NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

PUBLIC MEETING

BRIEFING ON POINT BEACH 2.206 PETITION

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Place - Washington, D. C.

Date - Wednesday, 28 November 1979 Pages 1-94

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

PUBLIC MEETING

BRIEFING ON POINT BEACH 2.206 PETITION

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Room 1130
1717 H Street, N. W.
Washington, D. C.

Wednesday, 28 November 1979

The Commission met, pursuant to notice, at 2:52 p.m.

BEFORE:

VICTOR GILINSKY, Acting Chairman

RICHARD T. KENNEDY, Commissioner

PETER A. BRADFORD, Commissioner

JOHN F. AHEARNE, Commissioner

PRESENT:

Messrs. Shapar, Eisenhut, Case, Hanrahan, Bickwit, Reis, Noonan, Malsch, Shao, Charnoff, and Barth.

Ms. Falk.

* * *

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COMMISSIONER GILINSKY: Let's vote to hold this meeting while we are waiting for Commissioner Kennedy. Is the Secretary here?

MR. HOYLE: Yes.

COMMISSIONER GILINSKY: Commissioner Kennedy is here, anyway. We are required to vote to hold today's meeting on short notice. It is a briefing on the petition of Point Beach-1. We need a vote to hold it on less than one week's notice. All in favor?

(Chorus of ayes.)

COMMISSIONER GILINSKY: The Commission requested this briefing today in order to assess the current situation at Point Beach, and to consider whether Unit 1 should restart without further Commission action. Wisconsin Environmental Decade has petitioned the Commission and asked that the plant not start up, again, pending an investigation and hearing on the steam generator degradation problems at Point Beach, which have been particularly severe recently. I understand tha the staff has met with Wisconsin Electric Power Company, Westinghouse and the petitioners to discuss their concerns and are prepared to give us their evaluation of the steam generator tube degradation.

The petition from the Environmental Decade has been referred to the staff under 10 CFR 2.206. We propose the following schedule for the briefing: today, a staff

presentation to take approximately one-half hour; a response from Wisconsin Electric Power Company, the licensee; approximately 10 minutes response from Wisconsin's Environmental Decade Incorporated, the petitioners -- also approximately 10 minutes; and questions from commissioners after that, and of course, during the presentations.

Mr. Case, you may proceed.

MR. CASE: Thank you, Mr. Chairman. I would like to make a brief statement, and make the record clear. The staff's intent is to deny the petition that you discussed. Mr. Eisenhut will lead off with a presentation as the basis for our conclusion.

MR. EISENHUT: Thank you. As in way of background for discussion today, I would like to go back through, very briefly, the Point Beach reactors, what they look like, and the history, because you really need to understand it and see how it looks to put it into perspective.

(Slide.)

First, the Point Beach Unit 1 reactor, which is primarily what we are talking about today, has been shut down for refueling for some time. That plant is in a holding pattern. It is ready to return to power on November the 21st. It is since being held up and being held at zero power, at my request a few days back, and they are doing

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criticality tests and this kind of thing.

It has been held up since November the 21st. This slide is basically a summary of the Point Beach Units 1 and 2 reactors, and some of the critical parameters in the plant. Point Beach Unit 1 has been operating since December 1970. It is a two-loop Westinghouse plant with 260 steam generator tubes. The thickness of the walls is about .05 inches. The tubes Inconel 600. The tube sheet, which we will be talking about also, is made of carbon steel.

(Slide.)

I won't belabor the details here. We can refer back to them if we need to.

COMMISSIONER KENNEDY: Can you explain the difference in the secondary water?

MR. EISENHUT: The time at which the plant converted from phosphate to AVT varied somewhat, but it also is effective full power month of time, and that time -- they were converted over just about the same time. You can see the 36 effective full power months versus 35.7. One has been operating longer than the other. That is why you see a difference.

On the next slide, this is a schematic of a U-tube recirculating type Westinghouse steam generator. The critical portions we will be referring to here today is the lower part of the steam generator. You will see a very

1 thick portion which is a 23-inch thick steel plate referred
2 to as a tubesheet. The tubes pass through that tubesheet.
3 You will see each of the support plates. They fold over in
4 a U shape.
5 The next slide is a simple schematic of what the
6 lower piece of the tubesheet looks like, or the lower piece
7 of the steam generator. There is a carbon steel tubesheet
8 about 23 inches thick. The steam generator tubes all come
9 through that tubesheet. They are what is called expanded
10 rolled at the very bottom. They are forced out. That is
11 the pipe between the primary and the secondary system.
12 The crevice you see between the tubes and the
13 tubesheet is an area that we will be talking about
14 considerably today, and is the area of real interest.
15 The problem that we will be talking about today,
16 principally, is occurring in this crevice region. The tubes
17 are degrading, primarily, in fact, all the data we have seen
18 is between the uppermost layer of the tubesheet and down to
19 the rolled area. All of the degradation has been in that
20 region.
21 (Slide.)
22 The next slide is a summary of the different kinds
23 of problems that we have seen in the past. This is a slide
24 that I am sure you have seen a number of time, summarizing
25 the types of problems that we have been looking at. You can

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1 see from this that there is the classic wastage problem that
2 you will recall was experienced back in the early 1970s,
3 associated with the phosphate treatment, because of the
4 chemistry that was used on the secondary side of the plant.
5 Wastage is literally a phenomenon of metal removal. Wastage
6 occurs above the tubesheet.
7 All wastage problems -- the principal problems
8 through that period of time, where you see the Xs in the
9 left-hand column, occurred in what is called the sludge
10 pile, a pile of sludge that accumulates on top of the
11 tubesheet. This is an area of a couple of inches up to six
12 to eight inches above the top of the tubesheet. Those were
13 principally the problems. You will see that Point Beach-1
14 had an X there. The problems were in the early '70s.
15 There is a U-bend fretting problem associated with
16 a couple of the unique designs. Deep crevice corrosion,
17 which is the problem we are talking about here today, it has
18 been experienced in the United States in four reactors. It
19 has been experienced as far back as several years ago, four
20 or five years ago, when these problems first came up.
21 Stress corrosion cracking in this case is generally referred
22 to as cracking that has been occurring again above the
23 tubesheet. It is another problem that we have seen, that we
24 are not principally concerned with here today, on Point
25 Beach.

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The number of columns on the right -- actually, all of them in a row, are basically associated with the denting phenomena, which we have talked about on a number of occasions.

The next slide summarizes the Point Beach Unit 1 history as it would be looked at if you just looked at and concerned yourself with what has actually occurred at this unit.

(Slide.)

If you just looked at the number of tubes plugged historically as a function of time, in the left-hand column for Point Beach Unit 1, the date of the outage, the date that the plants have been shut down for some reason, you can see that the chemistry -- that is the secondary chemistry -- control changed about September 1974. That change on Unit 1 was an on-line change. They did not shut the plant down in September of '74. They cleaned out the system and then switched to a chemistry. They made the change, stopped treating the secondary with phosphate and then changed to AVT.

COMMISSIONER AHEARNE: Was Unit 2 also on line?

MR. EISENHUT: It was not. It was converted in August of '75.

COMMISSIONER AHEARNE: It was not converted on line?

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MR. EISENHUT: It was not.

MR. CASE: It was cleaned out in between?

MR. EISENHUT: Yes. There is a history of the leaking tubes in gallons per day, just to give you a quick reference point. 500 gallons per day is about three gallons per minute, which is the primary coolant tech spec value. So if something is 72 that is a very small leak. In February 1975 there was a large leak of about 125 gallons per minute. It was a quite large leak. It was the first known large steam generator tube rupture in any of the plants operating in the United States.

If you look at just the right-hand column, at first blush it looks like the number of tubes plugged was considerable back in the 1972-'74 time frame, and then recently in 1979 you see a considerable amount of degradation. That is, in fact, the basic cause of the concerns that have been raised at this time, because you must explore and go into this somewhat deeper to understand what is going on.

COMMISSIONER GILINSKY: How many tubes would have been leaking?

MR. EISENHUT: Generally one tube. Occasionally you find two tubes that are leaking, but historically in reactors, in all reactors throughout the United States, when you see a leaking tube it is generally one leaking tube.

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There have been some dented plants. When you see some leakage, it is associated with one or more tubes.

COMMISSIONER AHEARNE: That is one, that is now leaking. There are several behind that.

MR. EISENHUT: That could be there eventually, as time goes on, yes. This column, though -- the leak rate generally when the leakage -- the period of time you are operating with a leaking tube is so short that another tube doesn't reach that point.

COMMISSIONER GILINSKY: What is the criterion for plugging a tube?

MR. EISENHUT: The utility in the past has used a plating requirement, but when a tube is -- 40 percent of the wall thickness is gone, they plug the tube.

COMMISSIONER AHEARNE: We do not have a criterion.

MR. EISENHUT: Yes. One of the regulatory guides tells us how you determine what the plugging limit should be. It is generally 40 to 50 percent of the wall gone. What you do is figure out the rate of degradation and then it is 40 percent throughwall is the limit. That has a lot of margin on it, to show it could probably go 60 to 70 percent throughwall, from tests that have been done, tubes -- you will see some data in a little bit -- tubes with a very small fraction of the wall left actually are capable of

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1 handling the differential pressures that you might
2 experience during normal operation and during postulated
3 accident conditions.
4 COMMISSIONER GILINSKY: This is 40 or 50 percent
5 at any one point?
6 MR. EISENHUT: At any one point. 50 percent or 60
7 percent left.
8 MR. CASE: Some are plugged because they are in a
9 suspect area. Not necessarily all of these reach 40
10 percent; is that true?
11 MR. EISENHUT: Yes, what you will see in a moment
12 when I dissect this last column, you will see that in fact
13 two things have changed recently. One is the thing you are
14 looking with, that is, the eddy current probe has changed.
15 It became more sensitive for certain kinds of cracks. It
16 used to be what is called a single frequency probe, and now
17 the eddy current probe is a multifrequency probe. So you
18 are looking with a different yardstick measuring how much
19 material is left.
20 And secondly, the utility has changed its limit.
21 Now he no longer says that tube must be 40 percent of the
22 way gone to have a problem, but any defect that I see, I
23 will plug.
24 COMMISSIONER KENNEDY: Any defect?
25 MR. EISENHUT: Any defect that is detectable, so

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1 therefore by definition what you are going to do is see a
2 larger number of tubes plugged.
3 COMMISSIONER GILINSKY: How often are all of the
4 tubes examined?
5 MR. EISENHUT: Generally, generically, Regulatory
6 Guide 1.121 says that you do a three percent inspection at
7 each outage.
8 COMMISSIONER AHEARNE: Any outage?
9 MR. EISENHUT: No, it is generally a refueling
10 outage, for some period not to exceed 24 months. Generally
11 an inspection is done at the refueling outage and you do
12 three percent.
13 COMMISSIONER KENNEDY: Three percent? Is there
14 some method by which you select the three percent?
15 MR. EISENHUT: A plant that has not found a real
16 problem, sort of at random. On plants that are suspect, or
17 plants that have seen some kind of problem in the past, it
18 is a selected pattern, not by Regulatory Guide 1.121, but
19 because as we are reviewing we require different plugging in
20 different inspection approaches.
21 For example, if a plant had denting problems, you
22 would do it with multisize probes as well as different
23 frequency probes. And we would look in the most suspect
24 areas. If you had primarily a wastage problem, we would
25 tell them to look in the kidney region, as it is called, of

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1 the size half-moons of the steam generators, which is
2 principally where wastage problems occur.
3 So it is pretty much general but if it gets to be
4 any more it is generally fit to a problem, once a plant has
5 a problem.
6 COMMISSIONER GILINSKY: Three percent is about 100
7 tubes?
8 MR. EISENHUT: There are generally 32,060, so
9 three percent would be about 100. If we found any defects
10 in the 100 tubes, you pick another three percent. So in
11 fact, from a practical standpoint --
12 COMMISSIONER AHEARNE: Is that a continual
13 process, and then the second three percent?
14 MR. EISENHUT: I think there is a limit on it,
15 but from a practical standpoint. Let me give you a
16 for-example. The August inspection and October inspections,
17 they inspected 100 percent of the tubes, all 32,060 tubes.
18 So, what in effect --
19 COMMISSIONER KENNEDY: Less those already plugged?
20 MR. EISENHUT: Yes, which was under 10 percent.
21 COMMISSIONER BRADFORD: What is the total gallons
22 per day that would go through a tube?
23 MR. EISENHUT: Probably from a double-ended
24 offset.
25 MR. CASE: Just going through the tube.

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MR. EISENHUT: During normal operations? You take 32,000 tubes times two and figure out the mass flow through the system.

COMMISSIONER AHEARNE: What led to the inspection of all 100 percent of the tubes?

MR. EISENHUT: We will get the number for you.

MR. CASE: Why did Point Beach decide to look at 100 percent?

MR. EISENHUT: I think the experience that has been growing of the -- there was a leak last September; there was a leak in March, leaks in August; and at some point there has been clearly within the last year three different identifiable leaks. The two August events on here, I believe, are the same tube, which is a mistake in plugging the wrong tube, and went back and returned to operation and foound the same tube.

COMMISSIONER AHEARNE: So does the 145 indicate that they inspected 100 percent of the tubes? And you say that the criteria was "any defect," so is it of the tubes they only found 145 with defects?

MR. EISENHUT: That is correct.

MR. EISENHUT: About 27 gallons per minute.

COMMISSIONER BRADFORD: 130,000 per day for one tube?

MR. EISENHUT: Yes. The flow-through tube is based upon the pressure differential from the coolant on the inside of the tube. It is roughly around 2200 psi. The coolant on the outside is somewhat under 1000 psi. So one could break a tube. You could have considerably more flow through that broken tube.

The maximum theoretical flow, if you postulate a tube instantly broken in half and if it could physically offset, would be probably on the order of 500 or 600 gallons per day.

Generally, there are lots of restrictions in the steam generator before you physically get to that.

So what we did next was -- this slide really ought to look in a little more detail. And the next slide sort of takes the last column. It is the number of tubes that have been plugged and dissected.

(Slide.)

It takes the same dates of the outtages and says what was the cause of them. When you look at it this way, you can put problems in a little better perspective. First, the problem that occurred historically was the thinning or cracking, the wastage associated phenomena which was

1 occurring somewhat above the tube sheet, a few inches above,
2 in that general region, again primarily is what is called
3 the kidney region, shaped like a kidney in the middle of it.
4 That problem was principally associated with the use of
5 sodium phosphate treatment for secondary treatment of the
6 steam generators.
7 The plant, you recall from the other slide, converted to
8 all volatile treatment in September of '74. It was
9 converted on line. And at the February, '75 shutdown, you
10 notice quite a large number of tubes were plugged. Those
11 have grown obviously during the period of time the plant was
12 on phosphate.
13 There was no shutdown in September, '74.
14 You will notice after they converted the secondary side
15 water treatment chemistry, that problem basically went away.
16 That is nothing new at Point Beach. That is something that
17 has been seen at a very large number of plants in the United
18 States and around the world.
19 On the left-hand side, the denting column, you will
20 recall in late 1976 we had considerable attention paid to
21 the denting phenomenon. A number of plants looked to see
22 whether or not there was any denting.
23 The denting surveyed there results in the plugging of tin
24 tubes in steam generator A and it turns out that those were
25 all extremely minor dents. There has been no evidence of

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growing denting problems in any significant way at all since that point in time.

That leads us over to the last column, which is the crevice corrosion problem, which, as I said earlier, is the thing that we primarily from a safety standpoint were concerned about.

The problem there is, as I said, exclusively, from everything that we have ever seen tied to cracks that occurred in the crevice. That is below the upper surface of the tube sheet in about a 20-inch span of the tube down in the tube sheet.

There are, I believe, 18 plants in the United States with this design. As I pointed out earlier, 2 or 3 of these other plants have seen the same kind of phenomenon.

(Slide.)

COMMISSIONER AHEARNE: Before you leave this one, just out of curiosity, what were the other 11 tubes plugged for?

MR. EISENHUT: On the last slide?

COMMISSIONER AHEARNE: On 10-5, there were 145 tubes plugged.

MR. EISENHUT: I think there were a few misplugged. And generally, the number went up from 135 that were supposed to be plugged up a little bit higher.

VOICE: 11 tubes steam generator with no

1 indication in laboratory examination. There was some
2 indication (inaudible).
3 MR. EISENHUT: It won't add up. The simple point
4 is that 2 or 3 of the tubes were pulled for examination.
5 There were 2 or 3 plugged by mistake. There were 2 or 3
6 that were actually pulled for examinations and test of a
7 couple of different times.
8 And to get a better understanding of what was going on in
9 the steam generator, the utility did pull good tubes.
10 Could I have the next slide?
11 (Slide.)
12 Let's skip that slide and go to the next one.
13 (Slide.)
14 I would like to focus on the piece of experience
15 associated with what we call deep crevice cracking. If you
16 look at the -- this, you see in '77 there were some problems
17 with 2 or 3 tubes. In August, there were a number of tubes
18 plugged in August of '79.
19 The real concern came about because in August, '79, there
20 was an extensive inspection, 100 percent inspection, which
21 resulted in that number of tubes plugged, about 100. And
22 then again, in October, there was another 100 percent
23 inspection, which resulted in 134 tubes here being plugged.
24 So the concern came down pretty simple of looking at the
25 August and October inspections.

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1 COMMISSIONER AHEARNE: The August was 100
2 percent. So these additional tubes two months later were
3 either --
4 MR. EISENHUT: That was my next statement exactly.
5 The August -- there were two differences. In August, the
6 plugging requirement was that you had to be 40 percent
7 degraded before it was plugged. In October, they plugged
8 all indications.
9 Obviously, they found 140 tubes in October, but also,
10 they used a different measuring technique. They used a
11 single frequency eddy current test probe in August and they
12 used a multi-frequency eddy current probe in October.
13 It is not simple to know what is the cause. You get down
14 to either, there is a very rapid rate of degradation and/or
15 the testing scheme, the previous testing scheme is in
16 question.
17 That is the single frequency.
18 Westinghouse estimates that of the 140 tubes that were
19 plugged in October that were not found in August, maybe
20 one-third of those were due to the fact that they switched
21 probes, a new technique.
22 The other two-thirds, it is hard to say how many of them
23 were plugged because now they have some indication which
24 before would have been below the limit.
25 COMMISSIONER AHEARNE: Since you did or since they

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1 did in August 100 percent, at least those that were below
2 the limit could have been -- was a record maintained?
3 MR. EISENHUT: Yes. And in fact, that is being
4 done. A number of the records of the -- it is two times
5 3000 -- 32,060 tubes are being checked to look at it.
6 I think in fact, our assumption here is that in fact
7 there was major degradation over that period of time. I
8 don't believe that we will be able to pin down precisely how
9 much of that 140 was due to eddy current change or how much
10 was due to mis-plugged.
11 There is also another parameter, and that is it is more
12 an art than a science, doing eddy current testing. And in
13 fact, it depends a lot on the reviewer of the eddy current
14 signals on the oscilloscope.
15 COMMISSIONER AHEARNE: Of those 134, whatever, if
16 the previous criterion had been used, how many of those
17 would have been --
18 MR. EISENHUT: I don't think that they went back
19 through them all and checked that.
20 COMMISSIONER GILINSKY: I didn't understand your
21 one-third and two-thirds. I thought you were saying that
22 two-thirds of them would have failed the previous test.
23 MR. EISENHUT: Let me use simple numbers because
24 it is easier with the one-third and two-thirds. Let's say
25 the number is 150 tubes. 50 of those tubes would probably

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1 have been found in August.

2 Is Westinghouse's assertion if they had used the

3 multi-frequency testing probe — that is, if they had looked

4 with a different tube?

5 COMMISSIONER AHEARNE: You say 50 would have been

6 found and met the previous criterion?

7 MR. EISENHUT: No. I am saying that 50 of those

8 defects —

9 COMMISSIONER AHEARNE: Would have shown up as

10 defects independent of the criteria.

11 MR. EISENHUT: Yes. Of the remaining 100, some of

12 those probably would have been plugged before if they had

13 used a criteria that all indications would be plugged.

14 COMMISSIONER KENNEDY: It would be 50 plus X.

15 MR. EISENHUT: Yes. Since we don't really have —

16 MR. CASE: The remaining would be due to the

17 degradation between the two periods of time and we

18 conservatively assume since we can't bend down the others,

19 that most, if not all, was due to degradation.

20 MR. EISENHUT: Yes. The reason is that we have

21 some serious questions about how adequate eddy current

22 testing is in the tube sheet, whether it is single frequency

23 or multiple frequency when you get down to defects under 40

24 percent anyway because the problem with eddy current testing

25 is that in a straight run of pipe, we believe it is very

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1 accurate. It is a good measure to be able to detect cracks
2 or defects. Even in tube sheets using the multi-frequency
3 probe, what it does is it measures the — it looks at the
4 tube, the lower frequency looks at the support plate on the
5 outside and differentiates between the two and gets a better
6 handle on what is in the tube.
7 But you need to have a lot of correlation data and you
8 need to be able to look at the situation to get that
9 correlated.
10 There is not enough research work done on this situation
11 down in the crevice in the tube sheet where you have a
12 corrosion product around the tube in a crevice to be able to
13 get a good measure of what it really looks like, what X
14 looks like.
15 For the sake of this discussion, we just assumed that the
16 rate of degradation is very large. We don't believe that we
17 will be able to be convinced that that large number
18 significantly goes away, either, because of the change in
19 technique or because of the change in the plugging limit.
20 We just don't believe that we are going to be convinced.
21 COMMISSIONER GILINSKY: Suppose the August test
22 had been used in October. Are you saying approximately
23 two-thirds?
24 MR. EISENHUT: I am saying some number. 1.40
25 would be — 140 —

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COMMISSIONER GILINSKY: I don't know how much.

COMMISSIONER KENNEDY: It would be 50 at least.

COMMISSIONER GILINSKY: They are saying they feel it would be at least 50 less. But it may be as high as -- it is not necessarily 50. It is one-third.

MR. EISENHUT: I can give you one more piece of information. Westinghouse believes that the accuracy of the eddy current probe is such that you can detect cracks 20 percent through wall.

So now you are only concerned about things that are 20 to 40 percent, if you accept that.

We are not accepting that and we are saying, without more work, it is just unclear that therefore, we are saying that, in fact, to be conservative about it, we are saying that it looks like 140 tubes became defects from August to October.

COMMISSIONER AHEARNE: Do we have any program to verify the eddy current multi-frequency device?

MR. EISENHUT: I will get to that. It is very simple. Yes, we have a program at Oak Ridge. We have some research work underway. I have asked research as of today if, in fact, they can move up and expedite a program that we have been talking at Oak Ridge about where they would actually try to mock up the situation and to in and see the accuracy of the eddy current probes in this kind of situation.

We are trying to do it. The first estimate was they could do it in six months. I have asked them to try to do it in something less than six months.

COMMISSIONER GILINSKY: To sum up, you said that you may be degrading at something like 50 tubes a month.

MR. EISENHUT: We could conceivably. That would be an upper bound. In fact, to get a better handle on the situation, I guess the next slide — this is some of the data what is being found. Now this is a composite of August and October.

You would expect, first of all, on the top part of the histograms, you would expect them to skewed toward the high end.

COMMISSIONER AHEARNE: To reiterate the point, the comparison of August and October, this is using different testing devices.

MR. EISENHUT: This is not a comparison of the two. This is a summation of the two, recognizing that they were done with different people reading the charts, different probes and different plugging.

COMMISSIONER AHEARNE: Different types of probes.

MR. EISENHUT: Absolutely. That is why I want to highlight -- you can't just walk into these numbers and accept these numbers without carefully examining the technology associated with the high number.

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We have considerable debate with the experts about the accuracy of the probes and the different configurations.

We now have a number of our consultants looking at it. It is a very complicated --

COMMISSIONER GILINSKY: All of this cuts two ways, doesn't it?

MR. EISENHUT: Absolutely. From a prudency standpoint, we are assuming that there were a significant number of tubes degraded. That is my bottom line. I don't think we are going to be able to resolve that discussion in short order.

And from a licensing standpoint, it is prudent to have a conservative approach.

One thing that we are going to try to look at also, we will try to duplicate this chart as to what it looked like in August and what it looked like in October so that we can make a comparison.

This is the data that we have at this point.

The important point that you see here is the top really doesn't tell you much except the sensitivity of eddy current probes is higher for defects nearly throughwall. And hence, you will see a lot more of those.

So you may well have a Gaussian distribution in the sense of the number of indications versus wall thickness.

You can't really ascertain that without knowing the

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1 sensitivity of the instruments you are looking at.

2 The bottom part of it, though, does tell us something a

3 little bit firmer. It shows us where, in fact, these

4 defects are occurring. And you will see that they are

5 occurring, by and large, looking at A and B together over a

6 considerable portion of the crevice.

7 I should point out that the top region there is a little

8 bit less. It is 20 inches to 23 inches. It is only a

9 3-inch band.

10 Again, most of the defects are actually, we believe, away

11 from the top surface of the tube sheet.

12 COMMISSIONER AHEARNE: Most are away from?

13 MR. EISENHUT: Slightly away, and slighly, you

14 will see in a moment. But very, very —

15 COMMISSIONER AHEARNE: Still in the upper three

16 inches.

17 MR. EISENHUT: In the upper three inches. We have

18 not seen any above the surface of the tube sheet.

19 COMMISSIONER AHEARNE: Any particular reason why

20 the difference in the distribution?

21 MR. EISENHUT: Not that we know of at this period

22 in time. A little more of what you would expect in the

23 upper curve on the steam generator B. Also IB.

24 COMMISSIONER AHEARNE: But it is more uniform

25 across that whole region.

COMMISSIONER KENNEDY: It is also interesting that at the very bottom on that one, whereas there is no indications on the other one.

MR. EISENHUT: That is correct. And if in fact you ask a lot of the experts on the crevice corrosion cracking, in any environment at the tip of the crevice is where one would expect more cracking. And what it shows you in 1A is that 3.6 in 1B is at the tip of the crevice. There is none down in the old area. So it really tells you that is all located at the tip of the crevice, which is what you would expect.

To get a little bit better understanding of what is going on, the utility did a couple of other things. He went in and pulled three tubes by cutting them out from the bottom and pulled on the tubes to see how hard it would be to pull the tubes out. He worried about a tube that is cracked slipping out of the crevice.

He found that it took an extremely large force to pull the tubes out.

(Slide.)

This also tells you something about the corrosion product buildup around the tube. He did just to see whether or not you have to worry about a crack, where a tube can lift out of the crevice region. It is also significant that in the crevice we have never seen circumferential cracks.

From a safety standpoint, you would be more worried about a circumferential crack, because a tube would be free to lift itself out if it is very, very close to the top of the tube sheet.

If the crack, of course, occurs down in the tubesheet, there is not enough play in the tube where you can get anything near an offset. The theoretical limit, that is, the amount of flow you would expect if you postulated a throughwall circumferential crack down in the crevice, and if you have a clean crevice, is only about seven gallons per minute. So this kind of cracking, while it is a concern if it is occurring down in the crevice, is not a problem of major primary system leakage per tube.

COMMISSIONER AHEARNE: Your distribution is up in the top.

MR. EISENHUT: That's right. But there have been calculations done that show that if the crack is below .15 inches from the upper surface of the tubesheet, it cannot pull out. It is not circumferential. It is longitudinal and at some angles and at some matrix, number one. And number two, it has got to be within .15 inches before it can pull out.

COMMISSIONER AHEARNE: In your previous chart, with the 40-some percent in the upper region, are those within the .15?

mte 3

MR. EISENHUT: We can't detect it that accurately. It is a backward look at it. How much can the tube actually give? There is none above the upper surface, we do know that. Even though you would think that the number there would be small, even though they are longitudinal, you can see that we would require a couple of extra defenses down the road to back it up.

The utility did a few other things. He removed three degraded tubes and tested them to pressurize them, degraded tubes. I don't have the details on how bad they were degraded. But none of them failed. They all failed between 5,000 and 11,700 psi.

COMMISSIONER AHEARNE: Is that a static test?

MR. EISENHUT: The 11,700 didn't fail, didn't burst. It ballooned and started to leak.

The utility also did a number of metallurgical examinations as to how much of the wall had to be there if now you had this degraded situation, if a tube is free and if it can move, and you now superimpose on it an accident. I again remind you, the wall thickness is about .050, fifty thousandths. This is for a main steamline break. You need about .013; 26 percent of the wall must be there to certainly amply be able to withstand the main steam line. For no collapse under a LOCA, you need something in the order of about .015, .02, or you need something on the order of about

1 forty thousandths.

2 COMMISSIONER AHEARNE: These are calculations?

3 MR. EISENHUT: Calculations. All it really tells

4 you is this is nothing new. There has been a considerable

5 number of independent calculations that the staff has done

6 or had done by its consultants at the national labs. What

7 you find is that a severely degraded tube has a considerable

8 amount of strength.

9 COMMISSIONER GILINSKY: Let me understand that

10 point. You are saying for a large LOCA, as long as you have

11 more than 40 percent remaining tube wall, you can withstand

12 the forces?

13 MR. EISENHUT: Yes.

14 COMMISSIONER GILINSKY: To maintain tube integrity.

15 MR. EISENHUT: Yes. That is outside the tubesheet.

16 That is a conservative calculation -- I didn't bring my

17 notes -- circumferential uniformity distributed in an area

18 outside the tubesheet. It is a conservative calculation

19 even at that.

20 COMMISSIONER KENNEDY: It would be less in the

21 crevice.

22 MR. EISENHUT: Yes, it would be much less.

23 COMMISSIONER GILINSKY: To go back to your earlier

24 histograms, if I understand them correctly, some appreciable

25 fraction of the tubes had penetrations of as high as

1 80 and 90 percent?

2 MR. EISENHUT: Correct, in the tubesheet. But in

3 the tubesheet, you only need -- inside the tubesheet, you

4 only need 10 percent of the wall required, even under accident

5 conditions.

6 COMMISSIONER GILINSKY: Even so, you had 40 percent

7 of the total steam generator 1A.

8 MR. EISENHUT: That's right, and that was part of

9 our concern as to things that have happened. And you will

10 see it is because of that -- if the utility shut down the

11 unit, if he does a conservative plugging pattern, if he does

12 a thorough inspection, conservative plugging pattern, extra

13 precautionary things, we know on day one when you start up

14 you know with confidence that there are not a lot of tubes in

15 the 90 percent range.

16 COMMISSIONER AHEARNE: The title you have is

17 "Summary of Lab Examination and Tests." Whose lab examina-

18 tions?

19 MR. EISENHUT: All of the licensees. I believe we --

20 our consultants have gone out to Westinghouse and the labs

21 and examined.

22 COMMISSIONER AHEARNE: About the point of the

23 calculations, of the 10 percent being adequate?

24 DR. SHAO: We have test results for outside the

25 tubes.

1 MR. EISENHUT: And we have calculations.

2 DR. SHAO: We do have test results to back up the

3 40 percent remaining outside the tubes, not for Point Beach

4 but the segment types.

5 MR. EISENHUT: We have also had, as far back as a

6 couple of years ago, we have had the national labs do calcu-

7 lations for us as to how much material is left, how much has

8 to be left, that you ensure the integrity. What you are find-

9 ing, it takes not that much material to ensure that, even

10 under transient situations, including dynamics, to ensure

11 that you don't have a big problem.

12 COMMISSIONER AHEARNE: Do you say your own calcula-

13 tions are at 10 percent?

14 MR. EISENHUT: Yes.

15 DR. SHAO: The calculation --

16 COMMISSIONER GILINSKY: One is concerned about a

17 relatively small number of tubes bursting.

18 MR. EISENHUT: Not quite so much from an ECCS

19 standpoint. Before you have a problem there is a window

20 where you have a concern, anywhere from about 1300 gallons

21 per minute maybe up to 5,000 gallons per minute. So you

22 see if these leaks are occurring down in the crevice, and

23 the maximum theoretical leakage of a circumferential crack

24 is like seven gallons per minute, you need a very large

25 number of tubes. You need a couple of hundred tubes. That

1 is for a clean crevice and for circumferential cracks, these
2 cracks. We've never seen circumferential. We see longitudinal.
3 Leakage would be less. And the crevice has products in it, so
4 the leakage would be less.
5 COMMISSIONER AHEARNE: Is there any significant
6 difference between calculations or the tests under dynamic
7 conditions than under static conditions?
8 MR. NOONAN: We basically looked at the blowdown
9 characteristics of the steam generator, both for the LOCA and
10 for the main steam line break. The time durations we are
11 talking about in the main steam line break are in the tens
12 to hundreds of seconds. In other words, the time it drops
13 from -- peak pressure drops on down, it takes at least 25
14 seconds to get down to a point where it stabilizes, and that
15 is basically a static type load from the standpoint of
16 dynamics.
17 For the LOCA load, we talk in terms of milliseconds.
18 Again, we talk in terms of 30 to 50 milliseconds and the
19 dynamic property of these tubes. That is again considered a
20 static-type load.
21 COMMISSIONER AHEARNE: When you say quasi-static,
22 are you saying that the tests and analyses are adequate for
23 the 30 to 50 millisecond load?
24 MR. NOONAN: Yes, would be adequate for this tube.
25 COMMISSIONER AHEARNE: Do you have some lab tests

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1 under both conditions to sort of support that judgment?

2 MR. NOONAN: We have analytical stuff to show. We

3 don't have any basic lab tests to represent that.

4 COMMISSIONER AHEARNE: What is the time duration

5 for water hammer?

6 MR. NOONAN: That could be in terms of a very --

7 in the millisecond range.

8 COMMISSIONER AHEARNE: Would that end up being

9 dynamic loads?

10 MR. NOONAN: That would be dynamic load. But I

11 would like to point out that for the steam generator it would

12 be almost impossible for us to get a water hammer dimension.

13 First of all, to get the water hammer through the feedwater,

14 you would have to come in through the feedwater and go out

15 to the sparger. There would be no way for us to generate

16 that wave propagation down into the generator as a total wave

17 propagation.

18 Again, happening from the primary side it comes

19 in through the bottom of the steam generator, into a large

20 volume area, and into 3,000 tubes. It is almost impossible

21 to get that kind of classical water hammer.

22 MR. EISENHUT: It can't propagate through that

23 down into the crevices to -- it would be greatly attenuated

24 by the time it got there. It is a question we have looked

25 at and dismissed.

(Slide.)

The next slide summarizes what we have been saying. Outside the tubesheet you need 40 percent of the wall and inside you need 10 percent of the wall. On the main steam line break, the tube, even if it is greatly degraded, the pressure differential is such that it pushes the tube out against the tubesheet, which supports it and stops, even if it were greatly degraded.

Now, the next slide is the last slide.

(Slide.)

I guess one other thing I should point out before I do this, there are a couple of other things that the utility has done to give himself some added assurance that the integrity of the steam generator tubes is in fact still adequate.

One is, in order to simulate a main steam line break or to simulate a LOCA, he has ran some hydrostatic tests. Granted, they are hydrostatic. But he ran a 2,000 psid primary to secondary, and he ran an 800 psid secondary to primary test, which is very similar to the hydrostatic test that you run, that is required every time you open up the primary system.

He did this just as another feature to give himself some assurance that in fact the integrity of the system is there.

1 MR. CASE: This is in addition to all of the plugging.

2 MR. EISENHUT: It is an extra tier to everything he

3 has done.

4 One item I didn't mention also, a second item, is

5 that all of the degradation that has been seen in the crevice

6 cracking has all been on the hot side of the tubes. By the

7 hot side, I mean the inlet to the steam generator. Nominally,

8 the hot is something on the order of 597 degrees and the cold

9 is on the order of 547, about a 50, 60 degree difference.

10 All of the degradation is on the hot side, even for other

11 phenomena. Most of the degradation is on the hot side because

12 there is a big temperature dependence on all of these corrosion

13 phenomena.

14 The utility therefore is considering an option of

15 reducing the hot leg temperature in the steam generator by

16 about 40 degrees. He will now make the hot leg temperature

17 comparable to the cold leg temperature, and hopes to be able

18 to arrest the corrosion. To do that, he has to reduce the

19 power output of the plant to 83 percent. He is considering

20 that as one of the means to be able to certainly arrest his

21 problem and to hold it.

22 We are certainly looking at that right now. It is

23 not something, again, that we have to specifically review and

24 analyze, because that happens to be the mode that he would

25 be operating on, a power coast-down.

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MR. CASE: It is a permitted mode of operation under the tech specs and an analyzed mode of operation.

MR. EISENHUT: Exactly. He can operate his plant at any power up to 100 percent. This would be the conditions for operating.

He is also considering several other things: closer feedwater chemistry surveillance, that is, looking closer at the condenser to see that--certainly if you have a condenser leakage problem, you can either -- you can isolate that leak very rapidly. He is looking at more frequent sludge lancing. He also went through a program of trying to boil out the crevice, that is, clean out the crevice by popping the valves on the steam side, going down into a couple of feet of water on the tubesheet. He literally tried to boil out some of the impurities in the crevice.

Those are the kinds of things he has done.

COMMISSIONER BRADFORD: How successful was that?

MR. EISENHUT: We don't believe that program can be that successful. You can certainly get some out. There are a couple of problems with it. You could probably do that forever.

COMMISSIONER AHEARNE: You are describing a list of actions which you don't think are going to do much.

MR. EISENHUT: Certainly the change in temperature seems to have a considerable amount of merit. Since he is

1 only considering it, we did not put that in as an assumption
2 on our program.
3 COMMISSIONER KENNEDY: His paper of November 23rd
4 says, we are planning. That is the word he used.
5 MR. EISENHUT: We are planning?
6 COMMISSIONER KENNEDY: On returning to power
7 operation, we are planning the following program in an attempt
8 to retard tube degradation.
9 MR. EISENHUT: That sounds pretty definitive, based
10 on that.
11 COMMISSIONER GILINSKY: Can I ask you, in this
12 whole picture what concerns you most? What would cause you
13 to come out the other way?
14 MR. EISENHUT: Come out what way?
15 COMMISSIONER GILINSKY: Not feeling that the plant
16 could operate.
17 MR. EISENHUT: You haven't heard my bottom line yet.
18 COMMISSIONER GILINSKY: I thought we heard it at the
19 beginning.
20 MR. CASE: You haven't heard the conditions.
21 MR. EISENHUT: I think in fact -- I think the thing
22 that would really change it is your confidence in the overall
23 integrity of the system is less, and therefore you can offset
24 that confidence by a number of different parameters and a
25 number of different changes.

1 We have gone through -- and it is not any one thing.
2 It is a family of things. I would be a lot more concerned if
3 in fact this phenomenon was occurring in the free space,
4 where the tubes can actually fail. I think the theoretical
5 physical restrictions are being done in the crevice. They
6 go a very long way to telling you that you are not worried
7 about a large amount of leakage.
8 COMMISSIONER AHEARNE: What that tells me is if you
9 see a crack up in the free space, you would start getting very
10 concerned.
11 MR. CASE: If you saw a number of them.
12 MR. EISENHUT: A number of large amounts of degrada-
13 tion.
14 COMMISSIONER AHEARNE: I would have felt that,
15 given that this is an increasing phenomenon, that you would
16 view it as a precursor.
17 MR. EISENHUT: If this were an increasing phenomenon
18 in the free space, absolutely.
19 MR. CASE: I would more think at least one in the
20 upper level (Inaudible).
21 MR. EISENHUT: Sort of in summary -- and I will go
22 through these in brief detail -- if things continue as they
23 are, as a linearity hypothesis, and if things have continued
24 as they have over the past two years -- that is, about three
25 leaks per year, not really safety significant as such per se,

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as much as, again, the general question in the back of your mind about the overall integrity of the steam generator, the confidence you have.

The utility both in August and in October ran 100 percent inspections. He switched to the multi-frequency inspection. He switched to a different level of expertise as far as eddy current testing. He has taken a more conservative plugging approach. He ran some hydrostatic tests.

I think all of those things together would tell you that in this short period of time, at least in the near future, you would expect to see less leakers than in the same comparable period of time in the past, if everything continues.

e-3

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COMMISSIONER KENNEDY: What is a short period of time?

MR. EISENHUT: I will get to that in a minute. We are not going to really rely on that, because in the past it has been running -- if there are three leakers a year, normally every four months you see something. We don't think you can rely on that completely. We have been working with the utility. He has proposed some various approaches. We are discussing some of those with him, and I think he is modifying some slightly. After 30 effective full power days of operation, it appears appropriate to do another hydrostatic test. 2000 psid, primary to secondary; 800 psid, the other direction.

If that is okay, if you don't find anything significant at that point in time -- that is, you don't have an indication of any continuing degradation -- then we think it would be appropriate for him to go another 30 effective full power days, for a total of 60 effective full power days.

At that point, we think it is appropriate that the plant be shut down and perform a thorough eddy current testing program, "thorough" being defined as something yet to be worked out by the staff to the staff's satisfaction.

COMMISSIONER AHEARNE: Why shouldn't it be 100 percent?

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MR. EISENHUT: There is no reason it shouldn't be. We are thinking, maybe -- we want to look more at the techniques. I am not necessarily happy with just saying "100 percent inspection."

COMMISSIONER KENNEDY: What is the effect on that set of assumptions if, in fact, as they said they did and would in the memorandum letter of November 23rd, operate at 83 percent full power?

MR. EISENHUT: I don't know what the effect would be of going to 83 percent power. That is why we tied it to 30 effective full power days. It means instead of 30 calendar days, it would be 38 days or something like that. And in fact, the situation is, in fact -- it arrests the situation. Great. But I can't take any comfort in the fact that it will, because we don't have any real, firm, quantitative handle on what the 83 percent power will do at 557 degrees F.

So things, so far as that is set -- which is the first item on here -- tell us that we think over the short period of time -- "short" being defined as 60 effective full power days -- we don't expect to see any major leakage.

The next item is that the problem is all in -- is in crevice attack. It is crevice intergranular attack inside the tubesheet. And the fact that it's confined in the tubesheet and we have never seen intergranular attack

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1 above that area, we have never seen circumferential
2 cracking, recognizing that the maximum theoretical leakage
3 is something less than 10 gpm -- I believe it is seven gpm
4 -- all of those things taken together help to give you
5 another layer of confidence, that even if leaks should
6 develop, or even if any kind of transient situation or
7 accident situation should develop, it would not be
8 complicated by this problem over the short period of time.
9 Third, we think to give us additional confort --
10 that is, additional confidence, that even if something
11 should happen, we are discussing for some time the lowering
12 of the reactor primary coolant inventory limits. He
13 presently has a parameter that is 162 over E-bar microcuries
14 per gram wholebody limit. It is tied into the wholebody
15 dose. The standard tech spec is 100 over E-bar.
16 It gives you confidence that even if you have a
17 leakage, the total amount of radioactivity in the primary
18 system that can leak out should be reduced by a sizeable
19 fraction.
20 Also, we are looking for, and have been discussing
21 a one microcurie per gram of iodine-131 equivalent for
22 thyroid dose in the same way. There is no tech spec and the
23 older. vintage plants don't have it.
24 COMMISSIONER AHEARNE: Changing that would
25 translate to what in terms of operation of the plant?

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MR. EISENHUT: Not that much. We think the numbers are considerably below that, anyway.

It gives you assurance that during this period of time there is not going to be a situation where the primary coolant activity goes up. If it goes above that limit, appropriate action has to be taken.

COMMISSIONER AHEARNE: You are saying, as far as you know —

MR. CASE: This would not restrict operation.

COMMISSIONER AHEARNE: It wouldn't affect operation?

MR. EISENHUT: Yes, that is why it is not the first main item. It is saying these are some confort factors to give you more confidence. It is the "even if" approach, the bottom line being the confidence you have in the first place is as good as you would have on other plants.

We are also in a more meaningful way — the utility has proposed and has been discussing some lower limits for shutdown and plugging the tubes in the plant. The primary coolant tech spec is .35 gallons per minute -- or it is actually 500 gallons per day, which equates to about .35 gpm. That is the same kind of limit I recall, on that order, that is on the other severely degraded plants. This utility has proposed, actually, to impose even on

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itself some lower limits.

If he had a sudden leak that occurred at .1 gallons per minute, he would, in fact, shut down and plug the tubes. If he had any leaker, any leakage of the .17 gallons per minute or greater, he would shut down and plug the tubes.

COMMISSIONER KENNEDY: .17.

MR. EISENHUT: .17 gpm. And if you have a rate of change of .01 gallons per minute per day, in that range, between .1 and .17, .01 gpm per day, he would do the same thing. That is a very, very tight tech spec. He has, however, measured down to several gallons per day, so it is well within the detectable limit.

COMMISSIONER BRADFORD: When you say "tech spec," will you treat it as a tech spec?

MR. EISENHUT: Administratively, how we treat all of these, I will get to in just a second.

These are all proposals from the licensee. We are working -- his proposal is that he would go in and plug the defective tube. We are saying one more thing that we are discussing with him, and that is we think if any leak develops that gets up to .35 gpm, that is actually to the tech spec threshold, or about .347, or 500 gallons per day, we believe the plant ought to be not only shut down and plug the tubes, but at that time it should undergo an eddy

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current test. That is, it moves the 60 effective full power day inspection up to that point in time.

COMMISSIONER AHEARNE: Do you have a limiting number of plugged tubes?

MR. EISENHUT: The limiting number of plugged tubes -- this plant has proposed, and has sent in a request to get authorized, for 18 percent plugged tubes. Actually, most plants can't go up to the order -- Surry is up to 28 percent plugged. There is a simple rule of thumb that says there is a six degree penalty for each percent of tubes plugged, on peak clad temperature. This plant is not peak clad temperature-limited. It was then to slightly over 2000 degrees F. Therefore, they have a long way to go. I believe at 18 percent plug they would be up on the order of 2130.

VOICE: 2113.

MR. EISENHUT: So if you take the delta of 180 --

COMMISSIONER BRADFORD: Why did you originally limit it to 10 percent?

MR. EISENHUT: The original applications are zero percent. That is the way the evaluation is done in the first place. The real yardstick, the real measure you put on plants, is they must operate in a mode that keeps them under 22 degrees F. The plug-in number is only an input parameter to a computer code, and that is approved by the

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1 staff.

2 The approach we take is that the operating

3 parameters that the plant operates under must, when fit into

4 an approved box, give you a number under 22 degrees F, and

5 they must do that calculation. It is not a tech spec limit

6 or a requirement per se.

7 COMMISSIONER BRADFORD: But if 18 percent fit into

8 that box, that gives you --

9 MR. EISENHUT: Still something under --

10 COMMISSIONER BRADFORD: Why wouldn't they say 18

11 percent in the first place?

12 MR. EISENHUT: The utility likes to have the extra

13 margin of operating at 2200 degrees F peak clad temperature,

14 so the next time a problem is associated with flow blockage

15 -- it was not a limit.

16 MR. CASE: It was an assumption made in the FSAR

17 analysis. The assumption made was 10 percent.

18 MR. EISENHUT: It would be prudent if you were a

19 licensee -- I would think if my evaluation that I could

20 operate the plant in the modes I wanted to operate, and show

21 that my peak clad temperature is 2000, I would want to do

22 it. Then, if the next time a small glitch comes along, of

23 whether it is a clad swelling that gives me a new blockage,

24 I have already got the margin there. I am not going to be

25 severely impacted. You have some margin.

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The plant that is at 2200 degrees, if he would -- and this parameter comes up quite often, if a plant comes in and says, "My evaluation is based on the 10 percent plugging," the first thing people look at is, what is the calculated peak clad temperature? 10 percent plugging gives you 2200.

The first reaction of people is, when you see a minor perturbation, a change in the ECCS evaluation model -- "My heavens! This plant has a 10 percent peak clad temperature penalty and they are over 2200 degrees."

The truth of the matter is the plant is not a 10 percent, anyway. It takes a simple calculation to back it down and show that there is a sufficient margin. It is not a safety sense, it is a calculational sense.

COMMISSIONER GILINSKY: Does that bring you to the end of your presentation?

MR. EISENHUT: A couple of other things I would like to put on.

We are also saying that any two leaks in 20 days, the plant should shut down for an eddy current test inspection, and go through eddy current testing.

COMMISSIONER AHEARNE: A leak of any size?

MR. EISENHUT: Any identified leak. That is similar to what we used in the dented plants. If you see any tube leaks in 20 days, any 20-day period, it should be

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1 assigned.

2 The other things simply over here is, under

3 accident conditions we don't believe even the degraded

4 tubes, if they were existing in the plant, would rupture to

5 cause any significant problem. We also believe that -- the

6 licensee is considering longer-term solutions. He has told

7 me, as late as last night, that he is considering such

8 options as retubing or steam generator replacement down the

9 road.

10 And he is studying those options right now. Some

11 extra actions which we are discussing with the licensee is

12 that in August -- the reason that it appears that there are

13 two leaks was that the wrong tubes were plugged. We are

14 asking for an extra check on the QA approach for plugging.

15 This happened at other plants, where plugs weren't detonated

16 or wrong tubes were plugged.

17 What they do is go in and take a photograph of the

18 bottom of the support plate so you can see what tubes are

19 plugged. Then you can do a cross-check, a correlation on

20 paper, counting the rows and tubes and checking to make sure

21 that all of the appropriate tubes are plugged.

22 We are rechecking the plant to be sure that they

23 have an adequate procedure to handle any steam generator

24 tube ruptures that they develop, emergency procedure. The

25 plant had a rupture, you recall, in 1975. The plant

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1 response was very good, to that. They did a good job of
2 responding to it. We have no reason to suspect there is,
3 but we want that rechecked. But since 1973 has been a long
4 time ago, we want all of the operators to be re-alerted that
5 you're operating with steam generators that you should not
6 have as much confidence in as before, and you should all be
7 very, very well aware of this procedure for taking care of
8 the situation.
9 And that is our approach. It is an overall
10 defense, in-depth approach, covering a multi-numbered layer
11 of things, administratively, how we get from where we are
12 today to get these requirements into place, or get this
13 agreement into place. The vast majority of these were
14 proposed by the licensee in his overall package. We have
15 been discussing with him his proposal. Administratively we
16 haven't come down to decide what vehicle to put it in place.
17 COMMISSIONER KENNEDY: Is a confirmatory order --
18 MR. CASE: That is one way.
19 COMMISSIONER GILINSKY: We could hold other
20 questions until we have heard the other presentations. Can
21 we do that? Is that acceptable?
22 COMMISSIONER AHEARNE: I wanted to ask Mr. Bickwit
23 a question.
24 COMMISSIONER GILINSKY: Go ahead.
25 COMMISSIONER AHEARNE: There may be some people

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here — it might even include myself -- who aren't completely clear that the process we have underway is -- the meeting started with Ed mentioning that they had a certain intention with respect to the 2.206. I thought it might help at least some people if General Counsel briefly described -- what is the process we have?

COMMISSIONER GILINSKY: Why don't you do that?

MR. BICKWIT: 2.206 petitions are, under our rules, filed with the staff. They are petitions for enforcement actions. The Commission, on its own motion, may take review of a staff decision, with respect to 2.206 petition.

This particular petition was filed not with the staff but with the Commission. Part of the rationale for a decision to file with the Commission was the need to get a quick decision from some element of this body, given that the licensee was prepared to start up shortly.

The Commission, mindful of that motivation on the part of the petitioner, decided to refer the petition to the staff to be treated as a 2.206, but to depart from the normal procedure under which the staff would reach a decision on the 2.206 followed by review of the Commission if it chose, and decided to collapse that particular way of proceeding, so that the staff would advise the Commission on the tack it was likely to take on the 2.206, and the

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1 Commission could then decide whether to step into the
2 matter, if it disagreed with the tack the staff was taking.
3 The options available to the Commission, if it
4 does disagree with the staff action, would be to come in and
5 issue its own order.
6 COMMISSIONER AHEARNE: Thank you.
7 COMMISSIONER GILINSKY: Mr. Bradford.
8 COMMISSIONER BRADFORD: You talked a little
9 earlier about the adminstrative framework of this. How
10 enforceable is it? The right way to regard this, as you see
11 it, is a voluntary package by the licensee? Or you are
12 issuing orders, you are making these license conditions?
13 MR. CASE: Right now it is a voluntary package by
14 the licensee. And we are still discussing with him what he
15 is going to volunteer. The alternative, then, is to treat
16 it as a voluntary package and approve the operation under
17 those conditions, or the next step would be a conformatory
18 order; that is, confirm his volunteering by order.
19 And another option was just to order him to do
20 these things without waiting for him to volunteer. Those
21 are the principal options.
22 MR. SHAPAR: And to treat it as an amendment, that
23 is another option. Those are, I think, the four principal
24 options.
25 COMMISSIONER GILINSKY: Could we now hear from

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Wisconsin Electric Power Company:

COMMISSIONER BRADFORD: One other question: if we treat it as voluntary, and if the licensee changes his mind, what happens?

MR. CASE: Then you can issue an order.

MR. EISENHUT: I think what we would do — it wouldn't be just a voluntary thing. We would send a letter, as a minimum, and say, "With the understanding that these are the conditions you are operating the plant under, here is our evaluation." Our evaluation would be contingent upon those conditions.

MR. SHAPAR: That is the mode we are under now, and they are shut down in an informal manner, without any formal order. Any time you have that kind of an informal situation, a commitment is broken, the circumstances change and then you can step in with an order.

COMMISSIONER GILINSKY: Can we now hear from a representative of the licensee? We went over our allotted time with the staff, largely because the commissioners asked quite a few questions. I think we will make the same adjustments in the case of the licensee and petitioner.

1 MR. CHARNOFF: I wasn't going to ask for equal
2 time, but it is hard to resist that invitation. We have
3 five or six points that I would like to make.
4 My name is Gerald Charnoff. I am with the law firm of
5 Shaw, Pittman, Potts, and Trowbridge. And with me here
6 today is Mr. Sy Berstein, who is the executive vice
7 president of Wisconsin Electric and is here to answer any
8 technical questions you might have.
9 Mr. Berstein is in the second row, the distinguished gray
10 haired looking man -- the distinguished applies to the gray
11 rather than to the man.
12 The six points that I would like to make briefly, if I
13 can, is, one, that it seems to me, as I was listening to
14 Mr. Eisenhut's presentation is that it is significant that
15 both the staff and Wisconsin Electric agree that the unit
16 can go back into service without endangering the public
17 health and safety.
18 If there were any contention between us, it would go only
19 to the frequency and intensity of the surveillance
20 requirements.
21 As you know, from the letter that you have before you
22 from Mr. Berstein and Mr. Denton, we, too, have already
23 started an intensified surveillance program. We have
24 conducted the hydro tests at 800 and at 2000 pounds that
25 were described. And the tubes have already passed that

1 test.

2 We have also agreed that we would propose to conduct a

3 number of other tests as time goes by in the 30-day interval

4 and another interval thereafter.

5 We had read to us just prior to the meeting the 6 or 7

6 conditions that the staff would like to give them added

7 confidence. And while we think that it is a little more

8 onerous, perhaps, than is necessary, we will agree to do

9 that.

10 We would commit unequivocally that we will do that and we

11 will confirm that in writing later today.

12 COMMISSIONER AHEARNE: You say that it is a little

13 more onerous in this area. Putting aside the quibbling

14 about some degree of being onerous is necessary, to which

15 don't you feel are necessary?

16 MR. CHARNOFF: We have proposed some of the

17 surveillance conditions. I think it is on page 7 or 8 of

18 Mr. Berstein's letter to Mr. Denton. We have proposed to

19 pick up in 30 days a 2000-pound test primary to secdondary.

20 The staff is asking for, in addition to that, another

21 secondary to primary test which we have just run and

22 completed.

23 To do that, that requires going down to cold condition

24 and more time than would be necessary in our judgment

25 because we have just run that.

1 It seems to me that is the nature of the difference
2 between us. We are prepared to provide that additional
3 confidence by doing that second test as well.
4 I should point out that, as you know, from our filings in
5 this case, and we filed a reply to the petition of the
6 decade of the environmental decade yesterday, so I won't go
7 into that in any detail, we have from the outset of this
8 condition and actually over the years kept the staff fully
9 informed of the conditions of tubes.
10 And indeed, we had a meeting with the staff early
11 November before the petition was filed by the decade to
12 brief the staff as to what was going on and what we proposed
13 to do.
14 And then, of course, there was a second meeting after the
15 decade's petition was submitted to the staff.
16 In our view, we think that the petition should be denied,
17 as Mr. Case indicated is the staff's intention. That
18 petition asks for a continued shutdown of the facility.
19 It also asks for a public hearing.
20 It seems to me that under the rules, if you would issue
21 an order to show cause in some way and ask for immediate
22 effectiveness of the suspension order, that would require
23 some finding that the public health and safety required this
24 immediate shutdown.
25 It seems to me that with the staff's presentation here

1 today and our own presentation to the staff, that there
2 really is no basis for any kind of a finding by the
3 commission that would require any continued shutdown as of
4 this point of this particular facility based on any public
5 health and safety requirement.
6 We would also submit without much argument at this point
7 that based on our filing yesterday, and I am sure that your
8 reading of the Environmental Decade's petition, and there
9 were in fact two of them, that a hearing would not be
10 materially helpful.
11 I don't think that the Decade petition presented anything
12 to the staff or the commission that was not already before
13 it. Indeed, the petition was fundamentally based upon the
14 notes of the meetings that took place before the petition
15 was filed.
16 And the second petition was based upon notes of the
17 meeting that took place last week at the staff's initiative.
18 Our contention and our filing is that if anything, those
19 notes don't just accurately reflect the full context of
20 everything that was said at those meetings and certainly
21 doesn't demonstrate that Decade presented any new
22 significant information for your consideration in any way.
23 Finally, as I indicated, we have already conducted the
24 two hydro-tests and we will volunteer to do that. We have
25 volunteered to do the temperature reduction.

That is not just a proposal by us; it is something that we are going to do without any question.

Most of the staff's requests to us are really of the same character; that is, it is a more intensified activity than that which is already called for. It is the kind of thing that we do without order from the commission and we will, as I indicated, do these extra tests without order from the commission.

They are in the same nature and, as a result, we don't see any need, either, for any formality or any kind of delay in order to implement this matter.

I thank you for allowing us to talk.

COMMISSIONER GILINSKY: Thank you for your brevity.

COMMISSIONER AHEARNE: Could I ask a question? Approximately what percentage of the tubes are now plugged?

MR. CHARNOFF: I think in one steam generator is it 1.1 and the other it is 9.8.

COMMISSIONER AHEARNE: Around 9 to 10 percent.

MR. CHARNOFF: Right.

COMMISSIONER AHEARNE: And if you are requesting going to around 18 percent as the limit, that if the rate of the last two months continues, you would have to end up plugging them at the rate of close to 2 percent a month.

MR. CHARNOFF: If you take a straight line from

1 that, I think one of the important charts that Mr. Eisenhut
2 presented showed that different time histories of the units,
3 there were different kinds of problems with the steam
4 generator and they showed arrest.
5 COMMISSIONER AHEARNE: But part of that was we are
6 now moving into a different mode of problem. I was just
7 wondering if you foresee in four or five months facing a
8 question of having reached that limit, then what to do?
9 MR. CHARNOFF: As I think Mr. Case indicated, the
10 18 percent is not a limit. It was an assumption going into
11 the ECCS analysis.
12 COMMISSIONER AHEARNE: That is the old assumption,
13 which was 10 percent.
14 MR. CHARNOFF: The new assumption is in effect
15 18. The analysis was based upon that. And the reason why
16 we did 18, frankly, was that it was the kind of analysis
17 that could be done much more quickly by Westinghouse at 18
18 than at some higher number. But we are aware that that
19 number has been done and evaluated elsewhere.
20 Theoretically, we can go further.
21 We do know that it is either Surry or Turkey Point or
22 both that have been looked at in terms of 25 to 30 percent
23 of the tubes being plugged, and they can still meet the ECCS
24 criteria.
25 COMMISSIONER AHEARNE: Let's say it goes to 30,

1 then. 20 percent at 2 percent a month.

2 MR. CHARNOFF: If your question is what are we

3 looking for --

4 COMMISSIONER AHEARNE: I didn't get a sense from

5 reading the material that I have read that there is a clear

6 understanding of what is causing the problem and, therefore,

7 a clear understanding of what steps are going to prevent the

8 problem from continuing.

9 MR. CHARNOFF: We have offered some proposal, one

10 of which is temperature reduction, which we think will be

11 significant in reducing the trend that we have seen the last

12 few months.

13 We are also looking, at Mr. Eisenhut indicated, at

14 back-up alternatives should we continue to see this

15 happening. And the back-up alternatives consist of retubing

16 or sleeving or replacing a portion, or all of those

17 generators.

18 Indeed, we just completed two days of hearings before the

19 public service commission of Wisconsin, where we indicated

20 these are the things that we are looking at. We don't have

21 any definitive position on either the feasibility or the

22 economics -- or which is the most attractive of those

23 alternatives or the time-frames.

24 But clearly, we are going to be looking at that over the

25 near-term in order to arrive at some back-up solution.

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1 This is primarily at this point looked at, I think, by
2 the utility, not as a safety problem, but rather in terms of
3 availability of the unit.
4 We are not interested in having this unit go down
5 repetitively for either failure to observe the leak rate or
6 for testing.
7 COMMISSIONER GILINSKY: Thank you. Would the
8 representatives of Wisconsin's Environmental Decade please
9 come forward?
10 MS. FALK: My name is Kathleen Falk. I am
11 attorney for Wisconsin's Environmental Decade, which is a
12 state-wide citizens group in Wisconsin that has many members
13 that live in the vicinity of the Point Beach plant.
14 We thank you for inviting us to appear before you today.
15 The main point I would like to leave you with today is
16 this afternoon, since quarter to 3:00, we haven't yet heard
17 one word about the issue that we raised in our petition.
18 As long ago as 1975, the very prestigious American
19 Physical Society wrote: "It was the consensus of the group
20 that steam generator tube failure during a severe LOCA could
21 occur frequently. Moreover, it appears that rupture of a
22 few tubes on the order of 1 to 10, dumping secondary steam
23 into the depressurized primary side of the reactor system,
24 could exasperate steam binding problems and induce
25 essentially uncoolable conditions in the course of a LOCA."

Nobody to this day has addressed that problem.

COMMISSIONER GILINSKY: Wasn't that the question that I was asking Mr. Eisenhut?

MS. FALK: That is a different question. You asked the question, but didn't get an answer. What you got was we don't think that is ever going to occur, not that we looked at it to see what will happen if it occurs.

COMMISSIONER GILINSKY: I understood him to say that in dealing with flaws and possible breaks in the bottom plate, the situation was different. The number of tubes that would pose a danger would be rather larger.

MR. CASE: Approximately 200.

MS. FALK: Can anybody here today prove that there will be no rupture of a tube above the tube plate? The people of Wisconsin living near that plant want to know the answer to that question. And that is a reasonable question to expect an answer to.

Nobody knows that yet. We want to find out. We want to get the experts together to hash over that question.

It hasn't been hashed over yet. We haven't heard a response yet either by the company or by the commission staff to that problem. And it is a real one.

What have we heard in response to our petition? We have heard a new promise, a new plea, a new offer, a new suggestion by the company, not of how to deal with the

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1 problem because they don't know how to deal with the
2 problem. We can't concede that the tube failure rate is
3 going to decrease. They don't know why.
4 Point Beach right now is experiencing the highest tube
5 degradation rate problem in the country.
6 COMMISSIONER GILINSKY: Can I just stop you for a
7 moment?
8 MS. FALK: Sure.
9 COMMISSIONER GILINSKY: In effect, it seems to me
10 that you are disputing the analysis of the source of those
11 flaws and failures as it was represented principally, or
12 almost entirely now within this lower region.
13 You seem to be saying that you don't draw a distinction
14 between that region and the other region.
15 MS. FALK: There may be a very legitimate
16 distinction to draw, but on whose promise, whose faith, on
17 whose competence should we rely?
18 WEPCO, in the history of this plant, has not built in a
19 lot of decisions on which the people around that plant can
20 rely. And let me give you an example on this problem. As
21 far back as 1965, at the time of the licensing, we do not
22 anticipate that tube thinning and denting problems would
23 develop.
24 Then when problems did start -- and Westinghouse
25 suggested that we use the phosphate treatment to preclude

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1 the secondary water chemistry problem.

2 In '72, they found out that that wasn't working because

3 there was denting occurring.

4 So what did Westinghouse suggest? Keep using phosphates,

5 increase the phosphate.

6 That bandage, that promise at that time, 7 years ago,

7 turned out to be the exact worst thing that they should have

8 done. Then what happened after that, when they finally

9 realized that the phosphates were increasing the problem,

10 they said, change to AVT without bothering to shut down the

11 plant, without figuring out the problem, without figuring

12 out the solution. Let's try something else.

13 We don't know what, but let's try something.

14 That didn't work.

15 In 1979 now, we have in the month of August 97 tubes that

16 had to be replaced. 6 weeks later, after they said that

17 they did 100 percent testing of all of the problem area

18 tubes, 145 tubes had to be replaced.

19 The confidence that you asked the people of Wisconsin

20 near that plant to have with this company is just not

21 there. The facts don't show it is there.

22 They want proof that nothing is going to happen. That's

23 all. They are not saying the company is bad people. They

24 are saying they want experts to sit down and look at the

25 problem they are worried about and not just ask the company

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1 to rely on their confidence.

2 Even the commission step, Mr. Eisenhut had to concede

3 that they just don't have the confidence in the eddy current

4 testing that they should have, that they need to have.

5 The many caveats that the staff is suggesting they put on

6 the license of the company as a recognition that there is a

7 problem and they don't know what to do about it.

8 COMMISSIONER AHEARNE: When you say proof, could

9 you explain what you mean?

10 MS. FALK: I mean the experts such as the American

11 Physical Society, the Union of Concerned Scientists,

12 respected experts who say that there is a potential problem

13 that has to be looked at -- go through the necessary

14 fact-finding, not this informal kind of negotiation and

15 absolute panic that has been going on the past week.

16 You can't make these decisions after having a

17 Thanksgiving dinner when your family wants you at home and

18 you should be here. A week's work is not just enough to

19 answer the question that has been posed five years ago and

20 still, everybody agrees has not been resolved.

21 They want the sworn testimony. They want to be able to

22 cross-examine the witnesses who are so confident the next

23 bandaid will work when it hasn't before.

24

25

1 They want the opportunity to get to the facts.

2 COMMISSIONER AHEARNE: When you say that you want

3 proof that this would be safe, by proof do you mean agreement

4 of individuals? You say, get together with the experts. Are

5 you talking about some kind of experimental proof?

6 MS. FALK: I would imagine that would include both.

7 Don't experiment with an ongoing plant knowing that there

8 could be a problem. That is not a reasonable scenario. Those

9 are dreams and wishes and hopes. The people living near that

10 plant want something more than dreams, wishes and hopes. They

11 hope fervently that WEPCO would be right. But they want

12 Mr. Eisenhut to be able to come to their house and say, I am

13 confident that eddy current testing works. He can't say that

14 right now, because the scenario we have given and which he

15 agrees to shows it isn't working.

16 It isn't showing where the failures are. It is not

17 an adequate testing mechanism.

18 COMMISSIONER AHEARNE: Do you see that there is

19 any -- you point out significant differences in new tubes

20 that had to be plugged two weeks after they were set. The

21 staff had made the argument that a large part of that was

22 due to changing, three types of changes: personnel doing the

23 tests, the type of equipment used, and the criteria for the

24 test.

25 MS. FALK: What are the criteria for the test? How

1 can the criteria -- like if you are going to do it once a
2 month or every two years?
3 COMMISSIONER AHEARNE: The criteria are -- that you
4 plug at 40 percent or you plug on defects.
5 MS. FALK: That is not the issue. What happens if,
6 even if you did, under your scenario, plug 40 percent, what
7 happens with the ones you don't catch? That's the issue.
8 COMMISSIONER AHEARNE: I am asking the question:
9 You had made the point that they said they did 100 percent
10 tests, and two months later they had to plug 145 tubes. I
11 am asking what way do you get to the fact that the second
12 test, two months later, was based with three differences from
13 the first set of tests?
14 MS. FALK: I can only believe Mr. Eisenhut, and he
15 says he doesn't know. I don't know. Nobody knows. That's
16 the point.
17 Your questions that you have all asked here are
18 excellent, and I don't think you have gotten answers that
19 you would rest comfortably with. You haven't gotten answers
20 to a lot of questions, the same ones that we have been asking.
21 All we want are some answers.
22 COMMISSIONER GILINSKY: Are you in effect saying
23 that you believe the assumptions the staff is making are not
24 sufficiently conservative and don't, therefore, provide
25 sufficient protection?

1 MS. FALK: If I understand your question correctly,
2 the assumption that I think the staff is working on is that
3 the eddy current testing will work. Even though we don't
4 think it maybe is working, it will work in the future. Just
5 do it more often, do it for more tubes, et cetera. I think
6 their own admissions and statements today are saying that
7 assumption is no longer true. The assumption for keeping
8 these plants open with the current leakage problem is that,
9 eddy current testing is going to predict everything before
10 it happens.
11 Now they are coming to you and saying today, we are
12 not sure that assumption is any longer true.
13 COMMISSIONER GILINSKY: Let's see. Let's see if I
14 understand correctly. Aren't they requiring certain criteria
15 in interpreting the test that would then take into account
16 the uncertainty in the result?
17 MS. FALK: It will be too late. Given that nobody
18 has looked at the problem yet of the LOCA, that will be too
19 late. Once the LOCA situation has occurred, if it is a
20 reasonable scenario, as many experts say, then at that point
21 it will be too late.
22 COMMISSIONER GILINSKY: They are taking into account
23 the possibility of a LOCA. They were making the point, which
24 I take you to be disputing, that, given that the cracks would
25 occur within the region of the plate, the number of defective

1 tubes that one can stand is larger than if the cracks were
2 in some higher region.
3 MS. FALK: On our petition we showed that there
4 is reason to doubt that that scenario will be true, and when
5 nobody here can promise me, given the enormous rate of tube
6 degradation right now, that that will continue to be true in
7 the future, that is resting on real shaky ground.
8 COMMISSIONER GILINSKY: You are in fact disputing
9 the analysis that was on one of the charts, which allocated
10 the three causes of tube degradation. The suggestion was that
11 two of them are no longer of concern and the one that remained
12 was in fact the one that left -- that produced cracks in the
13 bottom plate region.
14 MS. FALK: Right.
15 COMMISSIONER GILINSKY: Is it right that you are
16 disputing that analysis?
17 MS. FALK: Yes. That kind of dispute is exactly
18 what we need facts on. And I think it is asking an awful
19 lot of you four right now to have to make a decision of this
20 magnitude after a five-day analysis on everybody's part. It
21 just isn't sufficient.
22 COMMISSIONER KENNEDY: Have you participated in
23 that analysis, Ms. Falk?
24 MS. FALK: We have not been asked by anybody what
25 our opinion is on the company's reducing pressure or reducing

1 temperature or testing every three months instead of two years,
2 no. That has all been done informally, and certainly that is
3 objectionable to the people that would like to have an input
4 in that process.

5 COMMISSIONER BRADFORD: What is your opinion on
6 those measures? You obviously think they are insufficient.
7 But do you have more specific criticisms on them?

8 MS. FALK: From what I understand, the reducing
9 pressure and reducing temperature, nobody here, including the
10 company, knows if that is going to cure the problem. From
11 what I have heard from people that advise me, it is that there
12 is reason to believe it is not going to cure the problem.
13 That is what we have to look at.

14 Our purpose here today was to ask you, to beg you,
15 to have that kind of necessary fact-finding. These are
16 citizens that don't have, you know, the in put or the
17 opportunity to call on some very good people in this agency
18 and say, hey, what is this about. And it seems to me that
19 these people in your agency are saying, we don't know yet
20 what it is about.

21 This whole issue comes down to the company has said
22 that, in its submissions to the Wisconsin Public Service
23 Commission, that it is, quote, "reasonable probable," and
24 they are planning on replacing the steam generator, taking
25 something equally as drastic a measure in the next year and a

1 half or two. This should be before you, not as to whether to
2 shut the plant down. That is not the sole issue. The issue
3 is, given that it is likely that this major drastic step is
4 going to be taken in the next year and a half, how should we
5 proceed between now and then.
6 The balance that you have got to make is, is the
7 risk presented by keeping that plant open one year and costing
8 WEPCO maybe four percent in increase in charges for that one
9 year, balanced by the risk it is causing those people in the
10 vicinity of the plant? That is a different scenario than
11 if the company wasn't now conceding that they have to eventually
12 replace that steam generator. It is a very different balancing.
13 It is a year and a half we are talking about.
14 We submit -- and I will conclude on this -- that
15 the reasonable way to proceed is to get answers to questions
16 first. My God, they deserve an answer to questions first,
17 not experimenting with that plant.
18 We would be glad to answer any questions you have.
19 If they are very technical questions or financial things, I
20 would like to defer to my colleague Peter Anderson, who did
21 financial things in the submissions on the cost to the company
22 of keeping it shut down in the next year and a half. But for
23 other highly technical expert questions, please commence the
24 kind of fact-finding that is necessary.
25 COMMISSIONER AHEARNE: Could you say a few more

words on this technical fact-finding process that you had in mind?

MS. FALK: It is not so much different from what I just heard Mr. Eisenhut say in part. That is, they would like to do some analysis of the eddy current testing. And the first time I have heard that they are doing some kind of experimentation on the Oak Creek situation -- that is wonderful, but it still doesn't answer the question, is it significant enough to keep the plant open while we are doing the testing? And that is only one aspect of the testing.

For example, you don't have any technical specs or regulations or guidance that I know of on how serious the rate of degradation is. How significant is a 10 percent or 18 percent total amount of tube failures? We don't have answers, not even guidance. They said their rate of degradation problem they are experiencing right now is unprecedented. We need some guidance, some technical specs on those things.

COMMISSIONER BRADFORD: Could you be a little more specific as to what it is that you feel in the staff's method of presentation can lead to a serious accident? That is, my understanding of it is that they are proposing to permit restart, but under considerations based on other early warnings, would result in the shutting back down, the plugging of that, the tubes, the tubes they are shutting back down, and not reopening.

1 Is there -- have they missed something in the early
2 warning indications?
3 MS. FALK: Mr. Eisenhut would be the better one to
4 ask that. I think somebody asked that before of him: What
5 confidence do you have that reducing pressure and temperature
6 is going to make a difference in the rate of tube degradation?
7 And he said -- and Mr. Eisenhut car repeat it again -- frankly,
8 he doesn't think there is much reason to have confidence in
9 that.
10 COMMISSIONER BRADFORD: It is not so much solving
11 the problem of tube degradation as the fact, if these measures
12 don't solve the problem, there are then several indications
13 in terms of additional leak rates and what have you, that
14 will trigger --
15 MS. FALK: Trigger what? What guidance --
16 COMMISSIONER BRADFORD: The shutdown for plugging.
17 MS. FALK: Are there any rules or specs that say
18 that?
19 COMMISSIONER BRADFORD: I thought there were.
20 COMMISSIONER KENNEDY: As I understood it -- and
21 maybe I am misunderstanding what you are now saying -- as I
22 understood it, the company had indicated -- Mr. Eisenhut had
23 indicated that the company had -- was agreeing to a series
24 of conditions which would have to be undertaken as a condition
25 for continued -- or beginning operation of the plant. Those

1 included a series of points at which the plant would require
2 shutting down.
3 COMMISSIONER BRADFORD: The company's proposal is
4 at page 6 of their November 23rd --
5 COMMISSIONER KENNEDY: It carries on through page 7.
6 My understanding is -- and I asked if this was
7 something which the company had offered, and the answer was
8 yes. The company then asserted, as I understood it, that this
9 was a firm offer; it intended to do this, and indeed, intended
10 to go further and do those things which, although they didn't
11 feel them necessary, the staff did.
12 And then I asked another question about, as did
13 Mr. Bradford, I believe, what the options were of dealing
14 with that. And there are a variety of ways to confirm that.
15 MS. FALK: Confirm what?
16 COMMISSIONER KENNEDY: Am I misunderstanding some-
17 thing?
18 MS. FALK: Yes, and that is that no matter what the
19 company promises to do in the line of additional measures, they
20 don't know at all with any certainty that that is going to
21 stop the rate of tube degradation.
22 COMMISSIONER KENNEDY: Yes, okay.
23 MS. FALK: So if they --
24 COMMISSIONER KENNEDY: Is it not true, though, that
25 they have asserted that, should tube degradation continue and

1 leaking occur, that the plant will be shut down and steps
2 will be taken to stop the leaking.
3 MR. ANDERSON: If I could focus a little bit better,
4 the question is whether you're going to pick up the failure,
5 so that if you have a loss of coolant accident, will there
6 be no incipient failures at that instant in time. And if the
7 rate of degradation is low, you are going to pick them up
8 with these increased surveillance measures. If the rate of
9 degradation is high, to a lessening extent you will not be
10 picking up incipient failures.
11 So that when that -- if the LOCA occurs, you cannot
12 be confident there will not be incipient failures. So the
13 key factor is surveillance effectiveness is a function of the
14 rate of degradation. If the rate is very high, the surveil-
15 lance is going to -- the effectiveness will be less. And
16 the degradation that we saw at this plant is extremely high.
17 I think there should be a rate of degradation
18 limitation, because the surveillance will be less effective
19 with the high rate.
20 COMMISSIONER AHEARNE: Let me ask you the question
21 I previously asked Ms. Falk. Since you asked again the
22 question of rate of degradation, do you think that there is
23 any significance in measuring -- measuring that rate, due to the
24 fact that changes in the measurement techniques and the
25 criteria used between August and October?

1 MR. ANDERSON: I think -- I don't see a relationship.
2 I don't want to purport that I can understand, I can confi-
3 dently say that. I would give the same answer that Ms. Falk
4 did: I don't know and I don't think anyone really knows.
5 One thing I have see, watching it on a day to day
6 basis, is the fact that the representations made initially
7 are always based, by the utility and by the vendor, are always
8 ones that look for the rosy answer. The initial explanation
9 given in October was that all of it was probably picked up by
10 virtue of the multi- as opposed to the single. And the
11 explanations that are given I think are always biased and
12 skewed in the exercise of their judgment to find the answers
13 which are confident.
14 I would say, as Mr. Eisenhut, I don't know. We
15 don't know. The question is, are we going to take the risks
16 being imposed by these accumulating levels of uncertainties.
17 We don't know. For six years -- for four years we haven't
18 looked at the issue. It was frozen out of the ECCS hearings
19 earlier in this decade, and we still haven't looked at it.
20 And the crisis in terms of the time is utility-imposed.
21 COMMISSIONER BRADFORD: When you talk about the
22 absence of a rate of degradation standard, are you saying that
23 the proposal for rate of change, leakage increasing above
24 15 gallons per day, is a sufficient rate?
25 MR. ANDERSON: What that picks up is where the

1 leaks actually occur. So if you have a situation where there
2 is general corrosion, where leaks occur slowly, that would be
3 fine. We have a situation where the kind of corrosion, as
4 we understand it, is stress corrosion, where there is inter-
5 granual corrosive attack and the tube is stained together.
6 There is no leak, so the leak is not being picked up as a
7 general statement under a stress corrosion type of situation.
8 And in point of fact, we go back to that viewgraph. You will
9 see what we are talking about is stress corrosion, not the
10 previous or general corrosion.
11 The kind of thing the leak rate detection will do
12 is not going to be most particularly appropriate for a stress
13 corrosion situation that we have today.
14 COMMISSIONER BRADFORD: What about the other
15 criteria, the sudden leakage of 150 gallons per day?
16 MR. ANDERSON: Again, we are picking up leaks and
17 not the incipient failures of the tube degrading before
18 leakage. If you have a lot of stress corrosion occurring,
19 which is occurring but no leak occurring, you will not be
20 picking anything up in terms of your surveillance. But if
21 you have a loss of coolant accident, you have an incipient
22 failure in that tube, as the accumulation of the stress
23 corrosion, that can, under stress, snap, that will bring the
24 kind of American Physical Society scenario into play.
25 COMMISSIONER KENNEDY: I thought I understood the

1 staff to suggest that would not happen.

2 MR. ANDERSON: The thesis is, if it is within the

3 tubesheet, the APS thing will not go into play. That has been

4 a statement just popped off their heads. I don't know what

5 the basis is. But we have a very, very reputable, exhaustive

6 report by the American Physical Society five years ago, still

7 sitting on the table. There has been no public systematic

8 awareness of it, analysis of it.

9 But when this is subject to rigorous analysis, they

10 crumble and fall away. We are talking about the kind of

e-6 11 situation that is grossly insufficient in our view.

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MS. FALK: The company has submitted an unauthorized statement to you. I have not been given a copy. Out of the goodness of one of the commission staff's hearts, they gave me a copy at noon today. I have not been served with a copy by the company in spite of the fact that our submission was served on the company before even the NRC. Unless you are prepared to act within the very immediate future, we would like an opportunity to scrutinize their document and get comments to you, if we feel the need and if we are in a timely fashion to get them to you in time.

COMMISSIONER AHEARNE: You are speaking there of the --

MS. FALK: It is a document they must have filed late yesterday.

COMMISSIONER AHEARNE: November 27, it says. Licensee's reply to filing.

MS. FALK: I don't know.

COMMISSIONER AHEARNE: You are listed on the service list.

MS. FALK: We have not been served, and they could have done it by mail, which obviously would not have gotten to us.

COMMISSIONER GILINSKY: Any further questions?

(No response.)

COMMISSIONER GILINSKY: Thank you very much.

MS. FALK: Thank you for your time.

COMMISSIONER GILINSKY: I have some questions of the staff. Where have you actually left the plant? What sort of arrangements have been made between you and the licensee concerning startup of the plant?

MR. EISENHUT: First, in the same package that the licensee agreed at the meeting with the Environmental Decade and a number of other outside individuals and staff and everyone present last Tuesday, they agreed that the plant would not start up without prior written approval, even though the approval may not be normally required because of tech spec change, et cetera.

I told them that I wanted the plant to stay down until, number one, the staff had written the safety evaluation addressing all of these concerns, and, number two, we had addressed the Environmental Decade -- at least we addressed the petition at least preliminarily. If we don't have the complete detailed response prepared, there would be a reply out and a safety evaluation written. Until the details are worked out on the actual finetuning of these requirements and the administrative vehicle is in place, the plant is shut down. It is operating at zero power.

COMMISSIONER AHEARNE: "The administrative vehicle" meaning "order"?

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1 MR. EISENHUT: Yes.

2 COMMISSIONER GILINSKY: Where are you in the

3 process of preparing the documents?

4 MR. EISENHUT: As of late last night and early

5 this morning, we have a final draft safety evaluation, and I

6 guess we have a first draft at the response to the

7 Environmental Decade, to do whatever we can. We should have

8 that issued by tomorrow.

9 COMMISSIONER GILINSKY: Are you saying that,

10 barring commission action, the plant could then operate

11 after that has been --

12 MR. EISENHUT: That would be the administrative

13 vehicle.

14 MR. SHAPAR: Under 2.206, the only thing that is

15 different is, the general counsel explained, that the

16 commission asked for this briefing before the staff took

17 action. So, if the commission wishes to --

18 COMMISSIONER KENNEDY: Let me remind you that it

19 is my recollection the commission also requested staff after

20 this briefing allow 48 hours to elapse before taking any

21 action.

22 COMMISSIONER GILINSKY: That was my

23 understanding. And I want to be absolutely sure that that

24 was the case.

25 MR. SHAPAR: Yes.

1 COMMISSIONER GILINSKY: Okay. We will then have
2 that period to consider the matter.
3 I have two more brief questions. One is --
4 concerns operator instructions. Could you just say a little
5 more about what steps have been taken to ensure that
6 operators can cope with failures in these steam generator
7 tubes that may take place or should they take place?
8 MR. EISENHUT: All plants have an emergency
9 procedure. That emergency procedure is supposed to lay out
10 how the plant is supposed to respond, what actions the
11 operator should take following a major ruptured steam
12 generator tube. This plant, as it turned out, as I
13 mentioned earlier, had one in effect. It turns out, even in
14 '75 and, in fact, the utility, the operators responded very
15 well to that transient. They brought the plant down as it
16 was designed to.
17 The thing we are asking is that on this plant
18 there be a recheck to go back in and make operators really
19 aware of that --
20 COMMISSIONER GILINSKY: You may not have this in
21 operators, for one thing.
22 MR. EISENHUT: Yes, but there is an emergency
23 procedure, so we want to make sure that it is again called
24 back to their attention, particularly because of the
25 discussion we are having about integrity of the steam

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generator tubes.

COMMISSIONER GILINSKY: What are we doing to check to make sure that that in fact happens?

MR. EISENHUT: We haven't done too much yet. We would be asking the utility to, number one, check his submittals and his submittal to us. We would be looking at the emergency procedures. Number two, we would ask him to go through all of his operators and be sure that he has an internal retraining program to ensure that they are thoroughly familiar with that emergency procedure. And we will ask that that be audited by I&E.

COMMISSIONER GILINSKY: Could I also ask Howard. I assumed it is a section 104 license.

MR. SHAPAR: Back in 1970, I assume it was, too.

COMMISSIONER GILINSKY: Is there any difference in the way a case like this is handled as opposed to a situation if they had a 103 license?

MR. SHAPAR: No, the only difference in the act in relative context is that the commission is supposed to apply the minimum amount of regulation for 104s. But that has never reflected itself in any significant respect in the regulations, as such.

COMMISSIONER GILINSKY: That doesn't enter into this situation?

MR. SHAPAR: No. There is no real difference.

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COMMISSIONER GILINSKY: Anything further?

COMMISSIONER AHEARNE: Yes. Since there are many people here who might be intersted in the answer, would you go back carefully through this issue of the APS which has been raised, and, as Ms. Falk pointed out, she didn't believe it had addressed?

MR. EISENHUT: I will address a different piece of it, and I brought along Chris Parczewski, of our staff, who is an ECCS expert, and he can address some of the specific details of it.

The basic concern is that if you have large amounts of leaking in tubes and electricity, a very large number, the amount of gpm leakage in the primary system --

COMMISSIONER KENNEDY: Of what order are we talking about?

MR. EISENHUT: Greater than 1300 gallons per minute. There is a question that has been raised by the APS. That question has to do with steam binding. The situation we have here is --

COMMISSIONER AHEARNE: Being defined as?

MR. EISENHUT: Retardation of the amount of -- the way you could be recovering the core following a loss-of-coolant accident. It would retard the cooling of the core.

COMMISSIONER AHEARNE: Slow it down.

MR. EISENHUT: Yes, slow it down. It would therefore slow down the amount of cooling to the core. Slowing down the coolant to the core would in fact, if that happened, could cause higher temperatures in the core. The condition you find is that you have to have a large amount of, in leakage, something greater than about 1300 gallons per minute.

The situation we are seeing here is this cracking. Every piece of evidence we have ever seen shows that all of these defects are in the crevice. They are below the upper surface of the tube sheet.

The only other thing, the other aspect of it is the amounts of leakage we have been seeing are extremely small. In fact, to give you a handle on how it compares to 1300, we did a theoretical calculation that shows that even if a tube was circumferentially through-wall in a crevice, if the crevice was completely cleaned so that you had the maximum flow area, the theoretical upper limit is about seven gallons per minute for the amount of flow at the maximum delta P you see that would be seen coming out of one tube or going into one tube. Seven gallons per minute. You can, of course —

COMMISSIONER AHEARNE: That is where you get your 200?

MR. EISENHUT: And you have to have a very large

1 number of tubes that would fail simultaneously in such a
2 catastrophic way that has never been observed. Every crack
3 we have ever seen runs longitudinally. So, therefore, we
4 don't expect one of those situations would present itself in
5 that straightforward mode.
6 Therefore, while the steam binding question is a
7 good theoretical question, we believe it is not directly
8 applicable to this situation, because we really believe that
9 all the degradation we are seeing is actually with tubes in
10 the tube sheet.
11 COMMISSIONER AHEARNE: In the tubes that were
12 pulled out, were they examined to see whether there were
13 cracks in the part of the tube sheet?
14 DR. LIAU: No, sir.
15 COMMISSIONER AHEARNE: They were not examined?
16 DR. LIAU: No, sir. The tubes -- first, one tube
17 was below the support plate; the first was four to six
18 inches above the top surface of the tube sheet. In fact,
19 the tube -- gives us a section above the tube sheet. And
20 the third tube sample was broken, about one inch below the
21 top surface of the tube sheet. So, we did not have a
22 sample.
23 MR. EISENHUT: There were some that were looked
24 at.
25 DR. LIAU: With the two samples, there were no

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1 indications at all above the tube sheet.

2 COMMISSIONER KENNEDY: They were examined for that

3 purpose?

4 DR. LIAU: Yes, sir.

5 COMMISSIONER AHEARNE: Next question: Do you have

6 any information that the No. 2 plant might be somewhat back

7 out going down the same path?

8 MR. EISENHUT: We have no information along that

9 line. But we make the observation that if you look at the

10 experience with it, you don't see anything like the rate of

11 degradation that you see on the first unit. We believe from

12 a chemistry standpoint that it is very well tied. It is not

13 completely true to say that there is no understanding of

14 what is going on at all. There is a considerable amount of

15 chemistry work trying to understand the precise details.

16 But we believe there is some logical differences that you

17 might expect. Point Beach 2 would never see this kind of

18 problem.

19 COMMISSIONER AHEARNE: Could someone explain those

20 logicals?

21 DR. WEEKS: I can explain.

22 MR. EISENHUT: He has been -- run a research

23 program. This is not a five-day problem. The

24 crevice-cracking has been with us for many, many years. We

25 have been doing a research program that not only is run out

of Brookhaven, it entails a lot of work at a large number of other national labs. Dr. Weeks is the head of that.

DR. WEEKS: Could I ask you to repeat the exact question?

COMMISSIONER AHEARNE: In various ways of framing it, it is: What is your understanding of what is happening? And part of that is: Why shouldn't we expect it to be happening at Point Beach 2 and why not in other plants?

DR. WEEKS: Our understanding of what is happening is based rather on recent observations of these tubes pulled from Unit 1. There is a general intergranular attack of the grain boundaries, not intergranular stress corrosion cracking per se, because it seems to be bi-directional.

This can be reproduced in the laboratory under two specific conditions, one of which is rather acidic environment with a lot of sulfides present. We don't believe that that exists at Point Beach.

The other one is in a caustic environment in the presence of copper ions. This is possibly what exists at Point Beach.

To be honest with you, sir, I think it would be impossible to say we understand this phemonenon any further than that general statement. It can be reproduced in the laboratory. At Point Beach Unit 1 there appears to be -- and I was earlier today looking at the water chemistry

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1 of the two units -- greater amounts in the past history of
2 the plant of, say, free caustic in the coolant, which
3 therefore suggests that the possibility of a caustic
4 environment developing in these crevices may be greater in
5 Unit 1 than in Unit 2.
6 However, there is nothing that we know at this
7 time that would, say, in the long term preclude its
8 happening in Unit 2.
9 COMMISSIONER AHEARNE: That would then similarly
10 stand for other similarly designed steam generators?
11 DR. WEEKS: This is possible, yes.
12 MR. EISENHUT: How about a backup slide?
13 (Slide.)
14 We have two backup slides, which brings the
15 question of what about the other -- there is a total of 18
16 units in the United States.
17 COMMISSIONER AHEARNE: But let me ask the
18 gentleman.
19 So, if I gather correctly from what you are
20 saying, it is that, as far as the understanding of this type
21 of cracking, you are really going forward based upon this
22 small experimental sample size, trying to reproduce that
23 effect? And at the moment, it is based upon having been
24 able to reproduce it on two types of water chemistry, but
25 not necessarily reaching a conclusion that that is the

1 cause?

2 DR. WEEKS: That is correct. I think the

3 observations show that, at least in Point Beach Unit 1,

4 there was caustic in that crevice. There is certainly

5 copper in the sludge, and presumably some could be present

6 in that crevice, as well. Something is filling the crevice

7 with some deposit.

8 DR. SHAO: The question was why Unit 1 and Unit 2

9 are different. There is one possible reason. During

10 conversion from phosphate to AVT in 1974, for Unit 1, they

11 converted to the -- they -- for Unit 2 they shut down the

12 whole plant; they cleaned the whole unit and then converted

13 to AVT. So, I think that it makes a lot of difference

14 between on-line conversion and shutting down for

15 conversion.

16 COMMISSIONER AHEARNE: That is a factual

17 difference.

18 DR. SHAO: That translates -- on-line conversions,

19 there may be a lot of deposits in the crevices which are not

20 cleaned out. If it is shut down and cleaned out and then

21 converted, then you get rid of the deposits.

22 COMMISSIONER AHEARNE: It is still a factual

23 difference as opposed to an explanation --

24 DR. SHAO: You can translate it into some logic.

25 MR. EISENHUT: The other aspect, all you get is

from the things that you see. It could be associated with -- just like when you study the denting phemonena, many, many different situations can cause denting.

The other thing we are looking at is the other 18 plants. I believe there are four in the United States that have experienced some degree of this problem, and we are aware of three overseas plants that have also experienced this problem. We are following theirs very, very closely.

However, the other plants appear to be very similar to Point Beach 2-type situations. You get a very minor amount of it, but you don't see the rapid major degradation as you do within Point Beach 1. Again, it is just an observation. The factual difference of how they have operated and the way they made changes in the chemistry of their plants.

COMMISSIONER GILINSKY: Peter, do you have another question?

COMMISSIONER BRADFORD: The statement was made earlier that replacement of these steam generators was inevitable eventually. Do you have a time?

MR. EISENHUT: I didn't say it was inevitable.

COMMISSIONER BRADFORD: Somebody did.

MR. EISENHUT: The discussions I have had with utilities is that they are considering the various options: sleeving, tubing replacement. They are talking about

1 getting something submitted to us very tentatively in the
2 springtime of this next year. A submittal for such action,
3 of course, would entail staff review, and probably in the
4 long lead time -- that is, if you manufacture new steam
5 generators -- that would be for them to go out for them to
6 purchase new steam generators and get them manufactured.
7 COMMISSIONER AHEARNE: If one of the conclusions
8 that you say Westinghouse is reaching is that a cause is
9 sludge buildup or whatever in the crevices, as one of the
10 solutions, it is to try to clean it out.
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1 MR. EISENHUT: It is not just sludge buildup. It
2 is the type of chemicals present, because when they made the
3 on-line conversion they turned off the phosphate treatment
4 for a while and they started converting to AVT. Doing that
5 certainly changed the chemistry of that plant unique to no
6 other that we are aware of.
7 COMMISSIONER AHEARNE: Are you saying that this
8 was due to cleanup?
9 MR. EISENHUT: It is certainly unclear. I
10 personally don't know. It would be difficult. It is a
11 tight crevice, and if it is a material anything, certainly
12 like the materials you see from a denting phemonena that are
13 extremely hard -- in fact, they are harder than the tube;
14 that is why they are crushing the tube.
15 COMMISSIONER GILINSKY: Peter.
16 COMMISSIONER BRADFORD: Quite a lot in terms of
17 the ability if anything should go wrong suddenly seems to
18 depend on the accuracy more or less of this
19 seven-gallon-per-minute calculation that you make. Is that
20 calculation in a form that you can furnish it to the
21 parties?
22 MR. EISENHUT: I think it is a rather simple
23 calculation, certainly.
24 COMMISSIONER BRADFORD: When?
25 MR. EISENHUT: When the staff reconfirmed it

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recently? When was the calculation made? In the last couple of weeks. We have been actively working very thoroughly on this problem since the first of November, so it has been in that time frame.

COMMISSIONER BRADFORD: Made in the context of the Point Beach problem?

MR. EISENHUT: Yes.

COMMISSIONER GILINSKY: Can we see that, too?

(Laughter.)

COMMISSIONER GILINSKY: Thank you very much. The matter is before the commission.

(Whereupon, at 5:02 p.m., the meeting was adjourned.)

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