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PROCEEDINGS BEFORE

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

DKT/CASE NO. 50-266-OLA and 50-301-OLA

TITLE WISCONSIN ELECTRIC POWER COMPANY
(Point Beach Power Plant Units 1 and 2)

PLACE Milwaukee, Wisconsin

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of :

WISCONSIN ELECTRIC POWER COMPANY : Docket Nos.

(Point Beach Power Plant : 50-266-CLA and

Units 1 and 2) : 50-301-CLA

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Room 398, Federal Building

517 East Wisconsin Avenue

Milwaukee, Wisconsin

Thursday, November 18, 1982

The hearing in the above-entitled matter convened, pursuant to notice, at 9:02 a.m.

BEFORE:

PETER B. BLOCH, Chairman
Administrative Judge

JERRY R. KLINE, Member
Administrative Judge

HUGH C. PAXTON, Member
Administrative Judge

APPEARANCES:

On behalf of Applicant:

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On behalf of Intervenor,

Wisconsin Environmental Decade, Inc.:

PETER ANDERSON, Esq.

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EXHIBITS

P R O C E E D I N G S

JUDGE BLOCH: The hearing will come to order.

We do expect that when we are talking with Staff witnesses that we will ask them to clarify any areas of possible disagreement between the Staff and Applicant witnesses, and to explain the importance of those differences or lack of importance, and so we just would like to urge the Staff witnesses to make sure they are attending to whatever those differences might be.

Mr. Churchill approached me as we were beginning to commence the proceedings and suggested that he has the agreement of the parties to discontinue the questioning of Mr. Fletcher and call his eddy current interpretation experts. There being no objection, Mr. Churchill, will you proceed, please.

MR. CHURCHILL: Yes, sir. Thank you.

I would like to call to the stand Mr. Denton and Mr. McKee, please.

Your Honor, you know Mr. Denton from yesterday. He's already been sworn in. Mr. McKee is an employee of Mr. Denton's company. Mr. McKee is the man who actually reads and interprets the data from the Point Beach plant.

JUDGE BLOCH: Mr. McKee, you understand that you are testifying before an agency of the United States

Government, that the matters we are talking about are potentially serious safety and environmental matters, that the testimony you are about to give should be the truth, the whole truth, and nothing but the truth, and that the failure to live up to that obligation is subject to possible penalty for perjury?

MR. McKEE: Yes, I do.

JUDGE BLOCH: Please proceed.

Whereupon,

CLYDE J. DENTON,

recalled as a witness by counsel for the Applicant, having previously been duly sworn by the Chairman, was examined and testified as follows:

Whereupon,

EDWARD O. McKEE,

called as a witness by counsel for the Applicant, having first been duly sworn by the Chairman, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. CHURCHILL:

Q Mr. McKee, would you state your full name, please.

A (WITNESS McKEE) Edward O. McKee.

Q And by whom are you employed?

A (WITNESS McKEE) Zetec, Incorporated, Misaqua,

Washington.

Q And what are your duties there, Mr. McKee?

A (WITNESS McKEE) Electronics technician, data analyst, help in the engineering department.

Q And could you give us a description of the training and experience that you have had, first of all your educational background and second the experience you've had relative to the interpretation of eddy current data?

A (WITNESS McKEE) Four years military electronics, two years electronics tech school, and about 22 years in the electronics and nondestructive testing field.

Q And how long have you been interpreting eddy current data?

A (WITNESS McKEE) About 11 or 12 years.

Q What is your relationship or your role in the Point Beach eddy current inspection program?

A (WITNESS McKEE) I have done all the data from the first inspection except for two times, both plants.

Q Mr. Denton, yesterday when you were up on the stand we introduced Applicant's Exhibit 2, and what I would like to ask you to do -- you have been invited here by the Board, both of you gentlemen have been invited here by the Board, to explain how eddy current

data is interpreted, particularly the eddy current data from Point Beach.

And if you would, would you just run through Applicant's Exhibit 2 and explain to the Board just how eddy current interpretation is done with respect to those examples.

A (WITNESS DENTON) If I could say over what I said yesterday by way of review, I'll start and go through this. The first, page 1, first the eddy current equivalent that we use today has the capability of using four testers simultaneously sharing the probe. Each of those have two channels. We have to have both a horizontal and a vertical channel. So in fact this equipment has eight outputs.

And I'm emphasizing this now because as we go through the exhibit, we have chosen to put on strip chart in one case two channels and later we have changed one of the channels to a difference piece of information. All of the data collected on any of our inspections is always recorded in its raw form on an eight-channel magnetic tape, so that we always have the option of putting on strip chart any combination of information that we want.

Also, since this is a multi-parameter piece of equipment, which means we can manipulate the data, by

having it all in its raw form on magnetic tape we can choose to manipulate it later however we want.

JUDGE BLOCH: You mean primarily that you may add different channels together?

WITNESS DENTON: Yes. We can subtract the effects of tube supports or copper. We can also subtract the effects of things on the I.D. of the tube by judicious selection of frequencies when we do the original inspection.

We have basically two ways of looking at the data. The top picture shows three of the channels -- two of the channels presented simultaneously, I'm sorry, and the combination of those two channels. So these are then lissajous patterns of the main test frequency, in this case 400 kilohertz, the subtractor frequency, which is 100 kilohertz. It is picked lower, which allows us to subtract signals caused by things on the outside of the tube. And then the lower lissajous pattern is a result of adding the two top ones together.

Then the strip chart shows on channel one, the left channel, the vertical component of the mix.

JUDGE BLOCH: Just to be clear, in some places the chart on the left looks like a single line. Is that because the lines in fact are falling exactly on top of one another?

WITNESS DENTON: I'm sorry, I don't understand the question. On channel one of the strip chart recorder or are we talking the photograph of the lissajous?

JUDGE BLOCH: I thought you just said there were two channels on the left side of this.

WITNESS DENTON: No, I'm sorry. The vertical, the channel one, there is only a single pin, so on channel one there's the vertical information from the mix, which is the lower lissajous pattern. And the second channel is the vertical of the 400 kilohertz, which is the upper left lissajous pattern.

So this is a typical strip chart arrangement. If there is a decrease in electrical conductivity in the tube wall caused by a defect, there will be a vertical component to the signal. So we can easily screen strip charts to look for indications that we would then have to go to the mag tape and bring up on the oscilloscope.

JUDGE BLOCH: And that is the order in which you proceed. You start with the strip chart and then when you find some possible problem you then go to the --

WITNESS DENTON: It depends on the plant. If we have a plant that has exhibited small volume flaws or numbers of flaws, quite often we have the strip chart on

the table in front of us and the oscilloscope in front of us and we actually look at all of the mag tape along with the strip chart.

It is necessary to have the strip chart because it's the only real way to get the vertical elevation of the faults.

JUDGE BLOCH: So sometimes you're looking at the data simultaneously?

WITNESS DENTON: That is a fact, yes.

The other thing I need to point out about the lissajous pattern, I want to go just briefly through the basic eddy current phenomenon again. We pick a frequency which is high enough when we are setting up to detect flaws, that we have phase delay through the tube wall, so that flaws on the outside of the tube occur later in time than flaws on the inside of the tube. And as a flaw on the outside of the tube progresses toward the inside of the tube, the indication of that flaw rotates in a counterclockwise direction.

The other information contained -- there's actually three pieces of information in any one of these lissajous signals. One is the phase angle, which is related to the depth of the flaw and its origin, either I.D. or O.D. Second is the amplitude of the signal, which is related to the volume of the flaw. And third

is the loop opening of the lissajous, which is a little more ambiguous but nevertheless contains information. So those three items are always considered when we are interpreting data.

If I may proceed, then, to page 2. We have -- the strip chart in this case is connected the same as the first strip chart. Let me explain. At the top of each page we have some title, like "Lab Standard" or whatever, and then next thing says "2V/D." That is merely telling us that these pictures were all taken with the oscilloscope set on 2 volts per division. There's nothing mysterious about the number.

So we have then in the left side, we have a lissajous pattern of the tube support on the outside of the tube as the probe is pulled through it, at 400 kilohertz on the left, 100 kilohertz on the right. Now, those two signals look approximately the same at different phase angles, but in fact in order to have those two signals be the same size the amplification or the gain of the 100 kilohertz has been decreased, because at the lower frequency the tube support signal would be much larger.

If you were going to do a mix on the outside of the tube, that is a necessary relationship. You have to have the gain on the subtractor channel lower than

the gain on the tester channel. Then through some electronic manipulation those two signals are made to look as much alike as possible and put through a comparator and subtracted one from the other.

So the resultant, which is the spot down below, is what we call the residue of the tube support signal. Then if you look down on the strip chart, you see the same information displayed with the vertical information separated out and the horizontal is not presented.

So in the left channel you see the vertical component of the residual of the tube support right. Where the line is drawn, that little indication is what is left of the tube support signal. On the right channel, you see the vertical component of the tube support before the subtraction from the 400 kilohertz.

JUDGE BLOCH: These are lab standards; they are not from the actual generator?

WITNESS DENTON: That's true. It is just a tube with a carbon steel ring around it.

Then on the right channel -- I'm sorry. On the right side of the page you see exactly the same thing, and I'm sure it is probably also the same tube support ring. You just don't remove the probe from inside it, which then simulates being inside the tube

sheet. In other words, you entered the carbon steel but you did not leave it, so you see only one lobe of the signal.

Let me back up a minute. All of this data is taken from a differential probe. That means we have two coils in the bobbin that are placed, actually separated from each other by approximately a sixteenth of an inch. So this data is taken where you are comparing one section of the tube with respect to the next section of the tube, and as you pull the probe down through the tube, then as you enter a flaw one coil sees it, then the other coil sees it.

So all of these lissajous patterns are actually duplicates of the signal. If you see the signal, you notice if you have a symmetrical flaw -- we can use the tube support for an example. You see that the downward lobe is one coil coming in and then it goes back. Both coils are in it and then you see the other mirror-image lobe as the probe leaves it.

So now I can go back to the explanation of the next picture, because we never left it. We only have one lobe.

JUDGE BLOCH: Are you going to explain at some point whether there is any significance to deviations from central line?

WITNESS DENTON: We are rapidly approaching that, yes. In this case there is no significance to that, but we'll explain that in a minute.

Okay, so now we have page 3. We have an actual tube. There's no defect indication in this tube. It has been picked as a tube sheet area and above the tube sheet area without a flaw.

So you have to picture the strip chart as running toward the floor as it comes out of the machine and the probe is coming from up in the tube down toward the tube end. We always record data on the retraction of the probe, not on the insertion. So that if you look at the bottom of the page you'll see where it says "the first support."

So the probe is just coming through the first support plate, which is roughly 40-some inches above the top of the tube sheet. Then as the strip chart runs in time, you see the signals that occur as the probe comes down. Then you see the entrance to the tube sheet is marked on the strip chart.

Then the next big excursion which you see, which isn't marked, is the entrance into the tube roll. The bottom of the tube, the lower portion of the tube, is rolled into the tube sheet. So you have an expansion of the inside diameter of the tube.

JUDGE BLOCH: I cannot tell where that is on the chart. At the very top --

WITNESS DENTON: It's the first very large one as you go to the top of the strip chart. Then you are in the tube roll area, and that next small signal in the middle is the overlap from the tube roll and the next large signal is the end of the tube.

JUDGE BLOCH: Now, in the middle of the graph on the right there is noise, some of which seems to approach the amplitude of the signal marked 20 percent on page 1. Is there something I'm missing?

WITNESS DENTON: No, there isn't. As a matter of fact, the nice thing, you see, about mixing the signal out is that when you look at the channel on the left after we have subtracted those things on the exterior of the tube, that those signals are gone or drastically changed their shape.

JUDGE BLOCH: So the key strip is the left strip?

WITNESS DENTON: In this case, yes.

JUDGE BLOCH: And what is it you really are subtracting out?

WITNESS DENTON: In this case, when it's above, all those indications above the tube sheet are most likely the sludge layer. It is variations in the

density. It is a variation in the density of the magnetite in the sludge layer.

JUDGE BLOCH: And if it were a real defect?

MISS DENTON: It would appear on the left channel as well.

If there are no questions on page 3, we will progress to page 4. This is going to slow us down a little bit as we're starting to get more interesting here.

The left side of the page, we have now a tube, a recording of a tube which in fact was leaking water. It takes a little more time to go through this, so we'll start down at the bottom of the page on the strip chart again. We have the same tube support signal, so we always try to test to a known point. In this case the inspection goes above the number one support and then down through the area, through the tube sheet.

You see, all the noise on the right-hand channel is not on the left-hand channel until you get down to the tube sheet area or into the tube sheet area. So what we have is a case of, most likely, magnetite on the tube itself, on the straight length of the tube.

Then we enter the tube sheet and the first signal we come to indicates -- whoever laid this chart

out indicates that this is the leaking area in this tube, and you see some nice photographs up above. From these phase angles, this signal looks to be, I don't know offhand, but let's say 80 percent through the wall.

This is not an uncommon occurrence if you have a crack situation. If it is a stress-type crack it is not unusual for that to relieve the stress and still have some metal contact on the inner diameter of the tube that allows current to flow through it. So it is not unusual to have a leak that does not read a 40-degree phase angle and 100 percent of the way through the tube.

JUDGE BLOCH: So it's also not unusual to have a 100 percent through-wall defect that appears on the eddy current testing to be 80 percent?

WITNESS DENTON: That is correct, that is not an unusual occurrence. However, in this case if you come on down through the graphs, the reason I was explaining the entry to the tube roll so well is that in this case you notice there's a big indication above the entry to the tube roll, which in fact is a much bigger signal indication than the one that has been marked on the strip chart.

MR. CHURCHILL: Your Honor, I have a picture,

a scope picture of that larger indication. Would you like for me to distribute this to the Board?

WITNESS DENTON: If you would, please.

MR. CHURCHILL: Your Honor, this is a single sheet marked "Point Beach No. 1, WEP, November 1981." It is a picture of a tube identified as R-27-C-49, four inches ATE, meaning above the tube sheet, above the tube end, ATE.

I would like to have this marked Applicant's Exhibit 3.

JUDGE BLOCH: It shall be so marked.

(The document referred to was marked Applicant's Exhibit No. 3 for identification.)

WITNESS DENTON: Okay. Now, so the only other thing to discuss I think is, in the tube sheet area you notice that both channels reliably present the same information, and it indicates that once you get in the area of 13 inches above the tube end and down it has in fact a deterioration of the tube wall in the full length of the tube, between where the leaker is indicated and where the most likely leak really is. The indication is full length in that tube.

Now, when you are doing a differential coil

test, which we are, then what happens in this case is you are really comparing differences in defective sections of the tube wall, and so you don't really come up with phase angles. You merely come up with a bunch of garbage in signals.

In this case when we actually entered these two particular flawed areas, their volume was significantly larger than the background deterioration of the tube wall, that very nice signals were in fact pulled out of it. And in fact, the picture that we have just handed out is as close to a classic eddy current signal as you could ask for.

So again, thinking about volumes, you notice on the strip chart, in both cases the strip chart is actually saturated by this large signal.

JUDGE BLOCH: Mr. Churchill, could we somehow take this as evidence?

MR. CHURCHILL: Your Honor, given the background and the explanation, I would move that this be received into evidence.

JUDGE BLOCH: Any objection?

(No response.)

JUDGE BLOCH: Mr. Reporter, please bind it into the transcript.

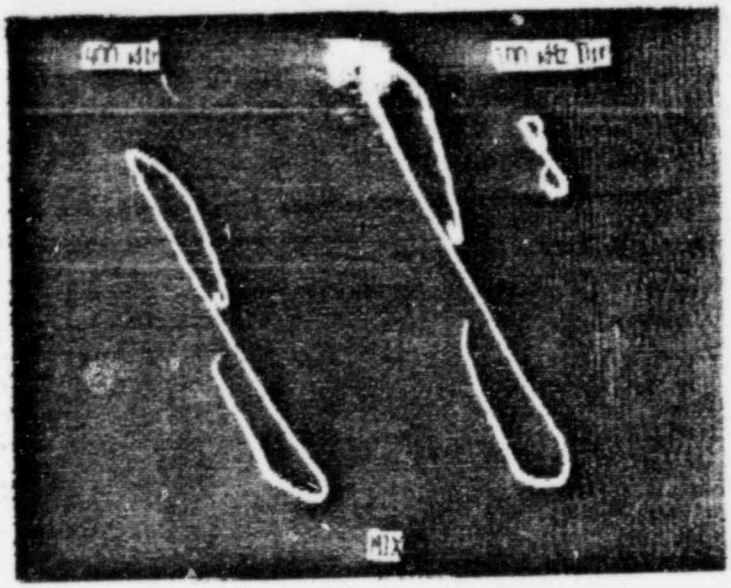
(The document referred

to, previously marked for identification as Applicant's Exhibit No. 3, was received in evidence and bound into the transcript at this point.)

Point Beach #1 WEP
November 1981
2 v 1 D

Atty Ex 3
insert #1

R27 C49 4" ATE



WITNESS DENTON: Okay. If there are no more questions, we'll move to the right side of the chart and we will have an example of the volume effects of flaws. In this case, first you notice that we're coming down to the strip chart in much the same manner. The tube sheet entrance is a normal-looking entrance, and then at 20 inches above the tube end you'll see the small indication on the strip chart, and you will look up at the test channel at 400 kilohertz and you'll see a signal which is not that easily identified.

Now, this is obviously a very small volume indication. The problem with this kind of indication is that it is close to impossible to put a realistic phase angle on this, because we're talking about a signal to noise ratio in this case which is about one. If you look at the strip chart, there are some general signals in that area that are almost the same as the one we are trying to identify.

So it is the obligation of the data interpreter to try to assess that in the most severe mode that he can justify, which is measure the angle which would make it appear to be the largest flaw. The problem with this type of flaw is, it is always questionable. There's always a signal to noise ratio limitation, and the question is, should we put a number

on this or should we not. Is it just noise or is it really a flaw?

In this case the interpreter, which I believe was Mr. McKee, chose to put a number on this that said 89 percent of the way through the wall. That doesn't mean in any stretch of the imagination that this flaw is really 89 percent of the way through the tube wall.

JUDGE BLOCH: Mr. McKee, when you do put that number on, we just had an explanation that it's rather arbitrary. What do you know about what the minimum size of that flaw may be and what the maximum size of that flaw may be?

WITNESS McKEE: To answer the second, probably the maximum may be 89 percent. But having a signal to noise ratio of about one to one, the minimum size I cannot tell you.

JUDGE BLOCH: Now, you say the maximum is probably 89 percent. What is that based on?

WITNESS McKEE: If you look in the center of that thing at the top of the page, you have that vertical line going up and down. That is what I measured to get the 89 percent.

JUDGE BLOCH: I know, but we just had an explanation, for example, that when you measured an 80 percent through-wall defect it may actually be a leaker

and it goes all the way through. The indication is a maximum of 89 percent, but do you know what would happen if it were destructively evaluated in a laboratory? Is it possible that it would be a through-wall leak?

WITNESS McKEE: No, not in this particular tube.

JUDGE BLOCH: Is that because you have had some of your specimens examined in a laboratory?

WITNESS McKEE: Yes, I have had some of mine called. But in the beginning when we go to a site they run usually a hydrostatic test on the secondary side of the steam generator, and the tubes will leak water usually with a hydro.

JUDGE BLOCH: If it is through-wall?

WITNESS McKEE: If it is through-wall.

JUDGE BLOCH: Okay. Now, we had one situation in the safety evaluation report for Point Beach in which there was a through-wall leak in the cold leg of a tube.

(Pause.)

JUDGE BLOCH: Off the record.

(Discussion off the record.)

JUDGE BLOCH: The passage which I would like to ask the witness about occurs on page 6 of the safety evaluation report. I'll read from the beginning of the

paragraph. If you don't know the answer to the question, please just say you don't know. I'm not trying to trap you into something here.

"A tube from which explosive plugs had been removed previously from tube inlet and outlet and which was subsequently sleeved on the hot leg side during the demonstration program in the fall of 1981 recently developed a small leak on the non-sleeved cold leg side. The source of the leak could not be identified with eddy current testing."

Now, in your experience with eddy current testing is there some reason why an actual through-wall leak might not be detected by the eddy current test, either one of you?

Actually, I'd prefer that the consultation be out loud instead of in private.

WITNESS DENTON: Actually, I was just going to answer the question.

JUDGE BLOCH: Fine.

WITNESS DENTON: Once you have been drilling on explosive plugs or any kind of plug, with the potential of damaging the tube wall, we're not sensitive, for instance, to circumferential cracks with our standard inspection, because the cracks flow around the tube wall. And if you have a tight circumferential

situation, currents merely flow on both sides of it.

Now, I am not suggesting that this was a circumferential crack. The question was, are there known cases where we can miss a fault.

JUDGE BLOCH: That is one possibility, a circumferential crack which didn't deviate at all from being circumferential you could not detect because of the nature of the test.

WITNESS DENTON: Typically, we wouldn't expect that kind of a situation in that area of the tube, but when they have been in there drilling who knows what happens to the tube wall.

JUDGE BLOCH: Are there other possible reasons you couldn't detect an actual crack with a test?

WITNESS DENTON: The other would be in the volumetric sense. It just plain didn't have enough volume in the flaw area to be detected, or -- I haven't seen the data and so I'll defer to Ted as soon as I say this -- it is possible that due to the drilling operations, the noise levels, the signal-noise level in that area was increased to the point where the flaw value would have to be quite large.

JUDGE BLOCH: Basically it wasn't a very smooth I.D.

WITNESS DENTON: I don't know, but maybe Ted

does.

WITNESS McKEE: Okay. The area above where the explosive plug deformed the parent tube, there were no indications. Now, that area, which is the lower approximate six inches where the plug was drilled out, you've got the expansion, the deformation by the explosive plug, and the drilling operation. And that area almost becomes impossible to inspect.

JUDGE BLOCH: Then logically you had no adequate baseline to compare it to, either?

WITNESS McKEE: That's true.

JUDGE BLOCH: So that is sort of a very special case.

WITNESS McKEE: A very special case.

JUDGE BLOCH: The only case where you would expect not to be able to get a through-wall crack as an indication at all would be a circumferential crack other than in these kind of messed up tubes where there has been something special done to them recently? Is there some other situation where you might expect to miss a crack?

WITNESS McKEE: Not usually when they leak water, no.

JUDGE BLOCH: Okay. Could you continue with the story.

WITNESS DENTON: Okay. I think that concludes page 4 if no questions on that.

Okay. This is a similar situation to the last data we talked about, except that this time the indication is above the tube sheet rather than within the tube sheet. So again, we have a very small volume indication and a very poor signal to noise ratio, and this time the conservative reading by measuring the phase angle turns out to be 38 percent. I don't see anything else that's particularly significant about this data.

So we go to page 6 now, the first of the sleeve information. I point out now that due to the increased thickness of the tube wall it is not necessary to do a signal subtraction to get rid of a tube sheet entry. So now the strip chart recorder is showing both components of the test frequency which, because of the thinner wall of the sleeve, is now 650 kilohertz as opposed to 400 kilohertz.

And now the strip chart has the vertical component on the left channel and the horizontal component of that same signal on the right channel. Theoretically, if you took the time, if you added those two channels back together, you could approximate reconstructing the lissajous that is on the

oscilloscope.

So this strip chart on the left side, then, depicts the data from the straight portion of the sleeve. You can see there's a small indication of the tube sheet entry on the left channel, on the vertical channel. And now, remembering that we put probe motion -- in the original setup, we set zero time horizontally, which then is the probe motion signal. Then now we are showing the horizontal channel, and so the variation in the right-hand channel of the strip chart is now mostly the motion of the probe or minor I.D. variations as you go through the tube.

And as you see, none of those signals have a vertical component in the left-hand channel. Okay, so one of these is a baseline, the left one is a baseline in November, and then we have the same tube in October -- I'm sorry, November of '81 and October of '82.

Unfortunately, there's been a drastic change in the gain that was used when the sleeve was done, and so now you see some noise levels in the strip chart in the right-hand channel that were not in the strip chart on the left. And if you look at all of the other information that's going on at the time, it is obvious that the gain is being run much higher. So there still is no indication in this recording of a flaw. We are

just seeing some background noise from the sleeve.

JUDGE BLOCH: Background noise from what?

WITNESS DENTON: From the sleeve, most likely.

JUDGE BLOCH: Where is there the change in the gain?

WITNESS DENTON: Do you know why there's a change in the gain?

WITNESS McKEE: I do not. The first was a 610 probe, the second was a 625. The baseline was done with a 610 sized probe, the second one was done with a 625 probe. The response from the 625 is a little greater than the 610 response because of the fill factor of the probe. So you actually get a larger response.

JUDGE BLOCH: Obviously, it's a little easier to compare a baseline to a new reading when they have exactly the same gain. What are you doing in your head to decide that the difference is only gain, rather than some change in indications?

WITNESS McKEE: You look at the magnetic tape recorder and watch the display on the scope to see exactly what is going on while you get this noise on the strip chart.

JUDGE BLOCH: Okay. So in order to decide this is only a change in gain, you are using the

oscilloscope and not the strip chart.

WITNESS McKEE: That's right. The analyzation of any indication is done off the oscilloscope, not off the strip chart. Only the elevation is usually received off of the strip chart.

JUDGE BLOCH: I guess in the future this will now become the baseline if you're going to look at the strip chart?

WITNESS McKEE: Every inspection is a baseline for the next one in line. The preceding inspection is always the baseline for the next one in time.

JUDGE BLOCH: So you never look back four inspections to see?

WITNESS McKEE: Oh, for sure, for sure.

JUDGE BLOCH: So you do look at the whole series of inspections?

WITNESS McKEE: If all of a sudden you become or have defect-type indication, then you review the previous history to find out where it occurred or when it occurred.

JUDGE BLOCH: Wouldn't it be easiest to look at the earliest baseline and the most recent to be able to detect differences, rather than looking at the most recent readings?

WITNESS McKEE: No, it is not.

JUDGE BLOCH: Why isn't it? It would seem that the largest differences would occur over a longer period of time.

WITNESS McKEE: Well, the way we do it is, we look at the most recent previous and we just go back. It is the way I particularly do things?

JUDGE BLOCH: Is my problem a real one?

WITNESS DENTON: It is really more pertinent, I believe, if there has been a change since the last inspection. We have -- it depends. If you have a small volume indication and now we are in the graphs and the question is, it's here now, was it there last time. Let's say you look back. If it was there last time, then you look back to the time before to see, was it there, then to the time before, until you get back to the entire history of the tube if you're chasing this thing down.

Unfortunately, we're not always consistent within ourselves, and when you are trying to say, yes, I see that little change in the graph pattern, I should have seen that last time, of course that isn't true. You may have seen it last time, you may not have seen it last time. So we may trace this thing back historically to in fact see if there's a change taking place in this tube.

JUDGE BLOCH: And the thing that starts you making the search is probably what, the strip chart or the oscilloscope?

WITNESS DENTON: I think in this case it could be either one.

JUDGE BLOCH: So if there has been a noticeable change, let's say in an 11-month period, which is what we're talking about here, in either the oscilloscope or the strip chart, you would check the historical records back further?

WITNESS DENTON: Yes, you would.

JUDGE BLOCH: With the sleeve tube you cannot go back any further?

WITNESS DENTON: If we sleeve them all, it would save us a lot of work, yes.

JUDGE BLOCH: That was a side benefit we hadn't thought about.

WITNESS DENTON: Now we come to page seven, which is a sleeve which has an indication in it as you come up through the line -- now that you are all qualified data interpreters, you see.

The unfortunate thing about Polaroid pictures is you don't know which direction the spot is going at any one time, so you if you look at the strip chart you see that two -- the first indication the two pins go toward each other, which in the way the electronics work means the signal went down and to the right first, and then up and to the left, which is the same direction as a flaw.

This indication was judged by Mr. McKee to be a permeability spot, possibly magnitite on the surface of the tube or the sleeve, I'm sorry, on the inner surface of the sleeve. The reason for this kind of judgment, we have to go now back to some basic eddy current thing.

If you are in a freestanding tube and the

probe is being pulled toward the flaw, the field around a coil is around the coil so that you have current in front of the probe coil as well as under the probe coil and behind the probe coil, so that the current that is flowing in the tube wall preceding the probe coil is flowing later in time for the same reason it is flowing later in time on the outside of the tube wall.

So as the probe approaches the flaw, the first current that is interrupted is interrupted later in time, and later in time is counter-clockwise. That is why if you look at a characteric flaw as the standard on page one, the first movement of the spot is in a counter-clockwise direction and then going down. As the probe approaches being under the flaw, the signal comes to center in time.

And then, when the second coil starts to see it, it makes this dramatic straight line change and then you see the second coil leave it, and then you have the same effect lagging the probe as you do leading the probe. So the characteristic approach into a flaw in a freestanding piece of tubing is the first current interrupted is late in time and you get this characteristic loop shape.

Now, when you have a permeability variation, that is influencing the magnetic field, and the magnetic

field is soon in time. However, permeability in itself has a base angle of its own. So what happens, if you have permeability, you don't typically get the loop opening that you do when you have a flaw. So in this case this picture is not that great.

But the dot limit leaves center, first goes to the right without a loop opening, then goes not over itself but the opposite direction and forms a line that goes to the upper lobe and then back to the center. This is characteristic of the permeability variation.

JUDGE BLOCH: What kind of a thing on the sleeve is necessary to cause this kind of a reading? What is your best speculation on what is doing this?

WITNESS DENTON: Well, the best speculation would be a spot of magnatite on the inside of the tube.

JUDGE BLOCH: A pretty big spot?

WITNESS DENTON: A mil or two, a mil deep. It doesn't have to be large because we are very sensitive to permeability changes.

JUDGE BLOCH: And what you are relying on is the difference in the direction of the phase reading?

WITNESS DENTON: It is the way the signal itself is formed. It is also short in time, as opposed to a flaw.

JUDGE BLOCH: And is this a frequent problem

that you had to be able to discern -- the difference between a spot of magnatite and a flaw?

WITNESS DENTON: Depending on the plant, it could happen frequently.

JUDGE BLOCH: Is it frequent at Point Beach?

WITNESS MC KEE: No, it is not. There are very few permeability indications at all at Point Beach.

JUDGE BLOCH: Is this the kind of reading that would make you more comfortable if there were visual inspection of that particular area of the tube to see if in fact there was a spot of magnatite there?

WITNESS MC KEE: Hindsight is a very nice thing because we have already gone in and done some other work in this tube.

JUDGE BLOCH: Was there a spot of magnatite?

WITNESS MC KEE: It is not determined yet.

JUDGE BLOCH: What is the data that you've got from which you are going to determine it?

MR. CHURCHILL: Your Honor, I should clarify that neither Mr. McKee nor Mr. Denton makes any decisions about what actual tests are done. What they do is they take the results, so Mr. McKee doesn't know what might be done in the future. I can tell you what has been done is that after this was discovered,

subsequent probes, subsequent eddy current tests were made with different probes and under different frequencies.

JUDGE BLOCH: That they should know about so that we get to read those again, wouldn't they?

MR. CHURCHILL: Yes. That they know has been done.

JUDGE BLOCH: Well, why don't we ask them what has been done?

MR. CHURCHILL: I'm sorry. I thought you were asking them what was going to be done.

JUDGE BLOCH: Well, let's just ask them what has been done so far.

WITNESS MC KEE: What has been done is we went in and used three more different probes before any mechanical work was done on this indication. The results from that still indicated a permeability spot on the ID of the tube. They went in and brushed the tube. The spot has not changed.

Then we also used two different probes after that. We went in and honed the tube. The spot still has not changed.

JUDGE BLOCH: Wouldn't that contradict your original hypothesis that it is a spot of magnatite, in your opinion?

WITNESS MC KEE: It should have reduced it some, if the spot was truly just on the surface of the tube -- the ID surface of the tube.

JUDGE BLOCH: But that is where you thought it was from the test, right? You thought it was on the ID.

WITNESS MC KEE: It is on the ID of the tube. That is no question at all.

JUDGE BLOCH: Did the honing that was done cover the area in which you believed there was a spot of magnatite?

WITNESS MC KEE: I was not involved in the honing process. I had the results after the honing process.

JUDGE BLOCH: Can you tell from the eddy current test and changes in the indications where the honing took place?

WITNESS MC KEE: No, I cannot.

WITNESS DENTON: I have been led to believe that this honing that took place, we are talking about the removal of half a thousandth.

JUDGE BLOCH: How much?

WITNESS DENTON: Half a thousandth of an inch or something.

JUDGE BLOCH: So you would not be sensitive to that degree?

WITNESS DENTON: So if there was a minor indentation in the tube, there could easily still be magnatite trapped in that area. It would have been really nice if it would have just brushed down and gone away, but it did not.

JUDGE BLOCH: Is there a laboratory verification of the difference between phase angles that allows you to differentiate between magnatite spots and flaws?

WITNESS DENTON: This signal has been recreated in the lab by someone putting a tape with some magnatite on it inside of a tube, yes.

JUDGE BLOCH: That is helpful. What you really need to know is that you can't get the signal from a flaw.

WITNESS DENTON: I understand that. If you are asking me is there any configuration of a flaw which could cause this, my answer would be I am certain I can make a flaw do anything I want to to this lissajous pattern with a little thought.

JUDGE BLOCH: Mr. Churchill, have you further questions of your witnesses?

MR. CHURCHILL: Yes. One or two might clarify it.

BY MR. CHURCHILL: (Resuming)

Q Mr. Denton, are you aware of whether or not this sleeve we were looking at was in a defective tube or in an intact tube?

JUDGE BLOCH: I'm sorry. A defective tube or a what?

MR. CHURCHILL: Or intact tube. As you recall, during the demonstration program there was six sleeves put on good tubes and six sleeves put on defective tubes, and I am asking whether this is one of the defective tubes or one of the good tubes.

WITNESS DENTON: It's in one of the good tubes.

BY MR. CHURCHILL: (Resuming)

Q And do you know whether eddy current tests were made of the tube itself?

A (WITNESS DENTON) Yes, and there is no flaw indication in the parent tube.

Q So to the best of your knowledge, that even if this were a flaw which has not yet been determined that it is, but even if it were, we don't have a situation where there is a leak or a breach of the primary pressure boundary.

A (WITNESS DENTON) That is not an eddy current decision, really, but I vouch for the fact that the tube under the sleeve is still sound.

JUDGE BLOCH: When you say it was an undefective tube, as I understand the term "undefective tube", that means there was no indication of at least a 40 percent through-wall deficiency. Were there indications of lesser defects than 40 percent?

WITNESS DENTON: There were no detectable defections in the tube.

BY MR. CHURCHILL: (Resuming)

Q Mr. Denton, while we have you on the stand, I would like to place a hypothetical question to you. I would like you to assume that the results of inspections of a particular tube showed that during the first inspection you had no detectable defect, that there was a second inspection six months later and no detectable defect was called out, and a third inspection six months after that and there was a 90 percent indication called out.

At the time the 90 percent indication was called out, I think Mr. McKee testified that he would then go back and look at previous inspections. And let us assume the interpreter went back and looked at the six months' previous inspection and found the same indication that he found in the most recent one, and you went back before and you found nothing. So the history is as follows.

At the first inspection you have no detectable defect. The second inspection you have the same 90 percent indication, except that the first time around it wasn't called out, and at the third inspection six months after that you have the 90 percent indication which was in fact identified at that time.

Okay. The reason I am setting up this particular hypothetical is this is the type of information that gets reported in LERs. Now it doesn't matter whether or not you are familiar with LERs. This is my hypothetical and what I would like to ask you, sir, is from this information -- the information I have given you -- can you discern anything or come to any judgment about the rate of progression of the defect that has been discovered?

A (WITNESS DENTON) That is quite a long hypothetical question.

JUDGE BLOCH: Do you understand the hypothetical question?

WITNESS DENTON: I think I do, and if my answer doesn't follow what it does, please stop me and redirect me.

JUDGE BLOCH: Well, I think it is so long I think it would be better if you first stated your understanding of the question and then answer it.

WITNESS DENTON: As I understand it, we have a three-inspection situation, that on inspection number one it is reported as no detectable defects, situation number two, no detectable defects. Situation number three, we are now reporting as defect. Then, in backtracking, we find that in fact the signal we now see existed in inspection number two and not in inspection number one.

So we have in fact a recorded history of some change in the tube wall.

JUDGE BLOCH: And in retrospect, looking back, the signals indicate zero flaw, 90 percent flaw, 90 percent flaw.

MR. CHURCHILL: Yes, sir. Well, sir, the first one doesn't indicate zero flaw. It indicates no signal.

WITNESS DENTON: Okay. Now I have to hedge my answer slightly, because it then determines -- it is dependent somewhat -- it is dependent on the volume of this indication we are talking about. If we have a situation such as we discussed earlier, where the flaw volume is so small that this phase angle is not reliable due to signal-to-noise ratio, then we have a situation where we might be indicating, just from a report, that we have had an increase from no detectable to 90

percent.

It has been discussed earlier in this session that a detectable limit for some types of flaws are in the 30 to 40 percent range. So if you just read the piece of paper, you would probably say well, you have grown from 30 or 40 percent to 90 percent, but you have to hedge that by actually finding out what kind of signal are we saying this is.

If we have an indication such as this supplement, I would guarantee you if that was not detectable in inspection one, you could say that in fact we had that growth in that period of time between inspection one and three.

JUDGE BLOCH: Off the record.

(A discussion was held off the record.)

JUDGE BLOCH: Back on the record.

Let the record show the witness was referring to Applicant's Exhibit 3.

WITNESS DENTON: So that is one extreme of being a large volume indication. If you go to page four, on the righthand side of the page, and look at this indication, my own opinion would be that this kind of a change can happen if you go from 30 percent of the tube wall to 40 percent of the tube wall. I have no idea.

You cannot talk about corrosion rates or deterioration rates based on signals that have only one-to-one signal-to-noise ratios.

MR. CHURCHILL: Now -- I'm sorry. Do you have a question?

JUDGE BLOCH: If in time period two -- in the hypothetical are the time periods one year apart?

MR. CHURCHILL: They are six months apart.

JUDGE BLOCH: Six months apart. Okay, time period two, if there is a 90 percent flaw and we accept the hypothetical that the maximum degradation possible during six months is 10 percent, would that indicate that given the volume flaw that you have that there was an 80 percent defect present during the previous reading that you were unable to detect because it was a small volume defect?

WITNESS DENTON: I'm sorry. Can I ask you to ask that question over?

JUDGE BLOCH: We had some testimony that with the non-thermally-treated Inconel tubes, the maximum degradation was approximately 20 percent in a year. We are talking about two readings that are six months apart, so the maximum degradation, as I understand the inference from that, is 10 percent.

You find in period two that there is a 90

percent flaw. Now I infer backwards that there must have been at least an 80 percent flaw of the same volume present in this previous six-month time period in order for there to be a 90 percent flaw in period two. Yet your previous readings show no indication of a flaw.

Does that mean that you were unable to detect an 80 percent through-wall flaw of that volume defect?

WITNESS DENTON: That might mean that, or it might mean that it is not now 90 percent, one or the other. It could be either way.

JUDGE BLOCH: How would you estimate the error range around the 90 percent estimation? How do you know -- what evidence to you have that would indicate, when you indicate a 90 percent flaw, what the maximum or minimum amount of flaw would be when you say it is 90 percent?

WITNESS DENTON: Well, you can speculate on what that error band might be, but you have to be specific to any one condition. You cannot make a general statement.

In this case, it is difficult to do from what I have in front of me because I sort of need to play the tape and see what kind of noise is happening after the instant this signal forms. From the strip chart, you can see that in fact there are signal changes going on

in the same area. Sometimes, if you are able to look at what the background noise is doing and speculate on how much that might vary the phase angle, it is not very precise.

In the case that this appears to be around the one-to-one signal-to-noise ratio, then if you go through the angle change mathematically, which I have not done, but I would say this is reported at 89 percent. You can't go plus more than 11 percent. There is a nice limit on that. Going minus could go down to the detectability threshold.

This thing may be just at the threshold of detectability and real depth and yet look like it is 89 by angle just because of the interference of the noise on the phase angle.

JUDGE BLOCH: Your answer is in terms of trying to think of physical principles of the test and how they show up on your oscilloscope.

WITNESS DENTON: Yes.

JUDGE BLOCH: Is there any empirical evidence from which to place error bounds on blind box readings? In other words, have different volume defects been examined in laboratory settings to find out the degree of correspondence between eddy current test interpretation results and the actual volumes present?

WITNESS DENTON: Well, in fact, it is more basic than that. The textbook says, thou shall not put values on signal to noise ratios less than three to one. It is a standard -- it is an industry standard that a three to one ratio is necessary to identify accurately. This is not just in eddy current, it is a truism in the world, whether you are reading radiographs or doing ultrasonic inspections. The book says you need a three to one signal to noise ratio.

JUDGE BLOCH: Then if your purpose is to avoid making a false positive reading, that is a good principle, but if you are most concerned about a false negative reading, is that also a good principle?

WITNESS DENTON: Well, it's a fact of life, whether it satisfies what we would like to do or not. I mean, we are bounded by the laws of physics and not by what we would like to be able to do. So we are doing what it is possible to do, and we are pushing what is practical when we put a value of 89 percent on the signal that has a one to one ratio.

This is conservatism beyond reason, almost.

JUDGE BLOCH: I guess I don't understand the direction of the conservatism. You are saying that you are interpreting this 90 percent because in your opinion that is the most it could possibly be.

WITNESS DENTON: And the alternate to that would be to say this does not have a three to one signal to noise ratio and it does not have a detectable or identifiable defect.

JUDGE BLOCH: Are there times you would do that? Instead of giving a conservative interpretation of the readings, you would return it back as no defect because there is no three to one ratio?

WITNESS DENTON: Yes, or two to one, or one to one, or some other number. It quite often gets involved in the clarity with which we think we can see something happening. This happened to have a very nice, straight up and down indication that Mr. McKee said, well, okay, I can see this straight up and down portion. I am obligated to put a number on that.

JUDGE BLOCH: But he could have said and also been within curve standards and no defect.

WITNESS DENTON: That is a fact.

JUDGE BLOCH: As a matter of practice, will he always at Point Beach indicate both of these facts at this point? That is, that the largest size flaw this could be is 90 percent, but it doesn't meet code standards, so it might be zero flaw, or would he just sometimes not report it back to Wisconsin Electric Power at all?

WITNESS DENTON: Well, as a matter of fact, in hypothetical inspection number two, we had a case where he either didn't see it or he chose not to report it.

JUDGE BLOCH: Which was it?

WITNESS DENTON: I will later mention the second one and say the -- to another -- tubes and it might not remember.

JUDGE BLOCH: Is this hypothetical real?

MR. CHURCHILL: No, it is not real. It is totally imaginary, sir. He may not remember what he did.

(General laughter.)

JUDGE BLOCH: In that case, I take it there are LER instances that approach this imaginary situation, though they may not be that extreme. Could you call out one so we could ask about a real one?

MR. CHURCHILL: I don't know. I didn't really look at one when I did this, but I could look.

(Pause.)

JUDGE BLOCH: We will take a five-minute break. Let's make it a ten-minute break. Five minutes is impossible.

(Whereupon, a brief recess was taken.)

JUDGE BLOCH: The hearing will please come to order.

MR. CHURCHILL: Your Honor, I am looking at an

LER for Unit 1. The cover letter is dated November 13, 1981, and I am looking at Page 3 of that LER.

You realize I may be violating the 48-hour rule here. I am doing it under duress.

JUDGE BLOCH: I think it is the panel which is violating the 48-hour rule.

MR. CHURCHILL: I will proceed when you so indicate, Mr. Chairman.

JUDGE BLOCH: We are ready.

MR. CHURCHILL: On Page 3 of this document, there is a chart, and the tube indications are in the lefthand column, and I am looking at about the tenth one down. It is indicated R08C64. What that means actually is Row 8, Column 64. That is how the tube is identified. In October of 1981, there was a 77 percent indication 12 inches above the tube end. This means it was within the tube sheet. The next column over for the previous inspection of July, 1981, an NC is indicated, meaning no change.

What this means is that originally in 1981 no detectable defect was called out.

MR. ANDERSON: Could we have the witness testify to this, please?

MR. CHURCHILL: I think this is an explanation of the LER. The witness has no familiarity with the

LER's. I am explaining to the chairman what the LER's mean.

MR. ANDERSON: I think I would object to having testimony from counsel table. I think the witness is capable of answering. Why don't we ask the witness?

JUDGE BLOCH: Mr. Anderson, I am looking at the chart, or I would call it a table, that Mr. Churchill is describing, and I see that all he is doing is taking the codes that are indicated on the table and reading what the codes mean at the bottom of the table. I don't understand why we have to worry about whether he does that or whether the witness does that.

MR. CHURCHILL: You could call it a part of a little refinement of my hypothetical question to the witness.

MR. ANDERSON: Why don't we proceed on it, and I will see if he gets more egregious, Mr. Chairman.

MR. CHURCHILL: I will try to hold down the egregious factor.

And then, of course, over in December, '80, there was an NDD, meaning no detectable defect. The only point I would like to explain how the LER's work, Your Honor, is that in July, '81, that would have been called and was called an NDD, and by calling it an NC

now, that means we have changed it.

Okay. That is the example I have selected that is analogous to my hypothetical.

JUDGE BLOCH: The question is in this particular instance, are you people familiar enough with this particular instance to be able to tell us more about it?

WITNESS MC KEE: This indicates it was done a year ago. I have seen I don't know how many signals since then, and to be perfectly honest, that I can recall, this particular tube fully, no, I cannot do that. I can go with the numbers that are on the page.

JUDGE BLOCH: Then I take it the volume of these defects is not indicated at all on the table that we are looking at. Is that correct?

WITNESS MC KEE: That is correct.

WITNESS DENTON: We would like to presume, since its status changed from the 1981 tapes, that this in fact is the case of a very small volume flaw, but it is only a presumption.

JUDGE KLINE: The original question in the hypothetical is, can you determine the rate of degradation from that, from those numbers. Can you?

WITNESS DENTON: Well, I can't because I have no knowledge of the actual flaw volume.

JUDGE BLOCH: Is there any chance that there are any other of the specific tubes on this chart or table which for some odd reason you do recall in detail, possibly the one that is 90 percent?

WITNESS DENTON: That says NDD, 90 percent.

WITNESS MC KEE: No, I cannot remember if any of these are perfect.

MR. CHURCHILL: Your Honor, it might be helpful, and again I remind the board that these witnesses have nothing to do with the LER's. It is just a piece of paper they are seeing now for the first time. On Page 4 of this LER, the paragraph at the bottom, I believe that does characterize these are small volume defects.

JUDGE BLOCH: Well, let me ask, are the reports that you made to Wisconsin Electric Power on the eddy current tests, do you include information that could be used to construct the table that appears on Page 3 that we have just been talking about?

WITNESS MC KEE: For the indications that exhibit greater than 40 percent, there is a photograph taken. This photograph is then used as I go back through previous tapes to compare that signal with.

JUDGE BLOCH: But do you in fact do a table for Wisconsin Electric Power which does this kind of

comparison between current indications and previous indications?

WITNESS DENTON: First we do it for Westinghouse.

WITNESS MC KEE: Yes, we do it for Westinghouse, which is then presented to the utility.

JUDGE BLOCH: And when you do a table, does that include a listing of the volume of the defects or the suspected volume of the defects?

WITNESS MC KEE: No, it does not.

JUDGE BLOCH: Perhaps, Mr. Churchill, you can explain through a witness how you get the conclusion about the volume of the defect that appears at the bottom of that following page. The data apparently doesn't come from the people who read the eddy current tests.

(Pause.)

MR. CHURCHILL: Your Honor, I am told that what happened as a practical matter was that there are conversations between Mr. McKee and Wisconsin Electric people at the site where they have generally been characterized as very small volume defects. It is this information that he has obtained orally that we used to characterize this and draw the conclusion in the LER.

JUDGE BLOCH: Mr. McKee, is that correct?

WITNESS MC KEE: Would you repeat it, please?

JUDGE BLOCH: Let's ask a different question. Do you recall discussions between yourself and Westinghouse about the size of particular defects?

MR. CHURCHILL: Excuse me, Your Honor. This was -- I was told it was with Wisconsin Electric people at the site.

JUDGE BLOCH: Okay. Do you recall any telephone conversations with Wisconsin Electric Power people about the size of particular defects, the volume of particular defects that have occurred?

WITNESS MC KEE: One on one per defect, I don't recall saying small volume, large volume. I may have indicated this one is a small volume at the time, but today I can't, if I have done that, say for sure that I have done that.

JUDGE BLOCH: Do you recall ever looking at a group of data on defects and asking you what the largest volume of those defects was?

WITNESS MC KEE: No, I can't really remember that either.

JUDGE BLOCH: Can you give volumes?

WITNESS MC KEE: I can give volumes and voltage readings that are displayed, yes. The voltage lissajous, the voltage of the pattern displayed on the

screen, I can give that number, which is represented to a volume of a defect.

JUDGE BLOCH: I see. So you can translate that into a physical dimension of a defect?

WITNESS MC KEE: No, I cannot.

JUDGE BLOCH: If you can clarify this further for me, Mr. Churchill, I would appreciate it. I don't think I can do any better.

MR. CHURCHILL: Perhaps I can ask Mr. Denton to clarify that.

WITNESS DENTON: I want to make just one point that Mr. McKee did say a moment ago that I think is overlooked, that for any indication which is 40 percent or larger, he takes Polaroid pictures of the lissajous pattern, and that information is submitted along with his interpretation of that, so that in fact there are presented to everyone involved photographs that do indicate the volume of the flaws that is being called.

JUDGE BLOCH: But on an NC entry on this table which indicates that the previous time you didn't find a defect, there would be no picture to look back to.

WITNESS DENTON: That's correct, but the magnetic tape is there, and a new picture can be generated from last year's tapes.

JUDGE BLOCH: Would that generally be done?

WITNESS MC KEE: Normally if it exceeds the plugging limit, I take a picture of the present inspection of that particular tube, and if a review is indicated or requested, I take that picture, take the magnetic tape from the previous indication, compare that picture to what is presented on the oscilloscope screen, and make the decision looking at the picture in hand, the picture that is on the oscilloscope, and ascertain whether it is a no change, small change, no detectable defect.

MR. CHURCHILL: Your Honor, the tech spec limitations are written only in terms of the amount of penetration. There are no parameters on volume, and so these things are not recorded, and I think the discussion -- it is clear that the discussion of volume comes in because, as we recall, the volume has to do with the amplitude of the signal, and the very small volume signals are the ones that are most likely to be lost in the grass or the noise.

So there generally has been no reason to record or to report to Wisconsin Electric data on the volumes, although looking at the strip chart I gather from what I am hearing when you have indications that are very small below a signal to noise ratio of three the conclusion generally is that these are very small

volume defects, difficult to read.

JUDGE BLOCH: I want to ask another question about the ability to detect leaks. We had one tube which was a very special case, one sleeve, because there had been a plug removed. You worked with Wisconsin Electric Power Company. Have you worked with other leakers in which your review of eddy current data was unable to show the location of the through wall defect causing the leak?

WITNESS MC KEE: I don't recall any, but that has been over many years.

JUDGE BLOCH: Do you know of other situations from your professional contacts or your knowledge of the literature in which leaks have occurred at other plants but have not been detectable with eddy current testing? That is for either gentleman.

WITNESS DENTON: I am afraid we are not the best historians in the world, and most likely a Westinghouse man could answer that question more intelligently. Certainly there have been other cases where there have been leaking tubes where we have not been able to identify the source of the leak, I know for sure. I am not prepared to sit down and start tabulating the list of these events. Usually we easily find the flaw, but there are exceptions.

JUDGE BLOCH: Do you know now from your

knowledge of the literature and from your discussions with professionals, do you know of other instances of three other leaks where they were not detected were circumferential flaws?

WITNESS DENTON: No. There are other cases, of course. Quite often this leads to some modification in the testing program, some addition to the testing. There have been cases, just for instance from a minor axial crack originating right at the end of the tube, you know, where there are several cases. We found there was leaking where we didn't identify a flaw.

JUDGE BLOCH: So it is an improving technology, and when these instances are found, work is begun to try to improve the technology further.

WITNESS DENTON: That is true, yes. It seems to be a never-ending job.

JUDGE BLOCH: Are there any of these instances which ought to particularly concern the board in that they are potentially serious problems of non-detectability?

WITNESS DENTON: Not to my knowledge.

JUDGE BLOCH: That is true for you, sir? You weren't familiar in the first place with these instances that we are talking about. Is that correct?

WITNESS MC KEE: That is correct.

JUDGE BLOCH: Don't answer the question now. Mr. Churchill?

BY MR. CHURCHILL: (Resuming)

Q Mr. Denton, you testified earlier that if you had a circumferential defect or on the outside of the tube that the probe would go by without seeing it. I presume you were talking about a perfectly symmetrical, even one in laboratory conditions.

A (WITNESS DENTON) That is certainly true. It is more a theoretical answer than a practical answer.

JUDGE BLOCH: So far as you know, that has never happened quite that way in an operating steam generator?

WITNESS DENTON: As far as I know. That is a tough answer, because if there was the perfect hypothetical circumferential flaw, we wouldn't know it was there, so it would be a question. It has to be leaking water, and we have to know that the water is coming from spot X, and then we can't see it before the answer is meaningful.

JUDGE BLOCH: And the reason for that is that the usual procedure is to plug such leakers but not to remove them and find out what the flaw is.

WITNESS DENTON: I wouldn't say that is the general procedure. It has been done both ways over

time.

JUDGE BLOCH: So far as you know, these removed tubes haven't shown these perfect circumferential flaws.

WITNESS DENTON: That is true. I put it that it's not one of our major concerns that we lay awake worrying nights about the perfect circumferential flaw that we won't see.

MR. CHURCHILL: Your Honor, I have no other questions.

JUDGE BLOCH: Judge Paxton?

BOARD EXAMINATION

BY JUDGE PAXTON:

Q Mr. Denton, there have been some references to pancake probes, pancake coil probes, and what would the orientation of the pancake be? I presume they were the bobbin type probes. The axis of the coil is on the axis of the tube that is being investigated.

A (WITNESS DENTON) Yes.

Q Is the same thing true with the pancake?

A (WITNESS DENTON) Let me just take a second. You know, the simple way to look at this is, eddy currents tend to flow in the same general patterns as the wires that generate them. So if you take a bobbin probe, which is our standard inspection, and you wind

the coil around the bobbin and you put it in the tube, then the current flows around the tube wall.

If you wind the wire in the pancake shape, which is like taking the end of your finger and winding a flat coil, and you put that against the tube wall, then the current flows in a circular pattern, the spot, so now you do not have 100 percent coverage of the tube wall. So then it is necessary to do one of two things. Either you are only going to examine one spot for a particular location or you must mechanically scan this one spot over the tube wall, or you must have multiple pancake coils, because you are now only looking at an area, say, one-eighth of an inch in diameter, for instance.

Q Is the axis of the tube on the plane of the pancake? Or does the axis of the pancake cross over the axis of the tube?

A (WITNESS DENTON) Basically you have a hole and the pancake is against the tube side, inside, so you have current flowing in a circular pattern, and the advantage of this is that this detectability then is non-directional. The current is flowing in a circle, so no matter which way the flaw goes, as you pull the coil it will interrupt the current the same way whether it is axial circumferential leak.

Q I think you are saying the plane of the pancake is parallel to the axis of the tube.

A (WITNESS DENTON) Yes, sir, the current is flowing in a spot, a circular part of the tube.

Q That answered my question. Thank you.

JUDGE BLOCH: Mr. Anderson?

CROSS EXAMINATION

BY MR. ANDERSON:

Q Some points of your testimony went too quick for me to take notes. I would appreciate that, Mr. Denton.

A (WITNESS DENTON) Of course, in the northwest we talk rapidly.

Q I am from the northeast.

You indicated there were three things you looked for with the data you would collect. The first was depth, the second was volume. What was the third?

A (WITNESS DENTON) The third which we really only pay attention to in the case of questionable interpretability is the shape of the loop openings that are formed.

Q And looking at Applicant's Exhibit 2, what kind of data do you look at to acquire information about depth?

A (WITNESS DENTON) The phase angle.

Q Would you point to where that is shown?

A (WITNESS DENTON) Let me take the easy one on Page 1 of the one standing straight up so the straight transition line -- this is, of course, an ideal flaw. It is symmetrical. It is manufactured to give this nice picture. You see the transition between the two lobes. That is the angle that we would measure.

JUDGE BLOCH: Let the record show that the witness is pointing to the top part of Page 1 of Exhibit 2, the part which is black background and white foreground.

BY MR. ANDERSON: (Resuming)

Q And is that phase angle a reading you can take that is exactly calibrated or is it a judgment call?

A (WITNESS DENTON) The angle is an exact reading. We have an electronic protractor that we measure it with. And it is plus or minus one degree.

Q Okay, and the volume would be shown how? Referring to Applicant's Exhibit 2.

A (WITNESS DENTON) If we stay with that particular flaw for simplicity, we would merely talk about that in volts peak to peak.

Q Are we looking at the strip chart or the oscilloscope?

A (WITNESS DENTON) The oscilloscope.

Q And when you say peak to peak, would you show me what you mean by peak to peak?

A (WITNESS DENTON) It is from the extreme upper excursion to the extreme lower excursion.

Q That is from here to here?

A (WITNESS DENTON) If I stay with the same flaw, it is from this point to this point (indicating).

Q I see.

JUDGE BLOCH: Off the record.

(Whereupon, a discussion was held off the record.)

JUDGE BLOCH: Back on the record.

WITNESS DENTON: Okay. We are referring to the lissajous pattern in the upper left portion of Page 1, and we are referring to the signal which -- whose major dimension is in the vertical direction, and we are measuring the phase angle from the straight portion, the transition of the straight portion of that signal, and we would measure, if we were discussing volume, we would measure the peak to peak voltage of that signal.

JUDGE BLOCH: The straight portion? I see one line that seems to be fairly straight. It is in the vertical axis?

WITNESS DENTON: Yes, essentially vertical.

JUDGE BLOCH: And you are going to measure

from the top of that to the bottom?

WITNESS DENTON: For a voltage reading, yes.

JUDGE BLOCH: For voltage reading, and that depends on the calibration of the oscilloscope for the voltage.

WITNESS DENTON: And that calibration is traceable to the Bureau of Standards.

JUDGE BLOCH: Okay, so that is not something you do each time you start up the instrument. That is a standard calibration that is built into the instrument.

WITNESS DENTON: That has to be certified every six months, traceable to the Bureau of Standards.

BY MR. ANDERSON: (Resuming)

Q And the third thing you said was the shape of the loop. Would you explain what you meant by the shape of the loop?

A (WITNESS DENTON) I would like to de-emphasize that a little bit in the sense that it is not something that is normally done. It is done when there is some question of the characteristics of the particular flaw. It can be ambiguous. For instance, if you have a small diameter drill hole that will fit between the two coils, then you can have the normal loop forming, but instead of having the straight line, it can try to come back on the same curve, because it is fitting between the coils,

and then the opposite would be true when the next coil goes over.

On the other hand, if you have a long crack, it could tend to do that, because now both coils are inside the crack at the same time, and so you don't have the effect of one leaving as one enters. So there are some ambiguities. Excuse me. There are some cases where you could be misled from this information.

Q So the shape of the loop is a clue to the extent of a small --

A (WITNESS DENTON) It is just a clue, because it has to do with the initial interruption of the leading currents on the probe as well as the interaction between the two coils as you pass the flaw, so if you have a large circumferential indication with axial length, so it is a question always of, do you have enough sensitivity way out in front of the coil to get an excursion at all, and if you do, then that will interrupt currents that are quite late in time and give a large loop opening.

Q Does this relate in your previous answer -- someone made reference, you or Mr. McKee, to a 610 probe or a 625 probe. Would that define the distance between the coils?

A (WITNESS DENTON) No, that is the outside

diameter of the probe coil.

Q Why do you use different diameter probe coils?

A (WITNESS DENTON) Usually it is a mechanical consideration of what you can get in the hole.

Q Is that because of restrictions that might occur?

A (WITNESS DENTON) No, just the inside diameter of the tube to begin with.

Q And which will you be using for sleeving?

A (WITNESS MC KEE) The standard is either a 625 MBS or a 650 MBS.

Q And which did you use before in Point Beach before the sleeving?

A (WITNESS MC KEE) Before the sleeving? A 720 spring flex.

Q Now, looking at the bottom of Page 1 of Applicant's Exhibit 2, the A strip chart is the left one, I understand you said, of the A and B, is the subtraction of a multifrequency result?

A (WITNESS DENTON) Yes.

Q And when you look at the deviation from the center vertical line, does that deviation give you a clue as to depth or volume?

A (WITNESS DENTON) Let me be sure I know what

you are asking me now. If we start at the bottom one, where it says 100 percent, are you talking about that signal excursion?

Q Let's talk about that for a start.

A (WITNESS DENTON) The same that happens when you do one of these kind of strip charts when both channels are vertical. The only thing you have is some reading of amplitude. You have no way to get a phase angle from this chart. So all we use this chart to do is say we have to look at the lissajous pattern on the oscilloscope, so this reading of 100 percent is not taken from the strip chart. It is taken from the lissajous and written on the strip chart in this case.

Q So the strip chart is just to make sure that you go to the oscilloscope.

A (WITNESS DENTON) That is true. There is no way to interpret the depth from this set of channels on a strip chart.

JUDGE BLOCH: Mr. Anderson, there is a question I have on this which came up earlier. There are deviations from the center line on this oscilloscope chart. You know that for example at the bottom on the left side strip we start some three small units from the center line. Then there is an excursion up to the center line exactly and then further up or a little bit

off the center line. What causes those differences?

WITNESS DENTON: The first one is very easy to explain, because they have a little button on this thing that says null, and someone pushed it, and it went to center.

JUDGE BLOCH: So before you start using the strip chart properly, you have got to push the button?

WITNESS DENTON: Well, in this case he is being pretty picky because three minors off of zero is close but one gets into the habit of pushing the button whether it needs to be pushed, and so it was pushed.

JUDGE BLOCH: Why did you go off null as you approached the top of the chart in between the indications? Or is that just noise?

WITNESS DENTON: Well, this is a differential probe, and so really we are looking comparing one piece of that tubing to the other piece of the tubing. I really cannot answer the question. That is a very negligible amount of drift, whether the electronics moved that much or there is some difference in the ID of the tube. I just -- I don't know.

JUDGE BLOCH: Are you at all familiar with the experiments being done on detecting IGA by measuring drift?

WITNESS DENTON: I really have a problem with

the word "drift" because in the electronics business "drift" means to me that the electronics are going some place uncontrolled by what you are doing to it. I would like to talk about a shift in the data somehow other than a drift.

JUDGE BLOCH: Do you have knowledge of the developmental work on detecting IGA?

WITNESS DENTON: That is a limited knowledge, I will have to admit. I have had some conversations in this session, but I am not expert in what is being done at Westinghouse at this moment, no. But if you are talking about using the baseline position as an indication of deterioration in the tube wall, you would not be doing it with the differential coil. You would be doing it with an absolute coil, and this data would look entirely different.

JUDGE BLOCH: Is that what they are doing? Are they using an absolute coil?

WITNESS DENTON: I am sure they would have to be using an absolute coil, yes.

BY MR. ANDERSON: (Resuming)

Q Mr. McKee, I gather your reputation is on the front line when it comes to eddy current tests.

A (WITNESS MC KEE) That's true.

Q And I was listening to the testimony earlier,

and you were talking about the problem of the signal to noise ratios that occurs at various times requiring some speculation as to what reading to give, and based upon that and your understanding or your work, would you state, would you agree or disagree that the interpretation of the data involves some degree of art as well as science?

A (WITNESS MC KEE) What do you mean by art?

Q Judgment calls that you can't have a clear, specific, scientific derivation for, where you are making judgment calls that don't have a specific scientific basis.

A (WITNESS MC KEE) Repeat the last part.

Q It will be judgment calls that don't have in every particular aspect a specific scientific basis that you could explain to an evaluator.

A (WITNESS MC KEE) You are on a learning curve every time you do a job. The experience that you receive in the field and the amount of indications that you see with eddy current signals, there is some experience that you have received put into every call or any judgment that you have to make on any signal that you see.

Q What I am trying to get at is, there are some kinds of things an evaluator will do, or there simply is

a cookbook which says that the deviation on the oscilloscope is three degrees, make this conclusion. What I am trying to get at is the kind of work that you are doing in some significant part doesn't involve the kind of specific scientific reading based upon a clear instruction in a cookbook. Is that correct?

A (WITNESS MC KEE) Yes, there are indications where it is not a typical cookbook indication.

Q And so I would assume from that then one evaluator such as yourself might reach a different conclusion than another evaluator from the same strip.

A (WITNESS MC KEE) From the strip chart recording?

Q From all the magnetic tape information that you have.

A (WITNESS MC KEE) Yes.

Q And if the tube has the high signal to noise ratio, there might be a substantial variation between evaluators, if you know?

A (WITNESS DENTON) I presume you mean a low signal to noise ratio.

Q Yes, I'm sorry.

A (WITNESS MC KEE) Yes, there can be deviation between analysts. That is correct.

Q How many different tubes do you review a day?

A (WITNESS MC KEE) I have no idea.

Q Well, let's talk in terms of ball park, 200, 1,000?

A (WITNESS MC KEE) I am sorry, I don't know. Whatever is brought to me, I look at on a day. If I get tired, I quit.

Q How many did you review Friday, last Friday, if you remember?

A (WITNESS MC KEE) I don't remember.

Q Would you know on a given day, might it be as much as 100 tubes?

A (WITNESS MC KEE) Oh, yes.

Q Might it be as much as 500 tubes?

A (WITNESS MC KEE) It could be.

Q Now, you say if you get tired, you quit. Would you explain why?

A (WITNESS MC KEE) My eyes get tired.

Q So as you spend more time reading those tubes, your sharpness and ability to make accurate evaluations falls off?

A (WITNESS MC KEE) That is when I take a stop.

JUDGE BLOCH: May I ask the panel if there are any data from which you can infer the reliability of different operators reading the same strip charts? Have there been studies of that sort comparing interoperator

reliability?

WITNESS DENTON: Internal to our company we have now a system that each of the lead interpreters on any one job, and many times we have more than one interpreter on a given job at the same time, they are required to bring back to our shop a tape which represents what they have been doing, a copy of all the data that they have submitted, and we in fact have some internal review of what we are doing.

The plan is to pursue that more aggressively than we have been. We are now, like I say, we are reviewing one tape and some data, and trying to coordinate the data interpreters.

JUDGE BLOCH: You do checks internally, but we are talking about a scientific study to see whether different operators read the same data the same way. You are not talking about that kind of a thing.

WITNESS DENTON: It will in fact encompass that, because we will have a copy of a tape that this particular operator has read, and we will have his answers.

JUDGE BLOCH: And you will have another operator doing the same tape, and then you will do a statistical measure of the degree of concurrance?

WITNESS DENTON: I am not sure that we are

into statistics, but we might be into discussions.

JUDGE BLOCH: It is a training and improvement device for your own internal procedures.

WITNESS DENTON: Yes.

BY MR. ANDERSON: (Resuming)

Q Could we look at, and either one of you who knows the right answer, I am not sure who the best person to ask it is, at Page 4 of Applicant's Exhibit 2. Am I correct -- I am looking at the strip chart on the lefthand side of the page, and I am trying to recall back to your testimony. Are the first ten subdivisions down from the top indicative of the tube roll? Is that what the statement was earlier?

A (WITNESS DENTON) As a matter of fact, that is not true. It is about the first five or six divisions down.

Q You are talking about the smallest of these as being subdivisions.

A (WITNESS DENTON) Yes, minor divisions. That indication, you see, ten divisions down, roughly, is in fact the indication that we just passed the new picture out today.

Q That is the leak?

A (WITNESS DENTON) That is the one we presume is leaking. Well, we presume it is the leak.

Q And looking at the strip chart and referring back to the signal to noise ratio, how do you make a determination of what the signal to noise ratio is?

A (WITNESS DENTON) Well, from this strip chart, I really can't tell the signal to noise ratio of the large indication because it is saturated on the strip chart.

Q Let's assume for the moment it was not saturated, it didn't go off scale.

A (WITNESS DENTON) Okay. Well, in this case we only have the vertical channel, but if we just talk signal to noise on the vertical, which is, I think, what would address your question, it would be as simple as measuring the peak to peak amplitude in the area of that flaw background on both sides, say, and then taking the ratio of that from the peak to peak of the flaw.

In this case, the signals that we're seeing above that, which is lower on the chart, those indications are not really noise, they are also caused by deterioration of the tube wall.

Q I was going to get to that. Would you list the things that cause noise insofar as you are aware of what they could be?

A (WITNESS DENTON) Well, we have two possibilities. It is either those things which can be

on the outside of the tube wall or those things which can be on the inside of the tube wall.

Q And what would those things consist of?

A (WITNESS DENTON) Well, I am doing this.

Q Okay.

A (WITNESS DENTON) So on the inside of the tube wall you can have variations of the internal dimension, and you can have those things which can play out of the primary coolant part which may contain some magnetite or whatever. On the outside of the tube, you have been in several discussions about earlier in this session about those things that might be on the outside of the tube, such as magnetite, copper. These are noise generating sources as well.

Typically, you wouldn't expect to have noise generated from within a sound tube wall. They are either things on the outside of the tube or on the inside of the tube.

Q Would sludge that does not contain magnetite or copper also cause noise in the outside wall?

A (WITNESS DENTON) Most of the noise we would have from sludge would either be from elemental copper or magnatite. The oxides basically are insulators and we are measuring conductivity or permeability, so all of those things that either conduct or have permeability greater than one will show up on this.

Q And if the copper is such an extent on the outside of the tube, would it change the signal-to-noise ratio?

A (WITNESS DENTON) Well, when we have copper on the outside of the tube, we do a mixing of two frequencies and we subtract the copper signal quite as we do the carbon steel tube support. So when you do that, you always have some residue signal left from the mix.

So we have pictures, you know, in this submission shows the residue from the carbon steel tube support. I can't answer your question exactly because it depends -- then the residue depends upon the variation that occurs in the thickness of the copper in the tubing.

Since we record all of the data in a raw form, it is possible to set up a mix to eliminate copper and look at the data and then change the mix slightly and then look at the data and then change the mix slightly

and look at the data, and then actually shift the area in which the residue is more or less.

Q Do I understand your answer correctly? The first step is to make a preliminary identification that copper exists, which leads to a decision to do this mixing process.

A (WITNESS DENTON) Believe me, that is quite easy to notice when copper exists.

Q Could you show us how?

A (WITNESS DENTON) Well, you just have a large signal. I don't have an example in the pictures.

Q Would it, by analogy, be referred to by an off-scale jump on the strip chart?

A (WITNESS DENTON) It could be, yes.

Q What else could it be shown by?

A (WITNESS DENTON) Well, I mean you see that kind of a signal. The difference is when you have a flaw in the tube wall, you are decreasing the conductivity in the tube wall, and the way we strobe attack a signal that means the signal goes down first. When you put copper on the outside of the tube, you have increased conductivity and so the signal goes up first, so there is no real problem identifying the fact that there is some copper on the outside of the tube.

JUDGE BLOCH: That is the same problem we were

talking about with the magnatite on the inside of the sleeve, wasn't it? That was the inside as opposed to the outside. It went up first.

WITNESS DENTON: No, it went down first.

JUDGE BLOCH: And on the outside of the tube it goes up first?

WITNESS DENTON: Well, you are talking two different things. In one case we are discussing magnatite. In the other case we are discussing copper. They are not the same. There is a complete difference in the phasing of those two things.

BY MR. ANDERSON: (Resuming)

Q And once you make this determination by off-scale reading or whatever, you then engage in this mixing process, which reduces the noise. Is that correct?

A (WITNESS DENTON) It reduces the signal from the copper, yes.

Q Now you mentioned before there are occasions when the signal-to-noise ratio is one-to-one or close to one-to-one. Are those cases where there is a lot of copper which you anticipate causes that kind of low signal ratio?

A (WITNESS DENTON) Well, usually that's attributed -- two things can happen. Either the noise

level has gone up, or the signal amplitude has gone down and that is the ratio we are discussing.

Q Let me back up a second. The one-to-one ratio that you were finding, the close to one-to-one ratios you were finding in your previous testimony is after the mixing was done. Is that correct -- or before the mixing was done?

A (WITNESS DENTON) It looks like both.

Q And with that understood, could you now state what was the reason of the mixing not succeeded in bringing down -- increasing the signal-to-noise ratio to above the three-to-one textbook standard?

A (WITNESS DENTON) Well, as a matter of fact, in the case we are discussing -- are we discussing this case in this example now in the handout?

Q No, no. I was just talking in general.

A (WITNESS DENTON) In general? Well, there are multiple sources of noise. In the case we are looking at, there is some other deterioration of the tube wall in the area of this flaw, and that in itself is a noise, even though it is a legitimate signal. It nevertheless has a change going on which interferes with the angle of the spot that's being interpreted.

Q Well, I thought we were talking about -- let me go back to the basic definition that "signal" meant a

signal from a flaw and "noise" meant a signal from something like magnatite, copper, or variations in the tube wall. Are we using different definitions?

A (WITNESS DENTON) Well, you are correct. That would be the normal definition of "noise", yes. In this specific instance -- incident, I'm sorry -- since the output of the mix, as you were pointing out, has still some signal in it, then it doesn't seem that that is being caused by magnatite or copper.

Q Let's hold that aside for a second in this particular instance and get back to it in a moment.

This is in general terms. If you are seeing, after mixing, signal-to-noise ratios that are not at the three-to-one standard, what kind of conclusions does that imply for you?

A (WITNESS DENTON) Okay. We have left, after mixing, the residue of whatever it is we are trying to mix out. So that has some value. And if your signal amplitude is of that same range of amplitudes, then we have poor signal-to-noise ratio.

Q Does that mean an awful lot of conductive impurities?

A (WITNESS DENTON) Not necessarily.

Q Could that be one of the explanations?

A (WITNESS DENTON) It could be, yes.

Q What else could be an explanation?

A (WITNESS DENTON) There may be enough variation in the signals coming from what we're trying to mix out. It is not practical to have the perfect mix as the probe goes through the tube.

Q Is that a variation in the tube wall thickness?

A (WITNESS DENTON) No. It is probably a variation in the thing that is causing the signal that we are trying to mix out. In other words, a difference in the constituency of the magnatide in the case of sludge, a difference in the thickness of the copper.

Q So pure copper is easy, but if it's mixed and all jumbled up it is more difficult?

A (WITNESS DENTON) You have a lot of residue. You can mix it all out, but the residue still increases.

Q Mr. McKee, do you have any information about your opinion as to what kind of impurities have been on the outer diameters of the tubes at Point Beach?

A (WITNESS MC KEE) I have not seen a chemical analysis of what is on the outside at Point Beach.

Q I don't mean a chemical analysis. I mean from your reading of the eddy current tests. Does that give you any clue, any feeling in your mind?

A (WITNESS MC KEE) Only that there is some copper there. I have no idea as to its consistencies.

Q I don't know if you answered this one. What proportion of time does a signal-to-noise ratio in the tubes inspected at Point Beach not equal the three-to-one standard, if you have any feel for that?

A (WITNESS MC KEE) I don't have any feel for it.

Q Is it substantial?

A (WITNESS MC KEE) I don't have any feel for that.

Q You don't have a feel for it.

Do you have any feel, Mr. McKee, for the rate of degradation of the tubes at Point Beach that are suffering the worst rate of degradation? By "worst" I mean take the five percent of tubes at Point Beach that are degrading at the faster rate. Do you have any feeling for what rate that would be?

A (WITNESS MC KEE) No, I do not.

Q Let me ask --

JUDGE BLOCH: Let me follow up on that.

On large volume defects, can you tell from eddy current testing the rate of deterioration of those tubes?

WITNESS MC KEE: Can I qualify that a little

bit? If I have a previous inspection which shows absolutely nothing and today on an inspection I may have a greater than plugging criteria, I do not know at inspection time when that started. All I can assume is that, okay, the previous one was zero, non-detectable or whatever. Then I have to take whatever the operating time was and assign the whole time to the growth to what I've got. But that may be very false.

JUDGE BLOCH: If you go from 30, which means it was detectable, to 50, does that mean there was a 20 percent rate of corrosion between those two readings?

WITNESS MC KEE: If it's a textbook type indication with no other influencing, it could be assumed that it went 20 percent. There is also a volume change with this.

JUDGE BLOCH: Because that assumes no error band either. Throughout the 30 or the 50 I assume there must be error bandsn around them. But you don't know what they are.

WITNESS MC KEE: Mr. Denton may possibly give the error bands.

JUDGE BLOCH: Mr. Denton, how would you treat a reading of 30 followed by a reading of 50? What does that tell you about growth rates?

WITNESS DENTON: First you have to understand

we don't concern ourselves with growth rates. We would merely report in the one case if we had a legitimate -- you know, if we had a 30 percent indication we reported 30. Some numbers of months later we see it again. We report it at 50.

JUDGE BLOCH: Okay. Then within the limitations of the technology of eddy current testing, is there anything you can tell us about a change from 30 to 50?

WITNESS DENTON: I'd say then we would say it is increased by 20 percent through the wall and then we have error bands.

JUDGE BLOCH: I wanted to talk about the error bands.

WITNESS DENTON: Well, unfortunately that is not a straight answer either because anything in eddy current testing or most things in eddy current testing are not linear functions, so at the 50 percent level we would talk about plus or minus seven percent. At the 30 percent level we are going to talk about plus or minus 13 percent. I don't remember the numbers exactly.

JUDGE BLOCH: Generally, the smaller the measurable defect, the larger the percentage of tube wall is an error band.

WITNESS DENTON: That is correct.

JUDGE BLOCH: Now when you say "error band", is that a concept of standard deviation we are talking about? We are talking what percentage?

WITNESS DENTON: This is all standard deviation.

JUDGE BLOCH: So approximately two-thirds of the readings, two-thirds of the time you would expect it to be within that particular --

WITNESS DENTON: I'm sorry. It's two signals.

JUDGE BLOCH: Two signals.

WITNESS DENTON: But it's only reproduceable because when you start talking real world flaws or even manufactured flaws, you can deliberately manufacture flaws that are completely wrong -- I mean, give wrong answers.

I like to use the example of if you take a 5,000th-diameter drill bit and you drill completely through the wall, this would not be enough volume to be detected in a normal inspection. So now I have the case of a non-detected 100 percent flaw. If you come in on top of that with a large diameter drill and you drill down 50 percent of the way through the wall, now you are going to report a 50 percent flaw, which is still in fact a 100 percent flaw.

So we have to talk about -- we're talking

about reproducaability in two signals when I am using these numbers. This was done years ago in a particular plant where we lived there for three months and we had the opportunity to run the same calibration standard many, many times with different operators and different equipment, but always the same standard.

JUDGE BLOCH: The question we were asking before, your basic answer is yes, you can infer very roughly the degradation rate when the reading goes from 30 percent to 50 percent, but it is very rough and is subject to a lot of error.

WITNESS DENTON: Yes.

BY MR. ANDERSON: (Resuming)

Q In the portion of your answer to Judge Bloch in which you indicated you could fool the eddy current testing and you deliberately tried to with a certain kind of flaw, am I correct in inferring from that answer that the evaluator is trained to detect the typical kind of flaws that you have seen up to that point in time and a new configuration or flaw might not flow from the bounds of that being picked up?

A (WITNESS DENTON) Well, all we can do as data interpreters is assume the best situation, which would mean the flaw is reasonably symmetrical, whether it is or is not. We can't start doing Kentucky windage and

say well, that one looks like we can all it this, and this one over here looks like maybe we should call it that. So we measure the most severe phase angle of the signal that we have, whether that be right or wrong. That is what we do.

JUDGE BLOCH: Sir, have you ever been criticized by Westinghouse for reporting a flaw that they felt should not have been reported?

WITNESS DENTON: No, I have not.

JUDGE BLOCH: Have you ever been criticized by Westinghouse for not reporting a flaw that they felt should have?

WITNESS DENTON: Westinghouse has exercised their option of reporting a flaw which we have not reported from the same data. We don't accept criticism very lightly.

JUDGE BLOCH: When you say they reported a flaw from certain of your data, does that mean they do a quality assurance check on your data indirectly?

WITNESS DENTON: I would say that is true, but I don't know that it's true in every case.

JUDGE BLOCH: Are you referring solely to situations where you have gone back historically, that is, where you reported a certain flaw now and then they go back and look at your old data and they say you

should have found the flaw then?

WITNESS DENTON: I would prefer to defer that to Mr. Fletcher when he gets back on the stand, if we could.

BY MR. ANDERSON: (Resuming)

Q Mr. McKee, let's assume a defect in axial length of 150 mils. At what percent through-wall defect in the tube sheet would you feel 100 percent confident at being able to pick that up through the eddy current test?

A (WITNESS DENTON) It's never 100 percent. Let's not get trapped.

A (WITNESS MC KEE) Well, I'm not perfect. The system isn't perfect.

Q Okay. What point of through-wall defect would you feel 95 percent sure of picking it up?

A (WITNESS MC KEE) 150 mils long?

Q Yeah.

A (WITNESS DENTON) This is a crack?

A (WITNESS MC KEE) What kind of a defect?

A (WITNESS DENTON) Let's start with what kind of a crack because flaws are three-dimensional. Let's start with something about the crack.

Q For the record, to be clear, we are talking about a 150 mil axial extent stress corrosion crack.

A (WITNESS MC KEE) With some opening?

Q It's a crack. It has to be.

A (WITNESS MC KEE) Probably 40 percent.

Q So you have a 95 percent confidence of picking up 40 percent or more through-wall defect of that type?

A (WITNESS MC KEE) Yes, 95 percent of the time.

Q And what percent of the time will you pick up 20 percent through-wall defect of that kind of a defect, if you have --

A (WITNESS MC KEE) This is also a crack you are speaking of?

Q Yes.

A (WITNESS MC KEE) Probably never.

Q And let's turn to the question of intergranular attack and ask the same question. Assuming 150 mil extent of the intergranular attack, too, at what percent of through-wall defect would you feel comfortable 95 percent of the time of picking it up?

A (WITNESS DENTON) I'm going to let Mr. McKee answer that, but I first want to say one thing about intergranular versus transgranular or express or whatever. From our standpoint, if the separation is such that the electrons cannot switch veillance bands,

then in fact it is cracked. We don't care how this occurred, whetner it is intergranular, transgranular stress or not stressed.

If you had given us a situation -- I don't want to get into a situation of can we detect intergranular corrosion. So from our standpoint, if in fact it is cracked, however it occurred, that the electrons cannot change veillance bands, then the answer to the question you asked is the same as the previous question.

Q The previous defintion was used by a previous witness. You don't have to adopt it. It was, if I recall correctly, that intergranular attack assumed no separation of grain boundaries.

A (WITNESS DENTON) That is a metallurgical answer. I am talking from our standpoint. If in fact the construction of the tube wall is such that the electronics can still switch veillance bands, it still is a conductor. If they don't switch veillance bands, it's a crack.

Q What percentage of the time would that be?

A (WITNESS DENTON) We don't know that.

JUDGE BLOCH: Well, let me ask. What you are saying is there are some things that a metallurgist might call IGA that you wouldn't even define as a

crack. Is that correct?

WITNESS DENTON: If the electrons change veillance bands, it conducts, we don't see it.

JUDGE BLOCH: Are you saying you don't know whether IGA is sometimes defined as existing where the electrons cannot change veillance bands?

WITNESS DENTON: I would expect in some cases there are what might be called IGA that the electrons are still jumping, yes.

JUDGE BLOCH: So some IGAs are, for eddy current purposes, not cracks?

WITNESS DENTON: That I believe is true. But then no matter what the dimension is, the answer is going to be we don't detect it. It is still a conductor. If it is not a conductor, then the dimensions are the same as the previous question.

BY MR. ANDERSON: (Resuming)

Q Okay, that answered my question -- not that it's good, but it answers it.

Mr. McKee, have you had any experience doing the San Onofre plant's -- any tests since they have had full sleeving?

A (WITNESS MC KEE) No, I have not.

Q Are you going to be getting any current test results from your knowledge after the sleeve tests at

Point Beach?

A (WITNESS MC KEE) I don't know that either.

Q Are you being given at this point in time, or have you been told that you would be given, special training to evaluate tubes with sleaves?

A (WITNESS MC KEE) The eddy current testing of the straight length of the sleeve testing is the same test as the parent tube.

Q So the answer is you are getting special training?

A (WITNESS MC KEE) Not for the straight part of the tube, no.

Q Now is it correct to state in the area of the tube part of the tube sheet, where it is today heavily packed with impurities, it is difficult to get a readable signal?

A (WITNESS MC KEE) What are you talking about -- the sleave or the mother tube?

Q The unsleeved Point Beach in the sheet tube cravice where it's packed with impurities, is it hard to get a readable signal?

A (WITNESS MC KEE) Not with the electronic mixing we are doing.

Q But you did say that you are getting some portion of the time signals which are not in the

three-to-one textbook standard after mixing, did you not, or did Mr. --

A (WITNESS MC KEE) If there is not enough volume gone, sure, your signal-to-noise ratio goes down.

Q But the signal-to-noise ratio is a function of two things. It is a function of the extent of the flaw, and it is a function of the extent of the conductive impurities or variation in tubes, is it not?

A (WITNESS DENTON) Well, yes, that's a definition of signal-to-noise ratio.

Q Would you agree that if a mother tube and sleeve tube is corroded through the wall and it's open and there are impurities in the bulk water that get into the annulus and it packs hard with impurities, that are conductive, would that tend to make a difficult signal-to-noise ratio?

A (WITNESS DENTON) Could I ask you to say that over again?

Q Sure. If we assume in a sleeved tube in Point Beach that the mother tube has a through-wall defect and it's open to th secondary side, and if we assumed, secondly, that the annulus between the sleeve and the tube has concentration effects and accumulated hard-packed conductive impurities, would you agree,

under those two assumptions, that the readability will be impaired because -- would you agree that the readability would be impaired?

MR. CHURCHILL: I'd like to object. We are assuming facts not in evidence here. If he wants to label this as a hypothetical question, I will withdraw my objection.

MR. ANDERSON: I thought I said assume. It's a hypothetical.

JUDGE BLOCH: It's a hypothetical question.

WITNESS DENTON: I would assume in those particular situations we'd be right back to the same situation we have in the parent tube today. That is, we would have an effective mix that could eliminate the majority of that interference signal and would have some residue signal left to contend with.

BY MR. ANDERSON: (Resuming)

Q But you do have a situation within the parent tube today, pre-sleeving, where you have a hard time making an evaluation of the tape because of the low signal-to-noise ratio, do you not?

A (WITNESS DENTON) And again it is normally with mixing, due to the fact that there is a very small loss of volume in the indication we are working with.

Q And the area of the tube right now, in the

pre-sleeved Point Beach, where you are having that surface-to-noise ratio, would you have that in the tube sheet?

A (WITNESS DENTON) In the case we are looking at right now, yes.

Q So you would agree the tube sheet type environment in the annulus, between the sleeve and the tube, you might expect to see, under the assumptions I gave you before about the open parent tube, the same kind of difficulty you are seeing today with the sleeve in the crevice. Is that correct?

MR. CHURCHILL: Objection. We did not -- this has not been testified that this is a difficult or an unusual event. I think Mr. Anderson is trying to assume that we had difficulty in eddy current testing with the tube sheet. We have explained what that situation is, but it has not been described as difficult.

JUDGE BLOCH: I would like to try a question or two and then, if you would like to rephrase it, I may be able to help.

Mr. Denton, is there some loss of the ability to detect flaws within the tube sheet area because of conductive impurities that are present on the outside of the tube, the mother tube?

WITNESS DENTON: Only that which is caused by

the residue of the mix.

JUDGE BLOCH: You use the mixing to reduce the loss of sensitivity, but there is some loss of sensitivity anyway?

WITNESS DENTON: Not -- well, I prefer -- yes, yes. In essence, the answer is yes to that because there is some residue signal which is then intermixed with the signal that you are trying to interpret, yes.

JUDGE BLOCH: I have the feeling you think the loss is very small. Is that correct?

WITNESS DENTON: I have that feeling, yes.

JUDGE BLOCH: What does that mean in terms of your ability to detect defects? What does it do to the ability to detect a 40 percent through-wall defect that you could detect if it wasn't in that area? Does it change the probability that you could find it?

WITNESS DENTON: I can't put numbers through it. Maybe if you are in the area of a residue for mix, maybe just change the dimension you could find. Maybe instead of 35 percent it is now 40 percent. It is not a large problem.

JUDGE BLOCH: It is not a very large problem? It is some effect, but you're just not sure?

WITNESS DENTON: The problem I have in quantifying, if we keep talking in one dimension

quantification. We are really involved with a three-dimensional flaw.

JUDGE BLOCH: Whatever these problems are now in the tube sheet crevice, I take it, would be similar if a similar deposit of conductive impurities were found in the annulus between sleeve and tube. Is that correct or incorrect?

WITNESS DENTON: Well, it is basically correct with the exception of whatever part of the residue comes from the carbon steel would be out, because it is further away.

JUDGE BLOCH: Okay, so the problems now would be limited to the conductive impurities and the carbon steel tube sheet is no longer a problem.

WITNESS DENTON: It is not one of the contributors to the residue of the mix.

JUDGE BLOCH: Would there be some contributors, though, from possible irregularities in the sleeve itself? That is, excuse me, in the mother tube?

WITNESS DENTON: I would anticipate that that would mix up with the same mix that we are using for the outside of the tube, since it is also further away.

JUDGE BLOCH: Mr. Anderson?

BY MR. ANDERSON: (Resuming)

Q Now, if I recall a previous answer you made, you indicated the industry standard for signal to noise

ratio is three to one?

A (WITNESS DENTON) That is the textbook thing, yes.

Q And you also indicated that there are instances at Point Beach -- I am talking about pre-sleaving Point Beach, where you are having, after mixing signal to noise ratios of one to one or close to one to one?

A (WITNESS DENTON) Well, yes.

Q Now, in that instance where that is the case, is there a significant or an insignificant impairment of your detectability of the defects that we were talking about before?

A (WITNESS DENTON) Well, there is an impairment, of course.

Q Is it significant?

A (WITNESS DENTON) Well, you could easily presume that since I am talking about this one to one, that there may be another one that is one half to one, and we don't see it and don't talk about it. This is a volumetric examination. If you decrease the volume of the flaw to some point you do not detect it at all, as I have the earlier example of the drill hole.

Q Let's go back, if I may, Mr. Denton, to 150 mil axial extent defect, and if I recall correctly, if

it was a stress corrosion crack defect, the testimony was that at 40 percent or more you feel 95 percent confident that the defect would be picked up. Is that correct?

A (WITNESS DENTON) It is in that range of sensitivities, yes.

Q Now, let's assume --

JUDGE BLOCH: Mr. Anderson, just a second. I think a lot of your questioning frankly has been quite effective, and has brought out information that is helpful to the board. I have a feeling you are getting redundant at this point, that you are going over the same field that you have gone over already.

MR. ANDERSON: I just want to clarify the question you had.

JUDGE BLOCH: Okay, so long as you are convinced that you've got something new you are going after, please pursue it, but I hope you won't be pursuing things that you really are just not organized on, that you haven't thought through.

MR. ANDERSON: I am certain of it.

BY MR. ANDERSON: (Resuming)

Q Now, if we are talking about that same circumstance where you feel the tube can be read at 95 percent confidance for 40 percent defect, if we have

moved to a tube which has a signal to noise ratio in that area of one to one, would you feel equally or less confident that it would be picked up, and now much less if so?

A (WITNESS DENTON) Well, again, I cannot dimension that, because you just dimensioned it. If it has a signal to noise ratio of one to one, my confidence level obviously is not 95 percent.

Q To still get a 95 percent confidence, would you go for a 50 percent defect before you were that confident?

A (WITNESS DENTON) Are you leaving the signal to noise ratio at one to one?

Q I am.

A (WITNESS DENTON) Well, then the confidence doesn't change.

Q Well, you are not going to be able to read it at 40 percent with the same confidence.

A (WITNESS DENTON) If you keep the signal to noise ratio constant, the answer is the same whether you get 100 percent or 10 percent.

Q I am sorry. The thing you are comparing it to is the first -- I assume it was the first time you gave your answer, Mr. McKee gave your answer, I assume you had a tube which didn't have a disturbingly low signal

to noise ratio, let's say it was two to one.

A (WITNESS DENTON) Okay.

Q Now, we are moving to one which is one to one.

A (WITNESS DENTON) And the answer obviously is, it destroys our confidence.

Q And how much up the extent of the through wall defect do you have to go before you can still get 95 percent confidence if it is one to one?

A (WITNESS DENTON) Okay, wait a minute. You left the signal to noise ratio at one to one.

Q Right.

A (WITNESS DENTON) Then the confidence doesn't change.

Q No, comparison A is a tube with a signal to noise ratio of three to one.

A (WITNESS DENTON) Yes.

Q 150 mils axial extent, 40 percent defect. Your testimony, I understood it, correct me if I am wrong, is 40 percent through wall you would feel 90 percent sure.

A (WITNESS DENTON) In a three to one signal to noise ratio.

Q Now, moving to comparison B, it has a one to one signal to noise ratio. What through wall defect would you feel 95 percent sure of picking up?

A (WITNESS DENTON) Are you leaving the noise constant? If you are taking the noise up every time you take the flaw up and then the ratio is always one to one, my answer is, the confidence level is the same.

Q Let me think about that and come back to it.

JUDGE BLOCH: I have a feeling the testimony is very clear.

BY MR. ANDERSON: (Resuming)

Q Mr. McKee, you don't use the pancake probe which was described in answer to Judge Paxton's question at Point Beach now, do you?

A (WITNESS MC KEE) No, we don't.

Q What are the problems with using a pancake probe, if you know?

A (WITNESS MC KEE) Excessive radiation received by everbody involved with the inspection. It is a special case, one of a kind situation.

JUDGE BLOCH: The excessive radiation comes from the fact that it takes longer to use the instrument?

WITNESS MC KEE: There are just many mechanical problems that go wrong. It just becomes a real, real problem.

BY MR. ANDERSON: (Resuming)

Q Are you aware of a metallurgical examination done on the tube at Point Beach at the end of 1979 by

Westinghouse?

A (WITNESS MC KEE) No, I am not.

Q Would you state what procedure you use after you review the tapes? Do you give the results in the written report to Westinghouse?

A (WITNESS MC KEE) Yes.

Q And the written results you give to them, does that list the tube by row and column number and the percent defect and location of the defect that you have evaluated?

A (WITNESS MC KEE) Yes.

MR. ANDERSON: Has the board been provided with a copy of all the 1981-82 LER's?

(Pause.)

JUDGE BLOCH: Off the record.

(Whereupon, a discussion was held off the record.)

JUDGE BLOCH: On the record.

While we were off the record, we ascertained from the applicant that there is no objection to the use of LER's for cross examination purposes. Staff has no objection?

MR. BACHMANN: At least as far as the applicant's witnesses are concerned, no objection.

MR. ANDERSON: Can we also stipulate that the

licensee did not report the results differently than they were reported to it by Westinghouse? Can we stipulate to that?

MR. CHURCHILL: What?

JUDGE BLOCH: Mr. Anderson, I don't think I understood what you just said, but please use them for cross examination purposes.

MR. ANDERSON: For the record, I am referring to the LER dated April 16, 1982.

JUDGE BLOCH: For the record, let's mark them as an exhibit.

MR. CHURCHILL: Your Honor, I have no objection to marking them as exhibits, but having them admitted is another question.

JUDGE BLOCH: These are to be marked for identification purposes only. They are not to be admitted into evidence. Mr. Anderson, they will be referred to as Intervenor's Exhibit Number 2.

(The document referred to was marked for identification as Intervenor's Exhibit Number 2.)

JUDGE BLOCH: Off the record.

(Whereupon, a discussion was held off the

record.)

(Whereupon, a brief recess was taken.)

Wisconsin Electric POWER COMPANY
231 WEST MICHIGAN, MILWAUKEE, WISCONSIN 53201

April 16, 1982

Mr. J. G. Keppler, Regional Administrator
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET 50-266
LICENSEE EVENT REPORT 82-007/01T-0
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report 82-007/01T-0 (a 14-day follow-up report) with an attachment which provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment."

Very truly yours,

C. W. Fay

Assistant Vice President

C. W. Fay

Enclosure

Copies to NRC Resident Inspector
Mr. Peter Anderson - WED

Blind copies to Messrs. C. S. McNeer
R. H. Gorske/A. W. Finke
Sol Burstein
D. K. Porter
G. A. Reed
Gerald Charnoff
INPO Records Center

(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | W I P B H 1 (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | (5)

LICENSEE CODE | LICENSE NUMBER | LICENSE TYPE | CAT

CON'T

0 1 | REPORT SOURCE L (6) | 0 5 0 0 0 2 6 6 (7) | 0 3 2 9 8 2 (8) | 0 4 1 6 8 2 (9)

DOCKET NUMBER | EVENT DATE | REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 | Unit 1 was shut down on 03/25/82 for an eddy current examination of the
0 3 | SG tubes. On 03/29/82 the 800 psid secondary-to-primary leak check
0 4 | revealed 2 leaking tubes in the "A" SG. On 04/03/82, verification of
0 5 | the eddy current results revealed that 19 tubes in the "A" SG and 9
0 6 | tubes in the "B" SG had indications exceeding 40%. This event is
0 7 | similar to others and is reportable in accordance with Technical
0 8 | Specification 15.6.9.2.A.3.

0 9 | SYSTEM CODE C B (11) | CAUSE CODE E (12) | CAUSE SUBCODE F (13) | COMPONENT CODE H T E X C H (14) | COMP. SUBCODE F (15) | VALVE SUBCODE Z (16)

(17) LER/RO REPORT NUMBER: EVENT YEAR 8 2 | — | SEQUENTIAL REPORT NO. 0 0 7 | / | OCCURRENCE CODE 0 1 | REPORT TYPE T | — | REVISION NO. 0

ACTION TAKEN B (18) | FUTURE ACTION Z (19) | EFFECT ON PLANT Z (20) | SHUTDOWN METHOD Z (21) | HOURS (22) 0 0 0 0 | ATTACHMENT SUBMITTED Y (23) | NPRD-4 FORM SUB. Y (24) | PRIME COMP. SUPPLIER N (25) | COMPONENT MANUFACTURER W 1 2 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 | All identified indications greater than 40% were within the tubesheet
1 1 | region and are considered to be IGA caused by caustic. All defective
1 2 | and leaking tubes have been plugged. A crevice flush was conducted by
1 3 | start-up and the operating hot leg temperature was reduced from the pre-
1 4 | outage value.

1 5 | FACILITY STATUS G (28) | % POWER 0 0 0 (29) | OTHER STATUS (30) N/A | METHOD OF DISCOVERY C (31) | DISCOVERY DESCRIPTION (32) Eddy current examination

1 6 | ACTIVITY RELEASED Z (33) | CONTENT OF RELEASE Z (34) | AMOUNT OF ACTIVITY (35) N/A | LOCATION OF RELEASE (36) N/A

1 7 | PERSONNEL EXPOSURES NUMBER 0 0 0 (37) | TYPE Z (38) | DESCRIPTION (39) N/A

1 8 | PERSONNEL INJURIES NUMBER 0 0 0 (40) | DESCRIPTION (41) N/A

1 9 | LOSS OF OR DAMAGE TO FACILITY TYPE Z (42) | DESCRIPTION N/A

2 0 | PUBLICITY ISSUED N (44) | DESCRIPTION (45) N/A | NRC USE ONLY

C. W. Fay | PHONE 414/277/2811

ATTACHMENT TO LICENSEE EVENT REPORT 82-007/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant Unit 1
Docket 50-266

On 03/25/82 Unit 1 was shut down for a scheduled steam generator eddy current inspection. The 2000 psid primary-to-secondary hydrostatic test condition was established during cool-down of the unit. An 800 psid secondary-to-primary leakage check was performed on both steam generators on 03/29/82. The 800 psid secondary-to-primary leakage check was performed visually with the aid of remote video equipment. The visual inspection was initially performed at 0100 hours on 03/29/82. Due to steam generator humidity conditions, an additional verification inspection was performed at 0900 hours on the same day. The secondary side was held at pressure throughout this interval. The specific conditions identified during the leakage checks are noted below.

"A" STEAM GENERATOR
HOT LEG

		Original Inspection	Verification
R24C37	Explosive Plug	21 Drops/Min.	16 Drops/Min.
R21C49	Explosive Plug	5 Drops/Min.	Boric Acid Coated
R31C31	Explosive Plug	2 Drops/Min.	1 Drop/Min.
R19C33	Explosive Plug	Dry	<1 Drop/2 Min.
R03C09	Explosive Plug	Boric Acid Coated	Boric Acid Coated
R01C22	Explosive Plug	Boric Acid Coated	Boric Acid Coated
R12C25	Tube	Wet	Wet ~ 1 Drop/10 Min

COLD LEG

R25C27	Tube (Explosive Plug Removed 10/81)	20 Drops/Mir.	20-30 Drops/Min.

"B" STEAM GENERATOR
HOT LEG

R23C38	Explosive Plug	20 Drops/Min.	20 Drops/Min.
R24C37	Explosive Plug	Boric Acid Coated	Boric Acid Coated
R29C35	Explosive Plug	5 Drops/Min.	5 Drops/Min.
R29C40	Explosive Plug	3 Drops/Min.	3 Drops/Min.
R13C61	Explosive Plug	Boric Acid Coated	Boric Acid Coated
R29C37	Explosive Plug	Boric Acid Coated	Boric Acid Coated
R23C63	Tube	2-3 Drops/Min.	Dry

COLD LEG

R24C50	Explosive Plug	Wet	Not Verified

The eddy current inspection program, performed this outage, consisted of the following:

1. Inspection of all readily remotely accessible tubes to the first support plate in the hot legs of both steam generators.

2. Inspection, over the U-bend from the leaking side, of the three tubes which were identified as leakers or potential leakers in the visual tubesheet check.

3. Inspection, to the first tube support from the cold leg, of the tubes in the cold leg of "A" steam generator which had either an explosive or mechanical plug removed during the sleeving demonstration in 10/81, and were not subsequently sleeved.

On 04/03/82, verification of all initial steam generator eddy current data for tubes with indications exceeding the plugging limit was completed. Nineteen tubes in the "A" steam generator and nine tubes in the "B" steam generator were verified to have degradation greater than 40%, which is the plugging limit of Technical Specificatic 15.6.2.A.5.

Of the 2,848 open tubes in the "A" steam generator, 2,835 were inspected and 2,833 of the 2,850 open tubes in the "B" steam generator were inspected. The tubes that were not inspected are as follows:

Number of Tubes Not Inspected		Reason for Not Inspecting
"A"	"B"	
12	14	Contained Template Plugs
1	2	Restricted Tube Ends
0	1	Located near environmental ledge (not accessible with remote equipment).
13	17	

These tubes were not inspected because of the radiation exposure associated with moving template plugs, manual eddy current probing, and reworking restricted tube ends. The non-inspected tubes constitute less than 1% of the unplugged tubes, most are not located in the zones where large numbers of defects have occurred, and the overall eddy current results did not indicate the necessity to inspect the tubes. Following is a summary of the eddy current indications and comparisons with the data from the three previous eddy current inspections. A blank entry under the results of previous eddy current inspections in the following table indicates that the tape for that specific inspection was not examined for this comparison.

"A" STEAM GENERATOR

HOT LEG SIDE TO FIRST SUPPORT PLATE

Tube	Defect	Location	10/81	07/81	12/80
R05C07 *	97%	15" ATE	UDI	UDI	UDI
R11C07 *	UDI	11" ATE		UDI	
R18C07 *	UDI	6" ATE	NT		
R01C13 *	90/95%	14" & 7½" ATE	C	UDI	UDI
R13C33 *	UDI	15" ATE	NDD		
R18C35 *	92%	10-15" ATE	NDD		
R31C37 *	UDI	11" ATE	NC	C	NDD
R18C37 *	UDI	8" ATE	NC	NC	C
R23C38 *	UDI	20" ATE	NC	NC	NDD
R27C38 *	UDI	20" ATE	NC	NC	C
R10C40 *	UDI	Roll to TTS	NC	NC	C
R12C41 *	79%	12" ATE	C/UDI	C	NDD
R11C43 *	87%	18-20" ATE	C/UDI	UDI	UDI
R18C44 *	UDI	20" ATE	NDD		
R15C20 *	UDI	8-14" ATE	NC	NC	NC
R29C45 *	79%	7½" ATE	NDD		
R29C47 *	UDI	8-14" ATE	NC	NC	NC
R09C55 *	96%	16-19" ATE	NDD		
R12C58 *	88%	18-20" ATE	NDD		
R13C59 *	UDI	20" ATE	NDD		
R15C59 *	58%	7-20" ATE	C/UDI	NDD	
R15C60 *	UDI	14-18" ATE	NC	NC	NC
R11C62 *	52%	21" ATE	NDD		
R12C62 *	93%	18-21" ATE	NDD		
R07C64 *	89%	12" ATE	NDD		
R15C65 *	UDI	6-19" ATE	NT	NDD	
R05C68	<20%	½" ATS	NC	NC	NC
R15C68 *	93%	10-15" ATE	C/UDI	C	NDD
R05C69	<20%	½" ATS	NC	NDD	
R15C71 *	UDI	8" ATE	NC		
R05C72 *	78%	7½" ATE	NDD		
R08C73 *	96%	17" ATE	NDD		
R09C73 *	94%	17" ATE	NDD		
R08C74 *	92%	17" ATE	NDD		
R06C81	<20%	1" ATS	NC	NC	NC
R14C22 *	UDI	14-17" ATE	NDD		
R15C22 *	UDI	14" ATE	NDD		
R18C23 *	69%	19" ATE	NDD		
R15C25 *	73%	16" ATE	NDD		
R15C27 *	UDI	10-15" ATE	NDD		
R36C29	36%	TTS	NC	NC	NC
			COLD LEG		
R26C53	25%	2" ATS			

"B" STEAM GENERATOR

HOT LEG TO FIRST SUPPORT PLATE

R02C15 *	UDI	6-11" ATE	NC	NC	NC
R02C17 *	63%	8" ATE	NDD	NDD	
R24C25 *	72%	11" ATE	NDD		
R27C30	<20%	1" ATS	NC	NC	NC
R21C34 *	90%	5" ATE	NDD		
R08C35 *	93%	10" ATE	NDD	NDD	
R14C40 *	30%, UDI	1" & 20" ATE	NC	NC	NDD
R10C42 *	73%	21" ATE	NDD		
R26C42 *	30%, UDI	21" & 19-21" ATE	NC	NC	NDD
R13C47 *	UDI	21" ATE	NDD		
R26C50 *	91%	12" ATE	NC	NC	NC
R01C47 *	95%	21" ATE	C	DNA	NDD
R22C59 *	72%	17" ATE	NDD		
R21C66 *	UDI	21" ATE	NC	NC	NDD
R03C47 *	91%	20" ATE	NT	NT	NT

DNA - Data Not Available
ATE - Above Tube End
NDD - No Defect Detected
UDI - Undefinable Indication
ATS - Above Tubesheet
TTS - Top of Tubesheet
NT - Not Tested
NC - No Change
C - Change
* - Tubes Plugged This Outage

Nineteen tubes in the "A" steam generator and nine tubes in the "B" steam generator contained indications exceeding the 40% plugging limit. These tubes and the two leaking tubes in the "A" steam generator have been mechanically plugged. Of the 28 indications exceeding the plugging limit, eleven are new indications in the "A" steam generator and six are new indications in the "B" steam generator. The other indications identified were either previously noted as undefinable indications or defects that previously existed, but were not identified in prior inspections. As in the past, all indications were small volume. As a conservative measure, all of the tubes containing undefinable indications have been plugged to further insure the reliability of the unit. The tubes marked with an asterisk (*) in the preceding table have been plugged. Correct plugging was visually verified via the use of tubesheet photography.

The explosive plugs verified to be leaking in excess of two drops per minute ("A" steam generator hot leg, R24C37; "B" steam generator hot leg, R23C38, R29C35, and R29C40) have been repaired with a welded plug. Based on the history of the plugs, personnel radiation exposure encountered during weld repair and future steam generator replacement, the plugs leaking at a very low rate (± one drop per minute) were not weld repaired this outage.

Eddy current examinations of the tubes noted to be wet or leaking during the visual leakage check revealed no indications. The tubes verified to be leaking were plugged. Tube R12C25 in the "A" steam generator was plugged with mechanical plugs in both hot and cold legs. Tube R25C27 in the "A" steam generator was plugged with a welded plug in the hot leg since it was sleeved during the 10/81 outage, and mechanically plugged in the cold leg. The type, or location, of the defect(s) existing in these tubes is unknown. They were both inspected through the U-bend from the leaking side.

Eddy current examinations of the cold leg ends of tubes which had either mechanical or explosive plugs removed during the sleeving demonstration of 10/81 and which were not subsequently sleeved revealed one indication in Tube R26C53 of 25% at 2" above the tubesheet from the cold leg side. The indication was previously reported during the 1978 refueling outage steam generator inspection. No other indications were identified.

An eddy current exam of the 12 tubes sleeved during the 10/81 refueling outage was also performed this outage. The exam consisted of using the same probe type and eddy current parameters used in 10/81 and comparing the signals to the 10/81 signals. There were no noticeable changes in the eddy current signals.

To minimize the rate of corrosion, the Unit 1 primary system was returned to power at a reduced hot leg temperature of 557°F. In addition, a crevice flush was performed before the unit was returned to service to remove impurities from the tubesheet crevice.

The NRC Resident Inspector has been notified of these findings. This event is reportable in accordance with Technical Specification 15.6.9.A.3 and is similar to others.

POINT BEACH NUCLEAR PLANT
WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 5424

March 30, 1982

Mr. J. G. Keppler, Regional Administrator
U.S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 82-007/01T-0
24-HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT

Licensee Code:	WIPBH1	Docket No.	50-266
License Type:	41111	Source:	L
License Number:	00-00000-00	Event Date:	03/29/82

Event Description: On 03/29/82 detailed visual inspections of the steam generator tubesheets during the 800 psid secondary-to-primary leak check revealed two leaking tubes. This condition is reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment. Additionally, six leaking explosive tube plugs were identified.

On 03/25/82 Unit 1 was shut down for a mid-cycle steam generator eddy current inspection. The required 2000 psid primary-to-secondary condition was established while the unit was being shut down. The 800 psid secondary-to-primary leak check was performed visually with the aid of remote video equipment. The visual inspection was initially performed at 0100 hours on 03/29/82. Due to steam generator humidity conditions, an additional verification inspection was performed at 0900 hours on the same day. The secondary side was held at pressure during this interval. The results are as follows:

"A" Steam Generator
Hot Leg

		Original Inspection	Verification
R24C37	Explosive Plug	21 drops/min	16 drops/min
R21C49	Explosive Plug	5 drops/min	Boric Acid
R31C31	Explosive Plug	2 drops/min	1 drop/min
R19C33	Explosive Plug	Dry	<1 drop/2 min
R 3C 9	Explosive Plug	Boric Acid	Boric Acid
R 1C22	Explosive Plug	Boric Acid	Boric Acid
R12C25	Tube	Wet	Wet ~1 drop/10 min

"A" Steam Generator
Cold Leg

		Original Inspection	Verification
R25C27	Tube (Explosive Plug Removed 10/81)	20 drops/min	20-30 drops/min

"B" Steam Generator
Hot Leg

R23C38	Explosive Plug	20 drops/min	20 drops/min
R24C37	Explosive Plug	Boric Acid	Boric Acid
R29C35	Explosive Plug	5 drops/min	5 drops/min
R29C40	Explosive Plug	3 drops/min	3 drops/min
R13C61	Explosive Plug	Boric Acid	Boric Acid
R29C37	Explosive Plug	Boric Acid	Boric Acid
R23C63	Tube	2-3 drops/min	Dry

Cold Leg

R24C50	Explosive Plug	Wet	Not Done

Considering the above, the past history of the plugs in question and steam generator replacement, the following repairs will be made:

"A" Steam Generator

R24C37 Explosive Plug; weld repair hot leg
R25C27 Tube; weld repair hot leg, mechanically plug cold leg
R12C25 Tube; eddy current and plug

"B" Steam Generator

R23C38 Explosive Plug; weld repair hot leg
R29C35 Explosive Plug; weld repair hot leg
R29C40 Explosive Plug; weld repair hot leg
R23C63 Tube; eddy current and plug only if defect found

The eddy current inspection scheduled for this outage includes inspection of all readily remotely accessible tubes to the first support plate in the hot legs of both steam generators. In addition, the three tubes which were noted as leakers or potential leakers will be inspected over the U-bend from the leaking side. Since the leak in the "A" cold leg is a tube from which an explosive plug was removed for sleeving demonstration in 10/81, all other tubes in the cold leg which had plugs removed, explosive or mechanical and were not sleeved, will also be inspected. All tubes with indications greater than the plugging limit will be plugged after eddy current.

The final licensee event report pertaining to this event will be submitted within 14 days following verification of the eddy current data.

The NRC Resident Inspector has been notified of this event.

R. E. Link Telephone: 414/755-2321

NRD FILE COPY
PT11.5.5
LER U1

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

November 13, 1981

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-266
LICENSEE EVENT REPORT NO. 81-017/01T-0
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report No. 81-017/01T-0 (a 14-day follow-up report) with an attachment which provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment".

Very truly yours,

C. W. Fay, Director
Nuclear Power Department

Enclosure

Copies to NRC Resident Inspector
C. F. Riederer, PSCW
Peter Anderson, WED

Blind copies to Messrs. McNeer, Burstein, Gorske/Finke, Porter, Reed, INPO Records Center, Charnoff

NPC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | W I P B H 1 (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | | (5)
LICENSEE CODE 9–14 | LICENSE NUMBER 15–25 | LICENSE TYPE 26–30 | 57 CAT 58

CON'T 0 1 REPORT SOURCE | L (6) | 0 5 0 0 0 2 6 6 (7) | 1 0 3 0 8 1 (8) | 1 1 1 3 8 1 (9)
60 | 61 DOCKET NUMBER 68 | 69 EVENT DATE 74 | 75 REPORT DATE 80

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 The unit was shut down on 10/09/81 for refueling. Eddy current examina-
0 3 tion of the steam generator tubes was conducted from 10/26/81 to 10/30/81.
0 4 On 10/30/81, verification of all initial eddy current data for tubes
0 5 with indications exceeding the plugging limit was completed. Ten tubes
0 6 in the "A" steam generator and seven tubes in the "B" steam generator
0 7 had indications greater than 40%. This event is similar to others and
0 8 is reportable per Technical Specification 15.6.9.2.A.3.

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
0 9	C B (11)	E (12)	F (13)	H T E X C H (14)	F (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	8 1	—	0 1 7	/	0 1	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
B (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	Y (24)	N (25)	W 1 2 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 All indications greater than 40% were within the tubesheet region and
1 1 are considered to be IGA caused by caustic. A crevice flush is planned
1 2 to be performed before startup. One of the defective tubes (R18C68) in
1 3 the "A" steam generator was sleeved; all other tubes exceeding the
1 4 plugging limit will be plugged.

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
1 5	G (28)	0 0 0 (29)	N/A	C (31)	Eddy Current Examination

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
1 6	Z (33)	Z (34)	N/A	N/A

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
1 7	0 0 0 (37)	Z (38)	N/A

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
1 8	0 0 0 (40)	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
1 9	Z (42)	N/A

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
2 0	N (44)	N/A	

NAME OF PREPARER C. W. Fay PHONE: 414/277-2811

GPO 917-926

ATTACHMENT TO LICENSEE EVENT REPORT NO. 81-017/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant, Unit 1
Docket No. 50-266

On October 30, 1981, verification of all initial steam generator eddy current data for tubes with indications exceeding the plugging limit was completed. Ten tubes in the "A" steam generator and seven tubes in the "B" steam generator were verified to have degradations greater than 40%, which is the plugging limit of Technical Specification 15.6.2.A.5.

On October 9, Unit 1 was shut down for refueling. The 2000 psid primary-to-secondary hydrostatic test condition was established during cooldown of the unit. An 800 psig secondary-to-primary leak check was performed in the "B" steam generator on October 24 (a similar test in the "A" steam generator will be performed after sleeving is completed). Detailed inspection of the "B" steam generator tubesheet with remote video equipment showed a total of seven explosive plugs which were either wet, coated with boric acid, or dripping at a slow rate (two to three drops per minute). Of the seven plugs, two had similar observations noted in previous outages. Based on the low primary-to-secondary leak rate before shut-down (less than ten gallons per day), the high personnel radiation exposure required for weld repair, and potential future sleeving of tubes in the "B" steam generator, the one dripping plug will not be repaired during this outage. The specific conditions noted during the leak check are noted below.

"B" Steam Generator

R23C38	explosive plug, leaking, two to three drops per minute
R28C39	explosive plug, wet end, no drips
R23C53	explosive plug, wet end, no drips
R29C34	explosive plug, coated with boric acid
R29C37	explosive plug, coated with boric acid
R24C37	explosive plug, coated with boric acid
R13C61	explosive plug, coated with boric acid

The plugs in tubes R28C39 and R23C53 were noted as wet end plugs in previous leak tests.

The eddy current inspection programs for the steam generators consisted of the following:

1. Inspections of all previously degraded tubes through the U-bend in each steam generator, in accordance with Technical Specification requirements.

2. Inspection of 3% of the tubes through the U-bend in the "A" steam generator and full length inspection of 3% of the tubes in the "B" steam generator, satisfying the Technical Specification requirements. The full length inspections in "B" steam generator were done as a precautionary measure after receiving reports of cold leg indications in the steam generators at Indian Point 3.

3. Inspection of essentially all tubes in each steam generator through the first support plate on the hot leg side.

4. Full length inspection of two tubes in the "A" steam generator that exhibited cold leg indications in previous eddy current examinations.

Of the 2,851 open tubes in the "A" steam generator, 2,766 were inspected and 2,792 of the 2,857 open tubes in the "B" steam generator were inspected. The number of tubes that were not inspected are as follows:

Number of Tubes Not Inspected		Reason For Not Inspecting
"A"	"B"	
31	32	Located under eddy current fixture foot.
17	16	Contained template plugs.
32	4	Restricted tube ends.
2	13	Restricted at first support plate with 0.700 probe.
2	0	Dented tube ends.
1	0	Poor eddy current data.
85	65	

These tubes were not inspected because of the radiation exposure associated with moving template plugs, manual eddy current probing, and preparing dented tube ends. The noninspected tubes constitute less than 3% of the unplugged tubes, most are not located in the zones where large numbers of defects have occurred, and the overall eddy current results did not indicate the necessity to inspect the tubes.

A summary of eddy current indications and comparisons with the July 1981 and December 1980 eddy current tapes are as follows:

"A" Steam Generator

Tube	October 1981 Indication	Comparison of October 1981 With July 1981 Tapes	Comparison of October 1981 With December 1980 Tapes
R20C60	27%, 5" ATS, CL	NT	<20%, 5" ATS, CL
R28C48	35%, 2" ATS, CL	NT	28%, 1" ATS, CL
R06C81	<20%, 1" ATS	NC	NC
R11C74	77%, 15-18" ATE	NC	NDD
R05C69	<20%, 1/2" ATS	NDD	NDD
R05C68	21%, 1/2" ATS	NC	NC
R15C68	UDI, 10-15" ATE	Small change	NDD
R18C68	80%, 15-17" ATE	Small change	NDD
R23C67	73%, 8" ATE	NDD	NDD
R08C64	77%, 12" ATE	NC	NDD
R15C60	UDI, 14-18" ATE	NC	NC
R15C59	UDI, 7-20" ATE	NDD	NDD
R08C55	UDI, 17" ATE	NC	NC
R10C54	<20%, TTS	NC	<20%, TTS
R33C54	38%, 1/2" ATS	DS	22%, 1/2" ATS
R29C47	UDI, 8-14" ATE	NC	NC
R25C47	57%, 18" ATE	Small change	UDI, 18" ATE
R15C 0	UDI, 8-14" ATE	NC	NC
R20C20	50%, 5" ATE	Some change	NDD
R10C21	90%, 15" ATE	NDD	NDD
R10C40	UDI, Roll to TTS	[illegible]	Some change
R25C44	UDI, 15" ATE	NC	UDI, 15" ATE
R11C43	UDI, 18-20" ATE	NC	NC
R23C43	67%, 5-7" ATE	Some change	UDI, 5-7" ATE
R23C42	70%, 20" ATE	TP, NT	NDD
R12C41	UDI, 12" ATE	Some change	NDD
R30C39	56%, 11" ATE	NC	Some change
R27C38	UDI, 20" ATE	NC	Some change
R23C38	UDI, 20" ATE	NC	NDD @ 400 KH
R18C37	UDI, 8" ATE	NC	UDI - some change
R31C37	UDI, 11" ATE	Some change	NDD
R36C29	38%, TTS	NC	NC
R05C07	UDI, 15" ATE	NC	NC

ATE - Above Tube End
NDD - No Defect Detected
UDI - Undefinable Indication
ATS - Above Tubesheet
TTS - Top of Tubesheet
NC - No Change
CL - Cold Leg
NT - Not Tested
TP - Template Plug
DS - Distorted Signal

"B" Steam Generator

Tube	October 1981 Indication	Comparison of October 1981 With July 1981 Tapes	Comparison of October 1981 With December 1980 Tapes
R02C13	80%, 6" ATE	NDD	NDD
R02C15	UDI, 6-11" ATE	NC	NC
R18C27	64%, Top of Roll	NC	DS
R20C28	77%, 3-17" ATE	NC	UDI
R27C30	25%, 1" ATS	28%, NC	29%, 1/2" ATS, NC
R14C40	29%, 1" ATS	28%, NC	32%, 1" ATS, NC
R26C42	29%, 1" ATS	21%, NC	NDD
R25C46	95%, 8" ATE	NDD	NDD
R26C47	44%, 8-20" ATE	NC	NDD
R27C52	70%, 20" ATE	NC	NC-DS
R11C78	75%, 8" ATE	NDD	NDD

ATE - Above Tube End
NDD - No Defect Detected
UDI - Undefinable Indication
ATS - Above Tubesheet
TTS - Top of Tubesheet
CL - Cold Leg
NT - Not Tested
TP - Template Plug
DS - Distorted Signal
NC - No Change

Plugging of 16 of the 17 tubes with indications greater than 40% is scheduled to be performed later in the outage. Tubes that have been verified to contain indications exceeding the plugging limit and are scheduled for plugging are as follows:

"A" Steam Generator		"B" Steam Generator	
R20C20	R25C47	R02C13	R26C47
R10C21	R08C64	R18C27	R27C52
R30C39	R23C67	R20C28	R11C78
R23C42	R11C74	R25C46	
R23C43			

One tube in the "A" steam generator, R18C68, which was found to have an indication greater than 40% was sleeved as part of the sleeving demonstration program.

The October 1981 results and the comparison with previous eddy current tapes demonstrate that the continued use of multi-frequency eddy current inspection techniques and additional experience in interpretation of the eddy current data have permitted identification of small volume eddy current indications present in previous indications but not called out as indications. Only four new indications were found in the "A" steam generator and only three new indications were found in the "B" steam generator.

The 24-hour notification preceding this report stated that eleven tubes in the "A" steam generator had indications exceeding the plugging limit. However, the condition of one of the tubes, R25C44, has since been reevaluated and is now reported as having an undefinable indication, changing the number of pluggable tubes from eleven to ten. The reevaluation of this tube is based on further examinations of the latest eddy current tapes and comparisons made with the tapes of previous eddy current examinations.

Restrictions with the 0.720 inch and the 0.700 inch eddy current probes were encountered in both steam generators. Twenty-seven of the 32 restricted tube ends encountered with the 0.720 probe in the "A" steam generator during this inspection were not noted in either the July 1981 or December 1980 inspections. The new restrictions are believed to have been caused by residue from the channelhead decontamination process performed on October 24-26, 1981. In the "B" steam generator, most of the tubes found restricted at the first support plate with the probes were also noted as restricted in the July 1981 and December 1980 inspections.

A crevice flush will be performed before the unit is returned to service to remove impurities from the tubesheet crevice.

The NRC Resident Inspector was notified of these findings. This event is reportable in accordance with Technical Specification 15.6.9.A.3 and is similar to others.

Return to power is scheduled for December 6, 1981.

DKP

POINT BEACH NUCLEAR PLANT

WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 54241

November 2, 1981

NED FILE COPY
PBT 11.5.5
LPR 41

Mr. J. G. Keppler, Director
Office of Inspection and
Enforcement, Region III
U.S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 81-017/01T-0
24-HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT

Licensee Code:	WIPBH1	Docket No.	50-266
License Type:	41111	Source:	L
License Number:	00-00000-00	Event Date:	10/30/81

Event Description: On 10/30/81 verification of all initial steam generator eddy current data of tubes with indications exceeding the plugging limit was completed. Eleven (11) tubes in the "A" steam generator and 7 tubes in the "B" steam generator were verified to have degradation greater than 40%, which is the plugging limit of Technical Specification 15.6.2.A.5.

The unit was shut down on 10/09/81 for a refueling outage, and eddy current started on 10/26/81. The extent of the inspection was essentially all readily-remotely accessible tubes to the first support, with over 3% of the tubes in the "A" steam generator being inspected over the U-bend and over 3% of the tubes in the "B" steam generator being inspected for the full length. All the defective tubes will be plugged or repaired prior to the unit's return to service.

The NRC Resident Inspector has been notified of this event. The event is being reported in accordance with Technical Specification 15.6.9.2.A.3.

R. E. Link

Telephone: 414/755-2321

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

July 16, 1981

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-266
LICENSEE EVENT REPORT NO. 81-008/01T-0
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report No. 81-008/01T-0 (a 14-day follow-up report) with an attachment which provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment."

Please note that the 24-hour written notification was incorrectly numbered 007 instead of 008.

Very truly yours,

Executive Vice President

Sol Burstein

Enclosure

Copies to NRC Resident Inspector
C. F. Riederer (PSCW)
Peter Anderson (WED)

Blind copies to Messrs. McNeer, Gorske/Finke, Fay, Porter, Reed, Charnoff, Zebroski (NSAC)

LICENSEE EVENT REPORT

CONTROL BLOCK: [| | | | |] (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Entry
01	Licensee Code (2)	W I P B H 1
01	License Number (3)	0 0 - 0 0 0 0 0 - 0 0
01	License Type (4)	4 1 1 1 1
01	CAT (5)	
CON'T 01	Report Source (6)	L
01	Docket Number (7)	0 5 0 0 0 2 6 6
01	Event Date (8)	0 7 1 0 8 1
01	Report Date (9)	0 7 1 6 8 1

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 The unit was shut down on 7-4-81 for the 150 EFPD steam generator eddy
03 current examination. On 7-10-81 verification of all initial eddy
04 current data of tubes with indication exceeding the plugging limit was
05 completed. Two tubes in each the "A" and "B" SG's had indications
06 >40%. Prior to eddy current examination a 2000 psid primary-to-
07 secondary and an 800 psig secondary-to-primary leak test was done. This
08 event is similar to others and reportable per T.S. 15.6.9.2.A.3.

09	System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp Subcode (15)	Valve Subcode (16)
	C B	E	D	H T E X C H	F	Z

(17) LER/RO Report Number	Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
	8 1	—	0 0 8	/	0 1	T	—	0

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
B	Z	Z	Z	0 0 0 0	Y	Y	N	W 1 2 0

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 Three of the indications were within the crevice and are considered to
11 be IGA caused by caustic. The fourth indication is 1/2" above the
12 tubesheet and is believed to be a remnant of phosphate wastage. The
13 four tubes with defects have been plugged. A crevice flush will be
14 conducted before startup and operation of the unit at reduced temperature will continue.

15	Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
	G	0 0 0	N/A	C	Eddy current examination

16	Activity Released (33)	Content of Release (34)	Amount of Activity (35)	Location of Release (36)
	Z	Z	N/A	N/A

PERSONNEL EXPOSURES

17	Number (37)	Type (38)	Description (39)
	0 0 0	Z	N/A

PERSONNEL INJURIES

18	Number (40)	Description (41)
	0 0 0	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

19	Type (42)	Description
	Z	N/A

PUBLICITY

20	Issued (44)	Description (45)	NRC USE ONLY
	N	N/A	

NAME OF PREPARER Sol Burstein PHONE 414/277-2121

GPO 917-926

ATTACHMENT TO LICENSEE EVENT REPORT NO. 81-008/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant, Unit 1
Docket No. 50-266

On July 10, 1981, verification of all initial steam generator eddy current data for tubes with indications exceeding the plugging limit was completed. Two tubes in the "A" steam generator and two tubes in the "B" steam generator were verified to have degradation greater than 40%, which is the plugging limit of Technical Specification 15.6.2.A.5.

On July 4, 1981, Unit 1 was shut down for steam generator eddy current inspection. The 2000 psid primary-to-secondary hydrostatic test condition was established while the unit was being cooled down. An 800 psig secondary-to-primary leak check was performed on July 6 and 7. Detailed inspections of the tubesheets with remote video equipment showed a total of nine explosive plugs which were either wet, boric acid coated, or dripping at a slow rate (less than one drop every one and one-half minutes). Of the nine plugs, five had similar observations noted in previous outages. Based upon the low leak rate before shut-down (four gallons per day) and potential steam generator demonstration sleeving during the fall 1981 refueling outage, the plugs were not repaired during this outage. The fact that weld repair of an explosive plug involves a relatively high personnel radiation exposure was also a major factor in deciding not to repair the explosive plugs at this time. The specific conditions noted during the leak check are noted below.

"A" Steam Generator

R03C09	explosive plug, wet, less than 1 drip/2 minutes
R19C33	explosive plug, wet, less than 1 drip/2 minutes
R24C37	explosive plug, wet, 1 drip/1.5 minutes
R33C50	explosive plug, boric acid coated
R21C49	explosive plug, wet end, no drips
R04C59	mechanical plug, boric acid ring, appears wet inside
R08C50	mechanical plug, boric acid ring, appears wet inside

"B" Steam Generator

R23C53	explosive plug, wet end, no drips
R29C35	explosive plug, wet, 1 drip/2 minutes
R04C46	mechanical plug, boric acid coated, appears wet inside
R29C41	weld repair, boric acid coated
R28C39	explosive plug, boric acid coated
R29C37	explosive plug, boric acid coated

Of the wet end and dripping plugs, the following have been noted in previous inspections:

R19C33 "A" steam generator
R24C37 "A" steam generator
R21C49 "A" steam generator
R23C53 "B" steam generator
R29C35 "B" steam generator

The eddy current inspection consisted of remote inspection of all readily accessible tubes to the first tube support plate. Of the 2,853 open tubes in the "A" steam generator, 2,814 were inspected and 2,816 of the 2,861 open tubes in the "B" steam generator were inspected. The tubes that were not inspected are tubes under the eddy current fixture foot (19 in "A" and 17 in "B"), the tubes that contain template plugs (17 in both "A" and "B", randomly located), and tubes with restricted tube ends which prevented the insertion of a .720 probe (3 in "A" and 11 in "B"). These tubes were not inspected because of the exposure associated with moving template plugs, hand probing, and opening tube ends. The non-inspected tubes constitute less than 2% of the unplugged tubes, most are not located in the zone where large numbers of defects have occurred and the overall eddy current results did not indicate that it would be necessary to inspect the tubes. The overall eddy current results and comparison with the December 1980 tapes are listed below:

"A" Steam Generator

Tube	Indication	December 1980 Reported	Comparison With December 1980 Tapes
R15C29	43%, 21" ATE	NDD	31%, small change
R23C36	49%, 8" ATE	NDD	small change
R20C20	<20%, 5" ATE	NDD	NDD, small change
R05C07	UDI, 15" ATE	NDD	no change
R18C37	UDI, 8" ATE	NDD	small change
R11C43	UDI, 18-20" ATE	UDI	no change
R23C43	UDI, 5-7" ATE	NDD	small change
R25C44	UDI, 13-15" ATE	UDI	no change
R25C47	UDI, 13-18" ATE	UDI	no change
R08C55	UDI, 17" ATE	UDI	no change
R15C60	UDI, 14-18" ATE	UDI	no change
R18C68	UDI, 15-17" ATE	NDD	small change
R10C54	32%, TTS	<20%	34% in July 1980
R33C54	<20%, 1/2" ATS	22%	34% in July 1980

ATE - Above Tube End
NDD - No Defect Detected
UDI - Undefinable Indication
ATS - Above Tubesheet

"B" Steam Generator

Tube	Indication	December 1980 Reported	Comparison With December 1980 Tapes
R03C25	80%, 17" ATE	NDD	small change
R06C43	33%, 21" ATE	NDD	no change
R16C47	52%, 1/2" ATS	NDD	no change
R27C30	29%, 1/2" ATS	29%	

ATE - Above Tube End
NDD - No Defect Detected
UDI - Undefinable Indication
ATS - Above Tubesheet

As in the past, all indications were small volume.

Besides the above listed indications, a number of restrictions were encountered with the .720 eddy current probe. In the "A" steam generator three tube ends and 23 first tube support plate restrictions were encountered. In the "B" steam generator 11 tube ends and 40 first tube support plate restrictions were encountered. Most of the same restrictions were noted in the July and December 1980 inspections. During the December 1980 inspection all but seven of the restrictions passed a .700 eddy current probe. Based on this experience, the restricted tubes were not gauged. Gauging of restricted tubes may be done during the refueling outage inspection.

The four tubes with indications greater than 40% were plugged on July 11, 1981. In addition, tube R06C43 in the "B" steam generator was also plugged. Correct plugging was visually verified the same day.

A crevice flush will be performed before the unit is returned to service in an attempt to remove impurities from the tubesheet crevice. Operation of the unit at a reduced temperature in order to reduce the corrosion rate will continue. However, the unit will be returned to service at a slightly higher temperature than that at which it has been operated since December 1979, assuming the results of the crevice flushing are satisfactory.

The NRC Resident Inspector was notified of these findings. This event is reportable in accordance with Technical Specification 15.6.9.A.3 and is similar to others.

Unit 1 return to power is scheduled for about July 20, 1981.

DKP

POINT BEACH NUCLEAR PLANT

WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 54241

July 10, 1981

NRC FILE COPY
PTI 11.5.5
LER U1

Mr. J. G. Keppler, Regional Director
Office of Inspection and
Enforcement, Region III
U.S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 81-007/01T-0
24-HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT

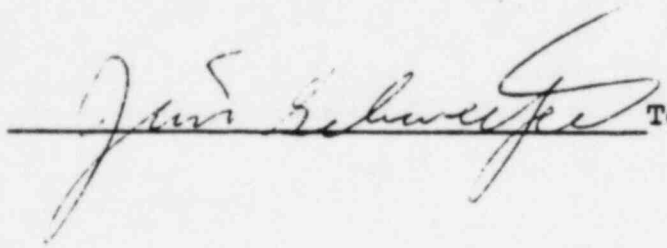
Licensee Code:	WIPBH1	Docket No.	50-266
License Type:	41111	Source:	L
License Number:	00-00000-00	Event Date:	07/10/81

Event Description: On 07/10/81 verification of all initial steam generator eddy current data of tubes with indications exceeding the plugging limit was completed. Two (2) tubes in the "A" steam generator and two (2) tubes in the "B" steam generator were verified to have degradation greater than 40%, which is the plugging limit of Technical Specification 15.6.2.A.5.

On 07/04/81 Unit 1 was shut down for a 150 EFPD steam generator eddy current inspection. The required 2000 psid primary-to-secondary condition was established while the unit was being shut down. An 800 psig secondary-to-primary leak check was performed on 07/06-07/81. Detailed inspections of the tubesheets with remote video equipment showed a total of nine (9) explosive plugs which were either wet, boric acid coated, or dripping at a slow rate (less than one drop every 1.5 minutes). Of the nine plugs, five had been noted in previous outages. Based upon this, the low leak rate before shutdown (four gallons per day), and potential steam generator sleeving or replacement, the plugs will not be repaired this outage.

The extent of the inspection was 100% of all readily remotely accessible tubes to the first tube support plate. About 2815 tubes were inspected in each steam generator.

The NRC Resident Inspector has been notified of the event. The event is being reported in accordance with Technical Specification 15.6.9.2.A.3.



Telephone: 414/755-2321

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

NRD FILE COPY
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11.5.5 (Unit 1
LER

December 23, 1980

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-266
LICENSEE EVENT REPORT NO. 80-014/01T-0
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report No. 80-014/01T-0 (a 14-day follow-up report) with an attachment which provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment."

Very truly yours,

C. W. Fay, Director
Nuclear Power Department

Enclosure

Copies to NRC Resident Inspector
Public Service Commission of Wisconsin
Wisconsin Environmental Decade

Blind copies to Messrs. McNeer, Burstein, Gorske/Finke, Porter, Reed, Charnoff, Zebroski (NSAC)

(7-77) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | W I P B H 1 (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | (5)

7 8 9 LICENSEE CODE 14 15 LICENSE NUMBER 25 26 LICENSE TYPE J0 57 CAT 58

CON'T

0 1 | REPORT SOURCE L (6) | 0 5 0 0 0 2 6 6 (7) | 1 2 1 1 8 0 (8) | 1 2 2 3 8 0 (9)

7 8 60 61 DOCKET NUMBER 68 69 EVENT DATE 74 75 REPORT DATE 80

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 | On 12-11-80 initial results from an ongoing refueling outage steam gen-

0 3 | erator eddy current inspection were received indicating the existence

0 4 | of some defective tubes. Prior to initiating the eddy current

0 5 | inspection, a 2000 psid primary-to-secondary and a 800 psid secondary-

0 6 | to-primary leak check was performed and no leaks were detected. This

0 7 | event is similar to others and reportable per T.S. 15.6.9.2.A.3.

0 8 | 7 9 80

0 9 | SYSTEM CODE C B (11) | CAUSE CODE E (12) | CAUSE SUBCODE D (13) | COMPONENT CODE H T E X C H (14) | COMP. SUBCODE F (15) | VALVE SUBCODE Z (16)

7 8 9 10 11 12 13 18 19 20

(17) LER/RO REPORT NUMBER: EVENT YEAR 8 0 (21 22) | — (23) | SEQUENTIAL REPORT NO. 0 1 4 (24 26) | / (27) | OCCURRENCE CODE 0 1 (28 29) | REPORT TYPE T (30) | — (31) | REVISION NO. 0 (32)

ACTION TAKEN B (18) | FUTURE ACTION Z (19) | EFFECT ON PLANT Z (20) | SHUTDOWN METHOD Z (21) | HOURS (22) 0 0 0 0 | ATTACHMENT SUBMITTED Y (23) | NPRD-4 FORM SUB. Y (24) | PRIME COMP. SUPPLIER N (25) | COMPONENT MANUFACTURER W 1 2 0 (26)

33 34 35 36 37 40 41 42 43 44 47

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 | A 100% inspection to the first support and a full tube length inspection

1 1 | of 3% was conducted during the outage. Three defects and five un-

1 2 | definable indications were found in the "A" SG and five defects and two

1 3 | undefinable indications were found in "B"; all within the tubesheet.

1 4 | The defects in "A" and all the indications in "B" have been plugged.

8 9 80

FACILITY STATUS G (28) | % POWER 0 0 0 (29) | OTHER STATUS (30) N/A | METHOD OF DISCOVERY C (31) | DISCOVERY DESCRIPTION (32) Eddy current examination

1 5 | 8 9 10 12 13 44 45 46 80

ACTIVITY RELEASED Z (33) | CONTENT OF RELEASE Z (34) | AMOUNT OF ACTIVITY (35) N/A | LOCATION OF RELEASE (36) N/A

1 6 | 8 9 10 11 44 45 80

PERSONNEL EXPOSURES: NUMBER 0 0 0 (37) | TYPE Z (38) | DESCRIPTION (39) N/A

1 7 | 8 11 12 13 80

PERSONNEL INJURIES: NUMBER 0 0 0 (40) | DESCRIPTION (41) N/A

1 8 | 8 9 11 12 80

LOSS OF OR DAMAGE TO FACILITY (43): TYPE Z (42) | DESCRIPTION N/A

1 9 | 8 9 10 80

PUBLICITY: ISSUED N (44) | DESCRIPTION (45) N/A | NRC USE ONLY

2 0 | 8 9 10 68 69 80

NAME OF PREPARER C. W. Fay PHONE: 414/277-2811

GPO 917-928

ATTACHMENT TO LICENSEE EVENT REPORT NO. 80-014/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant Unit 1
Docket No. 50-266

On December 11, 1980, at about 1400 hours, initial results from an ongoing steam generator eddy current inspection were received. At that time, two defects and one degraded tube had been found in the "A" steam generator and one defect was found in the "B" steam generator. The unit was shut down at the time for Refueling 8 and steam generator eddy current inspections.

While cooling down the plant for the refueling outage, a 2000 psid primary-to-secondary hydrostatic condition was established and after draindown, a 800 psig secondary-to-primary leak check was conducted. A detailed inspection of the tubesheet during the secondary-to-primary hydrostatic leak check showed no evidence of any leakage from the steam generator tubes, although two previously plugged tubes in the "A" steam generator and two previously plugged tubes in the "B" steam generator were observed to have "wet" tube plug ends.

The eddy current inspection program performed consisted of examination of 100% of the tubes up to the first support plate on the hot leg side; greater than 3% of the tubes plus all previously degraded tubes in the cold leg were inspected over their entire length. A list of all eddy current indications of degraded tubes found in the "A" and "B" steam generator is provided as an attachment. Three tubes in the "A" steam generator and five tubes in the "B" steam generator were identified as having crevice defects which exceeded the 40% tube plugging limit of Technical Specification 15.4.2.A.5. These tubes have been taken out-of-service with mechanical plugging devices. The attachment provides a comparison of the eddy current signals observed during this inspection with those signals recorded during the past three inspections. Continued refinement of the eddy current interpretation techniques, including use of a super-imposed 200 over a 100 KHZ signal during this inspection, have permitted licensee to identify extremely small volume defects which were present in previous inspections but could not be identified due to size and noise. We also have listed five tubes in the "A" steam generator and two tubes in the "B" steam generator which had very small volume but otherwise undefinable indications. These indications cannot be quantified as a tube defect but have been recorded as an abnormal signal. The two tubes in the "B" steam generator have been plugged but the five tubes in the "A" steam generator were left unplugged as potential sleeving candidates in the event of a demonstration program.

In August 1980, two tubes in the "A" steam generator, R10C54 and R33C54, had been identified with 34% small volume indications at or slightly above the tubesheet. Since these indications did not exceed the tube plugging criteria and the indications had remained essentially unchanged since at least the October 1979 inspection, these tubes were not plugged. We specifically re-examined these tubes during this outage. The results are provided as part of the attachment. We interpret these results as confirmation that the indication in these tubes are essentially unchanged. A similar tube, R27C30, was identified in steam generator "B" during this inspection and has remained essentially unchanged. No indications within the cold leg tubesheet region were observed and only one greater than 20% (28%) indication was observed above the tubesheet on the cold leg side. The 28% indication was previously identified as a degraded cold leg tube.

A total of 11 tube ends and 55 first tube support restrictions were encountered with a 0.720 probe. All except one tube end and eight first support restrictions passed a 0.700 probe, however. Only ten restrictions at various cold leg supports were encountered while performing the full tube length tube inspection.

Based on the results of this inspection and inspections conducted in July and March 1980, it appears that the rate of corrosion of the steam generator tubes in the tubesheet crevice region has been substantially reduced. The results of these inspections indicate that the condition of the steam generator has not changed significantly since the March 1980 inspections.

The NRC Resident Inspector was notified of these findings. This event is reportable in accordance with Technical Specification 15.6.9.2.3, and is similar to others.

Unit 1 return-to-power is scheduled for about December 29, 1980.

POINT BEACH NUCLEAR PLANT UNIT 1
STEAM GENERATOR INSPECTION RESULTS
NOVEMBER, 1980

Tube Identification	Indication Size/Location	Comparison to Previous Inspections 08-80	03-80	12-79
	Inlet - "A" Steam Generator			
R24C33	71%/11" ATE	Same	NDD	NDD
R11C35	63%/13" ATE	Same	*	*
R29C53	65%/11-13" ATE	*	NDD	NDD
R11C43	UDI/18-20" ATE	*	NDD	NDD
R25C44	UDI/13-15" ATE	NDD	NDD	NDD
R25C47	UDI/13-18" ATE	*	*	*
R08C55	UDI/17" ATE	NDD	NDD	NDD
R10C54	<20%/TTS	34%	Same	Same
R33C54	22%/½" ATS	34%	NT	NT
R15C60	UDI/14-18" ATE	*	*	*
R28C48	28%/1" ATS Cold Leg	Same	NT	NT
	Inlet - "B" Steam Generator			
R14C28	62%/21" ATE	Same	*	NDD
R19C30	UDI/20" ATE	Same	*	NDD
R26C37	UDI/12" ATE	NDD	NDD	NDD
R24C52	80%/5" ATE	Same	NDD	NDD
R03C60	80%/1" ATE	Same	*	NDD
R20C60	87%/19" ATE	*	NDD	NDD
R21C62	74%/20-21½" ATE	Same	Same	Same
R27C30	29%/½" ATE p.5	Same	NT	NT

ATE = Above tube end
NDD = No detectable defect
ATS = Above tubesheet
Same = Signal observed same as November 1980 signal
UDI = Undefinable indication
NT = Not tested
* = The signal appears to be the same, but it is not possible to say for sure because the small signal is masked by noise.

TUBES PLUGGED DURING THIS OUTAGE

"A" Steam Generator - R24C33, R11C35, R29C53

"B" Steam Generator - R14C28, R24C52, R03C60, R20C60, R21C62, R19C30, R26C37

POINT BEACH NUCLEAR PLANT
WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 54241

DKP

December 12, 1980

PTI1.5.5
LER U1

Mr. J. G. Keppler, Director
Office of Inspection and
Enforcement, Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 80-014/01T
24 HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT UNIT 1

Licensee Code:	WIPBH1	Docket Number:	50-266
License Type:	41111	Report Source:	L
License Number:	00-00000-00	Event Date:	12/11/80

Event Description: On 12/11/80 at about 1400 hours, initial results from the ongoing steam generator eddy current inspection were received. Two defects and one degraded tube were found in the "A" steam generator and one defect was found in the "B" steam generator with about one-third of the inspection program complete. All the defects were within the tubesheet region. A 100% inspection through the first tube support plate plus a full-length inspection of 3% of the tubes is being done. Also, all previous degraded tubes are being inspected. A complete listing of the inspection results will be submitted upon completion of the eddy current inspection program.

During cooldown of the unit, a 2000 psid primary-to-secondary hydrostatic condition was made. After draindown of the primary system a 800 psig secondary-to-primary leak check was conducted prior to initiation of eddy current testing. No leaks were found; only the existence of two wet end plugs in each steam generator were noted.

The NRC Resident Inspector has been notified of the event. The event is being reported in accordance with Technical Specification 15.6.9.2.A.3.

R. E. Link

Telephone: 414/755-2321

Blind copies to C. S. McNeer, Sol Burstein,
R. H. Gorske/A. W. Finke, D. K. Porter,
G. A. Reed, Gerald Charnoff,
E. L. Zebroski (NSAC)

NRD FILE COPY
PT11.5.5
LER 41

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

August 11, 1980

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-266
LICENSEE EVENT REPORT NO. 80-009/01T-0
POINT BEACH NUCLEAR PLANT UNIT 1

Enclosed is Licensee Event Report No. 80-009/01T-0 (a 14-day follow-up report) with an attachment which provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment".

Very truly yours,

C. W. Fay

C. W. Fay, Director
Nuclear Power Department

Enclosure

Copies to Resident Inspector
Point Beach Nuclear Plant

C. F. Riederer
Public Service Commission of Wisconsin

Peter Anderson
Wisconsin Environmental Decade

Joan Estes
Lakeshore Citizens for Safe Energy

NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

01 | W I P B H 1 (2) 0 0 - 0 0 0 0 0 - 0 0 (3) 4 1 1 1 1 (4) (5)
LICENSEE CODE | LICENSE NUMBER | LICENSE TYPE | CAT

CON'T 01 REPORT SOURCE L (6) 0 5 0 0 0 2 6 6 (7) 0 7 2 8 8 0 (8) 0 8 1 1 8 0 (9)
DOCKET NUMBER | EVENT DATE | REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 With the unit in cold shutdown for a required 90 effective full power
03 day steam generator testing program, an 800 psi secondary-to-primary
04 hydrostatic leak test of the steam generators was performed on 7-28-80.
05 In the "A" SG two dripping explosive plugs (R31C44 and R29C54) and two
06 wet end plugs (R24C37 and R21C49) were noted. In the "B" SG one
07 dripping tube (R21C48) and one wet end plug (R23C53) were noted. This
08 event is reportable per T.S. 15.6.9.2.A.3 and similar to others.

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
09	C B (11)	E (12)	D (13)	H T E X C H (14)	F (15)	X (16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
8 0	—	0 0 9	/	0 1	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
B (18)	Z (19)	Z (20)	A (21)	0 0 0 0	Y (23)	Y (24)	N (25)	W 1 2 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 A previously scheduled eddy current inspection program was performed.
11 28 tubes with indications in the "A" SG and 22 including the leaker in
12 the "B" SG were plugged. In addition, 3 tubes were mistakenly plugged
13 in the "A" SG. The two dripping plugs in the "A" SG were weld repaired,
14 and an 800 psi secondary-to-primary hydrostatic test of both SG's was
performed after repair.

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
15	G (28)	0 0 0 (29)	N/A	C (31)	Observed by inspector

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
16	Z (33)	Z (34)	N/A	N/A

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
17	0 0 0 (37)	Z (38)	N/A

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
18	0 0 0 (40)	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
19	Z (42)	N/A

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
20	N (44)	N/A	

NAME OF PREPARER C. W. Fay PHONE: 414/277-2811

GPO 917-820

ATTACHMENT TO LICENSEE EVENT REPORT NO. 80-009/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant Unit 1
Docket No. 50-266

In accordance with the Nuclear Regulatory Commission's modification of the November 30, 1979 Order dated April 4, 1980, Point Beach Nuclear Plant Unit 1 was taken out-of-service on July 25, 1980 for hydrostatic tests and eddy current examinations of the steam generator tubes.

An 800 psig secondary-to-primary leak check of both steam generators was performed on July 28. In the "A" steam generator, two dripping explosive plugs and two wet end plugs were identified in the hot leg with no leaks detected in the cold leg. In the "B" steam generator, one wet end explosive plug and one dripping tube were identified in the hot leg with no leaks detected in the cold leg. Pertinent information on the identified leaks is as follows:

"A" Steam Generator

R31C44 - 84% defect, explosively plugged 3/75, one drop every 20 seconds.

R29C54 - 75% defect, explosively plugged 4/74, one drop every 90 seconds.

R24C37 - 90% defect, explosively plugged 10/72, less than one drop every five minutes.

R21C49 - 45% defect, explosively plugged 10/72, wet end plug.

"B" Steam Generator

R23C53 - 68% defect, explosively plugged 11/75, wet end plug.

R21C48 - Leaking tube, slow drip about one drop every two minutes.

The eddy current inspection program consisted of an examination of 100% of the tubes to the first support plate on the hot leg side and 3% of the tubes inspected over their entire length. A listing of all hot leg eddy current indications found during this inspection and a comparison to previous inspections for both the "A" and "B" steam generators are provided in Attachment 1 to this submittal. A listing of tubes plugged during this inspection is provided in Attachment 2.

In the "A" steam generator hot leg, 30 tubes were identified with eddy current indications. Twenty-eight (28) indications were in the tubesheet crevice region and two tubes,

R10C54 and R33C54, had 34% small volume indications at the top of the tubesheet and one-half inch above the tubesheet, respectively. All 28 tubes with indications in the tubesheet crevice region have been mechanically plugged. Three additional tubes, R07C58, R07C59, and R07C51, were plugged inadvertently. The two dripping plugs in the "A" steam generator have been weld repaired and the steam generator was successfully hydrostatically leak checked on August 3, 1980. The two tubes with indications at the tubesheet and one-half inch above the tubesheet have been left unplugged since these indications do not exceed the Technical Specification plugging criterion. Further, review of old tapes revealed a stable condition of these tubes. These tubes will be re-examined during the next eddy current inspection.

In the "B" steam generator hot leg, 22 tubes were identified with tubesheet crevice indications. As discussed previously, tube R21C48 had been observed to be dripping during the hydrostatic leak check; however, no through-wall eddy current indication was observable during the inspection. All 22 tubes identified with tubesheet crevice indications have been mechanically plugged. A satisfactory hydrostatic leak check of the "B" steam generator was performed on August 5, 1980.

A review of all the available eddy current tapes from October and December 1979 and March 1980 for each of the tubes with eddy current indications was performed. A summary of this review is provided in Attachment 1. For some tubes, we have determined that small volume indications were probably present during one or more previous inspections by reviewing the previous tapes in close detail over the specific region of interest. Because of the small volume of the defects, the signal-to-noise ratio in previous inspections was so small that the evaluators were unable to identify the indications during their reviews.

Attachment 3 provides a listing of all cold leg eddy current indications found during the inspection of 3% of the tubes over their entire length. These results indicate that tube degradation on the cold leg side remains insignificant. No eddy current indications were found in the tubesheet crevice region, confirming previous experience.

The unit was returned to operation on August 9, 1980 in accordance with NRC authorization dated August 8, 1980.

This event is reportable in accordance with Technical Specification 15.6.9.2.A.3.

ATTACHMENT 1

EDDY CURRENT EXAMINATION RESULTS

"A" STEAM GENERATOR (INLET)

Tube	% Indication	Location	March, 1980	Dec., 1979	October, 1979
R22C18	73	6" above tube end	NT	NT	NDD
R28C26	23	5" above tube end	Same	<20 at Detect. Limit	NDD
	<20	20" above tube end	Same	Same	Same
R07C36	53	3" above tube end	NDD	NDD	NDD
R33C37	82	8" above tube end	NT	NT	NDD
R30C42	31	15-17" above tube end	NT	NT	NDD
R24C46	79	20" above tube end	Same	Same	NDD 400 and mix; same absolute
R08C50	<20	8" above tube end	Same	NDD	NDD
R09C50	85	20" above tube end	NDD	NDD	NDD
R12C50	<20	7" above tube end	Same	Same	NDD
R26C53	83	21" above tube	Same	Same	Small change
R33C54	34	½" above tubesheet	NT	NT	Same; better S/N ratio in 7-80
R10C54	34	Top of tubesheet	Same 400 KHZ Different Mix	Same 400 KHZ Different Mix	Same 400 KHZ Different Mix
R22C55	81	7-15" above tube end	NDD	NDD	NDD
R24C55	88	18-21" above tube end	Same	Same	NDD
R12C56	<20	11" above tube end	NDD	NDD	NDD
R08C58	54	15" above tube end	Same	NDD	NDD
R17C58	42	20" above tube end	<20	NDD	NDD
R27C59	69	8" above tube end	NT	NT	NDD

Tube	% Indication	Location	March, 1980	Dec., 1979	October, 1979
R05C61	92	10" above tube end	NT	NT	Same
R23C61	80	10" above tube end	Same		NDD
R18C62	59	10-15" above tube end	NT	NT	NDD
R27C62	34	15-20" above tube end	NT	NT	Same; smaller amplitude
R15C64	36	13" above tube end	33%	35%	NDD
R27C64	51	3" above tube end	NT	NT	NDD
R08C66	78	2½-6" above tube end	NT	NT	66%
R10C68	47	10-20" above tube end	NT	NT	Same
R08C70	50	20" above tube end	NT	NT	NDD
R09C72	76	20" above tube end	NT	NT	NDD
R08C75	89	20" above tube end	NT	NT	NDD
R08C76	Undefinable Defect	15-20" above tube end	NT	NT	Same

"B" STEAM GENERATOR (INLET)

R09C20	65	21" above tube end	NT	NT	NDD
R10C25	57	19" above tube end	Same	NDD	NDD
R14C27	42	20" above tube end	Same	Same	Same
R08C31	64	10" above tube end	NDD	NDD	NDD
R12C31	79	12-17" above tube end	Same	Same	NDD
R25C37	54	15-20" above tube end	Same	NDD	NDD
R27C38	48	20" above tube end	Same	NDD	NDD
R26C43	56	21" above tube end	Same	Same	Same

Tube	% Indication	Location	March, 1980	Dec., 1979	October, 1979
R21C48	46	3" above tube end	Same	Same	24%
R24C49	85	2½-5" above tube end	NDD	NDD	NDD
R20C50	67	17" above tube end	NDD	NDD	NDD
R28C51	82	2½-7" above tube end	Same	NDD	NDD
R27C53	75	5" above tube end	NDD	NDD	NDD
R24C54	80	11" above tube end	NDD	NDD	NDD
R29C62	75	2½-11" above tube end	NT	NT	NDD
R13C69	49	21" above tube end	NT	NT	Same
R13C71	83	20" above tube end	NT	NT	NDD
R02C74	90	2½-10" above tube end	NT	NT	NDD
R10C76	59	14-17" above tube end	NT	NT	NDD
R10C78	76	5" above tube end	NT	NT	NDD
	70	8" above tube end			
R02C80	82	5" above tube end	NT	NT	NDD
R04C46	61	10-17" above tube end	NT	NT	NDD

NT = Not Tested

NDD = No Detectable Defect

ATTACHMENT 2

SUMMARY OF TUBES PLUGGED
JULY-AUGUST, 1980

"A" STEAM GENERATOR

R22C18	R05C61	
R28C26	R23C61	
R07C36	R18C62	
R33C37	R27C62	
R30C42	R15C64	
R24C46	R27C64	
R08C50	R08C66	
R09C50	R10C68	
R12C50	R08C70	
R26C53	R09C72	
R22C55	R08C75	
R24C55	R08C76	
R12C56	R07C58	Plugged by Mistake
R08C58	R07C59	Plugged by Mistake
R17C58	R07C51	Plugged by Mistake Inlet Side Only
R27C59		

Total Tubes Plugged this Outage: 31
Total Tubes Plugged to Date: 404

"B" STEAM GENERATOR

R09C20	R28C51
R10C25	R27C53
R14C27	R24C54
R08C31	R29C62
R12C31	R13C69
R25C37	R13C71
R27C38	R02C74
R26C43	R10C76
R21C48	R10C78
R24C49	R02C80
R20C50	R04C46

Total Tubes Plugged this Outage: 22
Total Tubes Plugged to Date: 392

ATTACHMENT 3

EDDY CURRENT EXAMINATION RESULTS

"A" STEAM GENERATOR (OUTLET)

Tube	% Indication	Location
R28C48	29	½" above tubesheet
R24C52	<20	1" above tubesheet
R20C56	<20	1" above tubesheet
R24C56	<20	2" above tubesheet
R20C60	21	2" above tubesheet
R20C24	<20	2" above tubesheet

B" STEAM GENERATOR (OUTLET)

No eddy current indications observed.

POINT BEACH NUCLEAR PLANT
WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 54241

August 4, 1980

NED FILE COPY
A-11.5.5
LER 41

Mr. James G. Keppler, Regional Director
Office of Inspection and
Enforcement, Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 80-009/01T-0
24 HOUR WRITTEN NOTIFICATION
UNIT 1 STEAM GENERATOR PRIMARY-TO-SECONDARY LEAKAGE
POINT BEACH NUCLEAR PLANT

Licensee Code:	WIPBH1	Docket Number:	50-266
License Type:	41111	Report Source:	L
License Number:	00-00000-00	Event Date:	07/28/80

Event Description: With the unit in cold shutdown for the 90 effective full power day steam generator inspection, an 800 psig secondary-to-primary leak check of both steam generators was performed on 07/28/80. In the "A" steam generator, two dripping explosive plugs and two wet end explosive plugs were identified in the hot leg. In the "B" steam generator, one wet end explosive plug and one dripping tube were identified in the hot leg.

A 100% eddy current inspection of both steam generators is being performed. The results of the eddy current testing and other pertinent information will be supplied in the follow-up 14-day report.

This event is reportable in accordance with Technical Specification 15.6.9.2.A.3.

R. E. Link

Telephone: 414/755-2321

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

NED FILE
PTI1.5.5
LER-82

May 12, 1982

Mr. J. G. Keppler, Regional Administrator
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-301
LICENSEE EVENT REPORT NO. 82-002/01T-0
POINT BEACH NUCLEAR PLANT, UNIT 2

Enclosed is Licensee Event Report No. 82-002/01T-0 (a 14-day follow-up report) which provides a description of an event reportable according to Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment".

Very truly yours,

C. W. Fay

Assistant Vice President

C. W. Fay

Enclosure

Copies to NRC Resident Inspector
Peter Anderson (WED)

Blind copies to Britt, Burstein, Gorske/Finke, Porter, Reed, Charnoff, INPO Records Center

NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: [| | | | |] (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | W I P B H 2 (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | (5)
LICENSEE CODE | LICENSE NUMBER | LICENSE TYPE | CAT

CON'T 0 1 | REPORT SOURCE L (6) | 0 5 0 0 0 3 0 1 (7) | 0 4 2 8 8 2 (8) | 0 5 1 2 8 2 (9)
DOCKET NUMBER | EVENT DATE | REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

On 04/16/82 Unit 2 was shutdown for refueling 8. Steam generator eddy current started 04/24/82 and verification of the data for both SG's was completed on 04/29/82. The original inspection program and subsequent program expansions complied with the Tech. Spec. Seven tubes in the "A" SG and 6 tubes in the "B" SG were verified to have degradation in excess of 40%, which is the plugging limit. This event is similar to others and reportable per Technical Specification 15.6.9.2.A.3.

SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
C B (11)	E (12)	D (13)	H T E X C H (14)	F (15)	Z (16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
8 2	—	0 0 2	/	0 1	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
B (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	Y (24)	N (25)	W 1 2 0 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

Six of the indications in the "A" SG were caused by IGA in the tubesheet crevice. The remaining one in the "A" SG and all the indications in the "B" SG are remnants of phosphate wastage at the top of the tubesheet. All degraded tubes were plugged on 04/29/82. Sludge lancing and a crevice flush will be performed in an attempt to reduce corrosion.

FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
G (28)	0 0 0 (29)	N/A	C (31)	Eddy current examination

ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
Z (33)	Z (34)	N/A	N/A

PERSONNEL EXPOSURES

NUMBER	TYPE	DESCRIPTION (39)
0 0 0 (37)	Z (38)	N/A

PERSONNEL INJURIES

NUMBER	DESCRIPTION (41)
0 0 0 (40)	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

TYPE	DESCRIPTION
Z (42)	N/A

PUBLICITY

ISSUED	DESCRIPTION (45)
Z (44)	N/A

NRC USE ONLY

NAME OF PREPARER C. W. Fay PHONE 414/277-2811

GPO 917-928

ATTACHMENT TO LICENSEE EVENT REPORT NO. 82-002/01T-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant, Unit 2
Docket No. 50-301

On April 16, 1982, Unit 2 was shut down for its eighth annual refueling. Eddy current examination of the steam generators commenced on April 24, 1982. The original eddy current program for each steam generator was set up to meet the requirements of the Technical Specifications and Regulatory Guide 1.38. The "A" steam generator program consisted of inspecting 575 tubes through the U-bend. This included 276 tubes which were identified as having degradation in the hot leg during the Refueling 7 inspection. The "B" steam generator program consisted of inspecting 250 tubes through the U-bend and 31 tubes for the full length. The 250 tubes included 120 which were identified as having degradation in the hot leg during Refueling 7. All 31 tubes inspected for the full length had degradation identified in the cold leg during Refueling 7.

The eddy current program in both the "A" and "B" steam generator hot legs was expanded in accordance with the Technical Specifications as defects were identified. An expansion in excess of 200 tubes in the hot legs of both steam generators was performed after the original program. The results from the expansion in the "A" steam generator required an additional 400 tubes to be inspected, however, the program was expanded to include essentially all of the tubes in the area of concern. Based on the results of the expansion in "A", the program in "B" was also expanded to include essentially all of the tubes in the area of concern. This expansion in "B" was not required by the Technical Specification but was performed for prudent conservative engineering reasons. All the tubes in the expansion were inspected through the first tube support plate as the defects found were in the tubesheet region or just above the tubesheet. In excess of 60% of the tubes in the "A" steam generator and 50% of the tubes in the "B" steam generator were inspected.

A two-fold evaluation of the "B" steam generator cold leg indications was done to determine if it was necessary to expand the eddy current program in the cold leg. First, the history of the tubes with indications was looked at. The percentage size of the indication was compared with what was reported for the previous five years. Second, the Level IIA evaluator did a direct comparison of this year's eddy current signal with last year's signal. Both comparisons indicated that there was not a significant change in the condition in the cold leg and coupled with the exposure associated with setting up in the cold leg an expansion was not conducted.

The results of the eddy current inspection identified a total of 13 tubes which required plugging. The following table lists the tubes which required plugged along with three other tubes in the "A" steam generator which were plugged as a conservative measure.

"A" Steam Generator Hot Leg

Tube	Indication	Location
R16C34	96%	5" Above Tube End
R17C36	90%	5" Above Tube End
R20C38	77%	6-9" Above Tube End
R18C41	82%	8" Above Tube End
R18C43	Undefinable	9-13" Above Tube End
R17C45	Undefinable	12" Above Tube End
R13C46	89%	14" Above Tube End
R21C47	87%	14" Above Tube End
R12C63	48%	.5" Above Tubesheet
R19C63	27%	14" Above Tube End

"B" Steam Generator Hot Leg

Tube	Indication	Location
R23C26	55%	Top of Tubesheet
R23C27	43%	Top of Tubesheet
R27C27	41%	Top of Tubesheet
R23C28	53%	Top of Tubesheet
R21C34	43%	Top of Tubesheet
R06C44	55%	.5" Above Tubesheet

All of the above listed tubes were mechanically plugged on April 29, 1982. All of the tubes with indications at the top of the tubesheet or above had identifiable indications during the 1981 refueling outage. Only one of the tubes with indications in the tubesheet area had an identified indication during the 1981 refueling outage. Tube R19C63 had a 25% indication at 14" above the tube end in 1981.

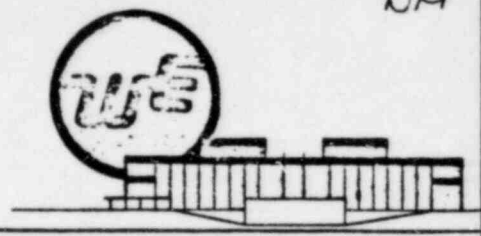
The indications within the tubesheet area are believed to be the result of intergranular attack caused by caustic corrosion. The indications at the top of the tubesheet or above are believed to be remnants of phosphate wastage as evidenced by the fact that they were noted during previous outages. The called indications are not significantly greater than the plugging limit and for the most part the difference in comparison to previous outages is within the expected range of scatter for small volume indications which are masked by a tubesheet signal.

In an attempt to reduce corrosion, the steam generators have been sludge lanced. Also, a crevice flush will be conducted prior to returning the unit to service. The crevice flush removes some of the corrosive materials from the crevice region.

This event is reportable in accordance with Technical Specification 15.6.9.2.A.3.

The Resident Inspector has been notified of this event.

DKP



POINT BEACH NUCLEAR PLANT

WISCONSIN ELECTRIC POWER COMPANY
6610 Nuclear Road, Two Rivers, Wisconsin 5424

April 29, 1982

MED FILE COPY
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Mr. J. G. Keppler, Regional Administrator
Office of Inspection & Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 82-002/01T-0
24 HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT UNIT 2

Licensee Code:	WIPBH2	Docket No.:	50-301
License Type:	4111	Report Source:	L
License Number:	00-000	Event Date:	04/28/82

Event Description: On 04/28/82, verification of steam generator eddy current data was completed for all tubes with indications exceeding the plugging limit in the "B" steam generator, and verification in the "A" steam generator was completed on 04/29/82. Seven tubes in the "A" steam generator and six tubes in the "B" steam generator were verified to have degradation in excess of 40%, the plugging limit of Technical Specification 15.4.2.A.5.

The unit was shut down on 04/16/82 for a refueling outage, and eddy current inspection was started on 04/24/82. The initial inspection program in the "A" steam generator included 575 tubes through the U-bend. The inspection program was expanded twice in accordance with Technical Specification 15.4.2.A and finally included all except peripheral tubes to the first support. The inspection program in the "B" steam generator included 250 tubes through the U-bend and 31 tubes full-length. Again the program was expanded in accordance with Technical Specification 15.4.2.A and finally included essentially all tubes between columns 23 and 61. A listing of inspection results will be submitted with the followup report. All tubes exceeding the plugging limit will be plugged prior to returning the unit to service.

The Resident Inspector has been notified of this event. The event is reportable in accordance with Technical Specification 15.6.9.2.A.3.

R. E. Link

Telephone: 414/755-2321

Wisconsin Electric POWER COMPANY
231 WEST MICHIGAN, MILWAUKEE, WISCONSIN 53201

May 11, 1981

Mr. James G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-301
POINT BEACH NUCLEAR PLANT UNIT 2
LICENSEE EVENT REPORT NO. 81-002/01T-0

Enclosed is Licensee Event Report 81-002/01T-0 (a 14-day report) which provides a description of an event reportable according to Technical Specification 15.6.9.2.A.3, "Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment."

Very truly yours,

C. W. Fay, Director
Nuclear Power Department

Enclosure

Copies to NRC Resident Inspector
Point Beach Nuclear Plant
Mr. C. F. Riederer
Public Service Commission of Wisconsin
Mr. Peter Anderson
Wisconsin's Environmental Decade

Blind copies to Messrs. C. S. McNeer, Sol Burstein, R. H. Gorske/
A. W. Finke, D. K. Porter, G. A. Reed,
Gerald Charnoff, E. L. Zebroski (NSAC)

LICENSEE EVENT REPORT

CONTROL BLOCK: (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

(2) LICENSEE CODE: WTPBH2 | LICENSE NUMBER: 00-00000-00 | (3) LICENSE TYPE: 41111 | (4) CAT: | (5)

CON'T

REPORT SOURCE: L (6) | DOCKET NUMBER: 05000318 (7) | EVENT DATE: 042081 (8) | REPORT DATE: 050181 (9)

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

On 4-20-81 an 800 psid secondary-to-primary leak check was performed in each steam generator during the Unit 2 Refueling 7 outage. One leaking plug was detected in the "A" steam generator. On 4-26-81 final results of the steam generator eddy current examination indicated the existence of some degraded and defective tubes in each steam generator. This event is similar to others and reportable per Technical Specification 15.6.9.2.A.3.

SYSTEM CODE (11)	CAUSE CODE (12)	CAUSE SUBCODE (13)	COMPONENT CODE (14)	COMP. SUBCODE (15)	VALVE SUBCODE (16)
CB	E	D	HTEXCH	F	Z

(17) LER/RO REPORT NUMBER	EVENT YEAR	SEQUENTIAL REPORT NO.	OCCURRENCE CODE	REPORT TYPE	REVISION NO.
	81	002	01	T	0

ACTION TAKEN (18)	FUTURE ACTION (19)	EFFECT ON PLANT (20)	SHUTDOWN METHOD (21)	HOURS (22)	ATTACHMENT SUBMITTED (23)	NPRD-4 FORM SUB. (24)	PRIME COMP. SUPPLIER (25)	COMPONENT MANUFACTURER (26)
B	Z	Z	Z	0000	Y	Y	N	W120

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

Essentially all of the tubes in the "A" steam generator and about 75% in the "B" steam generator were inspected through the first support plate, in addition to inspections required by Technical Specifications. 25 pluggable tubes were found in "A" and 16 were found in "B". One of these tubes was pulled for analysis. All tubes were plugged as of 4-30-81.

FACILITY STATUS (28)	% POWER (29)	OTHER STATUS (30)	METHOD OF DISCOVERY (31)	DISCOVERY DESCRIPTION (32)
G	000	N/A	C	Eddy current examination

ACTIVITY RELEASED (33)	CONTENT OF RELEASE (34)	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
Z	Z	N/A	N/A

PERSONNEL EXPOSURES

NUMBER	TYPE (38)	DESCRIPTION (39)
000 (37)	Z	N/A

PERSONNEL INJURIES

NUMBER	DESCRIPTION (41)
000 (40)	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

TYPE (42)	DESCRIPTION
Z	N/A

PUBLICITY

ISSUED (44)	DESCRIPTION (45)
N	N/A

NRC USE ONLY

NAME OF PREPARER C. W. Fay PHONE: 414/277-2811

GPO 817-928

ATTACHMENT TO LICENSEE EVENT REPORT NO. 81-002/01L-0

Wisconsin Electric Power Company
Point Beach Nuclear Plant Unit 2
Docket No. 50-301

On April 30, 1981, an 800 psig secondary-to-primary leak check was performed in each steam generator. Detailed inspections of the tubesheets with remote television equipment showed leakage from the explosive plug in the tube R32C15 in the "A" steam generator. The leakage rate was about two drops per minute. Another plug in the "A" steam generator (R31C52) was heavily coated with boric acid but no water was present. After considering the location of the leaking plug, which is in the tubesheet periphery, and the effect that repair of the plug would have on exposure, critical path, and problems associated with repairs in the area, the decision was made not to repair the plug during this outage. An additional consideration was the fact that the primary-to-secondary leakage rate in the steam generator was only one gallon per day before the outage.

The initial eddy current inspection programs for the "A" and "B" steam generators consisted of inspection through the U-bend of 3% of the tubes in each steam generator plus all previously degraded tubes, in accordance with Technical Specification requirements. Additionally, the "A" steam generator program included a full length inspection for a previous indication in the cold leg and inspections through the U-bend of about 190 tubes in connection with tube degradation at contact with anti-vibration bars (AVB) reported by other plants. The program for the "B" steam generator inlet included inspecting 33 previously degraded tubes through the U-bend and 172 randomly located tubes to meet Technical Specification requirements and for AVB tube degradation. The program for the "B" steam generator outlet consisted of inspection through the first support plate of all previously degraded tubes, inspection through the first support plate of about 200 tubes in problem areas determined by previous inspections, and inspection through the third support plate of about 170 tubes around the periphery, in connection with tube degradation in these areas reported at Prairie Island. The programs in the inlets of both steam generators were later expanded in accordance with Technical Specifications resulting in inspection of essentially all tubes in the "A" steam generator through the first support plate and approximately 75% of the tubes in the "B" steam generator through the first support. A summary of the extent of the inspection and the results are given in Table 1. A summary of eddy current indications by size and location is given in Table 2 and illustrated in Figures 1, 2, and 3.

Results of the eddy current inspections showed 25 pluggable tubes in the "A" steam generator and 16 pluggable tubes in the "B" steam generator. One of the tubes in the "A"

steam generator, R15C73, was pulled for detailed analysis and the hole was weld plugged on April 30, 1981. A degraded tube in the "B" steam generator, R24C25, had interference preventing insertion of a mechanical plug. The tube entrance area was re-rolled and then successfully plugged. Plugging of all tubes was completed on April 30, 1981. Photographs of the tubesheets taken later the same day verified plugging of the proper tubes. A list of eddy current indications of all pluggable tubes found in the steam generators is provided in Table 3. For a map showing all tubes plugged to date, see Figures 4 and 5. No evidence of AVB tube degradation or degradation of the type experienced at Prairie Island was observed in any of the tubes inspected.

To determine if tube degradation is progressing, a two-part comparison was done. The first part consisted of comparing the indication size reported in 1981 for all unplugged indications reported in 1980. The results of this comparison are shown in Table 4. After considering the inherent inaccuracies in evaluating and categorizing small volume eddy current indications which occur at or near the top of the tubesheet, the results indicate that the majority of the indications did not change. There is some indication of growth based just on the reported size of the indication. The second part of the comparison was performed by having a level IIA evaluator directly compare the 1980 and 1981 eddy current signals for the tubes with 40% or greater tube wall degradations in the "A" steam generator. This comparison was biased in that it concentrated on tubes which had a large change in the reported eddy current signal in 1981 as compared to 1980. Table 5 provides the result of this comparison. It too shows that there may be some growth in tube degradation but less than that implied by Table 4. A similar comparison for the "B" steam generator was not conducted since only four of the tubes with 40% or greater tube wall degradation in this outage had been inspected in 1980.

The results of earlier inspections of the "A" steam generator as previously reported to the NRC were also examined for those tubes having greater than 40% indications in 1981. This comparison is reported in Table 6. A similar comparison for the "B" steam generator indicated that only five of the tubes in the 40% or greater category had been inspected prior to 1980 and no degradation was reported in those inspections. The single frequency eddy current inspections in 1977, 1976 and 1974 indicated that many of these same tubes had either distorted tubesheet entry signals or indications of <20% wall degradation. Accordingly, we believe that the majority of the tubes plugged in this inspection had tube wall degradation for a significant period of time. The tube which was removed will provide additional information on the method of degradation. However, the indications being detected are believed to be the result of phosphate wastage and/or stress corrosion cracking. The results of previous steam generator inspections, as summarized in Table 7, have shown the existence of numerous eddy current indication and distorted tubesheet signal in the past. The continued use

and development of multi-frequency eddy current has given the evaluator the capability to identify and quantify small volume indications which were previously masked by the tubesheet entrance signal. A report on the results of the tube analysis will be provided at a later date.

This event is reportable in accordance with Technical Specification 15.6.9.2.A.3.

TABLE 1

SUMMARY OF EDDY CURRENT EXAMINATION

Type	Extent	"A" Inlet	"B" Inlet	"B" Outlet
Multi-frequency	U-Bend	491	208	
Multi-frequency	First Support	2,693	2,061	307
Multi-frequency	Third Support			163
Multi-frequency	Full Length	1		
	Total	3,185	2,269	470

Results			
90-100%	2	0	0
80-89%	0	0	0
70-79%	0	0	0
60-69%	0	2	0
50-59%	5	3	0
40-49%	20	11	0
30-39%	123	60	1
20-29%	150	62	30
Subtotal	300	138	31
<20%	309	81	253
Distorted	110	195	0
No Defect Detected	2,466	1,855	186
Total	3,185	2,269	470

TABLE 2

POINT BEACH NUCLEAR PLANT UNIT 2, APRIL, 1981, INSPECTION
EDDY CURRENT INDICATIONS BY SIZE AND LOCATION

	<20%	21-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-100%
1. "A" Hot Leg									
Top of Tubesheet	300	146	119	20	4	0	0	0	0
Deep Crevice	0	0	0	0	0	0	0	0	2
½" Above Tubesheet	9	2	0	0	1	0	0	0	0
17" Above Tubesheet	0	1	0	0	0	0	0	0	0
First Support Plate	0	1	3	0	0	0	0	0	0
Second Support Plate	0	0	1	0	0	0	0	0	0
Total	309	150	123	20	5	0	0	0	2
2. "B" Hot Leg									
Top of Tubesheet	70	55	58	11	3	2	0	0	0
½" Above Tubesheet	9	7	1	0	0	0	0	0	0
1" Above Tubesheet	1	0	1	0	0	0	0	0	0
2" Above Tubesheet	1	0	0	0	0	0	0	0	0
Total	81	62	60	11	3	2	0	0	0

3. "B" Cold Leg	<20%	20-29%	30-39%	>40%
Top of Tubesheet	0	0	0	0
½" Above Tubesheet	174	19	0	0
1" Above Tubesheet	64	7	0	0
1½" Above Tubesheet	15	4	1	0
Totals	253	30	1	0

("Top of tubesheet" equals indication at top of tubesheet or within 1/2" above or below top of tubesheet."

TABLE 3

TUBES PLUGGED DURING THIS OUTAGE

"A" Steam Generator

Tube Identification	Indication Size, %	Indication Location
R12C22	52	Top of tubesheet
R10C24	44	Top of tubesheet
R20C24	41	Top of tubesheet
R19C29	55	Top of tubesheet
R26C31	59	½" above tubesheet
R17C33	92/26	6" above tube end/Top of tubesheet
R19C39	92	9-13" above tube end
R12C41	46	Top of tubesheet
R20C41	41	Top of tubesheet
R23C41	45	Top of tubesheet
R12C43	42	Top of tubesheet
R13C44	45	Top of tubesheet
R19C44	51	Top of tubesheet
R21C44	51	Top of tubesheet
R22C44	49	Top of tubesheet
R10C45	43	Top of tubesheet
R11C45	41	Top of tubesheet
R23C45	47	Top of tubesheet
R33C49	43	Top of tubesheet
R25C55	42	Top of tubesheet
R21C62	47	Top of tubesheet
R19C66	46	Top of tubesheet
R12C71	41	Top of tubesheet
R17C71	41	Top of tubesheet
R15C73*	41	Top of tubesheet

"B" Steam generator

R06C17	60	Top of tubesheet
R07C17	66	Top of tubesheet
R06C18	41	Top of tubesheet
R06C19	41	Top of tubesheet
R06C20	46	Top of tubesheet
R06C22	46	Top of tubesheet
R14C22	46	Top of tubesheet
R22C25	46	Top of tubesheet
R24C25	46	Top of tubesheet
R26C25	41	Top of tubesheet
R26C26	41	Top of tubesheet
R22C29	44	Top of tubesheet
R15C32	54	Top of tubesheet
R09C64	53	Top of tubesheet
R06C74	46	Top of tubesheet
R08C76	50	Top of tubesheet

*Pulled and weld plugged.

TABLE 4

COMPARISON OF 1980 EDDY CURRENT RESULTS WITH 1981

	1980	1981					
	<20%	Still <20%	No Defect Detected	Increased <10%	Increased 10-20%	Increased >20%	Signal Distorted
"A" SG Inlet	253	130	28	69	16	2	8
"A" SG Outlet	9[1]	1	0	0	0	0	0
"B" SG Inlet	48	13	18	6	4	1	6
"B" SG Outlet	406[2]	208	5	9	0	0	0

	20-29%	Same ±3%	No Defect Detected	Decreased >3%	Increased 4-10%	Increased 11-20%	Increased >20%	Signal Distorted
"A" SG Inlet	118	42	3	8	36	22	3	4
"A" SG Outlet	0							
"B" SG Inlet	24	9	1	5	5	1	1	2
"B" SG Outlet	28	15	0	9	4	0	0	0

	30-39%	Same ±3%	No Defect Detected	Decreased >3%	Increased 4-10%	Increased 11-20%	Increased >20%	Signal Distorted
"A" SG Inlet	80[3]	26	0	12	21	7	0	4
"A" SG Outlet	0							
"B" SG Inlet	8	2	0	3	3	0	0	0
"B" SG Outlet	4	0	0	4	0	0	0	0

[1] Eight tubes not inspected in 1981.

[2] 184 tubes not inspected in 1981.

[3] 10 tubes were plugged in 1980.

TABLE 5

COMPARISON OF 1981 AND 1980 EDDY CURRENT SIGNALS
"A" STEAM GENERATOR INLET - POINT BEACH UNIT 2

Tube	1981 Reported	1980 Reported	Signal Comparison
R12C22	52	35	VC and DC
R10C24	44	37	Prob. NC
*R20C24	41	<20	DC and VC
R17C26	40	34	NC
R18C26	40	37	NC
R19C29	55	25	DC (small volume)
*R26C31	59	ND	DC and VC
R17C33	92	UI	NC (6" above tube end)
R19C39	92	ND	New (9" to 13" above tube end)
R12C41	46	35	NC
R20C41	41	25	NC
R23C41	45	31	NC
R12C43	42	35	NC
R13C44	45	32	NC
R19C44	51	34	NC
R21C44	51	33	NC
R22C44	49	<20	NC
R10C45	43	34	NC
R11C45	41	ND	DC and VC
R23C45	47	26	NC
R33C49	43	36	NC
R25C55	42	26	DC and VC
*R21C62	47	35	DC and VC
*R19C66	46	21	DC and VC
*R12C71	41	31	DC and VC
*R17C71	41	32	DC and VC
*R15C73	41	36	DC and VC (pulled)

Codes:

DC = Depth change
VC = Volume change
NC = No change
ND = No degradation reported
UI = Undefinable indication

Comparison of the Above Tubes:

The depth and/or volume changes in the eddy current test results from 1980 to 1981 range from small to moderate. Those tubes with asterisks (*) exhibit the most change from 1980 to 1981 in depth and/or volume. The test results are all analyzed off the mixing of 400 KHz and 100 KHZ to suppress the tubesheet signal and deposits on the OD of the tubing. The reevaluation of the 1980 test was done using the same mix as was used in 1981.

TABLE 6

STEAM GENERATOR A INLET
COMPARISON OF 1981 EDDY CURRENT RESULTS
WITH PREVIOUS EDDY CURRENT INSPECTION RESULTS

Inspection Results Reported

Tube	1981	1980	1979	1978	1977	1976	1974*
R12C12	52/TTS	35/TTS	--	--	--	--	--
R10C24	44/TTS	37/TTS	--	--	--	--	--
R20C24	41/TTS	<20/TTS	--	--	--	--	--
R19C29	55/TTS	25/TTS	--	ND	DTS	--	ND
R26C31	59/⅓	ND	--	ND	ND	ND	ND
R17C33	92/Crev.	<20/⅓	--	ND	<20/⅓	<20/⅓	<20/⅓
R19C39	92/Crev.	ND	--	ND	<20/⅓	<20/1	<20/1
R12C41	46/TTS	35/TTS	--	ND	DTS	<20/TTS	ND
R20C41	41/TTS	25/TTS	--	ND	<20/TTS	<20/TTS	<20/TTS
R23C41	45/TTS	31/TTS	--	ND	<20/TTS	<20/TTS	<20/TTS
R12C43	42/TTS	35/TTS	--	ND	ND	ND	ND
R13C44	45/TTS	32/TTS	--	ND	DTS	DTS	ND
R19C44	51/TTS	34/TTS	Cu	ND	ND	<20/TTS	21/TTS
R21C44	51/TTS	33/TTS	--	ND	DTS	DTS	ND
R22C44	49/TTS	<20/TTS	--	ND	DTS	DTS	ND
R10C45	43/TTS	34/TTS	--	ND	DTS	DTS	ND
R11C45	41/TTS	ND	--	ND	DTS	DTS	ND
R23C45	47/TTS	26/TTS	--	ND	DTS	ND	ND
R33C49	43/TTS	36/TTS	--	--	--	ND	--
R25C55	42/TTS	26/TTS	--	ND	DTS	DTS	ND
R21C62	47/TTS	35/TTS	--	ND	DTS	DTS	ND
R19C66	46/TTS	21/TTS	--	ND	DTS	--	--
R12C71	41/TTS	31/TTS	--	--	--	--	--
R17C71	41/TTS	32/TTS	--	--	--	--	--
R15C73	41/TTS	36/TTS	--	--	--	--	--

A/B = Percent Degradation/Location Above Tubesheet In Inches.
TTS = Top of Tube Sheet
Cu = Copper
ND = No Degradation Reported
DTS = Distorted Tubesheet Signal
-- = Not Inspected

*In 1975 the Unit 2 "A" Steam Generator was not eddy current inspected.

TABLE 7

SUMMARY OF PREVIOUS STEAM GENERATOR
EDDY CURRENT INSPECTION RESULTS
POINT BEACH NUCLEAR PLANT UNIT 2

Year Of Inspection	Number Of Tubes Inspected		Number Of Tubes Recorded With Following Degradations				
	A Inlet	B Inlet	> 40% A/B	39-30% A/B	29-20% A/B	< 20% A/B	DTS A/B
1974	1090	442	12/8	8/5	14/2	169/110	NR
1975	0	722	-/3	-/0	-/4	-/1	NR
1976	1223	1120	14/3	14/6	29/5	174/73	186/25
1977	1056	1457	0/4	12/7	28/5	153/51	493/997
1978	1335	796	1/0	6/7	18/5	19/7	NR
1979	570	455	0/1	6/3	5/3	20/10	NR
1980	3138	717	26/0	80/8	118/23	253/9	NR

DTS = Distorted Tube Sheet Signal

NR = None Reported

FIGURE 1

▲ 31 THROUGH 39% INDICATION

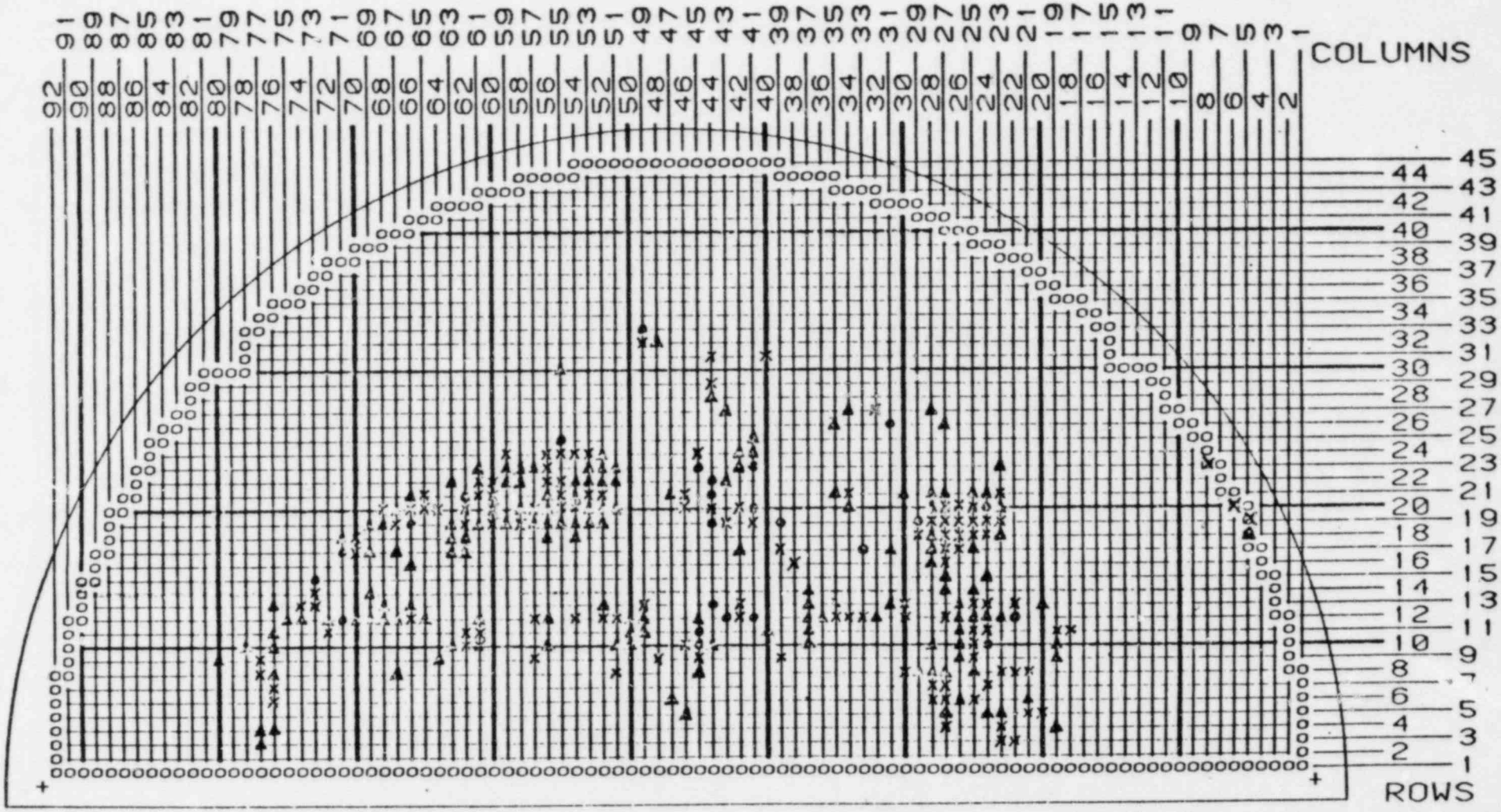
X 20 THROUGH 40% INDICATION

● 41% OR GREATER INDICATION

SERIES 44

UNIT 2

"A" INLET

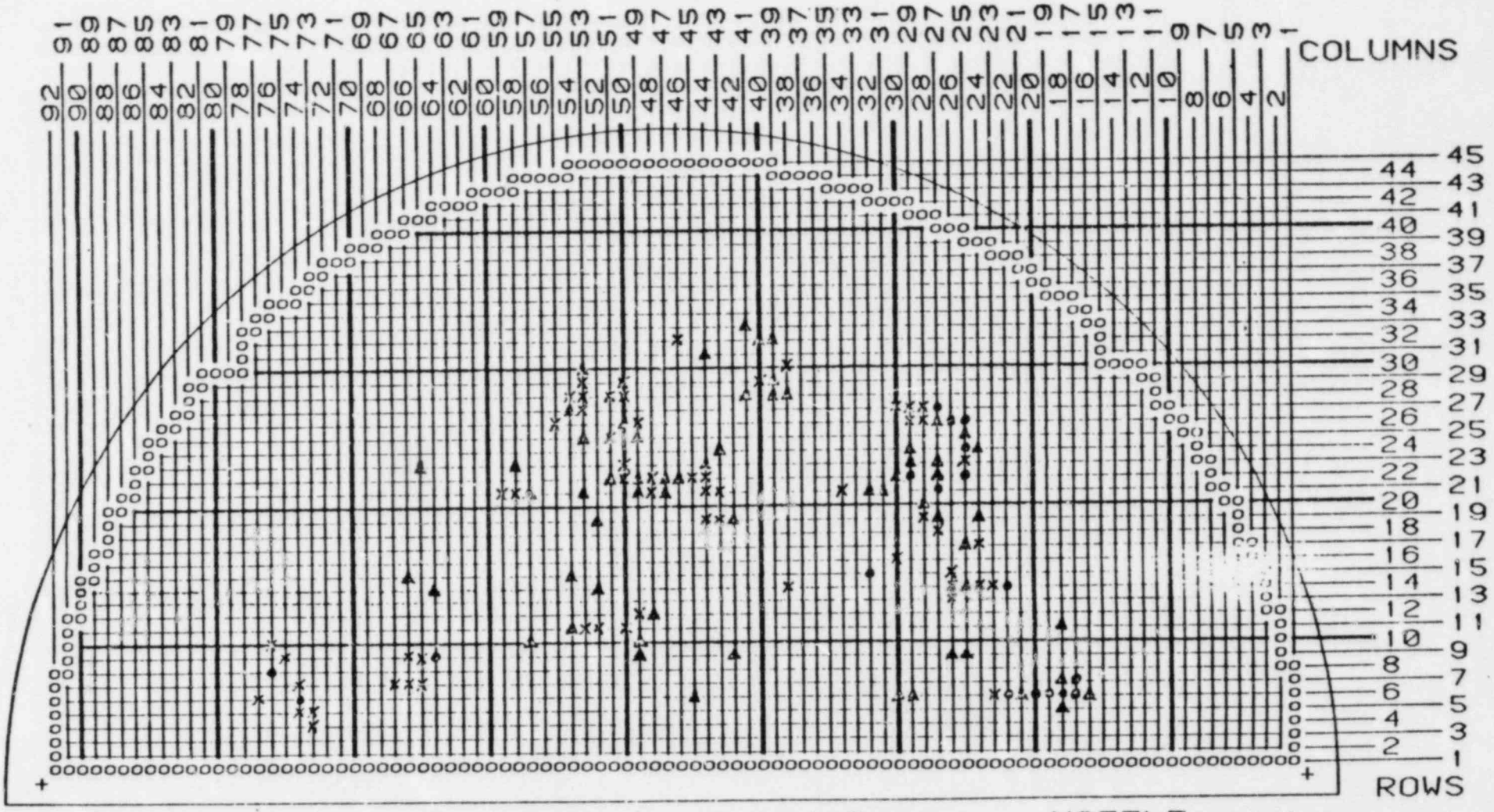


EDDY CURRENT INDICATIONS - REFUELING 7, APRIL, 1981

FIGURE 2

▲ 21 THROUGH 29% INDICATION
X 30 THROUGH 40% INDICATION
● 41% OR GREATER INDICATION

SERIES 44
UNIT 2
"B" INLET



EDDY CURRENT INDICATIONS - REFUELING 7, [illegible]
APRIL, 1981

FIGURE 3

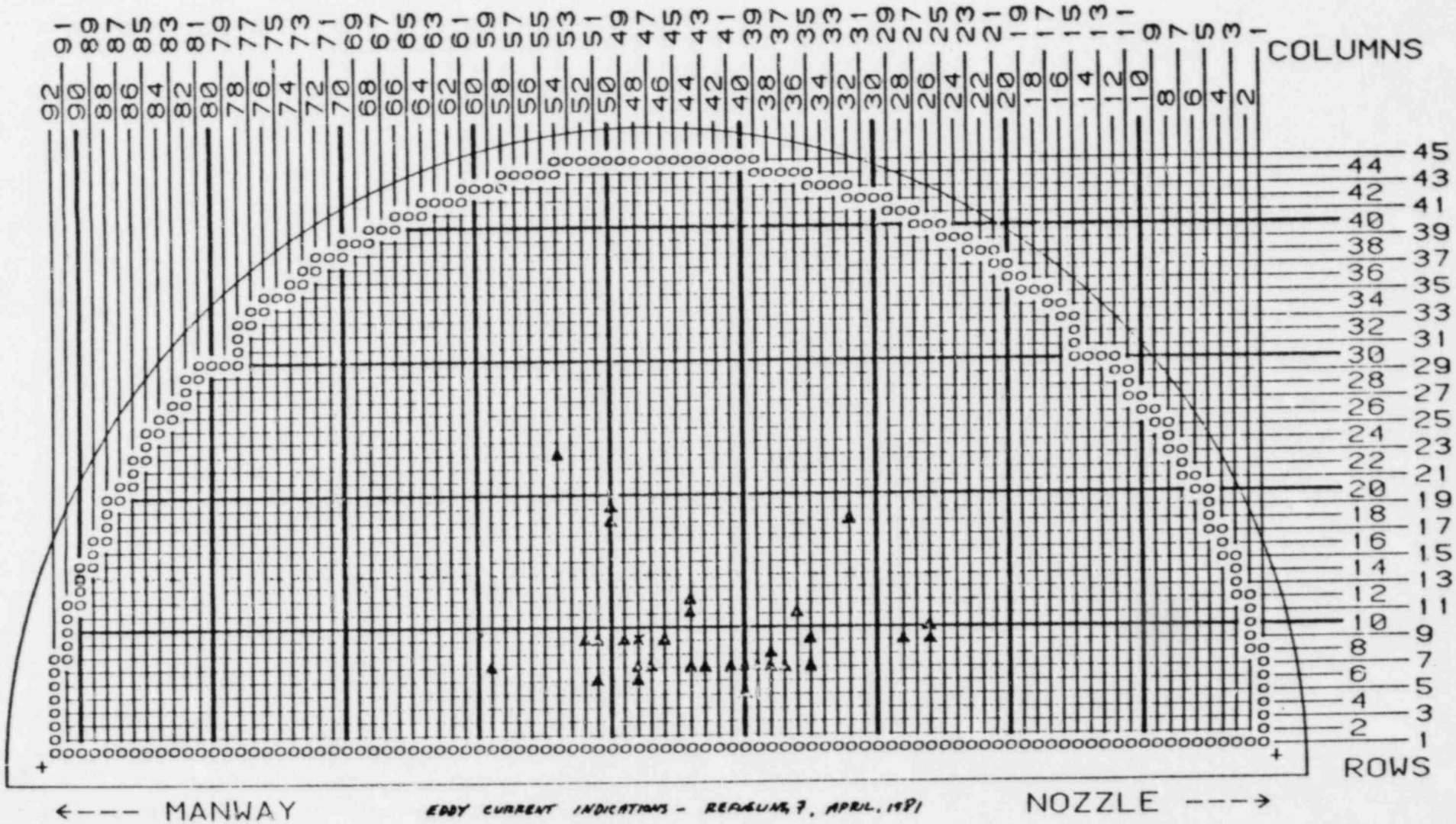
▲ 21 THROUGH 29% INDICATION

X 30 THROUGH 40% INDICATION

SERIES 44

UNIT 2

"B" OUTLET



EDDY CURRENT INDICATIONS - REFUELING 7, APRIL, 1981

FIGURE 4

"A" Steam Generator

Unit 2

4/81

SERIES 44

● Plugged Tube

○ Heavily Plugged Tube

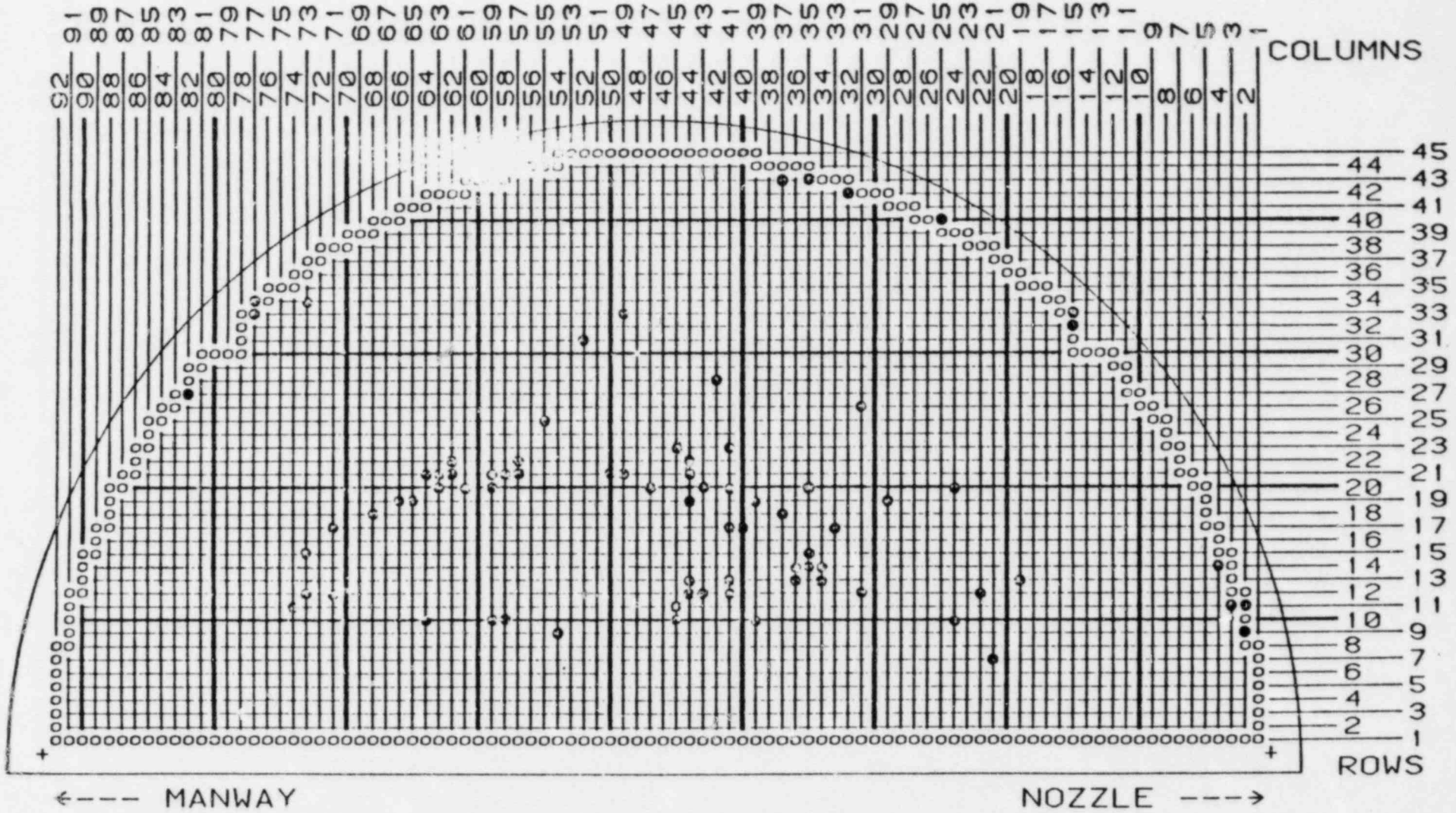


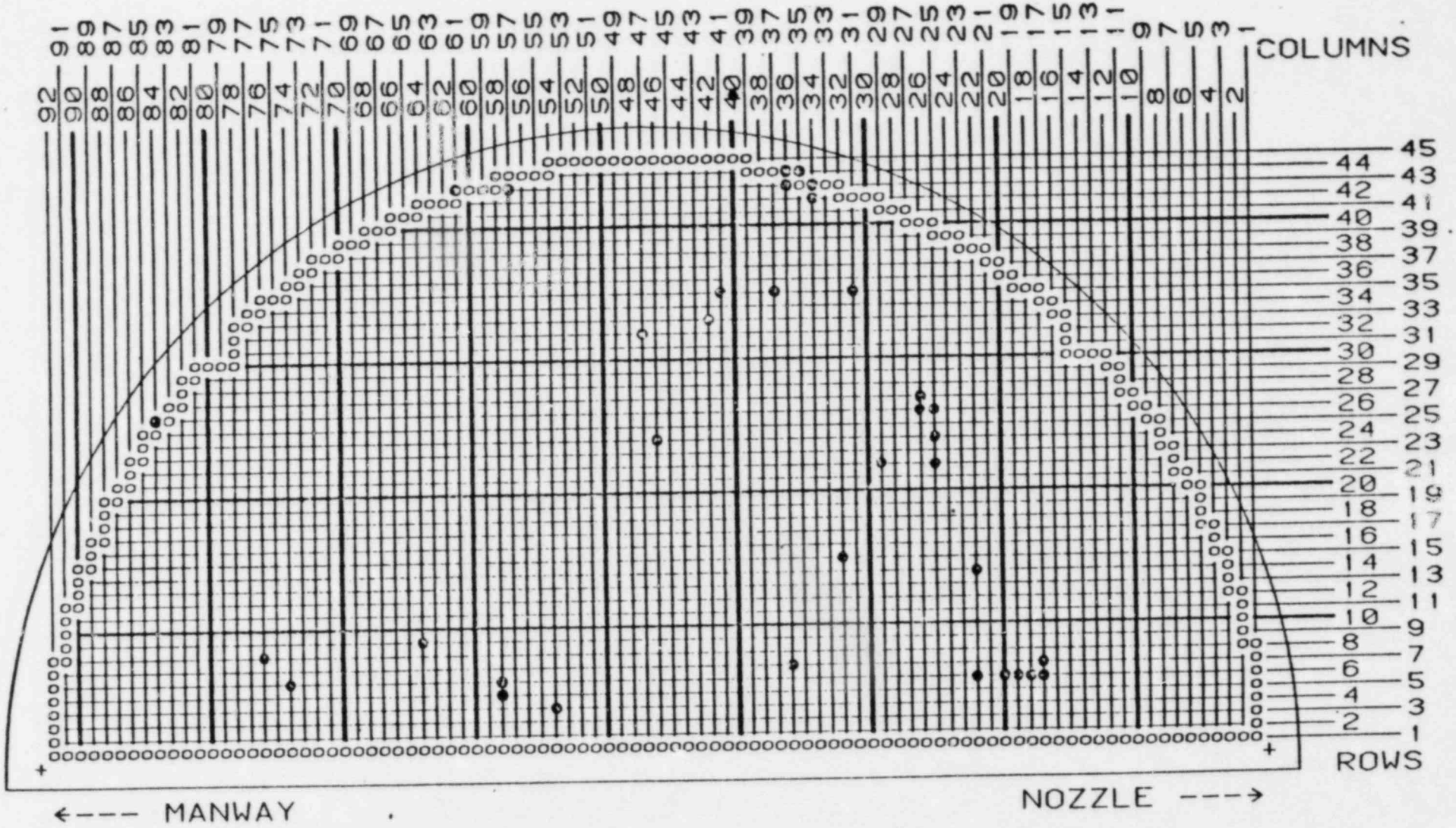
FIGURE 5

"B" Steam Generator

Unit 2

4/81

SERIES 44



DKP

POINT BEACH NUCLEAR PLANT

WISCONSIN ELECTRIC POWER COMPANY

6610 Nuclear Road, Two Rivers, Wisconsin 54241

April 27, 1981

NRC FILE COPY
PT11.5.5
LER 82

Mr. James G. Keppler, Regional Director
Office of Inspection and
Enforcement, Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Mr. Keppler:

LICENSEE EVENT REPORT NO. 81-002/01T-0
24-HOUR WRITTEN NOTIFICATION
DEGRADED STEAM GENERATOR TUBES
POINT BEACH NUCLEAR PLANT

Licensee Code:	WIPBH2	Docket No.:	50-301
License Type:	41111	Report Source:	L
License Number:	00-00000-00	Event Date:	04-26-81

Event Description: On 04-26-81, verification of all initial steam generator eddy current data of tubes with indications exceeding the plugging limit was completed. Twenty-five (25) tubes in the "A" steam generator and 16 tubes in the "B" steam generator were verified to have degradations greater than 40%, which is the plugging limit of Technical Specification 15.6.2.A.5. One of these tubes in the "A" steam generator is to be pulled for detailed analysis. The initial inspection of the "A" steam generator was done in accordance with Technical Specification requirements. An additional 130 tubes were inspected through the U-bend. The initial inspection program of the "B" steam generator was done in accordance with Technical Specifications. The programs in both steam generators were expanded in accordance with the Technical Specifications resulting in essentially all tubes in the "A" through the first support and approximately 75% of the tubes in the "B" through the first support. A complete listing of the inspection results will be submitted with the followup report.

An 800 psig secondary-to-primary leak check was performed in each steam generator on 04-20-81. Detailed inspections of the tubesheet with remote video equipment showed leakage from the explosive plug in tube R32C15 in the "A" steam generator. The

leakage rate was about two drops per minute. After considering the location of the tube and the effects that repair of the plug would have on exposure, critical path, and problems associated with the repairs in this area, it was decided that the plug would not be repaired during this outage. This plug will be reinspected on subsequent outages.

The NRC Resident Inspector has been notified of the event. The event is being reported in accordance with Technical Specification 15.6.9.2.A.3.

Robert E Link

R. E. Link

Telephone: 414/755-2321

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

NED FILE COPY
Ltr 11.5.5
LER U2

May 16, 1980

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NO. 50-301
POINT BEACH NUCLEAR PLANT UNIT 2
LICENSEE EVENT REPORT NO. 80-002/01T-2

Enclosed is Licensee Event Report No. 80-002/01T-2 (a revised report) with attachments. This report provides a description of an event reportable in accordance with Technical Specification 15.6.9.2.A.3. This revision is provided specifically to clarify the statements made regarding evaluation of previous steam generator inspection data.

Very truly yours,

C. W. Fay, Director
Nuclear Power Department

Enclosure

Copies to C. F. Riederer - PSCW
Peter Anderson - NED
Joan Estes - LSCFSE

Blind Copies to Messrs. C. S. McNeer
Sol Burstein
R. H. Gorske/A. W. Finke
D. K. Porter
G. A. Reed
Gerald Charnoff

NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

UPDATED REPORT - PREVIOUS REPORT SUBMITTED MARCH 12, 1980 & APRIL 16, 1980

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Field	Entry
01 Licensee Code (2)	W I P B H 2
License Number (3)	0 0 - 0 0 0 0 0 - 0 0
License Type (4)	4 1 1 1 1
Cat (5)	
CON'T 01 Report Source (6)	L
Docket Number (7)	0 5 0 0 0 3 0 1
Event Date (8)	0 2 2 7 8 0
Report Date (9)	0 5 1 6 8 0

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 During normal operation, indication of an increasing primary-to-
03 secondary leak in the "A" SG was noted on 02-27-80. The decision was
04 made to shut the unit down at 2340 hours on 02-27-80 and the unit was
05 off line at 0225 hours on 02-28-80. Chemistry results of a sample
06 taken at 0010 hours on 02-28-80 quantified a primary-to-secondary
07 leak rate of 1,420 gallons per day. This event is reportable per
08 T.S. 15.6.9.2.A.3 and is similar to previous LER's.

09	System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp. Subcode (15)	Valve Subcode (16)
	C B	E	D	H T E X C H	F	Z

(17) LER/RO Report Number	Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
	8 0	—	0 [illegible]	/	0 1	T	—	2

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub. (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
B	Z	A	A	0 3 5 2	Y	Y	N	W 1 2 0

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 A primary-to-secondary leak test performed on 03-01-80 revealed a
11 leaking tube in the "A" SG at position R18C37. Eddy current testing
12 began in both SG's on 03-03-80 and was completed on 03-09-80. One
13 degraded (41% defect) tube was found in the "B" SG and six defective
14 (>50%) tubes and 18 tubes with pluggable (40% to 49%) defects were found in the "A" steam generator.

15	Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
	E	0 9 9	N/A	A	Operator observation

16	Activity Released (33)	Content of Release (34)	Amount of Activity (35)	Location of Release (36)
	G	N	1.47 Curies	Air ejector

PERSONNEL EXPOSURES

17	Number (37)	Type (38)	Description (39)
	0 0 0	Z	N/A

PERSONNEL INJURIES

18	Number (40)	Description (41)
	0 0 0	N/A

LOSS OF OR DAMAGE TO FACILITY (43)

19	Type (42)	Description
	Z	N/A

PUBLICITY

20	Issued (44)	Description (45)	NRC USE ONLY
	Y	Newspaper, TV, and radio coverage	

NAME OF PREPARER C. W. Fay PHONE: 414/277-2811

ATTACHMENT TO LICENSEE EVENT REPORT NO. 80-002/01T-2

Wisconsin Electric Power Company
Point Beach Nuclear Plant Unit 2
Docket No. 50-301

Unit 2 was taken off line at 0225 hours on February 28, 1980 following confirmation of primary-to-secondary leakage in the "A" steam generator. The leak had begun as a slight indication about noon the previous day and gradually increased to 70 gallons per day (estimated) by 2200 hours on February 28. The decision was made to shut down at 2340 hours upon a further large increase in the air ejector radiation monitor reading. A static head leak check identified the leaking tube at position R18C37 and a subsequent eddy current inspection placed the defect at eight to ten inches above the tube end, i.e., 13 to 15 inches deep in the crevice of the tubesheet. The previously scheduled refueling outage steam generator eddy current inspection was performed during the outage. The extent of the inspection was expanded during the outage as six tubes with greater than 50% through-wall indications, in addition to the leaking tube, were discovered in the "A" steam generator. Eighteen tubes with indications between 40 and 49% were also found. The "A" steam generator hot leg program was first expanded by a 2S sample then to 100% as required by the Technical Specifications.

The 25 defective or degraded tubes in the "A" steam generator were explosively plugged on March 10, 1980. The leaking tube was mechanically plugged on the inlet side. This tube has been pulled during the April 1980 refueling outage for further examination.

Eight tubes which exhibited 39% defect indications were also explosively plugged as a conservative measure. Two tubes, R22C62 and R9C54, also with 39% defects, were plugged on the cold leg only. These tubes were mechanically plugged on the hot leg side during the April 1980 refueling outage.

An 800 psi hydrostatic test of the "B" steam generator revealed no leaking tubes or plugs. Approximately 700 tubes in each of the hot and cold legs of the "B" steam generator were examined and one cold leg tube was found to have a 41% defect indication. The one 41% degraded tube in the "B" steam generator was explosively plugged on March 9, 1980.

Unit 2 was placed on line at 1802 hours on March 13, 1980.

The average radioactive release rate via the Unit 2 air ejector during this event has been calculated to be 0.051% of the allowable annual release rate of 0.2 Curies per second.

This event is reportable per Technical Specification 15.6.9.2.A.3.

The approximate exposures recorded during the outage are as follows: (All exposure data are based on dosimeter information.)

Steam Generator Manway Work	1.8 Man Rem
Visual Inspections	0.8 Man Rem
Eddy Current Inspections	14.7 Man Rem
Tube Plugging	5.9 Man Rem
Health Physics Coverage	3.4 Man Rem

EDDY CURRENT RESULTS FOR PLUGGED TUBES

STEAM GENERATOR "A" INLET

Tube	% Defect	Location
R21C58	42	Top of tubesheet*
R10C59	39	Top of tubesheet
R20C59	41	Top of tubesheet
R21C59	39	Top of tubesheet
R20C61	42	Top of tubesheet
R20C63	51	Top of tubesheet
R21C63	56	Top of tubesheet
R10C64	42	Top of tubesheet
R21C64	46	Top of tubesheet
R19C65	51	Top of tubesheet
R18C68	39	Top of tubesheet
R12C73	43	Top of tubesheet
R34C73	43	First support plate
R11C74	39	Top of tubesheet
R07C21	39	Top of tubesheet
R13C19	40	Top of tubesheet
R12C31	41	Top of tubesheet
R13C34	43	Top of tubesheet
R14C34	57	Top of tubesheet
R14C35	42	Top of tubesheet
R15C35	44	Top of tubesheet
R13C36	42	Top of tubesheet
R14C36	39	Top of tubesheet
R10C39	45	Top of tubesheet
R13C41	56	Top of tubesheet
R18C37	100	9" above tube end
R28C42	45	Top of tubesheet
R20C43	39	Top of tubesheet
R12C44	41	Top of tubesheet
R20C47	39	Top of tubesheet
R21C57	43	Top of tubesheet
R22C57	42	Top of tubesheet
R10C58	52	Top of tubesheet

STEAM GENERATOR "B" OUTLET

R07C36	41	1½" above tubesheet

*The notation "top of tubesheet" refers to defect indications which have been separated from the tubesheet entry eddy current signal using multi-frequency techniques. The recent development of this technique, which was used for the first time on Unit 2 during this inspection, permits much better discrimination of low volume defect indications from the tubesheet signal. During previous inspections, using only 400 KHZ eddy current signals, the majority of these top of tubesheet indications were referred to as either distorted tubesheet signals or less than 20% indications. In some cases they were not characterized as abnormal signals. In only two of the tubes, R20C47 and R21C64, had previous tube defects at or near the tubesheet been consistently reported and quantified Table 1 summarizes the previous inspection reports of these tubes.

EDDY CURRENT RESULTS FOR PLUGGED TUBES - STEAM GENERATOR "A" INLET

In order to establish whether the remaining defects had been present in previous inspections, the 400 KHZ eddy current tapes for all previous tube inspections, dating from as early as 1974, were reviewed and compared to the 400 KHZ signal alone from this 1980 inspection. The object of this comparison was to evaluate whether the 400 KHZ eddy current tubesheet entry signal was essentially unchanged from inspection to inspection. It was concluded from this comparison that the majority of tubesheet entry signals for those tubes having been previously inspected, were unchanged from the 1980 400 KHZ signal. From this comparison it was concluded that the majority of these top of tubesheet defect indications have been present but undetectable in previous eddy current inspections. Table 2 summarizes the results of this comparison.

TABLE 1
PREVIOUSLY REPORTED STEAM
GENERATOR EDDY CURRENT INSPECTION RESULTS
UNIT 2, "A" INLET

ROW - COL.		1980	1979	1978	1977	1976	1974
13	19	40 - TTS	NI	NI	NI	NI	NI
7	21	39 - TTS	NI	NI	NI	NI	NI
12	31	41 - TTS	NI	--	DTS	--	--
13	34	43 - TTS	NI	--	DTS	--	--
14	34	57 - TTS	NI	--	DTS	--	--
14	35	42 - TTS	NI	--	DTS	--	--
15	35	44 - TTS	NI	--	DTS	DTS	--
13	36	42 - TTS	NI	NI	<20-TTS	<20-TTS	<20-TTS
14	36	39 - TTS	NI	--	DTS	--	--
10	39	45 - TTS	--	NI	NI	--	--
13	41	56 - TTS	NI	NI	DTS	DTS	--
28	42	45 - TTS	NI	NI	NI	<20-1/2"ATS	<20-1/2"ATS
20	43	39 - TTS	COPPER	--	DTS	<20-1/2"ATS	23-1/2"ATS
12	44	41 - TTS	NI	--	<20-TTS	<20-TTS	--
20	47	39 - TTS	30-1/2"ATS	31-1/2"ATS	30-1/2"ATS	31-1/2"ATS	23-1/2"ATS
9	54	39 - TTS	NI	NI	DTS	<20-1/2"ATS	<20-1/2"ATS
21	57	43 - TTS	NI	--	<20-TTS	<20-TTS	--
22	57	42 - TTS	NI	--	DTS	NI	--
10	58	52 - TTS	NI	--	DTS	DTS	--
21	58	42 - TTS	NI	NI	<20-1/2"ATS	<20-1/2"ATS	<20-TTS
10	59	39 - TTS	NI	--	<20-1/2"ATS	<20-1/2"ATS	<20-1/2"ATS
20	59	41 - TTS	NI	--	<20-TTS	<20-TTS	<20-TTS
21	59	39 - TTS	NI	NI	DTS	DTS	--
20	61	42 - TTS	NI	--	DTS	DTS	--
22	62	39 - TTS	NI	--	DTS	DTS	--
20	63	51 - TTS	NI	--	DTS	DTS	--
21	63	56 - TTS	NI	--	<20-TTS	<20-TTS	<20-TTS
10	64	42 - TTS	NI	NI	DTS	--	NI
21	64	46 - TTS	30-TTS	COPPER	21-TTS	22-TTS	NI
19	65	51 - TTS	NI	--	DTS	NI	NI
18	68	39 - TTS	NI	NI	NI	NI	NI
12	73	43 - TTS	NI	NI	NI	NI	NI
34	73	43 -#1TSP	NI	NI	NI	NI	NI
11	74	39 - TTS	NI	NI	NI	NI	NI

TTS = Top of Tubesheet
NI = Not Inspected
ATS = Above Tubesheet
TSP = Tube Support Plate
DTS = Distorted Tubesheet Signal
-- = Inspected with No Signal Comment

TABLE 2

COMPARISON OF PREVIOUS EDDY CURRENT SIGNAL

The following table presents the results of the visual comparison of previously recorded 400 KHZ tubesheet entry signals to the 1980 inspection 400 KHZ tubesheet entry signal for the listed tubes from the "A" steam generator inlet. Tubes R7C21, R13C19, R18C68, R12C73, R34C73 and R11C74 were not inspected prior to 1980.

NI = Not inspected S = Signal same as 1980

ROW	COLUMN	1979	1978	1977	1976	1974
12	31	NI	SMALL CHANGE	ALMOST NORMAL	ALMOST NORMAL	SAME AS 1976
13	34	NI	S	S	S	CHANGE
14	34	NI	POSSIBLE CHANGE	S	ALMOST NORMAL	SAME AS 1976
14	35	NI	POSSIBLE CHANGE	S	S	S
15	35	NI	SOME CHANGE	SAME AS 1978	S	CHANGE
13	36	NI	NI	S	S	S
14	36	NI	POSSIBLE CHANGE	SAME AS 1978	S	S
10	39	POSSIBLE CHANGE	NI	NI	SAME AS 1979	CHANGED
13	41	NI	NI	CHANGED	SAME AS 1977	SAME AS 1977
28	42	NI	NI	NI	S	S
20	43	S	S	S	S	SMALL CHANGE
12	44	NI	POSSIBLE CHANGE	S	S	SMALL CHANGE
20	47	S	S	S	S	S
9	54	NI	NI	SMALL CHANGE	SAME AS 1977	CHANGED
22	57	NI	S	S	NI	S
10	58	NI	CHANGED	SOME CHANGE TO 1978	SAME AS 1977	SAME AS 1977
21	58	NI	NI	S	S	S
10	59	NI	CHANGE	SAME AS 1978	SAME AS 1977	SAME AS 1977
20	59	NI	S	S	S	S
21	59	NI	NI	S	S	SMALL CHANGE
20	61	NI	S	S	CHANGE	S
22	62	NI	S	S	S	S
20	63	NI	POSSIBLE CHANGE	S	S	S
21	63	NI	POSSIBLE CHANGE	S	S	S
10	64	NI	NI	S	CHANGE	NI
21	64	S	S	S	CHANGE	NI
19	65	NI	S	S	NI	NI
21	57	NI	S	S	S	S

JUDGE BLOCH: Back on the record.

MR. ANDERSON: I'd like to indicate, if I understand it correctly, that we have had marked as Intervenor's Exhibit 2 the Licensee Event Reports for Wisconsin Electric, Point Beach Nuclear Plant Unit 1, dated December 15, 1982. I'm sorry, November 15, 1982, April 16, 1982, November 13, 1981, July 16, 1981, December 23, 1981, August 11, 1980, and, for Unit 2, May 12, 1982, May 11, 1981, May 16, 1980.

JUDGE BLOCH: That is correct.

BY MR. ANDERSON: (Resuming)

Q Mr. McKee, if I may show you the LER dated November 15, 1982 and the LER dated April 16, 1982, both for Unit 1, Point Beach, and can we look at the --

MR. CHURCHILL: Excuse me. Can we wait until we get these?

MR. ANDERSON: Oh, sure.

MR. CHURCHILL: Your Honor, we have given our witnesses a set of these LERs, if that will facilitate this.

JUDGE BLOCH: Off the record.

(A discussion was held off the record.)

JUDGE BLOCH: Back on the record.

BY MR. ANDERSON: (Resuming)

Q Would you look, sir, Mr. McKee, with me at the

November 15, '82 LER for 81. On page two, for the A steam generator hot leg, would you indicate what percent defect is shown for tube R-13-C-49?

A (WITNESS MC KEE) Eighty-nine percent.

Q And would you refer now to the April 16, '82 LET for Unit 1 at page three, which also shows the A steam generator hot leg results, and indicate whether that tube R-13-C-48 is also shown in the April LER as having a defect indicated?

A (WITNESS MC KEE) Would you repeat that?

Q Would you refer to the April 16, '82 LER, page three, A steam generator, and indicate whether the results show any defect indicated for a tube R-13-C-48?

A (WITNESS MC KEE) With a quick glance, I don't see it.

Q And would you look at the next tube, R-41-C-48? What defect is indicated?

A (WITNESS MC KEE) Ninety-one.

Q And would you look in the April LER and see if it is indicated there?

A (WITNESS MC KEE) It is not.

MR. ANDERSON: I want to indicate for the record, Mr. Chairman, that I have indicated to the parties and I am willing to indicate here we are willing to stipulate these LERs into evidence as a way of

expediting the tube-by-tube cross examination, but I would make an offer at this point and see if the parties respond.

MR. CHURCHILL: Your Honor, I don't fully understand what his intentions are, what he is driving at, or what he intends to cross examine these witnesses on based on this.

JUDGE BLOCH: Off the record.

(A discussion was held off the record.)

(Whereupon, at 12:10 o'clock p.m., the hearing recessed, to reconvene at 1:15 o'clock p.m., the same day.)

AFTERNOON SESSION

(1:15 P.M.)

JUDGE BLOCH: Mr. Churchill?

MR. CHURCHILL: Your Honor, I talked with Mr. Anderson over the lunch break on the question of stipulating in certain information to avoid long, arduous hours of cross examination, and what we have agreed to is that I will agree to stipulate into the record the LER's that have been identified as Intervenor's Exhibit 2 on the understanding that they will be used by Mr. Anderson solely for the purpose of demonstrating that there are cases where there have been defects called out and that the same defects existed before and that they were not called out before.

And furthermore, Mr. Anderson tells me that that will obviate his need to cross examine these two witnesses any more on the basis of the LER's, and it will obviate the need for him to cross examine Mr. Fletcher on the LER's with respect to -- with the exception of one aspect, which has to do with degradation on the cold leg side of the tubes.

And with that understanding, the applicant would be willing to stipulate into the record Intervenor's Exhibit 2.

JUDGE BLOCH: Mr. Anderson, is that

understanding acceptable to you?

MR. ANDERSON: Substantially, though I think on a non-substantive basis Mr. Churchill slightly misspoke. The use is not to compare the defects shown in a latter inspection to a defect in a preceding inspection, but to whatever the result was in a preceding inspection. I think that would be just a question of misstatement.

MR. CHURCHILL: With that clarification, that is okay with the applicant as well.

JUDGE BLOCH: Does the staff have any objection?

MR. BACHMANN: The staff has no objection to the stipulation as stated. I wish to make it clear that we would object to any use of the LER's in findings for any other purpose than we have just heard stated.

MR. CHURCHILL: That is my understanding of the limitation that I spoke of.

JUDGE BLOCH: Is that your understanding also, Mr. Anderson?

MR. ANDERSON: That is correct.

JUDGE BLOCH: With that understanding, the stipulation is accepted by the board.

Off the record.

(Whereupon, a discussion was held off the

record.)

JUDGE BLOCH: Mr. Anderson, do I understand you are resting with these witnesses, or do you have other areas not covered by the stipulation?

MR. ANDERSON: Just one, and that relates to an area we left off on on Mr. Fletcher, and I don't want to transgress the ruling of the board. Let me make sure I understand the previous ruling of the board from yesterday on the question of inspectability of the sleeve tube in the area above the upper joints, and if I understand the ruling of the board was that it would require a motion of some sort, an affirmative ruling before it could be cross examined on. Is that a correct understanding?

JUDGE BLOCH: It is our understanding that was not an admitted issue for the purpose of this hearing.

MR. ANDERSON: What I am trying to get at is, I would like to ask a very few questions on that area of these witnesses, and if I can't do it in evidence, I would like to do it as an offer of proof by question and answer.

JUDGE BLOCH: Mr. Churchill?

MR. CHURCHILL: I am not sure I heard everything. Were you referring to inspectability of the tubes beyond the sleeve?

MR. ANDERSON: Beyond the sleeve, above the sleeve.

MR. CHURCHILL: No, sir, I would object to that.

JUDGE BLOCH: I also do not think that it is proper to have offers of proof that are entirely outside the scope of the hearing, so we won't allow it on that basis either.

MR. ANDERSON: Well, if I could impose one brief moment, Mr. Chairman, I think it would be useful. I think the time to consume to have that hearing in the avent the motion is favorably ruled upon would be very small, in addition to the time consumed in this proceeding. While if the motion is later on moved affirmatively and it hadn't been offered as an offer of proof here, the time and expense would be saved.

JUDGE BLOCH: We have heard that before, and we ruled against you before, and so we will rule against you now. Now, are there are other areas to go into with these witnesses?

MR. ANDERSON: No, just the offer of proof.

JUDGE BLOCH: Does the staff have any questions of these witnesses?

MR. BACHMANN: Could we have one moment, sir?

(Pause.)

MR. BACHMANN: The staff has no questions of these witnesses.

JUDGE BLOCH: I just have one question. I would like to know if there is any area of difficulty in interpreting eddy current signals that comes up regularly, some difficulty or ambiguity that comes up regularly in examining these records that we haven't discussed this morning, that you would like to disclose to us at this time. If there is some area we ought to know about, that it is an irregular ambiguity that you face in interpreting these signals.

WITNESS DENTON: I think any time that you have a mechanical change in diameter of the tubing is at the end of a tube roll or, you know, in some cases in denting in tubes. Any time there is a significant mechanical distortion, it changes the inside diameter of the tube, that at the instant that diameter change is occurring, it is difficult, very difficult to determine the extent of defect in that area.

JUDGE BLOCH: Okay. You will get a chance to recross.

MR. ANDERSON: I had something outstanding about this morning. I had a question to figure out on an aspect of the ratio of signal to noise. It is not redirect. I am sorry. It is not recross. I ask the

leave of the board.

JUDGE BLOCH: I have a difficulty believing that it is an important question, an area that you spent minutes on, going over and over and over. Try one question.

BY MR. ANDERSON: (Resuming)

Q The question related to the 150 mil axial length SPD.

MR. CHURCHILL: Could you repeat that?

BY MR. ANDERSON: (Resuming)

Q The 150 mil axial extent -- defect, which meant that there was no complications that could be read down with 95 percent probability to a 40 percent through wall defect.

A (WITNESS DENTON) Yes.

Q And the question -- I think I phrased the question incorrectly -- was, if that is assumed to be with a three to one signal to noise ratio, and we went to a one to one ratio, and the defect, the noise was reduced to make it similar one to one as it was relative to the signal, what would be the through wall defect that you could still receive the same amount of reliability for reading?

A (WITNESS DENTON) You did confuse me with that question. The thing I have to know is, is the signal to

noise ratio the same or is the signal to noise ratio not the same?

JUDGE BLOCH: If you hold the signal constant, you reduce the noise, the signal to noise ratio increases, and if you hold the noise constant and increase the signal, the signal to noise ratio also increases.

MR. ANDERSON: I also understand.

JUDGE BLOCH: I don't understand what your problem is, once you take those facts as given. If you increase both the signal and noise at the same time, you don't change the ratio, and you also can't differentiate any better than you could before.

MR. ANDERSON: I understand that.

BY MR. ANDERSON: (Resuming)

Q If you go up to a 50 percent through wall defect --

JUDGE BLOCH: No matter what the defect, if the signal to noise ratio is one to one, you can't tell what you're seeing.

MR. ANDERSON: Okay. I will stop there.

MR. CHURCHILL: Thank you, Your Honor.

WITNESS DENTON: That was very good.

JUDGE BLOCH: Well, you did explain it about five times.

Mr. Churchill, do you have any redirect?

MR. CHURCHILL: Yes, I have one question.

REDIRECT EXAMINATION

BY MR. CHURCHILL:

Q Mr. McKee, this morning the board asked you one question about whether you had any information or conversation with people from Wisconsin Electric characterizing generally volumes of defects that you were seeing. Do you from time to time have conversations, and do you discuss from time to time with Wisconsin Electric employees the results of your findings?

A (WITNESS MC KEE) Yes, I do. It is a general overall observation of the indications that are found.

MR. CHURCHILL: Thank you. I have no further questions.

JUDGE BLOCH: Recross, Mr. Anderson?

(No response.)

JUDGE BLOCH: The witnesses are excused. Thank you very much for your participation.

(Witnesses excused.)

JUDGE BLOCH: Mr. Churchill?

MR. CHURCHILL: I would recall Mr. Fletcher for the resumption of his cross examination.

(Pause.)

MR. ANDERSON: Shall we proceed?

JUDGE BLOCH: Mr. Anderson, please.

MR. ANDERSON: Could I have a ruling on whether I would be permitted to make the same offer of proof I was requesting to make with respect to the preceding witnesses?

JUDGE BLOCH: That was a request for an offer of proof, period. It was denied.

MR. ANDERSON: It would pertain to Mr. Fletcher as well?

JUDGE BLOCH: That is correct.

Whereupon,

DOUGLAS FLETCHER

was recalled as a witness and, having been previously duly sworn, was further examined and testified as follows:

CROSS EXAMINATION

BY MR. ANDERSON:

Q Mr. Fletcher, looking at page six of your testimony, you indicate a rate of about fifteen percent of IG of two-wall thickness per year from examinations of tube in the field, amongst other things, do you not?

A (WITNESS FLETCHER) That is correct, Mr. Anderson.

Q Could you describe for the record what kind of

field observations are done to draw that conclusion?

A (WITNESS FLETCHER) Specifically, data, eddy current data were analyzed from the San Onofre station back in the period of 1980. These data relate to eddy current signals that were found at that point in time, and these signals were then compared with signals during the preceding years back to about 1975.

Those comparisons made certain assumptions in being able to interpret the signals, but derived from that in the change in the signals the rate of corrosion or the depth of penetration was arrived at, which was in that case approximately 12 to 13 percent penetration per year.

Q And that is for the San Onofre Unit 1 plant prior to 1980?

A (WITNESS FLETCHER) Including 1980.

Q And your estimates for the field as shown on page six does not derive from any field data for Point Beach?

A (WITNESS FLETCHER) No, it is not.

Q In what year did San Onofre commence commercial operation?

A (WITNESS FLETCHER) I believe San Onofre began commercial operation in about 1969, if I recall correctly.

Q And is the steam generator a Model 44 Westinghouse?

A (WITNESS FLETCHER) No, that is a Model 27 series steam generator.

Q And Point Beach is a Model 44?

A (WITNESS FLETCHER) Point Beach is a Model 44.

Q And did San Onofre operate on phosphate chemistry initially?

A (WITNESS FLETCHER) Yes, San Onofre did, and they still remain on phosphate chemistry.

Q So they haven't switched to EVT like Point Beach did in 1974?

A (WITNESS FLETCHER) They have not changed.

Q Now for San Onofre have you been following the results of the sleeving at San Onofre?

A (WITNESS FLETCHER) In a very peripheral way, Mr. Anderson.

MR. CHURCHILL: Excuse me. Could I inquire where this line of questioning is going and what part of the testimony it relates to?

MR. ANDERSON: The testimony is going to the question of whether any results exist from San Onofre regarding -- which is the only full-scale sleeving Westinghouse plant that I am aware of.

MR. CHURCHILL: What part of the testimony, sir?

MR. ANDERSON: Does the Board need that information to rule?

JUDGE BLOCH: This is cross examination. You are cross examining on direct testimony.

While Mr. Anderson is considering the question, I do want to ask one further question on the line he started. When you say the rate of 15 percent of tube wall thickness per year was conservatively estimated, is that an attempt to estimate a rate for, particularly for, severe periods of corrosion, or was that an estimated average rate of corrosion from San Onofre?

WITNESS FLETCHER: The figure I gave, Judge Bloch, on the actual results from analyzing the San Onofre data was more like 12 to 13 percent per year.

JUDGE BLOCH: Those are averages over the length of the life of the tubes?

WITNESS FLETCHER: That is the average over the period of time, dating back to about 1975 to 1980.

JUDGE BLOCH: Is it possible that for a given six-month period that the rate was substantially higher than 15 percent?

WITNESS FLETCHER: I don't think so. The

analysis of the display of the data would show that the average would be more like 12 to 13 percent, with a possible upper limit of perhaps 18 percent, in that order. So there were a population of some tubes, a small population, that would go up to that, but the average would be more like the 12 to 13 percent.

MR. ANDERSON: Yes. I refer to Exhibit 1, which is sponsored by Mr. Fletcher. Page 6.1 talks about testing results from the San Onofre sleeving repair.

JUDGE BLOCH: Mr. Churchill, this is now acceptable cross?

MR. CHURCHILL: I'm checking. Could I have the reference again?

JUDGE BLOCH: Page 6.1.

MR. CHURCHILL: I'm sorry. I don't know how this relates to Mr. Fletcher's testimony.

JUDGE BLOCH: Mr. Anderson stated that Mr. Fletcher was responsible for the admission of this document.

MR. CHURCHILL: No, sir.

JUDGE BLOCH: That's not true?

MR. CHURCHILL: He did not sponsor that.

MR. ANDERSON: How did it get in here? I thought this was sponsored by Mr. Fletcher.

MR. CHURCHILL: This was part of the application. It was admitted before Mr. Fletcher was even called to the stand.

MR. ANDERSON: I recall asking him questions about it yesterday.

JUDGE BLOCH: Off the record.

(A discussion was held off the record.)

JUDGE BLOCH: Let's go back on the record.

It seems to me that Mr. Anderson has argued that he has already asked one question on page 6.1, and arguably opened up a line of cross examination about that.

What do you say about that, Mr. Churchill?

MR. CHURCHILL: I don't recall that. I think that his reference just now was to page 6.7. I'm not at all sure that the question he is about to ask relates to the one he asked yesterday on page 6.7, which I fruitlessly objected to, but he was allowed to ask it.

MR. ANDERSON: Perhaps I could shorten the rather tortuous path. Why don't I just declare that Mr. Fletcher be declared an adverse witness and I'll call him as my own?

MR. CHURCHILL: Your Honor, I don't think that is the way it works.

JUDGE BLOCH: Mr. Anderson, you would have

been able to subpoena your own witnesses, including witnesses employed by the Applicant. If you had done so at the proper time, that requires that you file direct testimony. You weren't surprised. You knew that Mr. Fletcher would be an adverse witness.

MR. ANDERSON: I'm not subpoenaing Mr. Fletcher. He is here right here now.

JUDGE BLOCH: If you call him as a direct witness, that means that there is testimony that you wanted to elicit that should have been filed.

MR. CHURCHILL: In any event, the adverse witness concept doesn't apply here. I think the correct concept is the hostile witness and that is applied when one's own witness is fighting one's own lawyer, and the lawyer seeks the judge for help.

MR. ANDERSON: Well, I was trying to get through things faster, Mr. Churchill, but I'll just pass it and go back to the original path we were on.

JUDGE BLOCH: Could you tell me what it is that you want to find out from this witness?

MR. ANDERSON: I want to find out what results exist from San Onofre from an actual sleeve in terms of an actual examination. I want to establish the basis for a motion that we did make earlier and we laid it open until eventually the record establishes the

necessity for having metallurgical examination of sleeve tubes at Point Beach.

MR. CHURCHILL: Your Honor, I would emphatically object to his attempt to use this witness to obtain information outside the scope of this hearing in an attempt to open up the record.

MR. ANDERSON: It is not a motion to open up the record. It's an attempt to have more data collected on the record in this proceeding.

JUDGE BLOCH: What data about San Onofre do you want to examine about?

MR. ANDERSON: I want to ask whether data exists in terms of the examination of sleeve tubes at San Onofre, destructive examination of sleeve tubes at San Onofre, and, if not that, whether data exists at all at San Onofre.

JUDGE BLOCH: It seems to me if the questions were first does the data exist and then, second, does the data in any way contradict or call into question any of the direct testimony of this witness that that would be acceptable cross. Is that incorrect, Mr. Churchill?

MR. CHURCHILL: I would agree with that, Your Honor.

JUDGE BLOCH: So you may ask for those limited purposes.

MR. ANDERSON: Well, let me proceed on that basis and pursue it, if we need to, from there.

JUDGE BLOCH: Well, let me ask the two questions.

Mr. Fletcher, is there any data that you know of resulting from destructive examination of tubes at San Onofre? You said destructive, did you not, Mr. Anderson?

WITNESS FLETCHER: Data from destructive examination of tubes? Yes, there is.

JUDGE BLOCH: And is any of that data directly relevant to testimony that you have presented to us as direct testimony in this hearing?

WITNESS FLETCHER: In terms of establishing the corrosion rate from the eddy current data, no, it is not.

JUDGE BLOCH: Are there other areas of that destructive evaluation data which are relavant to your direct testimony?

WITNESS FLETCHER: Reference is made to the presence of IGA on removed tube samples from San Onofre. The presence of IGA was detected. So in that context, what we found at San Onofre, some tube examinations are similar to that which we have found from examination of the Point Beach samples.

JUDGE BLOCH: Mr. Anderson, would you like to ask questions about what was detected about IGA at San Onofre?

MR. ANDERSON: Yes, I would.

JUDGE BLOCH: Please proceed.

BY MR. ANDERSON: (Resuming)

Q Were those results of sleeve tubes subsequent to sleeving at San Onofre?

A (WITNESS FLETCHER) No, they were not.

Q And were any tests done, either destructive or non-destructive, of the sleeve tubes at San Onofre subsequent to the sleeving operation at that plant?

A (WITNESS FLETCHER) I'm not aware of any, Mr. Anderson.

JUDGE BLOCH: Mr. Fletcher, the one I asked before was a tough one because it required recollecting a rather substantial body of data and trying to relate it to your own testimony. Have you thought of anything further that is relevant to your testimony that is from that San Onofre data?

WITNESS FLETCHER: The reason for my pause, Judge Bloch, is to try and answer as completely as possible. I cannot think of any other information related to my testimony derived from San Onofre.

JUDGE BLOCH: I can only ask that you answer

to the best of your recollection and I trust that you have done that.

WITNESS FLETCHER: Yes.

JUDGE BLOCH: Mr. Anderson?

BY MR. ANDERSON: (Resuming)

Q Also on page six of your prepared testimony you refer to thermally-treated Inconel-600, do you not, sir?

JUDGE BLOCH: Mr. Anderson, if you could bypass asking what we can see in front of us, it might be helpful. Why don't you ask the question.

BY MR. ANDERSON: (Resuming)

Q Would you state whether any research has been done about the corrosive resistance characteristics of Inconel-600 in a crevice condition?

MR. CHURCHILL: Are you talking about mill-annealed or thermally-treated?

MR. ANDERSON: That's why I asked the previous question -- thermally-treated.

WITNESS FLETCHER: Tests have been performed with thermally-treated Inconel-600 in comparison with mill-annealed Inconel-600 in environments similar to that which would be presumed in the crevice region, namely with magnatite and with concentrated caustic solution. And these test results or these tests with

the thermally-treated material have gone on for a large number of years, since the first part of the 1970s, and we had accumulated a large amount of information, part of which has examined the behavior of Inconel-600, thermally-treated, in crevice type configurations.

BY MR. ANDERSON: (Resuming)

Q And what is the size of the crevice that you used in the laboratory examination you just made reference to?

A (WITNESS FLETCHER) That would be encompassed by that.

Q That is to say, 7,000ths of an inch?

A (WITNESS FLETCHER) 7,000ths of an inch larger than that and smaller than that.

Q And what results?

A (WITNESS FLETCHER) Well, the results continue to support that thermally-treated Inconel-600 has added corrosion resistance against caustic stress corrosion cracking and intergranular attack, even in that configuration -- almost independent of the configuration -- compared to mill-annealed Inconel-600.

Q Let me ask is the added corrosive resistance of thermally-treated Inconel greater or less in a crevice environment as opposed to a freestanding environment?

A (WITNESS FLETCHER) There is no discernable difference in the behavior of Inconel-600, mill-anneal or thermally-treated, be it in a crevice configuration or a free, open configuration.

Q And when you say it's added corrosive resistance, you don't mean to say it is completely impervious to corrosion, do you, sir?

A (WITNESS FLETCHER) No. Any material subjected to a very corrosive environment would be expected to show some degree of corrosion or degradation.

JUDGE BLOCH: Mr. Fletcher, there is a difference in the extra resistance of the thermally-treated Inconel-600 to IGA and SCC. Is there any theoretical reason for this difference in resistance? Am I understanding from our discussion yesterday that the mechanisms were very similar except for the presence of pressure?

WITNESS FLETCHER: I guess in the strictest sense, Judge Bloch, there is not a ready explanation for the difference in rate between intergranular attack, which is, as I explained in my testimony of yesterday, kind of a three-dimensional corrosion of the grain boundary structure in the material as opposed to stress corrosion cracking, which is a rather linear attack of

the grain boundaries in the material.

But what would cause the difference in rate, which is not large, but in my testimony I did report that the difference was perhaps five percent on the basis of five percent of the tube wall per year, as noted on page seven of my testimony. I can neither assign a significance to that nor can I express any mechanistic reason for the difference.

JUDGE BLOCH: It's an empirical result with no sound theoretical basis?

WITNESS FLETCHER: It is a result from laboratory testing. I would not call it empirical. I would call it the results of laboratory testing.

JUDGE BLOCH: I would define laboratory testing as empirical.

WITNESS FLETCHER: I guess I think of imaginary things when one goes to empiricism, as opposed to taking actual laboratory results and reducing those data into numerical values.

JUDGE BLOCH: Okay.

BY MR. ANDERSON: (Resuming)

Q Do any other plants in operation have thermally-treated Inconel-600 in the steam generator tubes of Westinghouse design?

A (WITNESS FLETCHER) Yes, they do.

Q Which would those be?

A (WITNESS FLETCHER) The Surrey Unit Number 1 and 2 plants have thermally-treated Inconel tubing.

Q If I can interrupt you, if I may, those is the new replacement steam generators?

A (WITNESS FLETCHER) Those are the new replacement steam generators. Turkey Point Unit Number 3 replacement steam generator.

Q Any others?

A (WITNESS FLETCHER) No, I believe that's it.

Q And how much operating experience do we have from those three plants?

A (WITNESS FLETCHER) The longest operation is with the Surrey Unit Number 2, which began operation in, I believe, December of 1980 with the replacement units.

Q Are there any other advances in steam generator tube metals that are available to you for your consideration besides Inconel-600 thermally-treated?

A (WITNESS FLETCHER) Mr. Anderson, there are always programs, development programs, aimed at examining different materials for this specific application -- steam generator tubes. I would say that that has been a major program in steam generator development and design research activities over the last many several years.

Q And -- I'm sorry.

A (WITNESS FLETCHER) So there are always new materials being looked at. Presently, we are examining different forms of Inconel and other nickel alloys in terms of their corrosion resistance in comparison with thermally-treated 600.

Q And of those, which stands out as the most promising?

MR. CHURCHILL: Your Honor, this is beyond the scope of the hearing. The scope of the hearing is the amendment, as proposed, which is to sleeve with thermally-treated Inconel-600 and the relative merits of any other potential materials are irrelevant.

JUDGE BLOCH: Mr. Anderson, you may show there is a problem with the thermally-treated Inconel-600 and the fact that there might be better materials is not helpful to your case.

BY MR. ANDERSON: (Resuming)

Q Now you are arguing on page seven, are you not, sir, that there will be a leak before break in a tube?

A (WITNESS FLETCHER) A leak before break is a characteristic of stress corrosion cracking of Inconel-600, as I have discussed on page seven of my testimony.

Q Also on page seven you refer to the fact that a crack, were it to occur, is more likely to be axial. It is your testimony there are no instances of circumferential cracking at Point Beach?

A (WITNESS FLETCHER) I have no knowledge. There is no report of any circumferential cracking at the Point Beach plant.

Q Let me see if I can make reference without inquiring any further to do about it. Looking at Applicant's Exhibit Number 1, page 6.13, which is bracketed -- Mr. Chairman, is that one of the portions which was removed from brackets by your confidentiality order? I can't recall.

JUDGE BLOCH: This is a substitute filing that was intended to meet --

MR. ANDERSON: I don't have it with me. I have the original.

JUDGE BLOCH: As I understand it, that is not the revised? Applicant will tell us in a moment.

(Pause.)

MR. CHURCHILL: No change to that page, Your Honor.

JUDGE BLOCH: So it is still confidential or proprietary.

Mr. Anderson, do you want to request an

in-camera session?

MR. ANDERSON: Well, I would suggest we just try it with allusions, which wouldn't require, I think, anything confidential, but I'll ask the question in a vague sense and if it does lead to any problems, Mr. Churchill can speak up.

JUDGE BLOCH: If you will attempt to not ask anything. If you start to, we will have to stop.

BY MR. ANDERSON: (Resuming)

Q Does page 6.13 deal with the analysis done by the Licensee and the Licensee's vendor as to the ability of the sleeve to survive various accident situations?

JUDGE BLOCH: I would note that it's in section 4, beginning at 6.12, entitled "Postulated Accident Tests." I infer that it is about postulated accident condition tests.

BY MR. ANDERSON: (Resuming)

Q And does anything there deal with the postulated response to a LOCA accident?

A (WITNESS FLETCHER) Yes, the LOCA accident is discussed in this paragraph.

Q Well, am I correct -- well, let me ask, does that analysis deal with a situation in which the sleeve is suffering from a defect?

MR. CHURCHILL: Your Honor, excuse me, Your Honor. May I ask what part of the witness' testimony this is referring to?

MR. ANDERSON: Part 4.8 on 6.3.

MR. CHURCHILL: No, sir, the witness' testimony.

JUDGE BLOCH: You began on page 7 of the witness' testimony.

MR. ANDERSON: Well, I'm relying on a previous statement, which we never did resolve by going to the transcript, that Mr. Fletcher yesterday agreed to respond to questions about the sleeving report.

MR. CHURCHILL: No, sir.

JUDGE BLOCH: I didn't think that's what we were talking about. I thought there was a question asked about a specific portion of the sleeving report yesterday that you had remembered.

MR. ANDERSON: I also asked if he was the person to ask questions of about the Exhibit 1. I suppose we could pause and I can try to find that section of the transcript.

JUDGE BLOCH: You may ask questions that are relevant to the statement that the leak before break criteria operates and that there would not be a large leak in the event of a postulated accident, because that is on page 7. It's got to be related to that.

MR. ANDERSON: Or if I'm right with respect to the exhibit, which has not been established one way or the other at this point in time.

JUDGE BLOCH: We don't see any basis for ruling that it's just with respect to the exhibit. Is there really something you wanted to do that goes beyond the leak before break criteria?

MR. ANDERSON: Well, I don't think, if you look at page 9, it is limited to leak before break in terms of the second full paragraph on that page. It relates to the ability of the sleeve to degrade a certain amount and still resist rupture.

JUDGE BLOCH: Not about whether the tubes will remain strong enough to resist postulated accidents.

MR. ANDERSON: And let me try it this way. Now I'm asking, were the tests done on page 6.13 in Part 4.3 done with the degraded tube, a degraded sleeve or not?

MR. CHURCHILL: Your Honor, Mr. Fletcher's testimony does not discuss the LOCA. It discusses the steam break, which is worse, but he does not discuss the LOCA.

JUDGE BLOCH: Is that correct, Mr. Anderson? Is there any testimony about a LOCA?

MR. ANDERSON: Apart from Exhibit 1, which we still have open as a question?

JUDGE BLOCH: Mr. Churchill is saying that they are discussing a worst case, but the worst case is a main steam line break and not the LOCA.

MR. ANDERSON: That is in terms of pressure differantial. My question is a different one. My question is, whatever pressure differential was used for the test, was it done in terms of what was done here in Exhibit 1, with respect to a defective tube or a defective sleeve.

MR. CHURCHILL: Your Honor, Mr. Fletcher's testimony simply does not describe the LOCAL accident

condition, and for Mr. Anderson to attempt to cross-examine him is an attempt to bring back in, I would suggest, his contention 1, which was disposed of on summary disposition.

MR. ANDERSON: Am I correct that pages 6.12 and 6.13 are not being offered into evidence as part of that exhibit?

MR. CHURCHILL: Your Honor, we are cross-examining Mr. Fletcher on Mr. Fletcher's testimony.

JUDGE BLOCH: Are there things that you have to cross-examine Mr. Fletcher --

MR. ANDERSON: I understand this exhibit was offered by, sponsored by Mr. Fletcher, and that is what is in dispute.

MR. CHURCHILL: This exhibit was not offered by Mr. Fletcher.

JUDGE BLOCH: During our next break, you find something in the transcript to demonstrate your point. If it was sponsored by Mr. Fletcher we'd be interested in knowing that. Right now we do not believe it was sponsored by Mr. Fletcher.

Mr. Fletcher, along the lines that Mr. Anderson has been asking, on page 9 you talk about some tests, rupture tests with uniform thinning, is that

right?

WITNESS FLETCHER: Yes, it is, sir.

JUDGE BLOCH: Back on page 7 where you talk about leak before break, you talk about the leak before break concept. Now, in addition to the rupture tests on page 9 that you use, taken partly to support the leak before break concept, are there other laboratory tests that do support that concept?

WITNESS FLETCHER: Sir, on page 9 of my testimony I am really referring to the structural strength of the sleeve, which can degrade to 38 percent of its original wall thickness and still resist rupture, which is based on analytical calculations considering the minimum properties of the material. That is a sleeve, a tube with uniform thinning of the sleeve wall down to 38 percent of its original thickness.

JUDGE BLOCH: Please continue.

WITNESS FLETCHER: On page 7 I am referring to a full-wall sleeve thickness in which corrosion has occurred and in which a stress corrosion crack develops and begins to penetrate in through the sleeve wall. As the crack propagates, it will first perforate the tube, allowing leakage to occur, and in conjunction with that then the crack has grown in length.

Now, the leak before break characteristic or

concept is such that the perforation will occur before the crack length exceeds a certain value. That certain value is first based upon what would the leakage rate be, so that we could establish what the technical specification limit should be for the operating plant.

JUDGE BLOCH: Okay. Have you done analyses that indicate that if you were to get a main steam line break with a small through-wall leak that you could detect, that the tube would not rupture?

WITNESS FLETCHER: Yes, we have performed tests like that, with pressurization of the inside of the tube containing through-wall slots that would have various lengths, to determine and to identify what the critical crack length would be.

JUDGE BLOCH: Now, these are through-wall slots that are drilled?

WITNESS FLETCHER: No, they are electric discharge machining or fatigue cracks. We usually use the EDM or electric discharge machining technique to put a very fine narrow crack in through the tube wall. It penetrates the tube wall and we can vary its length.

Subsequent to that, one end of the tube is plugged and the other end of the tube is connected to a hydraulic device that permits it to be pressured up to the point where the crack opens in fishmouth-like

fashion. And that is the point where we identify that point as the fishmouth point. It's not really a tube rupture, but it has opened up and fishmouthed to allow substantial leakage to occur.

JUDGE BLOCH: In what way are these machining cracks different from or the same as stress corrosion cracking, and why is it legitimate to generalize from these specially tooled cracks to the stress corrosion cracking technique?

WITNESS FLETCHER: The EDM machine crack would actually be more conservative than an actual stress corrosion crack, in that we remove some of the material. Some of the material in forming that EDM crack would be removed, and when you remove material you remove some of the reinforcement that helped support the crack during the pressure event.

JUDGE BLOCH: Are those machine cracks with vertical walls completely through? One of the things we mentioned in our opinion, something I wondered about, was whether you sometimes have a stress corrosion crack of substantial length which only leaks through a very small portion of its length. Is there any reason to believe that might be a more serious problem within the tube than these machine cracks that you're using for testing?

WITNESS FLETCHER: No, that would be a less serious problem as you put it, in that again, if you penetrate the outer surface of the tube wall with, say, a 150-mil length crack and you have penetrated the inside of the tube wall or sleeve wall with half of that or even less, that remaining material that is attached, that is uncracked, provides additional reinforcement. Now, the slots that are put in the tube are machined more or less straight and flat, such that we don't end up with not too significant difference in the length of the crack on the O.D. of the tube compared to the I.D. of the tube.

JUDGE BLOCH: So you rely on the leak -- you substantiate the leak before burst criterion based partly on field experience, but also partly on this laboratory test?

WITNESS FLETCHER: Yes, the laboratory tests are an integral part of establishing the characteristics of the tube under this condition of cracking.

BY MR. ANDERSON: (Resuming)

Q Turning to page 10 of your prepared testimony, you indicate that if the rupture of a sleeve were assumed to occur above the tube sheet the consequences would be no worse than the consequences of an equivalent rupture of an unsleeved tube, do you not?

A (WITNESS FLETCHER) I believe you're reading from the bottom of page 10, Mr. Anderson?

Q Yes. You say it's no worse than, but what is the consequence of an equivalent rupture from an unsleeved tube?

A (WITNESS FLETCHER) Well, if a tube were to rupture above the top of the tube sheet -- and my concept of rupture, mind you, is fishmouthed opening of a crack -- you would get a certain flow of water from primary to secondary side. That would be limited by the opening of the fishmouthing in the tube.

In the case of a sleeve, the same circumstances would occur if one presumed you have a crack above the top of the tube sheet in the sleeved region, except that it would be expected that the tube would still surround the sleeve such that the leakage rate would be significantly reduced from primary to secondary.

Q Now, in that circumstance what would be the consequences if the secondary side safety valve stuck open, the main steam line broke, and the iodine partitioning were diverted from --

MR. CHURCHILL: Your Honor, I would object. That sounds like a contention that was excluded at the preliminary hearings, and his question leads to the

unsleeved situation.

MR. ANDERSON: He says it's no worse. I'm just trying to find out.

MR. CHURCHILL: He's just explained what he meant by that, the consequences in terms of the amount of leakage that occurs.

JUDGE BLOCH: Your question goes to an incident that is a steam line break compounded by other things?

MR. ANDERSON: A tube rupture compounded by other things.

JUDGE BLOCH: That is, that there is already a tube rupture, and what else?

MR. ANDERSON: A secondary side safety valve sticks open, main steam line breaks, and the iodine partitioning is shut off.

JUDGE BLOCH: Why is that relevant to the testimony?

MR. ANDERSON: He is saying the consequences aren't something to be concerned about if the sleeve ruptures, and I wanted to find out what it is that is not to be concerned about.

MR. CHURCHILL: Your Honor, I object to this testimony. He's saying the consequences of a rupture of the sleeve are no worse than the consequences of a

rupture of an unsleeved tube in this region, and he explained what he meant by the consequences was in terms of the amount of water, the amount of leakage that occurs.

MR. ANDERSON: Your Honor, that would be a rational statement in a world in which, in a preceding proceeding, these things were considered and there is no need to duplicate it. But the testimony of the Staff in this proceeding, for example, as well as the post-Ginna accident reports, demonstrate these things have never been considered, and to say we're not going to consider them now because they were considered before by application, when they in fact have not been, is not something a rational man would permit to continue to happen. It would perpetuate irresponsibility and would compound irresponsibility.

JUDGE BLOCH: Mr. Anderson, we're not here to solve the problems of the world. We're just trying this one case. If you have a question that is relevant to the testimony, you must show me why it's relevant to the testimony.

MR. ANDERSON: I think it's relevant to the import of the testimony that going to say there is no safety problem, and that is not a correct characterization.

JUDGE BLOCH: I don't think that Mr. Fletcher has ever testified that the ruptured tube was not a safety problem. If you can show me that in the testimony, you may be able to pursue it, but I don't think he has said that.

MR. ANDERSON: I think that is implication of what that sentence is going to be used to show, and I think that would be an improper inference.

MR. CHURCHILL: If we said that you could object to it.

JUDGE BLOCH: I cannot interpret that passage to mean what you say it to mean, and therefore I cannot find what you asked -- want to ask -- relevant to that statement. I therefore rule that it cannot be asked.

BY MR. ANDERSON: (Resuming)

Q Does the "no worse" relate also, sir, to the consequences of a rupture during LOCA?

A (WITNESS FLETCHER) Mr. Anderson, I believe my previous remarks would apply, in that I am speaking of leakage rates and comparing the unsleeved tube with the sleeved tube.

Q I'm not sure the question was asked -- let me ask it again. You indicated one of the consequences you contemplated in the word "consequences" was a fishmouth rupture during normal operation, and I'm asking whether

the word "consequences" also contemplated a LOCA-induced collapse of the tube.

A (WITNESS FLETCHER) I didn't say that there would be a rupture of the tube or the sleeve, but if one were to assume the initiation or the event of a LOCA or steam line break then my previous remarks apply relative to the leakage rates, be it from secondary to primary or primary to secondary.

Q Does "no worse than" mean the same as "as bad as?"

MR. CHURCHILL: Your Honor, I'd object to that. He's answered the question. He's now just badgering the witness.

JUDGE BLOCH: Mr. Anderson, the question here seems to be a simple one.

MR. ANDERSON: The consequences to the people of Wisconsin are not simple, sir.

JUDGE BLOCH: But you are trying to challenge this statement. Now, if there is some other place where you want to challenge something, you may go ahead and do that. You have many opportunities to protect the people of Wisconsin at this proceeding, in a summary disposition motion, motion for legal issues, which is the nature of summary disposition -- just a limited number of things you can do at this point. On one issue you can do the cross examination.

The statement here is that it can be no worse -- if it occurred above the tube sheet it would be no worse if it were sleeved than if it were a tube that were not sleeved. I don't understand what you're trying to get out of that statement in terms of cross. It seems to me to be self-evident that that is true, once you take the statement that he's referring to, the

amounts of water coming out of these breaks. Is there reason to think there'd be more water coming out of the break with the sleeve tube than there would with a tube that is not sleeved? That's all he's saying.

How are you going to cross examine on that? I think you'd better pick another spot to cross examine.

BY MR. ANDERSON: (Resuming)

Q Mr. Fletcher, were you involved with the metallurgical examination with the two Rs, 20 C 73 from steam generator A in Unit 1 in late 1979, early 1980?

A (WITNESS FLETCHER) Mr. Anderson, this was a tube that was moved from Point Beach Unit No. 1 in 1979.

Q Do I have the reference correct?

A (WITNESS FLETCHER) I have reviewed the results of the examination of that, but I did not participate directly in the hands-on that is to be performed.

JUDGE BLOCH: To be clear, you understood there was only one tube to be removed?

WITNESS FLETCHER: I was making certain that I understood Mr. Anderson's reference to a tube that was removed.

MR. ANDERSON: It was one of three.

JUDGE BLOCH: You're not saying you recollect

that particular row or column, are you or are you?

WITNESS FLETCHER: Yes, I am.

JUDGE BLOCH: Okay. I wasn't sure from the answer.

BY MR. ANDERSON: (Resuming)

Q Is it a correct statement to say the in-plant eddy current test indicated no problems?

A (WITNESS FLETCHER) My understanding at the time of the eddy current inspection, there was no signal report or further examination of that tube.

Q Is it a correct statement that there's no indication from the laboratory of any current test?

A (WITNESS FLETCHER) That particular part of it I'm not too clear on, and that after a tube is removed there are marks in the tube that have been assigned to two pulling marks or scratches or gouges from the tooling used to pull a tube. And in my review of that particular information there was some of that present in the tube, so there were indications. But I think that the conclusion is that any indication due to corrosion may have been obscured by the presence of some of these marks and gouges, leading one to the conclusion that you could not discern anything uniquely related to corrosion.

Q Is it a correct statement to say that the evaluator of the tapes during the laboratory eddy

current test did not call it a defect?

A (WITNESS FLETCHER) Yes, I believe that's true.

Q Is it correct that the metallurgical examination in the laboratory showed a general intergranual attack 4 to 5 mills deep with occasional intergranual penetrations up to 10 mills deep, and another granulation extending about 17 into the wall?

A (WITNESS FLETCHER) Mr. Anderson, you've got a great advantage on me. You've read me a lot of data and numbers. I don't have instant recall. I don't know what you said.

Q Over the next break could you go over these numbers?

MR. CHURCHILL: I would object.

JUDGE BLOCH: Mr. Fletcher, one of the exhibits to the motion for litigable issues was a letter from Mr. Porter. Have you read that letter?

WITNESS FLETCHER: Yes, I had.

JUDGE BLOCH: Would you please show the letter to Mr. Fletcher? Show him the portions you're interested in, and he can tell you whether he agrees or disagrees.

MR. ANDERSON: I've handed Mr. Fletcher a letter dated February 28, 1981 from Mr. Porter to myself entitled "Steam generator A tube sample results,

2-20-73."

JUDGE BLOCH: Off the record.

(Discussion off the record.)

JUDGE BLOCH: That will be marked as Intervenor Exhibit No. 3.

(The document referred to was marked Intervenor Exhibit No. 3 for identification.)

JUDGE BLOCH: It's not being admitted for evidence at this time. However, for ease of reading the transcript, I would appreciate it if it would be bound into the testimony.

(Intervenor Exhibit No. 3 follows:)

X22
6630-UI-2
6630-UI-20

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INT X3
NRC Docket
50-266
50-301
11/18/82
WED

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

February 28, 1980

Mr. Peter Anderson
Public Affairs Officer
WISCONSIN'S ENVIRONMENTAL DECADE, INC.
114 East Mifflin Street
Madison, Wisconsin 53703

Dear Mr. Anderson:

POINT BEACH NUCLEAR PLANT, UNIT 1
STEAM GENERATOR A TUBE SAMPLE RESULTS
TUBE 20-73

This is to provide written confirmation of laboratory and in-plant eddy current, radiographic, and metallographic examinations of tube 20-73 from steam generator 1A, in accordance with your request during the February 20, 1980 hearing before the Public Service Commission of Wisconsin in Docket 6630-UI-2.

As you will recall, the preliminary results of the examination of this and other tubes removed during the October 1979 refueling outage for Unit 1 were given to you orally on December 12, 1979, and are extensively discussed in our letter to the Nuclear Regulatory Commission of November 23, 1979, copy of which was transmitted to Wisconsin's Environmental Decade.

The results of laboratory and in-plant examinations for tube 20-73 are as follows:

In-Plant Eddy Current - No indications.

Laboratory Eddy Current - No indications.

Laboratory Radiography - Indications of intergranular penetration beginning at a location in the crevice approximately three inches from the top of the tubesheet.

Laboratory Metallography - General intergranular attack 4 to 5 mils deep (8 to 10 percent of tube wall) with occasional intergranular penetrations up to 10 mils deep (20 percent of tube wall) and one penetration extending to about 17 mils (33 percent of tube wall).

III.-B

These results are consistent with our previous testimony and reports on detection of intergranular attack on portions of steam generator tubes within the tubesheet. As we stated in our November 23 letter to the Nuclear Regulatory Commission, eddy current techniques are presently not capable of detecting intergranular attack so long as the metal grains in the suspect region remain in physical and electrical contact providing a continuous path for eddy currents induced when the eddy current test is performed. This condition is illustrated in Figure 1 which includes photographs of a sample of tube 20-73 at a point 7-1/16 inches below the top of the tubesheet containing the intergranular penetration to a depth of about 17 mils (33 percent of the tube wall). These photographs show the tube sample in the as-polished condition prior to chemical etching for metallographic examination. It is clear that metal grains and grain boundary material at this location have few discontinuities. Eddy current techniques would not detect intergranular penetration in this condition.

Figure 2 includes photographs of the same tube sample after chemical etching for metallographic examinations. During the etching process, grain boundary material is selectively dissolved to provide enhanced grain boundary definition and contrast. Some grains may be removed in the final polishing of the sample. From these photographs, the existence of the intergranular penetration is clearly evident. Thus, metallographic examinations and radiography can reveal intergranular corrosion which are presently not detectable by eddy current techniques. In portions of the tube above the tubesheet and outside the support plates, the unrestrained tube expands under internal pressure and intergranular penetrations would appear as cracks which are detectable by eddy current techniques. As stated in our November 23 letter, no evidence of such intergranular attack has been found at or above the tubesheet.

Very truly yours,

D. K. Porter
Superintendent
Nuclear Projects Office

Copies to Mr. L. T. Mittness
E. James Wolter
Thomas Lockyear
Ms. Joan Estes

Enclosures

BY MR. ANDERSON: (Resuming)

Q Does reviewing that letter indicate to you that the numbers that are recited were an accurate statement of those test results?

A (WITNESS FLETCHER) I believe that is an accurate representation of the test results from metallography of the tube sample.

JUDGE BLOCH: Are there any portions of that letter that you think are inaccurate, misleading, or need your clarification in any way?

MR. CHURCHILL: Could he have a moment to read the entire letter?

JUDGE BLOCH: Please take your time.

(Pause.)

(Recess.)

JUDGE BLOCH: On the record.

WITNESS FLETCHER: I've reviewed the letter of February 28, 1980, signed by D.K. Porter to Mr. Peter Anderson, and I agree with the contents of this letter with the exception of the first sentence on the second page. That refers to this letter being consistent with the previous testimony and reports.

I have not, as related in the November 23 letter to the Nuclear Regulatory Commission, I have not made that comparison.

JUDGE BLOCH: Mr. Anderson.

MR. ANDERSON: Mr. Chairman, Intervenor's Exhibit 2, the LER dated November 13, 1982 shows three cold legs at the top of the sheet. These were the basis for a new contention, and I would suggest I be permitted to make an offer of proof now here based upon subsequent action.

JUDGE BLOCH: I've already ruled three times on that. If you have a question on cross, you may ask the question.

MR. ANDERSON: In light of the ruling, Mr. Chairman, no more questions.

JUDGE BLOCH: Staff?

MR. BACHMANN: The staff has no questions of this witness.

JUDGE BLOCH: Mr. Fletcher, just one question. I would like to have you describe for me how dense the material gets to be in the tube sheet crevice. Is it hard? Is it soft? How would you describe the density of that material?

WITNESS FLETCHER: From the limited visibility, Judge Bloch, the material can range, as noted on the outside surface of the tube, from a hard deposit that one would need to exert quite a bit of force to scrape off of the tube to a deposit that can be

removed simply by moving a finger across the tube. It varies from one extreme to the other. The actual condition within the tube crevice with the tube in place is really not known. It is only a suggestion of that composition or that characteristic on examination of a tube sample removed from that region.

JUDGE BLOCH: One of the lawyers removed from another case advised me you should never say you only have one more question.

There were three tubes taken out in 1969, is that correct? I mean '79. Could you give us an indication of approximately where the defects were in those tubes?

WITNESS FLETCHER: Those indications of corrosion, the intergranular attack were all located within the tube sheet region.

JUDGE BLOCH: Thank you.

JUDGE PAXTON: I have one question, Mr. Fletcher. It has been partially answered. The question is about the significance of your statement that eddy current testing fully complies with requirements of the ASME boiler and pressure vessel code, Section 11 and so on.

Could you please give us the nature of these requirements? Are they very specific or are they more

in terms of performance requirements? We haven't had the code before us, and I'm just curious about what your statement really means.

WITNESS FLETCHER: Yes, sir, Judge Paxton. In the ASME code, Section 11, Appendix 4 is a description of the requirements for eddy current testing of steam generator tubes, and these requirements encompass the entire spectrum of activity describing the electronic instrumentation that must be used, the sensitivities or the accuracies of the instrumentation, the standards which must be used to calibrate the instrumentation and set it up in preparation for an examination. It also covers personnel qualification. It covers the established procedures that are then employed at the plant.

JUDGE PAXTON: So it is very detailed.

WITNESS FLETCHER: It is quite detailed, yes, sir.

JUDGE PAXTON: And does it refer specifically to bobbin coils?

WITNESS FLETCHER: I don't believe it does, sir, but that is a point I don't recall offhand. In my recollection it does not. It refers to the eddy current test technique. I don't recall accurately, but I do not recall the word "bobbin coil" in there.

JUDGE PAXTON: Maybe the performance requirements take care of that point.

Does it refer to this three-to-one signal-to-noise requirement?

WITNESS FLETCHER: I don't believe it refers to the three-to-one signal-to-noise ratio.

JUDGE PAXTON: Thank you.

JUDGE BLOCH: Do you know where the three-to-one noise ratio rule comes from?

WITNESS FLETCHER: As Mr. Denton referred to this morning, he referred to the book which is apparently an industry standard that has been established -- and I'm really repeating his statement of this morning -- established for all types of nondestructive examination work. So I cannot give you a specific reference to that three-to-one ratio. I gleaned from his statements that it is an industry experiance factor that is repeated in textbooks and other reference manuals on the subject.

JUDGE BLOCH: Is it used pursuant to some general language in the code that would invite that kind of a standard to be used?

WITNESS FLETCHER: Judge Bloch, I really cannot answer that.

JUDGE BLOCH: This may be a better subject to

pursue through briefs which discuss the actual legal materials than by questioning the witness. Possibly the parties could consider addressing the specific standards applicable to eddy current testing, whether they are being followed.

I have no further questions. The Board has no further questions.

Is there any redirect?

MR. CHURCHILL: One or two questions.

REDIRECT EXAMINATION

BY MR. CHURCHILL:

Q Mr. Fletcher, yesterday there was some discussion about the existence of the annulus which extends above the top of the tube sheet. Does the presence of an annulus between the sleeve and the tube above the tube sheet increase the likelihood of degradation or damage to the primary pressure boundary above the top of the tube sheet?

A (WITNESS FLETCHER) No, it doesn't, for several reasons.

JUDGE BLOCH: I am sorry. The question was increase or decrease, so the answer doesn't apply.

MR. CHURCHILL: I'm sorry. I didn't realize I said that.

WITNESS FLETCHER: I didn't realize you said that either.

BY MR. CHURCHILL: (Resuming)

Q Does it increase the likelihood?

MR. ANDERSON: Could I have it restated?

JUDGE BLOCH: Why doesn't the witness tell us what the annulus does to the likelihood?

WITNESS FLETCHER: The annulus does not present a situation that would otherwise degrade the

primary pressure boundary of the sleeve tube, and the reasons that I draw that conclusion are based upon a consideration of, I will call it a hypothetical situation, a model to examine the various aspects of the annulus region.

For example, if one presumes that there is leakage into the tube, into the annular region between the tube and the sleeve, that leakage by and large would be derived from corrosion of the tube within the tube sheet region itself. As such, since that is the only location that we have noted any significant corrosion, as demonstrated by eddy current testing and by tube examination, as such, leakage from the water from the secondary side in through a presumed crack in the outer tube for water to enter the annular region, the first thing that would happen would be that the water would form steam and that steam pressure would be higher than the steam pressure on the outside of the tube so as to limit the amount of water that would enter through that cracked outer tube.

The annular region is expected to be at a higher temperature. Certainly the sleeve is at a higher temperature than the corresponding boiler water on the secondary side of the tube such that you would have a higher pressure inside the annulus region than you would

have on the outside of the tube.

But, nonetheless, the steam would form and even if there were a sufficient amount of water to accumulate in the annual region, you would still have that steam formation that would be at least above the point of entry of the water. So that means that the area of the annulus above the leak location, which is expected, if it should occur, would be expected to be within the tube sheet crevice region and above the tube sheet. Then that annulus region would be filled with steam.

Now I have drawn that example or that picture in considering whether or not we can develop a corrosive environment in the region of the annulus above the tube sheet, and I think drawing that example shows how unlikely it would be that we would develop a corrosive environment above the tube sheet in the annular region.

Now, if one were to consider the conditions above the tube sheet as to whether or not there is a possibility for a tube corrosion above the tube sheet, first of all, we have not seen it.

JUDGE BLOCH: Mr. Fletcher, is that true for even a few mils above the tube sheet or half an inch or an inch?

WITNESS FLETCHER: Well, the results of eddy

current testing by and large show that all of the present activity or corrosion is occurring within the tube sheet region itself. At the top of the tube sheet there are some indications that have been noted. By and large, these are stable. They are not growing or progressing at any significant rate, given the variance in the eddy current sensitivities and accuracies.

JUDGE BLOCH: So I guess you believe those came during the phosphate regime and are no longer intensified?

WITNESS FLETCHER: That is my belief, Judge Bloch, that they came during the phosphate regime period and they are not progressing, as I said, within the bounds of accuracy of the eddy current testing, but consider above the top of the tube sheet, with the sleeve tube.

First of all, in the absence of sludge, the temperature of the outer wall of the tube would be significantly reduced because the impediment to heat transfer caused by the sleeve -- the air gap between the sleeve and the tube -- would be such as to reduce that temperature.

Now, if you had sludge on the outside of the tube, it would depend upon its porosity, but one would still expect to see some reduction in outer wall

temperature due to the presence of the sleeve.

In addition to that, the region of the sleeve above the top of the tube sheet can be inspected with less interference from outside influences, especially compared to the tube within the tube sheet, where the interference or noise signals can be derived or arrived from the presence of the tube sheet hole itself in addition to any impurities that might be surrounding the tube within the tube sheet crevice.

So above the tube sheet, then, we have an expected lower temperature, lower heat flux, less heat transfer, which tends to mitigate against the development of a corrosive atmosphere to begin with. The inspectability of the sleeve in that region is good compared to the tube within the tube sheet, and, in addition, the sleeve material, of course, as we have discussed before, the thermally-treated Inconel-600, which has added resistance against these forms of corrosion.

So that for these reasons I would summarize that there is no degradation of the primary pressure boundary due to the presence of a sleeve. In fact, I think that the presence of the sleeve substantially enhances the pressure boundary by it being there.

JUDGE KLINE: I want to plug a little gap now

based on that. The idea of the steam developing in the annulus between the tube and the sleeve, that is something I guess I hadn't considered before.

I had thought that the mechanism of sludge accumulation was a process of sedimentation, but now, when you have steam developing there it would seem to me that the mineral burden of the water would be left behind. Would sludge accumulate by that mechanism? That is to say, I am sure whatever water accumulates there will be driven out as it turns to steam, but in that process the minerals are not carried off, or are they?

WITNESS FLETCHER: Judge Kline, for the small amount of water that I'm really referring to, or even a larger amount, consider first that the volume of water to fill half the annulus would be perhaps less than a cc -- a cubic centimeter of water. So we're talking about a very small amount of water.

And in my model I am describing, let's say, first the presence of a stress corrosion crack in the outer tube within the tube sheet region, and the only thing that I could consider to penetrate through that stress corrosion crack would be water and really carrying the solids with it -- no undissolved solids.

It is true that the water could have dissolved

solids in it and certainly you are correct. If you evaporate some of that water to form steam, there would be a corresponding concentration of the soluble materials in that water within the residual water that is left in there.

That concentration, for this model that I have drawn, would be quite small in terms of concentration factors just to form enough steam to fill the annular region above the point of leakage.

JUDGE KLINE: Okay.

JUDGE BLOCH: If the leakage occurred while the generator was cold, mightn't there be a substantial amount of water before you brought power?

WITNESS FLETCHER: Well, there could be. Again, you could fill up, I believe, the region below the elevation of the leak point. That could be filled with water. I think that any additional filling beyond that, then you are compressing the air or water vapor above that, so you would not fill the entire cavity and upon return to power that water that is in there would heat up to a temperature equivalent to -- I'm sorry, to a pressure equivalent to the temperature to provide a pressure within the annulus region that would preclude any additional introduction of water at that point.

So you have, then, an annulus region that is

partly filled with water and the remainder is filled with steam.

JUDGE BLOCH: You don't think there'd be any difficulties caused by pressures that would be built up inside the annulus as you go up to power? The pressure would be released gradually through the crack through which the water entered?

WITNESS FLETCHER: That is correct, but the pressure there would be of no concern to me.

JUDGE BLOCH: That's also a new model to me.

BY MR. CHURCHILL: (Resuming)

Q Mr. Fletcher, yesterday Mr. Anderson was talking to you about leak before break and some of the experiences that there have been in the industry with leaking tubes.

I would first like to ask you what, generally, is the experiance with leaking tube as far as its behavior characteristics. Do you generally see leak before break, and what is the experience in this regard?

A (WITNESS FLETCHER) Well, the experience of leaking tubes generally, and for the large majority of tubes that have leaked, have shown that the leaks are small. They are what I characterize as being well-behaved. That is, there is no sudden increase in

the leakage rate once noticed. The leakage may in fact, the leakage rate, may in fact increase over a period of time in terms of weeks or months, if not years, that characteristic being representative, I think, of the large majority of leakage events.

And the tube samples that have been removed from operating plants and examined for the leak before break characteristic have shown that the cracked link is within the bounds of the aspect ratio that I referred to in my testimony, where the cracked link is, let's say, a factor of five times or less than the thickness of the tube wall, which is the definition of the aspect ratio.

So, that experience in the main is quite consistent with the leak before break concept.

Q Are you finished?

A (WITNESS FLETCHER) Yes.

Q Mr. Anderson gave you, I believe, four specific examples at specific plants -- specific leaks that occurred. Do these examples that he gave you in any way constitute a violation of the leak before break principle, if you will, or an exception to them, or do they in any way increase -- do they in any way suggest that perhaps we shouldn't give as much reliance to the leak before break principle as we do?

A (WITNESS FLETCHER) No, I really don't believe

that the four examples that Mr. Anderson cited yesterday detract or degrade from the leak before break concept because of the especially unusual circumstances related to these events that are unrelated to the present corrosion that we might see at Point Beach plants or in circumstances with regard to sleeving.

Let me elaborate on that a bit. There were two events that Mr. Anderson referred to, namely, Northern States Power large leakage event and the Ginna plant large leakage event of earlier this year in the case of Ginna. Those two events were due to the presence of loose parts and the presence of those loose parts caused wear on the tube to occur which brought the tube wall thickness down to a value that the normal pressures -- differential pressure between primary and secondary sides -- cause the wall to open and lead to the leakage event.

That is completely out of character with regard to the concept of the premise of leak before break -- leak before break referring to a corrosion mechanism and the characteristics of stress corrosion cracking as opposed to the presence of loose parts.

So in the case of Northern States Power and the Ginna event I think it is reasonable to accept that those two events do not in any fashion relate to the

leak before break concept.

Another event that Mr. Anderson referred to was the leakage that occurred in a U-bend tube at Surrey Unit 2 back in 1976 and, again, the circumstances surrounding the leak event are entirely different than the subject of interest here with regard to sleeving, in that that U-bend, the leakage did occur at the apex of the U-bend and it was the result of the pressing inward of the legs of the U-bend at the uppermost tube support plate, giving rise to very high stresses at the apex of the bend where the cracking occurred.

That is a circumstance that is unrelated to sleeving, to Point Beach plants. It is a circumstance that is unrelated also to the fundamental basis, to the leak before break concept with regard to caustic stress corrosion cracking, so that I would set that one aside as not being related to and especially not detract from the leak before break concept because of the unusual circumstances surrounding that leakage event.

The fourth example that Mr. Anderson referred to yesterday was the Point Beach leakage event that occurredin 1975. That was in a tube that the leakage occurred just above the tube sheet in a region that was discerned to have undergone a significant amount of thinning and in subsequent operations that thinned

region was subjected to stress corrosion cracking by the presumed presence of caustic.

Again, that is an exceptional or an unusual event. The circumstances surrounding that are such that we had a thinned region on the tube with superimposed stress corrosion cracking over that region, such that the boundary conditions for the leak before break for the Inconel tube or sleeve, as I have discussed in previous testimony, that circumstance does not really apply. So I would discount that as having any significant effect upon the fundamental concept of leak before break.

So, in summary, I think that these four events, while they did occur, they detract little or none at all from the leak before break concept.

BY MR. CHURCHILL: (Resuming)

Q The thinning that occurred, I take it that was a result of a phosphate treatment which no longer occurs?

A (WITNESS FLETCHER) Yes. I didn't go into reference of that history. But the tubes at Point Beach, some of the tubes at Point Beach Unit No. 1 plant had undergone thinning-type corrosion from the presence of phosphate. Subsequent to late 1974 the phosphate chemistry was removed, and the plant presently operates with all volatile chemical treatments, so thinning by phosphate is no longer an issue.

JUDGE BLOCH: Meaning all the tubes that have been thinned are no longer in the generator?

WITNESS FLETCHER: No. The tubes that are in the generator, as we made reference to earlier, there are some in there have very minor amounts of thinning that are being -- as indicated by eddy current testing. Those that have large amounts of thinning have been plugged.

BY MR. CHURCHILL: (Resuming)

Q Is thinning readily detectable with eddy current testing?

A (WITNESS FLETCHER) Thinning is readily detected by eddy current testing.

JUDGE KLINE: I guess I'm with you on three

out of the four cases, but I didn't see why the Point Beach didn't violate the leak-before-break. Why was it different? I mean, that is, you had a stress corrosion crack. I don't see why it shouldn't have leaked before it broke. Let's clarify that, if you will.

WITNESS FLETCHER: Well, the records, as I understand them, did not show any indication of leakage prior to the larger leakage that followed. I rationalized that by again developing a model for a tube that has a very thin wall due to phosphate thinning. And, indeed, the leak-before-break principle could apply to that very thin wall. But that is so unrelated to the wall thickness that we're talking about.

JUDGE BLOCH: Could you give us an idea of the dimension of the type from thinning before the break occurred?

WITNESS FLETCHER: Unfortunately, I cannot do that, Judge Bloch. The tube was not removed for examination. And I am saying in my model if you thin the tube down, then the crack length to sustain the pressure, the normal differential pressure, was shorter and shorter as you thin the wall more and more.

JUDGE BLOCH: That seems clear theoretically, but how much thinning occurred seems relevant to whether there was a violation of the principle.

WITNESS FLETCHER: Yes. Adjacent tubes were examined and shown to have thinning on them. That was the best that could be done at that time.

JUDGE BLOCH: How much thinning was there on adjacent tubes?

WITNESS FLETCHER: I really don't recall offhand. It is a matter of record, but there was indeed thinning of the tube wall. And it was on this basis than that I'm saying with a thinner and thinner tube wall, the shorter is the crack length that would be sufficient to sustain the normal delta P differential pressures.

So that conceptually says that we're dealing with something that is entirely different in dealing with thin-walled members that are thinner than what we have in our leak-before-break concept for the tube wall seat.

BY MR. CHURCHILL: (Resuming)

Q Mr. Fletcher, the Point Beach incident, that wasn't an instantaneous guillotine break or equivalent rupture, was it? Actually, many of the events that Mr. Anderson brought up that I have addressed were equivalent to the double-ended leakage break. And the point of the Point Beach tube, the leakage rate was on the order of 125 gallons per minute, but it achieved

that only after a period of about 48 minutes, I believe, as I recall, having reread the report on that.

There was a period of time after the leakage was first noticed that during a period of 48 minutes the leakage rate increased and progressed, and the 125 gallons per minute that I quoted represented that leakage rate at the end of the particular event. The 125 gallons per minute does not represent the double-ended tube rupture that is analyzed in the FSAR.

Q Mr. Fletcher, is the tube material at Ginna -- the tube material, not the sleeve material -- mill-annealed Inconel 600? I'm sorry. I don't mean Ginna. Let me rephrase that question.

Is the tube material at San Onofre mill-annealed Inconel 600?

A (WITNESS FLETCHER) The tube material at San Onofre is mill-annealed Inconel 600.

MR. CHURCHILL: Thank you. I have no more questions.

JUDGE BLOCH: Mr. Fletcher, I take it that the operating experience is helpful to establishing leak-before-break for normal operation of steam generators. Is also suggestive or is not suggestive of what would happen with a main steam line break, which apparently has not occurred at all anywhere?

WITNESS FLETCHER: Well, the data from the field give us information on crack length versus crack depth, and that's where we derive the aspect ratio of five or less. The actual pressures that are used to evaluate the characteristics of the tube material itself are laboratory tests, burst tests of tubes at relevant pressures as a function of crack length. So we know what to expect in terms of the response of the tube to these large pressures.

So there are two aspects of it. One is to determine from the field data what the aspect ratio is of cracking in tubes. And the second is to do the laboratory work necessary to establish that burst pressure characteristics of a tube that has a through-wall slot in it.

JUDGE BLOCH: To know how to make our inferences we'd like to know something about the universe from which we are deriving our inferences. Do you know either the total number of leakers that have been found for which there was no burst or the total number of years of experience with tubes?

WITNESS FLETCHER: Sir, your first question was do I know how many leakers may have been experienced without burst?

JUDGE BLOCH: A rough estimate would be good

enough.

WITNESS FLETCHER: Approximately 200, if my memory serves me.

JUDGE BLOCH: That's nationwide experience?

WITNESS FLETCHER: Yes, it is.

JUDGE BLOCH: And how many years of operation of tubes are we talking about?

WITNESS FLETCHER: That is an interesting arithmetic challenge, is to take the tubes, the number of tubes in service with the number of years. We have used Inconel 600 tubing material in steam generators dating back to about 1968 or '69, and to date I believe there are close to 70 operating plants that have come on line since about that 1968 time frame, about 70 operating plants utilizing Inconel 600 material.

JUDGE BLOCH: So there are thousands of years of operations of tubes.

WITNESS FLETCHER: Thousands of years.

JUDGE BLOCH: Mr. Anderson.

RECROSS EXAMINATION

BY MR. ANDERSON:

Q You used two words in a sentence that defeated me by and large, and one was "all."

Now, am I correct with the subject of the annulus, in your answer to Mr. Churchill's question on

redirect that you're not making a statement that no tubes have defects of the tubes of Point Beach, are you, sir?

A (WITNESS FLETCHER) Well, a tube above a tube -- I'm sorry. A tube that shows an indication above the tube sheet that is called out as being greater than 40 percent should be plugged. And there are tubes that have shown indications above the tube sheet during the period when phosphate chemistry was employed, and those tubes were plugged.

I am not that close to being able to say what the maximum penetration of a tube wall for a location just above the tube sheet would be, but I am aware there are some indications above the tube sheet.

Q Now, in response to a question from Judge Kline, you indicated that the steam in this annulus in terms of the context you were talking would concentrate impurities, did you not -- nonvolatile impurities?

A (WITNESS FLETCHER) The steam in the annulus is derived from the water in the annulus, and for the small amount of water that goes into steam there would be a corresponding amount of concentration of impurities there, yes.

Q And Point Beach uses presently all volatile treatments?

A (WITNESS FLETCHER) That's right.

Q And Westinghouse in 1972 and also I think in 1973 specifically advised against all-volatile treatment because it will not perform the solid removal process that phosphates would perform?

MR. CHURCHILL: Objection. He's back to voir dire. He's attempting to discredit the Westinghouse Corporation because at one time it was recommending phosphate treatment which is still used today indeed in many parts of the world, and it has now changed its recommendation back in the early '70s to all-volatile treatment, and it's well beyond, well beyond any contention in this treatment.

JUDGE BLOCH: Are you going to use this to attempt to develop a line that the all-volatile treatment will itself cause sedimentation in the annulus?

MR. ANDERSON: Yes, the intention is that.

JUDGE BLOCH: If that's the intention, please continue.

MR. ANDERSON: There is a question outstanding.

MR. CHURCHILL: It's my understanding, Your Honor, that anything having to do with all-volatile treatment that is going to cause concentrations within the annulus has been disposed of on summary disposition. This Board found there was no genuine

issue of fact to be litigated.

JUDGE BLOCH: I think what we found was we had no reason to believe there would be a greater amount of corrosion in the annulus than there would be outside in the tube sheet crevice. But Mr. Fletcher has just given us a new model which attempts to explain why there would be no corrosion or much less corrosion in the annulus than I think we would believe any previous testimony might have existed. And I think Mr. Anderson ought to have the opportunity to show that there's a mechanism for corrosion to exist despite Mr. Fletcher's new model.

MR. CHURCHILL: It is my understanding Mr. Anderson's going to attempt to show that the all-volatile treatment is going to produce this corrosive environment.

JUDGE BLOCH: Well, let's just see what the questions are going to be, and we'll find out what the thrust of this line is. It may be that the questions will not be allowable or that they will. If the purpose is to show that there's going to be corrosion despite this new model, we've got to allow the line.

Mr. Anderson.

MR. ANDERSON: There's a question outstanding.

MR. CHURCHILL: I objected to that question.

MR. ANDERSON: The objection was overruled.

JUDGE BLOCH: I'm sorry. The specific question -- I do not recollect the specific question. I didn't rule on it. The line I ruled on.

Please ask that question now, and I will rule on it.

MR. ANDERSON: Certainly, sir.

The question is is it not true that in 1972 and 1973 Westinghouse specifically recommended that all-volatile treatment not be used because it did not perform a solid removal process that was performed by phosphates?

JUDGE BLOCH: We'll find out if there's something wrong with the all-volatile treatment. Was it once recommended against?

WITNESS FLETCHER: Judge Bloch, I do not remember the exact wording of any Westinghouse recommendation at that time without documentation. I do know that during the time frame of 1972 and '73 that phosphate chemistry was the preferred treatment.

BY MR. ANDERSON: (Resuming)

Q Is it really your testimony, Mr. Fletcher, that you have no recollection that AVT was not recommended specifically because it did not have solid removal? Your statement before was you didn't remember the exact words. Put aside the exact words. I'm

talking about the recommendation and the subject of the recommendation and the reason for the recommendation.

A (WITNESS FLETCHER) Mr. Anderson, there's a lot of information that Westinghouse has issued on the subject of water chemistry control, and you have perhaps the advantage of having read something. I have not reviewed that information, so I'm not in a position to state one way or the other the preciseness of the wording that Westinghouse may have recommended.

JUDGE BLOCH: Mr. Anderson, why don't we try to limit the questions to the effect of all-volatile treatment on the tube sheet -- excuse me -- on the annulus?

MR. ANDERSON: Well, before I get to that, I would like to ask to be able to make an offer where I can produce the document showing what Westinghouse recommended and why they were recommending it, because I think it would go to the validity and credibility of the testimony that's being given right now.

MR. CHURCHILL: This goes to the area that I objected to. I agreed reluctantly that he could ask the questions on whether the all-volatile treatment is going to do violence to Mr. Fletcher's model. I don't see the relevance of trying to pin down the precise words that were used back at the time when there was a controversy

going on in the industry about which method was best.

JUDGE BLOCH: Please show Mr. Fletcher the statement and ask whether he agrees or disagrees with it.

MR. ANDERSON: I'm trying to remember whether I have it with me.

Can I have a second?

(Pause.)

JUDGE BLOCH: Let the record show the witness is being asked to examine an excerpt. Mr. Anderson, it's an excerpt from what? Would you describe what this is?

MR. ANDERSON: It is two paragraphs quoted from the Westinghouse Electric Corporation summary paper on GESMO 1 steam generator tube leakage problem, dated May 10, 1976, at pages 1 and 15.

JUDGE BLOCH: We are not admitting this for the purpose of the truth of the statement, nor for its accuracy as an excerpt, merely for the purpose of asking Mr. Fletcher whether he agrees or disagrees with the content of this excerpt.

MR. CHURCHILL: But you're not admitting it?

JUDGE BLOCH: No, we're just asking a question of Mr. Fletcher, not admitting it as evidence.

MR. CHURCHILL: May I see the excerpt?

JUDGE BLOCH: Off the record.

(Discussion off the record.)

JUDGE BLOCH: On the record.

MR. CHURCHILL: This I take it is a document that was not identified to us 48 hours before the start of the hearing?

MR. ANDERSON: That's correct, like redirect was not identified 48 hours.

MR. CHURCHILL: My redirect, no, it was not.

I would object to it on that basis. I would object strenuously to being handed an excerpt from the document and not being handed the document, and asked to read something totally out of context without being given the opportunity to see the document.

MR. ANDERSON: If we have a continuance I'll be glad to provide one.

MR. CHURCHILL: I'd object strenuously to a continuance, Your Honor, at this point, when he full well knows the schedule we're operating.

May I suggest, Your Honor, if Mr. Anderson wants to ask whether Mr. Fletcher knows of any reason why all-volatile treatment would do this, or if he wants to ask Mr. Fletcher specifically whether it would do specific things, fine. But I do object to having him read into the record an excerpt from a document that we haven't seen.

MR. ANDERSON: Your suggestion is rejected.

JUDGE BLOCH: Mr. Anderson, please ask questions based on this excerpt. The excerpt itself cannot be used because it was not noticed under the 48-hour rule, because it is only a portion of a much larger document.

If you would like to try to ask questions

about all-volatile treatment and its effect on the annulus and you want to use this to refresh your mind or to inform yourself about what the previous beliefs were, it is proper to use that to refresh your own recollection, but I prefer that you ask individual questions derived from this passage.

MR. ANDERSON: May the record reflect, Mr. Chairman, that we strongly object to the application of a rule that results in testimony given today about five minutes ago -- we think it is entirely inappropriate. I have no need to review that excerpt to refresh my memory. I'm trying to refresh Mr. Fletcher's memory, and I don't think any post hoc explanations or justifications -- I just want to test the credibility of the testimony.

JUDGE BLOCH: We're not applying the 48-hour rule. What we're just saying is, you cannot use a document in a proceeding where there's an excerpt and you have not made the document available for the other people so that they could have the entire document.

MR. ANDERSON: I would request a continuance to get the document for the other people, and I would justify that on the basis that I had no notice that I was going to need this document.

JUDGE BLOCH: The request for the continuance

is denied. If overnight you can obtain the document and you can persuade us in the morning that it's necessary to call Mr. Fletcher, we will consider doing that. But you will have to show us why from the document it is necessary to complete your case by recalling Mr. Fletcher.

I suggest you probably can get a lot of what you want to get by doing exactly what the Board has suggested. I don't see how it is going to prejudice you. Certain information on which you want Mr. Fletcher's opinion, that information is contained in the passage. Just ask individual questions based on the passage.

We could not admit the passage for its truth anyway, because you don't have an evidentiary basis for it.

MR. ANDERSON: I would respectfully disagree, Mr. Chairman.

JUDGE BLOCH: With what, sir?

MR. ANDERSON: With asking him a question on this, whether the substance of the material provided in answer is of any use to this Board or of any use to the public, because the post hoc justifications are knee-jerk without thinking, based upon the past track record of this vendor and this licensee. And I think

that has to be demonstrated by comparison to previous representations made with just as much assurance as Mr. Fletcher has made here, which such events were not demonstrated on the paper that they were printed on, sir.

JUDGE BLOCH: The Board's ruling stands. Please continue, sir.

MR. ANDERSON: If I could just say for the record, Mr. Chairman, that if the hearing goes tonight there is no way I could bring that material in tomorrow.

MR. CHURCHILL: I'd like to add for the record, there is no way I would possibly agree now to his wanting to bring this in, since he has confessed and admitted on the record that all he wanted to do was attempt to discredit Westinghouse, precisely what I said that he was going to do before and precisely what he passed up his chance for a long time ago on voir dire.

JUDGE BLOCH: The Board would appreciate it if the comments of both parties were limited to the substance before us.

It was clear, Mr. Anderson, that we had prohibited the use of the documents to discredit Westinghouse. We did it twice. Please stick to the subject matter, and we hope Mr. Churchill also can stick

to the subject matter. We don't need by-play between the parties of that sort.

BY MR. ANDERSON: (Resuming)

Q Now, turning to the subject of leak before break that was discussed on redirect, Mr. Fletcher --

JUDGE BLOCH: Mr. Anderson, before you do that, Mr. Fletcher, do you know any way in which the all-volatile chemistry which is now being used at Point Beach could create special problems in the annulus between the sleeve and tube?

WITNESS FLETCHER: No, I do not, Judge Bloch.

JUDGE BLOCH: Please continue.

BY MR. ANDERSON: (Resuming)

Q You discounted the incidents at Ginna and Prairie Island by saying they were resulting from mechanical loose parts; is that correct, sir?

A (WITNESS FLETCHER) That is correct, Mr. Anderson.

Q Let me show you a letter which I believe is a letter in this proceeding, dated November 9, 1982, from Mr. Bruce W. Churchill to the Licensing Board.

MR. CHURCHILL: When was the later dated?

Your Honor, the hearing started 9:00 o'clock in the morning on November 17. This subject was opened up on redirect because of specifically his direct

examination. He's the one that raised the question of these four plants that required the redirect.

JUDGE BLOCH: Mr. Churchill, I think I understand your point.

Mr. Anderson, what is the possible relevance of that letter to the leak before break criteria?

MR. ANDERSON: The relevance is, it attempts to dispose of leak before break -- let me strike that.

The attempt to dispose of events which do not follow leak before break by saying those leaks were caused by mechanical parts rubbing does not serve to dispose of the problem at Point Beach or any other plant, especially a plant which does not have any of those parts monitored.

JUDGE BLOCH: But we have an amendment here that deals with sleeving. It is not a question of whether it is possible that there could be loose parts in the steam generator. The question is whether the sleeving project creates risks to the public.

MR. ANDERSON: The question to the public, Mr. Chairman, is whether the NRC has ever considered this problem, and to our knowledge it has not. I think as far as the Staff testimony indicates, it's still under consideration. It has not done it anywhere in here.

This relates to what happens, and to foreclose

it based upon a legal ruling is not going to serve the substance of justice, sir.

JUDGE BLOCH: I suppose that if you have a loose parts problem you should petition for a rulemaking on loose parts. It's not subject to the hearing before us.

MR. ANDERSON: That is a legal argument, that it's not a subject of our hearing.

JUDGE BLOCH: Nevertheless, it is subject to our ruling.

BY MR. ANDERSON: (Resuming)

Q Now, the track record that we have with the leaks at pressurized water reactors, especially the instances we discussed from the Licensee, from the evaluation of steam generator tube rupture event reports and the 200 instances you referred to in an answer to Mr. Bloch, referred to leakages during normal operation with normal pressure differentials, is that not true?

A (WITNESS FLETCHER) I am sorry, Mr. Anderson. I thought you included the four events in your overall statement, and I guess I'm a little bit confused as to what your question is.

Q Let me restate it if I may. If we look at the four events we discussed yesterday -- the Prairie Island, Surry, Point Beach and Ginna -- and we look at

the 200 leaks that you responded to in a question by Mr. Bloch earlier, those were all leaks that occurred during normal operation with normal pressure differentials; is that correct?

A (WITNESS FLETCHER) That is correct.

JUDGE BLOCH: There were two parts to that question. You said the 200 leaks were all normal pressure differential; is that correct?

WITNESS FLETCHER: Yes, to the best of my knowledge they were all during normal operating conditions.

JUDGE BLOCH: The question was two parts. He also mentioned the four. Those were not -- those also were normal?

WITNESS FLETCHER: That is corract, sir. That is why I answered to the affirmative.

BY MR. ANDERSON: (Resuming)

Q And the response of the tubes to the prassure differentials in the main line steam break or a LOCA may not be the same, is that not true, sir?

A (WITNESS FLETCHER) The pressures resulting from a steam line breek, for example, would be somewhat increased, the differential pressure across the tube wall.

Q And the strasses would be different in a LOCA,

although the pressure differential itself might not be greater?

A (WITNESS FLETCHER) The pressure differential is lower and it is in the reverse direction.

Q But the stresses are of a different nature, are they not?

A (WITNESS FLETCHER) Yes, they are. The stresses in the case of a LOCA are a pressure to the outside of the tube. In the case of the steam line break the outside of the tube would be in tension.

Q And beside that, there is also a difference in time, is there not? The pressure changes would be different in terms of time, in terms of LOCA and normal operation? Wouldn't you basically have an instantaneous pressure reversal?

A (WITNESS FLETCHER) Well, I guess I'm a little bit confused over what you're calling time. There is a time for the transient that is assumed for either event. How closely related those are to each other, I don't know offhand.

Q But the fact that there is different times in the transients in the LOCA case or in the steam line break case makes the stresses different than under normal operating conditions, is that not true?

A (WITNESS FLETCHER) I didn't agree that the

times were different. The stress would be the stress for any applied differential pressure. The time would not be a factor in determining the stress on the tube wall.

Q Well, a weakened tube might respond differently differently to a sudden pressure change than to a slow pressure change, might it not?

A (WITNESS FLETCHER) There could possibly be some influence, but I have difficulty in exactly what the difference would be.

Q I'm going to try to get to that. There may be some difference, though.

A (WITNESS FLETCHER) There could be, with respect to the time of application of the differential pressure. However, in the ultimate sense of analysis of that situation, the tube strength is dictated by its properties and its response to the pressure would be its response to a maximum pressure.

So if you consider that in the limit sense, maximum delta P considering the condition of the tube at the time --

JUDGE BLOCH: Maybe I can clarify that for myself. The maximum change in pressure differential is the principle limiting variable. Is that correct?

WITNESS FLETCHER: Yes, sir.

JUDGE BLOCH: But I thought you said there could be some influence from the speed with which that pressure differential is applied, or isn't there?

WITNESS FLETCHER: I'm not too clear on that myself, whether speed and the time frame that we're talking about with regard to LOCA or steam line break would have any influence.

JUDGE BLOCH: If the change is extremely rapid, it would have an influence, but you think that under those scenarios it could develop on a steam line break or a LOCA, and that extremely rapid change would not occur?

WITNESS FLETCHER: Well, there is a finite time to my recollection and understanding for a steam line break depressurization and a LOCA depressurization. There is an assumed time for the differential pressure to occur. I would think that the longer that time span is then the system perhaps would respond differently. I guess I just have to leave it. At least, I am not prepared to address the answer of time effects on tube response.

I would leave it that the tube is in a particular condition and we know what the tube strength is when a differential pressure is applied across that in our burst test, for example. These pressures are taken up in a matter of minutes, perhaps, and the tube does not respond in a burst pressure test until the critical pressure has been exceeded.

JUDGE BLOCH: Off the record.

(A discussion was held off the record.)

JUDGE BLOCH: Mr. Anderson?

MR. ANDERSON: Yesterday it was left open for Decade to discovery with the requesting body.

JUDGE BLOCH: Well, let's first finish with the witness.

MR. ANDERSON: I thought that was clear. No more questions on redirect.

JUDGE BLOCH: Does the Staff have any questions?

MR. BACHMANN: The Staff has no questions of this witness.

JUDGE BLOCH: Is there further redirect?

MR. CHURCHILL: No, Your Honor.

MR. ANDERSON: Before he is excused, I would like to take up another issue in case it impacts on this.

JUDGE BLOCH: We can always recall Mr. Fletcher, if necessary, and I take it Mr. Fletcher is not expected to leave the proceeding.

MR. CHURCHILL: I don't know. He may be ready to. No, he will be here.

JUDGE BLOCH: Mr. Fletcher, thank you very much for your cooperation.

MR. ANDERSON: Just to be clear, I would object to his being dismissed before this issue is clarified for the record.

MR. CHURCHILL: You made yourself clear.

JUDGE BLOCH: Okay. Mr. Fletcher, you are excused from the stand.

(The witness was excused.)

JUDGE BLOCH: Mr. Reporter, you may make the break for today's transcript at this point.

(Whereupon, at 3:44 o'clock p.m., the hearing recessed, to reconvene at 3:45 o'clock p.m., in the evening session.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

ATOMIC SAFETY AND LICENSING BOARD

in the matter of: WISCONSIN ELECTRIC POWER COMPANY
(Point Beach Power Plant Units 1 and 2)

Date of Proceeding: November 18, 1982

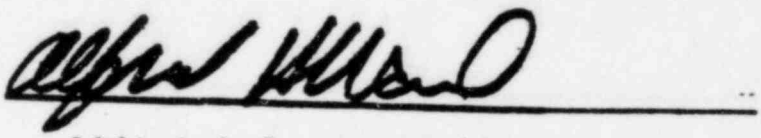
Docket Number: 50-266-OLA & 50-301-OLA

Place of Proceeding: Milwaukee, Wisconsin

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Alfred H. Ward

Official Reporter (Typed)



Official Reporter (Signature)