particular Mr. Tamburro.
20 We strongly disagree with Mr. Webster's aspersions on
21 their integrity and rigor of analysis.

22 In our opening statement we described the
23 incredible assumptions the Board would have to make in
24 order to find that a four-year UT frequency was not
25 adequate. Citizens' testimony over the past two days

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1 did not make those assumptions any more credible.

2 In fact, Citizens' testimony confirmed
3 that their arguments about the acceptance criterion,
4 available margins, sources of water, performance of
5 the epoxy coating and future corrosion rates are based
6 either on a misunderstand of the facts or an
7 inappropriate application of science. Let's go over
8 each of those areas.

9 Acceptance criterion first. The general
10 buckling criterion and pressure criterion really never
11 were at issue in this proceeding and nothing over the
12 past two days called those criteria into question.
13 Contrary to Mr. Webster's assertion we did provide the
14 citations which refute that there is no exceedance of
15 the LOCA buckling criterion -- I'm sorry, the pressure
16 criterion.

17 As for the LOCA criterion, LOCA buckling
18 criterion, the current licensing basis is AmerGen's
19 description in Applicant's Exhibit 11, namely a one-
20 foot square center 536 surrounded by a transition of
21 one foot to a uniform thickness of 736 mils. Dr. Har
22 Mehta from GE has demonstrated that Citizens misread
23 the GE analysis. That was the basis for this LOCA
24 buckling criterion when they interpreted that
25 criterion to be half the size.

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1 Amergen then demonstrated that Citizens
2 also misread AmerGen's documents when they argued that
3 this LOCA buckling criterion has changed over time.
4 In fact, Citizens' only expert could not address the
5 CLB because he was unfamiliar with it. Finally, the
6 staff concurred that the LOCA buckling criterion is
7 part of the CLB and that it has not changed over time.

8 Two, available margin. As for identifying
9 the available margin, the testimony has demonstrated
10 that AmerGen's approach to use the average of the
11 internal UT grid data is adequate and is the standard
12 in the nuclear industry.

13 Citizens would like a different standard
14 which would require AmerGen to use the lower 95
15 percent competence interval for the data. That
16 approach we believe would actually ignore data and
17 ignores the phenomenon that the ASME code is seeking
18 to present, namely buckling, which is a phenomenon
19 over large areas, not single points.

20 In their opening statement Citizens cited
21 to federal courts and scientists who require each fact
22 to be proven to a 95 percent confidence. Mr. Webster
23 alluded to that again in his closing. Reasonable
24 assurance, however, does not require a 95 percent
25 confidence.

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1 As for the bounding available margin, the
2 Board has made it abundantly clear that AmerGen has
3 the burden here but the record now makes clear that
4 AmerGen's bounding available margin estimate of 64
5 mils in a six-by-six inch area in bay 19 is extremely
6 conservative and that the likely available bounding
7 margin is considerably higher.

8 We started with 64 mils in an area in bay
9 19 located in the upper sand bed region but it is now
10 clear from Dr. Hausler that the likely future site of
11 corrosion, if any, will be near the sand bed region
12 floor because if there is any new water in the
13 exterior, it would accumulate on the floor because
14 there is no longer any sand to keep the water in
15 contact with the higher elevation in the sand bed
16 region. There is significantly more margin near the
17 sand bed floor. Bay 17 trench data show more than 200
18 mils of available margin in this elevation.

19 Moreover, the contour plots -- pardon me.
20 There has also been quite a bit of discussion over the
21 past few days about whether the internal UT grid data
22 are representative of the bounding conditions from the
23 drywell shell when considering buckling.

24 AmerGen unequivocally demonstrated that
25 the external UT measurements are biased thin because

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1 (1) they were selected in 1992 to be the thinnest
2 locations as documented in historical reports; (2) the
3 internal grids when superimposed on external data
4 technically demonstrate that the external points are
5 thinner than surrounding areas; and (3) the photos and
6 personal observations of the exterior surface visually
7 show that they are.

8 Accordingly, Citizens' contour plots of
9 the drywell shell which treat these data as randomly
10 selected and, therefore, representative of the drywell
11 shell, are meaningless. Moreover, the contour of
12 other failings. They are not based on actual UT
13 thickness measurements.

14 Approximately half of the points used on
15 the bay 13 contour plot in Citizens' Exhibit 61 were
16 manipulated by taking 1992 data and uniformly
17 subtracting 20 mils from each point. The contour
18 plots then extrapolate behind the known data. As Dr.
19 Hausler stated, this is an exercise in speculation.

20 As for the sources of water, the testimony
21 is now conclusive that there is no potential for water
22 during normal operation and that only the refueling
23 cavity when it is filled with water could be the
24 source in the future. This cavity is only filled
25 during refueling outages.

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1 It is only expected to be filled during
2 refueling outages. The time that the exterior shell,
3 therefore, could be wet is very short, less than 30
4 days every two years. All parties now agree that
5 condensation of the exterior, whether during normal
6 operation or an outage, is not an issue.

7 As for the epoxy coating, Dr. Hausler
8 lacks the experience to provide a meaningful opinion
9 about the performance of that coating. The coating on
10 the exterior drywell shell is located in a benign
11 atmospheric environment. It simply cannot suffer the
12 same untimely and rapid degradation as a coating in an
13 oil field which is located in a submerged, pressured,
14 and elevated temperature environment. Dr. Hausler's
15 testimony on this issue, therefore, deserves little,
16 if any, weight.

17 Finally, future corrosion, future
18 corrosion rate for the external surface. Mr. Gordon
19 explained why 3 mils is a reasonable annual corrosion
20 rate assuming no coating, no sand, and the presence of
21 water. This is based on an outage temperature of 93
22 degrees F and Mr. Hosterman testified that this
23 temperature is reasonable considering temperatures in
24 the external sand bed region during normal operations,
25 which would be hotter, is around 109.5 degrees.

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1 For the interior surface Mr. Gordon
2 demonstrated why any future corrosion of that surface
3 of the drywell shell is of no engineering concern. He
4 also explained in his prefile testimony that the
5 chemistry of the water in contact with the internal
6 drywell surface that is embedded in concrete meets the
7 NRC's goal and every guidelines for a noncorrosive
8 environment.

9 Citizens provided no evidence to the
10 contrary. Thus, there is no basis for Citizens
11 alleged annual interior corrosion rate of 10 mils per
12 year and, frankly there never was a basis other than
13 an unsupported arguments that 2 mils of corrosion is
14 going on right now and that this rate might be
15 multiplied by five if new water reached the concrete
16 drywell floor and somehow came into contact with the
17 drywell shell before its pH was increased by the ever-
18 present concrete.

19 Mr. Gordon logically explained in his
20 prefile testimony that the pH of any new water would
21 quickly become basic from its contact with the
22 concrete. Under no scenario would this rate be
23 sustained for an entire year. The Citizens contend
24 when they list 10 mils it's an annual corrosion rate.

25 As for any rate of general corrosion on

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1 the exterior, that remains frankly outrageously
2 speculative. To explain, to exceed the over 200 mils
3 of bounding margin near the base of the sandbed floor,
4 the Board would have to conclude that greater than 50
5 mils per year of corrosion would need to occur during
6 the four-year UT inspection interval.

7 The Board would also need to find that the
8 coating, which is in excellent condition, would
9 degrade and that it would do so near the floor of the
10 sandbed region. Coating failure would have to be in
11 an area larger than 9 square feet because anything
12 smaller than that would be evaluated using LOCA
13 buckling criterion which, due to the bottom of its
14 tray of 536 allows significantly more metal to be
15 removed before exceeding that criterion and the LOCA
16 buckling criterion which is seven.

17 The water would then have to come into
18 contact with the same large area of failed coating and
19 remain in contact with the underlying bare metal
20 surface for over four years without AmerGen detecting
21 the water and taking corrective action. This is
22 despite fact that AmerGen has committed to check the
23 sandbed drains every three months.

24 There is no known source of water during
25 operations and there is only speculation that water

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1 could reach the sandbed region during the
2 approximately 30-day long outages every other year.
3 In addition, the floor of the sandbed is now sloped to
4 facilitate drainage away from the shell.

5 For all these reasons there is reasonable
6 assurance that AmerGen will be able to manage the
7 effects of aging in the drywell shell during the
8 period of extended operation consistent with the
9 current licensing basis. Thank you.

10 CHAIRMAN HAWKENS: Thank you, Mr.
11 Polonsky.

12 That concludes the presentation of the
13 parties for this hearing. Some administrative matters
14 I would like to address in closing. A reminder
15 parties that propose questions will be provided the
16 Sec'y. When the Board issues its written decision a
17 request for Citizens. We did provide your handwritten
18 confidential questions. If you would do us the favor
19 of providing Ms. Wolf with a typed copy of that by
20 Thursday, close of business. Would that be possible?

21 MR. WEBSTER: If I could get a copy of the
22 questions back, Judge, that would be fine.

23 CHAIRMAN HAWKENS: You certainly may. As
24 a reminder, the parties have agreed they will submit
25 their motions for transcript corrections by October

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1 9th. If Ms. Wolf has not done so already, she will
2 provide you with a format.

3 MR. WEBSTER: Sorry, Judge. I'm sorry to
4 say that Dr. Hausler informed me, and he had been
5 wanting to inform the Board, that he has said that he
6 is over-committed for the next two weeks and cannot,
7 therefore, provide to me his transcript corrections.

8 I suggest that perhaps an approach might
9 be that I could certainly provide the corrections I
10 believe are appropriate by the deadline we had
11 discussed previously. I think it is appropriate since
12 it is Dr. Hausler's testimony to allow him to correct
13 his own testimony at a later date.

14 CHAIRMAN HAWKENS: What date can Dr.
15 Hausler supply his transcript corrections?

16 DR. HAUSLER: Monday of the third week of
17 October. I'm committed through the 15.

18 CHAIRMAN HAWKENS: October 22nd? That's
19 the date?

20 DR. HAUSLER: That would be fine.

21 CHAIRMAN HAWKENS: All right. We will
22 have then the parties submit their motion consistent
23 with our original understanding. On October 9th they
24 will have the corrections agreed upon by the parties
25 with the exception of those corrections by Dr.

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1 Hausler.

2 You will provide your proposed findings of
3 fact and conclusions of law consistent with the
4 corrections submitted. To the extent there are
5 further corrections, you may provide a revised draft
6 of those proposed findings of fact and conclusions of
7 law.

8 MR. WEBSTER: Sorry, Judge. I'm a little
9 slow by the end of the day.

10 CHAIRMAN HAWKENS: Your proposed findings
11 of fact and conclusions of law are due on or before
12 October 10th.

13 MR. WEBSTER: I understand that. Are
14 those going to be based on the draft transcript?

15 CHAIRMAN HAWKENS: Yes. Correct.

16 MR. WEBSTER: Okay.

17 CHAIRMAN HAWKENS: The party anticipates
18 issuing its decision sometime in November. The Board
19 does. I'm sorry. I get a little slow also this time
20 of day. If a party wishes to challenge that decision,
21 it must file a petition for review within 15 days of
22 the service of that decision with the Commission.

23 If no petition for review is filed, if the
24 Commission does not initiate any review action, the
25 Board's decision is final Agency action 40 days after

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1 its date of issuance. As a reminder to the parties,
2 under Commission regulations you must seek Commission
3 review as a prerequisite for seeking judicial review.

4 Are there any other additional matters to
5 discuss before we close the record subject to the
6 motions for transcript corrections?

7 MR. POLONSKY: Nothing for AmerGen, Your
8 Honor.

9 MS. BATY: Nothing from the staff at this
10 time.

11 MR. WEBSTER: Is there going to be another
12 time? Nothing for Citizens.

13 CHAIRMAN HAWKENS: Thank you. Thank
14 counsel and their witnesses for the service they
15 provided for cooperation and the contributions to this
16 hearing. We express our gratitude to the audience for
17 their attendance. The record is closed subject to the
18 motion for transcript corrections and the hearing is
19 closed. Thank you very much.

20 (Whereupon, at 4:34 p.m. the hearing was
21 adjourned.)

CERTIFICATE

This is to certify that the attached proceedings
before the United States Nuclear Regulatory Commission
in the matter of:

Name of Proceeding: Amergen Energy Company
Oyster Creek Evidentiary
Hearing

Docket Number: 50-0219-LR

Location: Toms River, New Jersey

were held as herein appears, and that this is the
original transcript thereof for the file of the United
States Nuclear Regulatory Commission taken by me and,
thereafter reduced to typewriting by me or under the
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James Salandro
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