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UNITED STATES
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

DOCKET NO: 50-400-OL
50-401-OL

SHEARON HARRIS NUCLEAR POWER PLANT

LOCATION: APEX, NORTH CAROLINA

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of:	:	
CAROLINA POWER AND LIGHT COMPANY and NORTH CAROLINA EASTERN MUNICIPAL POWER AGENCY	:	Docket Nos. 50-400-OL 50-401-OL
Shearon Harris Nuclear Power Plant Units 1 and 2	:	

Ramada Inn
Interstate 55
ECU Room
Apex, North Carolina

Tuesday, October 23, 1984

The hearing in the above-entitled matter was reconvened, pursuant to adjournment, at 9:00 a.m.

BEFORE:

JAMES L. KELLEY, Esq., Chairman,
Atomic Safety and Licensing Board.

DR. JAMES H. CARPENTER, Member.

DR. GLENN O. BRIGHT, Member.

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APPEARANCES:

On behalf of the Applicants:

SAMANTHA F. FLYNN, Esquire
Carolina Power and Light Company
Raleigh, North Carolina

THOMAS A. BAXTER, Esquire
JOHN H. O'NEILL, JR., Esquire
and
MICHAEL A. SWIGER, Esquire
Shaw, Pittman, Potts & Trowbridge
Washington, D. C.

On behalf of the NRC Staff:

BRADLEY JONES, Esquire
U. S. Nuclear Regulatory Commission
Region II
Atlanta, Georgia

JANICE MOORE, Esquire
and
CHARLES BARTH, Esquire
U. S. Nuclear Regulatory Commission
Bethesda, Maryland

Wells Eddleman, pro se

Sim 1

C O N T E N T S

WITNESSES	DIRECT	CROSS	REDIRECT	RECROSS	BOARD	VOIR DIRE
ROBERT W. PRUNTY, JR.) PETER M. YANDOW)		5026	5083 5089	5086 5090	5080	
PETER M. YANDOW) ROBERT W. PRUNTY, JR.) - and -) RICHARD B. MILLER)	5091	5100				
RICHARD M. BUCCI) - and -) EDWIN J. PAGAN)	5164	5168	5230		5225	
EDWARD E. McLEAN) RICHARD M. BUCCI) EDWIN J. PAGAN)	5231	5236				

E X H I B I T S

EXHIBIT NO.	IDENTIFIED	RECEIVED
Staff Exhibit No. 7	REMARKED as Exhibit No. 6 5026	

#1-1-SueT

P R O C E E D I N G S

JUDGE KELLEY: Good morning. I'm sorry we are a little bit late. The 8:05 took off at 8:20. I guess it could have been worse.

We plan to pick up on the testimony as soon as we can. We do have a few preliminary matters we want to at least mention, and one thing we want to talk about a little bit and I will see if parties have anything to bring up, is -- let me note first that we had two documents provided the Board and I assume the parties this morning. One is a letter dated October 1984 to Mr. Eddleman from Mr. J. M. Felton, the Director of the Division of Rules and Records of NRC. And this, I gather, is the action on the pending FOIA matter that we have spoken about before.

Let me suggest in that connection, let's put that on the docket first thing tomorrow so that in the meantime we can read this letter and think about it a little bit. But, the pending proposition is what approach do we take to the filing of further documents that were produced in response to the FOIA, and what approach do we take to whether we wait for further review of this letter in relation to the management contention that we tried last month.

And we can hear from everybody -- it shouldn't take too long -- tomorrow morning.

Secondly, we have an Affidavit from Chan Van Vo,

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also known as Van Vo Davis, and we have not had an opportunity to read this. It's a rather lengthy sixteen-page affidavit. In the regard, I suggest that the Board at least needs a chance to read this over. Perhaps we can read it this evening and say something about it further tomorrow, whatever seems to be appropriate. But some initial reaction at least tomorrow to the document. But we need until then to at least just read it.

MR. EDDLEMAN: Let me just note for the record that I'm the one that supplied that.

JUDGE KELLEY: Thank you. Mr. Eddleman, you supplied the copies to the Board and the parties?

MR. EDDLEMAN: They became available from the Government Accountability Project yesterday, and I got copies.

JUDGE KELLEY: Fine. Thank you.

MR. BAXTER: Mr. Chairman --

JUDGE KELLEY: Yes.

MR. BAXTER: -- I understand the Board's desire to read the Affidavit over. I would simply volunteer that we are prepared now to provide some -- our views and reaction to the Affidavit if that would be helpful for you to have prior to reading it, to put some of it in context rather than leaving you with the document alone.

It's not something we received just this morning.

(The Board members are conferring.)

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JUDGE KELLEY: We would rather wait. I think one more day wouldn't matter, and we could take a look at it tonight, and we can hear from you tomorrow.

There is a pending motion on emergency planning, but there is some indication we might not have everybody's views in by this time.

Is that right as far as you know, Mr. Baxter?

MR. BAXTER: That's correct.

JUDGE KELLEY: Okay. I think I said Friday just let us know when you think it's ripe for discussion.

And the other thing that we talked about, we referred to at least, last week was the question whether we should adopt some system of time limits for hearing parts or all of the case remaining. And in that connection we had some xerox copies of a section of the Catawba Opinion which outlines in general terms the kind of thing we were referring to.

And our inclination is that that approach might be useful here. We would like to talk about it and give you some of our ideas and hear from you, too. This seems to be as good a time as any to do that.

It's really two separate questions. One, do you favor some system of time limits, let's say, similar to the one outlined in the Catawba case for questioning in the case. When I say questioning, to include cross-examination, Board questions, recross, redirect, and the like, not necessarily

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broken down that fine but covering all the questioning so that you have at least a goal in time towards which you are working, or within which you are trying to keep, I should put it that way.

As we envision it, it wouldn't be an absolutely rigid type of arrangement but rather we might say, for example, X hours on Panel A and Y hours on Panel B, and then the cross examiner who gets most of the time might want to do some re-allocating within the system; that's okay. And if it's clear at the end of anybody's expired time they do need some more, we could then consider that and grant some more if we think it's warranted.

So, that's just a quick thumbnail sketch of what we have got in mind. Then, apart from that, if that's deemed to be a good idea by the Board, and in light of the comments made by the parties, what limits should there be? And, we have some thoughts on that, too.

But I think having said that much, let me go around the tables. Mr. Baxter, do you favor that approach?

MR. BAXTER: We think that consideration of time limits is warranted at this point to move the case along in a more orderly way, and I think it would perhaps even be helpful to Mr. Eddleman in trying to get to the main points and the merits of the individual pieces of testimony.

I would note with respect to Contention 9 in particular

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which is a little bit peculiar, we have testimony broken out by subparts that on the last day of the management hearing in September when we were discussing rough estimates for how long various issues would take, Mr. Eddleman was asked for his rough guess -- and I know that's what it was -- on Contention 9 as a whole, and he indicated four days at that point.

I think with respect to this Contention in particular, we would urge that a time limit for the entire contention be considered, with Mr. Eddleman having the flexibility to devote and allocate among the various subparts whatever time he felt was appropriate, rather than doing it panel by individual panel.

JUDGE KELLEY: I'm not sure I understand. How do you do that mechanically?

I mean, if you are a Board sitting here and you are setting up such a system, what do you say in order to achieve that result?

MR. BAXTER: You say that we ought to be done with Applicant's -- all of Applicant's panel on Contention 9 by whatever time period is judged to be appropriate. Within that rule, Mr. Eddleman, you are free to take whatever amount of time you think is appropriate.

JUDGE KELLEY: Like, by Thursday afternoon, or whatever that might be?

MR. BAXTER: Right.

JUDGE KELLEY: I see. And, then your assumption is

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that the remaining question will sort of follow along and it will all work out. And maybe that's right, maybe that's right. If the bulk of the time is given over to cross, you don't have to concern yourself that much with the other questioning; is that your idea?

MR. BAXTER: Well, I think our record to date shows that the redirect examination and Board examination has not occupied a significant amount of time at all. I grant that would have to be included in the overall time limit. And if we did an hour and a half's worth of redirect, it may -- you may have to reallocate the time somewhat. But that so far has not been the case, and I don't expect it will be.

JUDGE KELLEY: You also, under that approach, maybe it doesn't matter, but it occurs to me there is a tendency under that approach to guarantee you will take that much time.

MR. BAXTER: Well I see that problem with the sub-part approach myself as well.

JUDGE KELLEY: All right. I think I understand your point. I will go to Ms. Moore and come to you last, Mr. Eddlemen.

Ms. Moore, what's your view?

MS. MOORE: Your Honor, I think that a time limit is not a bad idea for this contention in particular, because of the way it is organized and there are lots of subparts.

I would agree I think with Mr. Baxter on an overall

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time limit for the contention, allowing Mr. Eddleman to allocate his time for cross as he sees fit, and also give him an opportunity for good cause to extend that time if he believes there is a reason that at least his cross-examination needs to go longer, that that should be presented to the Board and the parties.

JUDGE KELLEY: One of the problems I've got with that suggestion -- I guess it applies to both of your positions, and I'm not in any way characterizing you, Mr. Eddleman, but I'm talking about my own experience in listening to cross -- and that is that there is cross and there is cross.

Suppose you've given a party three days to finish a contention. And if you just said, here are your three days, use it as you see fit, then he gets up to the last day and has barely gotten started on one of the points and he wants another day to do that, it's kind of hard to say no. I'm not saying you can't, but it's kind of hard.

It may also be the case that cross has been pretty vigorous, moved along pretty well toward the end but not previously. Then, the judgment it seems to me is a little bit harder to make. Do you follow me?

(No reply.)

But, in any event, nothing is perfect. This is a gross system whatever you do. Okay, Mr. Eddleman, what's your view on the point under discussion?

MR. EDDLEMAN: Being over a fence, I read over a portion of the Catawba Decision that was handed out, and find myself thoroughly confused as to what the real basis may be for these time limits, so what I am saying is as a matter of law I can't say one way or the other whether they are justified in law, but as a matter of practice, I don't have any problem with trying to finish things on a reasonable schedule, if indeed, the other parties don't have much cross, and I guess that would include Mr. Runkle when he is here. I believe he has a conflict. I believe that is what he said. I am not certain.

Then, I can lay out sort of contention by contention where I think I am going to be. As a teacher, I sort of see the problem of an overall time limit for Contention 9 this way. It is like if I say to my students okay, you have a project that has five pieces, and I want you to have the whole thing done the 15th of December.

That doesn't give them, basically, any guidance as to how far along they need to be at various times. If I take a more mechanistic approach and say, well, I expect you to have the first part done by Halloween, and the second part done by the second week in November, and so on, that is clearer and for some people that are kind of having a hard time getting started, it is a little more effective.

Obviously there are going to be variations in it

no matter what you do.

Unfortunately, I have not -- when I looked over Contention 9, because of some problems with my own schedule in the coming weekend, and Monday after that, I had to do a good bit of work on 65 and 4] over the weekend, too, so I haven't really gotten 9 scoped out as to piece by piece.

I think, however, that I am almost certain, if I can just lay out where I think I can get, as to what I think I need to do on cross with these things, I think that I can almost surely finish up with the Applicant's witnesses on 9 by the end of tomorrow.

I am not sure about Mr. Masciantonio, or not --

JUDGE KELLEY: Excuse me. We hae what, six panels?

MR. EDDLEMAN: Well, there are two of them right here, and -- we have six panels and seven parts, as I recall.

JUDGE KELLEY: Yeah. You have got -- There was an introductory part, and that is on, and then we did -- that leaves six, starting with 9 B.

MR. EDDLEMAN: That is roughly three a day, although I am not promising to absolutely finishing three a day. I might finish four today, I might, but I am not sure.

JUDGE KELLEY: When you say that, I take it you are factoring in some anticipated, but not very long period, for questioning by others?

MR. EDDLEMAN: Right. I am not saying hust me. Like we have been doing. If it goes roughly like that, if the Board asks some questions, and the other people ask a few, and that takes maybe, I don't know, twenty minutes a panel, something like that, just guessing.

JUDGE KELLEY: It might average out around there?

MR. EDDLEMAN: That is the kind of rough estimate I was making when I was figuring what I would need, and then if I can get Mr. Masciantonio on Wednesday, I would certainly try to get as far with him as I can, but I don't anticipate going with him past noon the next day in any case.

JUDGE KELLEY: Did you say Wednesday, Masciantonio? I thought you would have meant Thursday.

MR. EDDLEMAN: Well, what I am saying is if I go a little faster -- you raised the point if you set a limit you tend to fill it up. I certainly don't intend to do that on Contention 9 if I can help it. If there is more questions, that is one thing. I haven't gone through some of these things in the detail that I know exactly how many questions I have, but just in a general sense, that is there I think I am.

In other words, I would be pretty sure of finishing up with the Applicant's panels, all of them, by the end of Wednesday, and if I can get to Mr. Masciantonio some time on Wednesday, I would be willing to start in on him then, and in any case I think I can have him finished, at least from

my cross examination needs, no later than noon on Thursday.

Then we go into 65. That is another matter I need to raise. It is sort of out of place here, but I need to mention it at some point.

JUDGE KELLEY: Yes, go ahead.

MR. EDDLEMAN: I have made arrangements with Mr. Stokes to come in and be available on the 30th, which is the Tuesday after this week.

JUDGE KELLEY: A week from today?

MR. EDDLEMAN: Right. And also Mr. Stokes is preparing some stuff in the nature of rebuttal, and I wanted to see if I could get consent to put them both on at the same time, simply because we have to fly him back otherwise , and it costs a lot of money.

What I am thinking is that Mr. Stokes will be somewhere in the middle of 65. I am not quite sure how fast I am going to be able to go with the Applicant's panel there, and the subpoenaed witnesses, but then Mr. Stokes will be in there, and I would anticipate finishing up 65 in no event later than -- and again, I am figuring from my point of view and allowing for little more cross on Mr. Stokes --

JUDGE KELLEY: Another thing you might talk about with regard to Stokes, and I am not saying it is a good idea, but sometimes you just take witnesses out of order, if you have Stokes down here on Tuesday, and you know the Applicant's

not done, or the Staff is supposed to be up at bat, or whatever, you could talk about that.

MR. EDDLEMAN: Right. I think that is an issue that might arise, and we need to get into it, but I am trying to cover it here from the point of scheduling just to get it on the record.

JUDGE KELLEY: Good.

MR. EDDLEMAN: In any event, I anticipate finishing up everything on 65 by the 31st, unless something funny comes to light, and what with Mr. Van Vow popping up and so on. I am not sure that somebody else won't pop up.

JUDGE KELLEY: Right.

MR. EDDLEMAN: But we will deal with that if it happens when we come to it. I don't have anybody on line right now, so I am saying on that finish the 31st, and then Dr. Plato and the Staff Panel on 4 will be in on the 1st and 2nd, and Mr. Runkle is in charge of that. I know he doesn't anticipate taking more than two days, but in any event, if he finishes up on that earlier, I am prepared to start 41, and also if we finish 65 early, I am prepared to start 41 then.

And then the rest of 41 would spill over into the week of the 6th, and I haven't frankly scoped out exactly how long that will take, but I think even with Mr. Van Vow, if he is going to testify and is accepted as a witness, I am still not anticipating that this is going to go beyond the

end of that week.

That is just my rough estimate of how much time I think I need. Now, that doesn't address limits per se, but if that is kind of a comfortable schedule, then I am willing to go by it. That is what I am saying.

JUDGE KELLEY: It strikes me -- going out to 65 is last on the agenda, as we are not set up.

MR. EDDLEMAN: I thought 41 was last.

JUDGE KELLEY: I get the two confused. But in any event, we can take a harder look at that one as the time goes on. That is pretty far down the road. But -- I don't know my colleagues reactions, but what you have outlined for 9 and 41, is it?

MR. EDDLEMAN: 65.

JUDGE KELLEY: 65. That is next after 9. That is concrete.

MR. EDDLEMAN: Yes.

JUDGE KELLEY: Okay. What you have outlined for 9 and 65, and the TLD's strikes me as pretty reasonable as gross limits, don't you think so? I think that is consistent with the way you were talking isn't that right?

MR. BAXTER: Yes, Mr. Chairman. I want to respond to just a couple of statements.

JUDGE KELLEY: Sure. go ahead. This was just in very general terms, but go ahead.

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MR. BAXTER: Mr. Eddleman's estimate for the time required to finish Applicant's panels on Contention 9 I don't find to be unreasonable, and we would be content with that without further discussion. The time limits for this contention.

I know we are not raising these other issues for decision, but sometimes I gets misunderstood if I don't speak up.

JUDGE KELLEY: No, go ahead. Now is the time to get it said.

MR. BAXTER: I can't -- I will work with Mr. Eddleman to try to coordinate, if possible, Mr. Stokes appearance, but I can't conceive of a basis for having written rebuttal by Mr. Stokes on that contention, and I doubt very seriously whether there is going to be consent on our part at any time to the presentation of rebuttal. None of the facts that are concluded in our testimony are new, and could not have been addressed by Mr. Stokes on August 9.

The second point is that when Mr. Eddleman discussed Joint 4, he overlooked our witnesses, and I think it is our plan, and I think it is the Staff's, that our witness would go first on November 1, followed by the Staff witnesses and Dr. Plato. That we are going to put those in there as well. I didn't want that to be a surprise.

End 2.
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JUDGE KELLEY: Is that your understanding, Mrs. Moore?

MRS. MOORE: Yes, Your Honor, it is.

JUDGE KELLEY: I don't know. Maybe you ---

MR. EDDLEMAN: Mr. Baxter is right that I left their witnesses out. It was inadvertent. Mr. Runkle would have to tell you what that does. I still -- let me put it this way. He has not told me that even handling all the witnesses that he anticipated it going more than two days, but you will have to ask him when he gets here.

JUDGE KELLEY: Okay.

MRS. MOORE: Your Honor, I would say that when I spoke to the parties about the Joint 4 issue being heard on November 1st and 2nd, I did say that we would hear the issue in its usual order, and that is that the applicants' witnesses and then the staff's would be presented. I believe Mr. Runkle understood that.

JUDGE KELLEY: Okay.

MR. EDDLEMAN: And for what Mr. Baxter said on Mr. Stokes, I am willing to discuss this with him off the record and see what we can work out.

JUDGE KELLEY: Okay. And we note the applicants' being doubtful about the rebuttal proposition, and go ahead and talk about it anyway, and then if you disagree, we will just have to rule on that.

Well, it seems to be the consensus that we have got agreement on Mr. Eddleman's goals for the next three contentions, the one that is pending, plus the two after that in terms of about when they ought to get done.

And there doesn't seem to be any support for the idea of interim type time deadlines and we don't think they are all that critical. So the parties feeling that way, we are willing to go along the outline we have just about. Everybody knows what it is in gross terms.

We will keep an eye on how the case is going just as the parties will, and if things seem to be getting out of whack, it will be in order to say we are way behind and we will never make it and then we will see how we are doing and maybe it will get extended. I don't mean that even the outside deadline is in concrete, but it does at least give us something to plan around.

I think that is all we need to say on that topic at this point.

So we had a pending question to Mr. Prunty, as I recall.

MR. EDDLEMAN: Yes, sir.

MR. BAXTER: I am sorry, Mr. Chairman. I have one more matter. I was a little slow on the uptake this morning with respect to Mr. VanVo because I was expecting to address it here and hadn't reacted quickly enough to the

Board's reading some materials overnight.

In light of your desire to do that we would like to make available to the Board for reading as well two documents, which I will identify for the record and provide to the rest of the parties.

One is a Department of Labor letter dated September 13, 1984 to Carolina Power and Light Company attaching the complaint to Mr. VanVo alleging discriminatory employment practices in violation of the Energy Reorganization Act.

And the second document is the Department of Labor's letter to Mr. VanVo of October 12, 1984 reporting on the results of their investigation in which they conclude that discrimination did not occur.

So we would like the Board to have both of those documents to read along with the affidavit.

JUDGE KELLEY: That seems appropriate.

MRS. MOORE: Mr. Chairman, I have one preliminary matter.

JUDGE KELLEY: Okay.

MRS. MOORE: I would like to make a correction to the record at this time. In the fire protection contention 116, the staff had an exhibit, which was the standard review plan section referring to fire protection. I misspoke at the time and it was marked as Staff Exhibit

7. It should be Staff Exhibit 6.

JUDGE KELLEY: Fine. So remarked.

(Staff Exhibit 7, previously marked, was remarked as Staff Exhibit 6 for identification.)

JUDGE KELLEY: Anything else before we return to the panel?

(No response from the parties.)

JUDGE KELLEY: Okay. Mr. Eddleman, go ahead.

Whereupon,

ROBERT WAYNE PRUNTY, JR.

- and -

PETER MAURICE YANDOW

witnesses called for examination by the applicants, resumed the stand and, having been previously duly sworn, were further examined and testified as follows:

CROSS-EXAMINATION (Resumed)

BY MR. EDDLEMAN:

Q Gentlemen, do you want me to ask the question again, or can you go ahead and answer?

A (Witness Prunty) Yes.

A (Witness Yandow) Yes.

Q I believe the question was in Safety Evaluation Report 311 which of the open items from the NRC staff in

that SER applied to the various parts of Contention 9 that we are hearing here, if any?

A (Witness Prunty) The SER open items apply to the program as a whole. With respect to these items, we have subsequent to the SER being issued, we have provided to the staff written information answering the questions raised by the SER. The staff is evaluating the information we have submitted them, and we are awaiting confirmatory audit by the staff upon completion of their program review of our entire equipment qualification program.

Q Okay. Are you gentlemen the sponsors of Applicants' Exhibit A. I just wanted to clarify that?

A Exhi it which?

Q Eight. Applicants' 8 I believe is the FSAR section on environmental qualifications.

A Yes, we are.

Q You are. Okay.

Mr. Yandow, Judge Kelley kindly lent me his transcript from last Friday as to your discussion of the further actions you had taken with respect to Limitorque valve operators at the Harris plant.

A (Witness Yandow) Yes.

Q Do you have a copy of the transcript available to you?

A No, I don't.

(Counsel O'Neill took a copy of the referred to transcript to the witnesses.)

MR. EDDLEMAN: I just have the one, but I would like him to be able to see it. This is page 4971.

MR. O'NEILL: Mr. Chairman, if you will give the witness a chance to read the transcript.

JUDGE KELLEY: Yes.

MR. O'NEILL: I would like to look over his shoulder and read it myself.

JUDGE KELLEY: Sure.

(Pause.)

WITNESS YANDOW: Yes, I have read it.

BY MR. EDDLEOAN:

Q The discussion that you make there on about lines 8 through 10 on page 4971 about Part 1 of the field verification program of Limitorque's, does that Part 1 -- yes, I think it is clear from the transcript. Part 1 and Part 2 have the same verifications involved, correct?

A (Witness Yandow) Yes.

Q And so as to the inspections in Part 1, you do the same things that are listed down there below under Part 2?

A Right. As it says, the two verifications discussed above.

Q All right. Now in using the word "deficiencies"

there, does that have sort of a technical meaning? I mean is it a deficiency per the rules as opposed to perhaps a defect where you find something is wrong and you replace it?

A What I meant by the word "deficiency" there is the criteria which we had set, which I discussed, we did not find any variations from that criteria that would be a discrepancy or a deficiency.

Q All right. And those criteria are discussed in your prefiled testimony on 9B, correct?

A Correct.

Q Okay. Now as to Item 6 under this description of the verification program, visual inspection of internal components, was there any visual inspection of the O-rings?

A No.

"Q Okay. Now as to Part 1 which talks about safety related active valves, is there is a set of safety"related passive valves also?

A Yes.

Q And is the difference that the active valves have to actually operate to perform their safety function, is that the difference?

A Yes. They would have to perform their function and actually move, yes.

Q Okay. And the other ones are planned to be able

to perform all their safety functions without moving; is that correct?

A Or prior to the incident.

Q Well now, does that mean that one of these passive valves might be called on to perform a safety function by moving?

A Well, during the process of, let's say, a refueling or something there might be a valve actuation or movement, yes.

Q And could a failure in such a situation have safety significance?

A No. By the requirements, is a failure could occur that could cause a problem, that would have to be included in the program and evaluated.

Q Okay. Whether the valve was labeled active or passive, if its failure to act could cause a problem, you would have to inspect those valves?

A Yes.

Q Okay. Now as to Part 3 down at the bottom of page 4971, that is the part that is still continuing in your inspections, right?

A That is correct.

Q And the definition of active valve there would be basically the same as we discussed?

A Yes.

Q Okay. It says the scope of the inspections will be defined using information available from Limitorque and Shearon Harris. Is there any of the information that is available for Limitorque that you use in defining that scope that is not discussed in your prefiled testimony on 9B?

A Well, we have not discussed a verification of outside containment valves with Limitorque yet. So I can't say that one way or the other. I would expect that it at least includes this in the fact that those are some of the areas we would check. But in the case of, let's say, the motor installation, we wouldn't have to check for RH since they are probably Class B, which would be a different type.

Q I see. And the information available from Shearon Harris, would that be your own records concerning these valves?

A Yes. One of the concerns was verification that the PO files agreed with the valve installed.

Q All right. I think that basically takes care of that line.

Let me just for clarify, gentlemen, the testimony on Contention 9 that you present, other than your qualifications, is basically a layout of what the allegations are and how the testimony on them is organized in Contention 9, is it not?

A (Witness Prunty) Yes.

Q If we may turn then to Contention 9B, do you have your prefiled testimony on that available to you?

A Yes.

A (Witness Yandow) Yes, I do.

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Q The first thing I want to ask for clarification, have either of you ever worked at the Midland Nuclear Power Plant?

A (Witness Prunty) No.

(Witness Yandow) No.

Q Have either of you ever worked for the Bechtel Corporation?

A (Witness Prunty) No.

(Witness Yandow) No.

Q Did either of you have anything to do with the inspection of Limitorque valves at the Midland Plant?

A (Witness Prunty) No.

(Witness Yandow) No.

Q All right. I'm referring to Page 3 of your pre-filed testimony, gentlemen, Question and Answer 5. These valve operators, if I try to translate this into kind of lay person's terms, are sort of automatic valve turners or automatic valve --

A (Witness Yandow) I'm not sure I understand the word "automatic."

Q Well, the -- it has got a motor and some gears to change the valve's position.

A That's correct.

Q Now, the motor, I take it, is started by an electrical signal?

#4-2-SueT

A That's correct.

Q Okay. And the signal will tell it if it's open, go ahead and close; or, if it's closed, go ahead and open.

Is that generally what these things do?

A The signal doesn't tell it which position to take. It just supplies power to it, and it changes state. In other words, if it was open it closes. If it is closed, it opens. It doesn't have the intelligence to know inside. There is no microprocessor or something involved to tell it which way it should be going.

Q Okay. So, in other words, if this thing starts it may be like one of the old fashion light switches that turns, you turn the thing around and from whichever position it is, on or off, it goes to the other click. If you turn it again, it goes back to the other position. If you just keeping turning, it goes on, off, on, off, on, off.

A I'm not sure I know the light switch you are talking about, but in essence I guess that's what it does. Yeah.

Q It's an ancient piece of electrical equipment. It may be before your time.

But, in other words, if you actuate this valve operator, whatever position the valve is in it goes to the other position? And then if you actuate it again it goes from whatever position it's in then back to the other position; is that correct?

#4-3-SueT

A If it were open and you applied the power, it would go closed and would stop.

Q And then if you applied power to it again after it stopped, it would go back to open?

A If the limit switch and the other functions that are in this control circuit allowed it to do that, yes.

Q Uh-huh. But as far as the operator goes, if power comes into it, it just switches position on the valve?

A Yes.

Q All right. Does the operator -- I think you might have already answered this, but does the operator itself include any indication or anything that indicates back to the control room or to the operators as to what position the valve is in?

A Yes. There is a limit switch inside that's connected through a series of gears to the operator itself.

Q And that limit switch indicates which position the valve is in or which position the gears are in?

A Which position the valve is in by the gear position.

Q Okay. If, for example, the gears became unhooked someway, the limit switch would indicate where the gears are or where the valve is?

A My knowledge of a Limitorque would be the indication where the gears are.

Q Okay. The Figure 1 that's attached, the typical

#4-4-SueT

gate valve with the Limitorque operator, over here on the left side it looks to me like the bottom of this drawing is the valve, that is the part that sits down toward the bottom of the left side and has a center line through it and a cross section showing pipe, and I believe that is a gate valve; is that correct?

A Yes, as indicated in the drawing it is a gate valve.

Q Okay. And the operator, does that start with the Part AA, kind of in the middle of that, or is it up the highest part of it, where you have approximate written in the description?

A I believe you probably could say it starts with the dimension or the Part Number 232-3 which would be on the right hand side of the upper part of the stem.

A better way to look at that would be to look at Figure 2 which actually shows the operator and kind of go from one to the other to see what parts are included and what is not.

Q Okay. All right. And the automatic operator itself is what's shown in Figure 2?

A (Witness Prunty) The operator, yes.

Q Okay. Now, on this Figure 1, is there any indication of what orientation the operator needs to be installed in?

#4-5-SueT

A (Witness Yandow) No, except for the piping connection.

Q Okay. Would you turn to your Question and Answer 6, also back on Page 3. You list a number of functions that these valve operators perform, isolation of reactor containment, operation of the emergency core cooling system, operation of emergency safeguard systems.

Is this isolation of the reactor coolant system boundary the isolation of the primary system; is that what one of their functions is?

A In some cases.

Q And in any case, these are all ways of isolating the reactor coolant system?

A Not in all cases, no.

Q What I mean is just within that one section. In other words, whether one of these valves performs an isolation to the reactor coolant system pressure boundary, it may isolate at the edge of the primary system boundary or some other place in order to isolate the reactor coolant, but all these valves that fall within that description are holding basically the primary coolant within a boundary.

A Yes.

Q All right. These are extremely important safety functions, aren't they?

A Yes.

#4-6-SueT

Q Okay. And then you describe the places where the Limitorques are found. Is this a description of where the safety-related Limitorques are found at Harris or is this all Limitorques?

A No. This is a discussion of the safety-related.

Q Okay. In Answer 7, you describe the receipt of the Information Notice distributed at the Harris Plant Engineering Section.

How fast does that normally happen? Is it something that when you get it in, the Engineering Section would have it the same day or next week?

A (Witness Prunty) It wouldn't happen within the same day, but it would happen in the first few days.

Q Uh-huh. Now, the Harris Plant Engineering Section is the section that you gentlemen are in, right?

A Yes.

Q Okay. And is the QA for these valves within that section or is it separate?

A The Quality Assurance is separate from the Harris Plant Engineering Section.

Q So, that would be another department than you gentlemen?

A That's right.

Q Okay. Now, when you give descriptions as -- well, in Answer 8 you then describe what's in this Information Notice

#4-7-SueT

from ya'll's point of view and then describe what CP&L did on receiving that Notice; is that correct?

A (Witness Yandow) That's correct.

Q All right. Now, going over from Page 4 to Page 5, from the part that says "Limitorque in its written response stated that..." and then gives some text, and then there is some more sentences and you come over finally on Page 5 to a sentence, "However, Limitorque indicated that Westinghouse had undertaken to identify and replace all unqualified terminal blocks. Therefore, Limitorque did not recommend that any corrective action be taken by CP&L as a result of this Notice," is all the stuff in between those two lines basically out of that Limitorque letter, things that Limitorque said?

A No. We've had discussions with Midland personnel also.

Q All right. I don't know if you can piece it out but since I don't believe the written response is attached to this testimony, can you recall which of those pieces of information you got by directly contacting the Midland people and which came from Limitorque?

A I would say that the information is all from Limitorque and then we verified it with Midland. So, it's all in -- I don't know how you can do that.

Q Okay. So, that's your answer. Your answer is --

#4-8-SueT

A We are not relying on Limitorque only, is what I mean to say here.

Q Uh-huh. So, basically you have verified all the things in this paragraph by contacting someone in Midland.

Is the verification in writing, or is it something you did over the phone? Or, do you recall?

A It started out with phone calls, but we received written information, copies of evaluation and that type of information.

Q Okay. And you've used this information in your review at Harris?

A Yes.

Q Now, you say that there are sixteen active safety-related valves with Limitorque operators located inside containment at Harris.

That's your first group that you've talked about in your update on Friday, correct?

A Yes, Part One.

Q Part One. Okay. How many valves are involved in Part Two? Do you know?

A I believe it's either eight or nine. I'm not sure. I think it's eight.

Q Okay. And how many are in Part Three?

A Approximately a hundred and seventeen, a hundred and twenty. I don't have an exact count.

#4-9-SueT

Q Okay. But somewhere in that range?

A Yes.

Q All right. Now, as to the underrated terminal blocks, looking in the beginning of your Answer 9 beginning on Page 5 and following over on Page 6, at the Harris Plant are the motors on those valves also 460 volts?

A We have some.

Q Some are 460? Do you know what the voltages are on the others?

A Most of them are DC, which would be 125.

Q Most are 125 volts DC?

A Yes.

Q Okay. If you had an underrated terminal block, as you describe there, how would they, or how could they, prevent the valve from performing their safety function?

A Well, as I pointed out, we don't have these but I guess I could -- if they were underrated, what that means is if the voltage was applied the terminal could break down and cause the signal not to be applied to the motor but be applied to the case, or a short, or that type of affair.

Q Okay. And is the danger to the plant personnel basically of electric shock?

A That's correct.

Q Okay. In the middle paragraph on that page, you start off, "According to Limitorque...," again is this something

#4-10-SueT

that you have also gone back to Midland and verified the information in this paragraph?

A Yes. I believe in that packet that we got from them there was a letter from Bechtel talking about that information.

Q So, you got a packet of information from Midland about the Limitorques?

A Yeah. That was the written information I was talking about.

Q Uh-huh.

A It's also written out very clearly in the Information Notice, that same type of information. So, we received it from the Staff also.

Q Uh-huh. Okay. As to the random sample that was inspected of the other operators at Midland, do you have any idea what percentage that sample was, or how big the sample size was, and how many valves were in the total of other operators at Midland?

A No, I don't believe I have that.

Q Would there normally be some kind of a confidence level associated with a sample size for an inspection like this?

A If I were to do an inspection like this, it would be looking at different sizes and different purchase order or shop order numbers, and that kind of thing, good engineering

#4-11-SueT1

judgment to establish what the criteria would be.

Q But not a direct examination of what the confidence level is that, say, if you got a hundred valves and you sample five what confidence level you have that if there is one bad that you would have caught it?

MR. O'NEILL: Objection to the question, Mr. Chairman. Since the witnesses have testified that they are doing a hundred percent inspection of these Limitorque valve operators, questions regarding sample sizes and confidence levels are really irrelevant here.

MR. EDDLEMAN: I will withdraw the question.

JUDGE KELLEY: Okay.

BY MR. EDDLEMAN: (Continuing)

Q The -- what was the follow-up on this matter at Shearon Harris?

A Besides the walk-down?

Q Now, the walk-down is just a -- you walk down and look at the things as they sit there, right?

A Yeah, to the criteria established for the walk-down.

Q Right. But, I mean, does that mean that you at Harris inspected all of the terminal blocks?

A That's correct.

Q Uh-huh. Now, I gather that the two of you didn't perform all of those inspections personally, or am I wrong?

#4-12-SueT

A I performed probably ninety percent of them myself --

Q Uh-huh.

A -- along with my staff.

Q So, you would have high confidence that if there were anything wrong with any of them, or any mistakes in the inspection, that you would know about it?

A Yes, sir.

Q Now, what kind of verification, if any, does QA do on this sort of inspection?

A On the inspection that I completed, they were not directly involved but seeing that we found no deficiencies I believe that we can state that the QA organization had performed their function correctly.

Q So, in this sense, you were checking behind QA instead of QA checking behind you?

A I guess, yeah. I agree with that.

Q Okay. Was -- had QA inspected these things before ya'll rechecked them; is that correct?

A Most definitely.

Q Now, as to Item C-9 down at the bottom of Page 6, the last paragraph, again do I take it that ya'll checked back with Midland about what Limitorque did, verified that information?

A Yes.

Q Okay. And is that method of identifying terminal

#4-13-SueT1

blocks that was used there at Midland the same one that ya'll are using at Harris?

A They were provided with the similar information that we used. But I might point out, in case of C-9 we have been informed by Westinghouse along with verifying it ourselves, that we don't have those type of terminal blocks.

Q But it is something you look for when you inspect the valves yourselves, right?

A That was part of my criteria, yes.

Q Okay. As to Item B on the top of Page 7, it describes a type of terminal block that had never been type tested. And then you say Westinghouse has notified CP&L that none of the operators at Harris has these particular Buchanan 0824 terminal blocks.

Is Westinghouse the only supplier of valves of Limitorque operators to Shearon Harris?

A No. But the reason Westinghouse is mentioned here is because Limitorque has provided those types of terminal blocks, the 824s, were only provided in valves sent to Westinghouse, so there is no reason to believe that we need to go into the other vendors.

Q Uh-huh. And you checked, when you looked at the valves, to see if it's a Buchanan 824, 0824, terminal block?

A We verify that it's a Buchanan of the two types that we are supposed to have by measurements and by actually

#4-14-SueT

seeing the name on the terminal block.

Q Are the measurements different on the 0824 than on your two types?

A I don't have that information.

Q Do all of your terminal blocks state on them in some readable location what model they are, these Buchanan terminal blocks?

A I know they all state -- and I don't know what you mean by defining readable. In a couple, we had to disassemble the mounting to look at it.

Q Uh-huh.

A But they don't have the actual model number on it. They have the manufacturer.

Q So, in other words, the thing would have stamped on it or marked on it someplace, Buchanan, but it wouldn't necessarily say Buchanan 0824 or Buchanan 1755 or whatever the number is?

A Not to my knowledge.

Q All right. In the Answer 10 about the terminal blocks, there are a number of different types made by various manufacturers in addition to Buchanan, correct?

A Yes.

Q It's down at the bottom of Page 7. Do any of these have the same dimensions?

A Well, in some cases the point to point was the same,

#4-15-SueT1

but if you measured the overall dimension of the terminal block or looked at the physical description you would see the difference.

Q All right. So, in addition to checking the dimensions, you would sometimes have to check the contact to contact or point to point dimensions, you would also have to measure the block and in some cases look at the description; is that right?

A We use the description to help us determine what the style might be, but then we compare it to the actual physical dimensions to assure ourselves, and then we measure -- of course, read the name off the back.

Q Are these descriptions given in your Figures 3 and 4 for the ones that we are talking about here?

A We have examples of two of the types.

Q All right. And one is a Buchanan 0524, which is Figure 3, correct?

A Correct.

Q Okay. Now, is the description on this sheet?

A Well, as you can see, the example shows you a top view, side view and end view. And that's what I'm talking about, the description like that.

Q So, in other words, whichever direction you were looking at it from, you would look and see if it matched that drawing?

#4-16-SueT

A Yeah, along with the measurements.

Q Right. Okay. And the Marathon 300 series, Figure 4, these dimensions and standard modification drawings down here, are the way that you would look to see if it matched the description?

A No. We were looking at the upper Figure which shows a top view and end view, the screws that hold it on, the number of screws, the orientation, that type of thing.

Q All right. Now, under the diagram dimensions there, down at the bottom of kind of that first -- I want to say box, but it has got rounded corners in the middle of the page, under diagram dimensions can you read the line that goes under those dimensions? The one that begins "Catalog dimensions are for guidance only..."

A Yes.

Q It says for guidance only and are not to be construed as inspection standards, does it not?

A That's correct.

Q Have you verified from Marathon what the tolerance is on these dimensions?

A No, sir. We got this from Limitorque who is the vendor that supplied them. So, we believe that they are correct.

Q The qualified terminal blocks that you say you would replace with, do you have those on site already or would

#4-17-SueT

you have to order them if you had a block to replace?

A We would have to order them.

Q Okay. The motor insulation material discussed in Question and Answer 11, do you know when the Class RH nomenclature or name was adopted?

A I don't recall the exact date. I think I've seen it once but I don't remember the exact date.

Q Well, do you have any recollection of whether it was after some of these motors were delivered or installed at the Harris plant?

A Again, I don't recall the exact date. I can't even guess.

Q All right. As to the results of Limitorque's review for Midland, do you know whether that review at Midland was audited by the NRC or anybody else?

A I'm not sure of the exact timing, but as you know Midland is no longer being constructed. So, maybe -- I'm not sure, but I don't think the NRC followed up on it because there was no need to.

Q No need for it at Midland, right?

A Correct. That's what we are talking about, Midland.

Q Right. The Answer 12, top of Page 9, please, this starts off with the statement that CP&L asked Limitorque to conduct a review of its records on valve operators located inside containment at Harris. Now, it says, "Limitorque's review

#4-18-SueT

indicated that the valve operator motors for Harris have qualified insulation."

What does indicated mean in that context?

A They stated in the letter to us.

Q Did you, or any of your QA people at Harris, go back and check Limitorque's review, to your knowledge?

A Not to my knowledge.

Q Okay. Now, it says, in addition CP&L was checking Limitorque motor ratings on nameplates as part of the field verification program.

Now, have you found any nameplates indicating Class H insulation so far in your review?

A We have found, I think, two in the steam tunnel but I'm not sure of the exact count. I don't remember any in the containment.

Q Uh-huh. Have those been checked back with Limitorque by serial number now?

A That's part of the qualification review, yes.

Q All right. The review includes checking with Limitorque?

A What we've done is taken the model numbers and serial numbers, shop order numbers what Limitorque calls them, and sent them back to Limitorque and said please verify with your records that these are Class H and RH, depending on what they are. I might add that that's on the motor. It's a

#4-19-SueT

requirement of our drawings, and those are inspected. When the QA people receive these valves on site they are inspected to make sure they conform to the drawings. So, that has already really been checked. As we found, there has been no -- none of the valves have come through without that kind of thing.

Q Well, I thought that you said two of the valves were Class H?

A On the drawing it so indicated Class H.

Q Well, did they have to be RHs as they were used at Harris?

A H and RH are the same thing. It's just a matter of when they were produced.

end #4
Joe flws

Some of the valves we have were produced earlier, apparently, and the have 'H,' but it is the same thing.

Q Now, it says any valve operator motor found to be unqualified for inside containment will be replaced with a qualified motor.

Would this also apply to ones outside containment?

A Yes.

Q Then would you have to order those motors, or do you have them on site?

A Most likely, they would have to be ordered.

Q Now, it says the serial numbers will be provided to Limitorque in order that Limitorque can confirm that RH insulation was used.

Does that mean confirm that, or confirm whether RH insulation was used?

A Well, on the containment values, it would be certification that they -- that the records indicate that it was used as we have found. This is a follow-up.

In the outside areas, in our Part 3, there may be Class B insulation, so we will not be replacing Class B if that is qualified for that location.

Q But you would compare it with the standards for the location that it is in, is that right?

A Correct. That is part of our program.

Q Okay. Now, as to Answer 13, also on page 9,

were reference to Item C-3 of Information Notice 8372, the Limitorque qualification report B 0058 that is referred to there, is that something that was available to Shearon Harris before this information notice came out?

A Yes, that was a test report provided by Limitorque for those valves.

Q Okay. Do the -- the recommendations there, were they established based on environmental qualification of those valves -- I mean valve operators, pardon me.

A You mean the recommendation for the orientation?

Q Yes.

A Yes, it would be depending on how they were tested, and what they are qualified for.

Q Okay. Were any of those tests, to your knowledge, audited by CP&L QA, or anybody else at CP&L?

A I am not aware of any direct CP&L review, although these valves are supplied for other units, so I suspect that we have been there. I might indicate that EBASCO services organization has a large QA organization, which has reviewed vendors and sub-vendors, and Westinghouse does the same.

Q Do you know whether EBASCO or Westinghouse have audited these tests on these valve operators?

A I have no direct knowledge to that, no.

Q By your other plants, do you mean other nuclear plants, or are these used in all sorts of power plants?

A These are indicating other nuclear plants.

Q Do you know if the NRC Staff has done any auditing of the EQ tests for theze valve operators?

A I am not directly -- I don't know for sure if they have or not.

Q Mr. Prunty, I don't mean to be freezing you out of this. If you have any addition to any of these things, please feel free to put it in. I am sort of taking it that if you don't add anything, that you don't have anything to add. I just wanted to be sure we were clear on that.

JUDGE KELLEY: Are we coming up on a break point, Mr. Eddleman?

MR. EDDLEMAN: We can go ahead and take it now.

JUDGE KELLEY: Let's take ten minutes.

(Short recess taken)

JUDGE KELLEY: Before we get too far into the day, just let me make a comment or two about this evening. As you will recall, we previously scheduled for this evening a limited appearance session for members of the public to come in and have a chance to speak their minds about the facility. We set 7:30 to 9:30. We don't have any sense at all about whether we are going to have a few people or a lot of people at this point.

The reason we got the extra space was primarily to have seating accommodations in case we had a fair number

of people.

With that there, I must say opening up that extra space makes this whole arrangement a little more livable. Not only from the standpoint of just sitting room, but from the standpoint of claustraphobia.

Does counsel prefer this, or would you rather be in cozier circumstances? Any particular preference.

MR. EDDLEMAN: I think this is a little better, but I am not going to say it is a requirement.

JUDGE KELLEY: It doesn't -- if it doesn't cost us a lot more money, maybe we can just tack it on for the other sessions. I will look into that.

This evening at limited appearances, we would like to have representatives of each party; from the applicant's, the Staff. Mr Eddleman has some preparation to do, and we wouldn't expect you to be here, but I hope some of the others could be here.

MR. EDDLEMAN: I understand that Dr. Wilson plans to attend at least part of the session, and I believe Mr. Runkle will be here for the joint interveners. I don't know about the others.

JUDGE KELLEY: Okay, thank you. We will ask you at the end of the day to take a few minutes, because we will need some configuration for tables other than the one we have got, and you may want to do a little moving of furniture when

we break for dinner tonight.

Okay. On that, we can go back to Mr. Eddleman's cross examination.

CROSS EXAMINATION

B Y MR. EDDLEMAN (Continuing)

JUDGE KELLEY: Excuse me. We don't allow smoking in here. If you want to smoke, please go out in the hall.

MR. EDDLEMAN: Thank's judge. I am not environmentally qualified for exposure to smoke.

BY MR. EDDLEMAN (Continuing)

Q Gentlemen, when you checked these Limitorques, do you verify that the equipment inside them, the terminal box and other things, are environmentally qualified?

A (Witness Yandow) The verification that we are doing is nust a back check against the system. The qualification -- QE qualifications is established by reviewing the report against the requirements at Shearon Harris, and then we are just verifying the equipment that is covered by this report either has been, the equipment has been shipped.

Q So, if I understand this correctly, what you are doing is checking to make sure the equipment that is in Limitorque valve operator that you have in Shearon Harris, is the same equipment that is covered in a qualification test report for that type of valve operator, is that correct?

A That is correct.

Q Do you know whether CP&L, or EBASCO, or Westinghouse QA has audited those equipment qualification tests?

A I am not aware of any direct review.

Q I would like to refer to Applicant's Exhibit 8 for a moment, if we might. Now, this I take it is that of the current FSAR, correct?

A (Witness Prunty) Yes.

Q Okay. There are some tables in it, oh, for example Table 3.11.0-1, starting at page 3.11.0-3, and what I would like to ask you is in which of these tables, if any, are these Limitorque valve operators listed?

A The Limitorque valve motor operators inside containment are shown on 3.11.0-4, about in the middle of the page.

A (Witness Yandow) And the outside ones are on 3.11.0-6.

Q Okay. Now, do the outside ones, Mr. Yandow, include the ones in the steam tunnels?

A Yes.

Q Okay, and if we could look at that -- it says the model or drawing numbers are various, does it not? Those Limitorques outside containment?

A This is on 3.11.0-6?

Q Yes.

A Yes, it does.

Q And the qualification reference is Limitorque

Report No. 800, from 1976, and Limitorque Report No. 600456, from 1974?

A That is what it says, yes.

Q Are those the qualification references that you checked against?

A We have additional information that we have been using, too. This is the summation of the NSSS supplied safety related equipment. We also have EBASCO's related equipment.

Q Okay. Now, as to the Limitorque's 3.11.0-4, the ones inside containment, this gives -- I take it this is the model number, model or drawing number, in the very middle of the page, the middle column, middle of the page, SNB Class H, correct?

A Yes.

Q Okay. And there, the qualification references are two WCAP reports, and NS-CE-692. Do you happen to know what the dates of those reports are?

A I am not familiar to give you the exact dates, but I might point out that these zren't the only reports we are using. This table, of course, will have to be updated, because as you can see, it says 71 qualify, and we know they have to be 74 qualified. It is just that the table hasn't been updated on this part.

They are, indeed, 74 qualified. It is just a matter

the table is slightly out of date.

Q Okay. Now, the portion of the table that we are in on page 3.11.0-4, is Amendment 16 information, correct?

A That is correct.

Q Including the part about Limitorques, correct?

A That is correct.

Q And on page 3.11.0-6, the Limitorque references there are also Amendment 16 information, correct?

A That is right.

Q Did you gentlemen have anything to do with preparing or filing -- preparing for filing Amendment No. 16 to this FSAR/

MR. O'NEILL: Mr. Chairman, I raise an objection at this time. The Contention itself goes to some rather narrow issues that have been identified, and I Notices with respect to Limitorque value operators. The questioning of the last five minutes has been very generalized in nature, and has gone into environmental qualification reports and their identification, which don't have anything to do with our response to the particular items that have been identified in this contention.

I think this line of questioning is irrelevant to the contention, and we should get back to the actual issues that are before this Board for litigation.

MR. EDDLEMAN: Judge, the testimony says, and

earlier questions establish further, that one of the things that they are doing in their verification program, which is discussed in the testimony in some detail, is checking to see that the components of those Limitorque valves are the ones that are in these qualification test reports.

I think the question about Amendment 16 actually goes to what -- it is sort of a what did you know, and when did you know it -- because he said, Mr. Yandow said that they actually had to be qualified in 1974, and I think there is some question as to why thst wasn't put in, and I wanted to know, you know, did they have anything to do with preparing the thing.

In other words, is the information that he knows in it. Now, they have also said that they are the sponsors of this exhibit, and I think I am entitled to ask them about the exhibit in a more general sense.

That is, about Contention 9 period, and not just 9.B.

End 5.
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JUDGE KELLEY: Which exhibit are you on now?

MR. EDDLEMAN: This is Applicants' Exhibit 8, the Final Safety Analysis Report, Section 311 and Appendix 311-A on environmental qualification.

JUDGE KELLEY: Excuse me.

(Pause while the Board confers)

JUDGE CARPENTER: Mr. Eddleman, would you tell us again how this most recent line of questioning relates specifically to the contention?

MR. EDDLEMAN: It relates through the testimony which describes how these things are qualified. They have got to verify that certain things are in there that the information notice expresses a concern about.

As I understand it, the way they do that is to check against these qualification reports. The Exhibit 8 lists those qualification reports and the standards to which the valve operators have to meet. I recognize it gets complicated, but then the question is that the information in this appears to be out of date by one of the last answers, and I wanted to know, and this is what the question relates to as opposed to the line, I want to know what role these gentlemen played in preparing this exhibit. They are its sponsors.

(Pause while the Board confers.)

JUDGE CARPENTER: How long do you think this line is going to go, Mr. Eddleman?

MR. EDDLEMAN: No more than two minutes if I am not wrong.

JUDGE CARPENTER: Would you go ahead, please.

MR. EDDLEMAN: Thank you.

BY MR. EDDLEMAN:

Q Gentlemen, what role, if any, did you all play in, or either of you play in preparing this Amendment 16 to the FSAR?

A (Witness Prunty) We do a review of the amendments in HPES. The information supplied here I believe comes directly from Westinghouse. I can't confirm that, but I believe it comes directly from Westinghouse.

Q When you say we do a review, does that mean you gentlemen personally or the people that work for you, or both?

A Both, plus it gets reviewed through other parties in the section. We don't do the entire review.

Q And so nobody apparently had noticed that 71 there should be 74; is that correct?

A I can't say they didn't notice it. But due to contractual commitments or other items, it may or may not have followed the normal chain of events for having the FSAR updated as a result of any additional commitments. I think

it is more along that line that people are aware. But FSAR amendments follow up after commitments are firmly established and contracts are brought up to date and that sort of thing. It is not a matter of not knowing.

Q Is it a matter of contracts or of environmental qualification requirements that these things have to be qualified to the 1974 standard?

A It is a result of the environmental qualification standards. We are upgrading these as a result of discussions with the staff.

Q Okay. If you gentlemen have h d a chance to look at those parts of the Applicant's Exhibit 8, are there any othdr, oh, let's say mistakes or indications with respect to those Limitorques identified on the pages that ve have been discussing, and I will call them 0-4 and 0-6 for convenience, that just come to your notice looking at them?

A I do not see any others.

A (Witness Yandow) No, I don't see any either.

Q All right. Mr. Yandow, if we could move on. I believe you said that there were also some of these Limitorques listed under Ebasco supplied equipment in this exhibit?

A Yes.

Q Could you indicate where that is?

A Well, that would be under Table 311.0-2, whibh

are Ebasco safety related equipment.

Q Now I am just going through this and trying to find a supplier named Limitorque.

A Well, this is a list of valves. Now valves are purchased from companies other than Limitorque. Limitorque is an operator manufacturer.

Q All right. So how would I know looking at this which ones have the Limitorque operators on them? Is there any indication in this table?

A No, there is no direct indication.

Q Okay.

A There are some mentions of motors.

Q And this table does not list an applicable qualification report for these items, does it?

A It is included under the qualification for the valve in the Ebasco supply.

Q Yes, but what I am getting at is, oh, say, if we looked on page 311.0-11 at the top, equipment, butterfly valves. Do you see where I am? Do you have that?

A Yes, yes.

Q Okay. Supplier, BIF, unit of general signal. Model No., none listed. Qualification per IEEE-323, 1974. On that one or anything else on this page can you point out to me one of these that indicates what the EQ report that applies to those valves or any other item on this page is?

A There is no direct -- if we might look at the bottom of the page, the Chainsboro Corporation valves. I am not sure if there is any Limitorque's, but the qualification standard uses 1974. So there is a test report for that qualification.

Q But what test report it is is not indicated in this table, correct?

A That is correct.

Q Are those test report numbers indicated for these items of equipment somewhere else in this exhibit, to your knowledge?

A Not to my knowledge.

Q Okay. Well now, when you inspect a valve, is there something in the record for that, I mean valve operator, is there something in the records for 4hat valve or valve operator that tells you what qualification reports you have to check against?

A There are several ways. The vendor is required by specification to submit a qualification report to either CP&L, Ebasco or Westinghouse depending on the purchaser for their review and approval. So that is one place. The other place is on the manufacturing drawings which are submitted for approval to us. There is indication there on the qualification, maybe not the report, but the data that we use for the inspections. So all that all ties into directly

through the QA organization to document what criteria we have to use to inspect.

Q Now by the data we use for inspections, do you mean the parts that are supplied to be in that operator?

A There is some motor information on the drawings and there is other information, orientation, that type of thing that might be on the drawing.

Q Okay. Would you actually go back and look to the qualification report about this?

A Oh, yes, most definitely. Like in the question of orientation in most cases it is in the report to talk about the different orientations it was qualified to.

Q Okay. That brings me back to a question I had per your Answer 14 on page 10 of your prefiled, if we can turn to that, please.

I think we said or established that the Limitorque recommended orientations did flow from the EQ test, correct?

A Yes.

Q Okay. Have there been any deviations identified since the filing of this testimony as to orientation of those valve operators?

A I am not aware of any.

Q And the actual EQ report would indicate what position or positions the entire valve and operator were

qualified in, correct?

A I am not sure if it directly says in every case that the valve was operated, you know, indicated in this direction or tested in this direction. It will make a statement that it was tested in its recommended installation orientation.

Q And to find out what that recommended orientation would be, would you be able to find that in the test reports, or would you have to look at the drawings for the valve?

A Sometimes the drawings that were used, the drawings of the valves or operators that were used are in the report. Sometimes they are referenced, depending on how how that was done.

Q I see. And you would be able to get ahold of those references in doing your review?

A This is all covered in 9-E, but, yes.

Q Okay. Now 9-E is the one about orientation of equipment at Harris in general, right?

A That is correct.

Q And here we are talking about just the orientation concerned with Limitorques that comes out of this information notice?

A That is correct.

Q Okay. Now as to the installation of drain plugs,

I want to ask a possibly silly question. What is a drain plug?

A When the manufacturer or the valve specifies a Limitorque operator, they go to Limitorque and order it. The Limitorque people do not know what the orientation of the operator or the motor will be in when they send it to the vendor or the manufacturer of the valve.

The drain plug replaces a pipe plug which is in the motor at the lowest point. There are pipe plug holes at 90 degree intervals around the motor. So that in any orientation you have a lowest pipe plug. What a drain plug does, it is pipe plug that has been drilled out in the form of a "T", one hole going up into the motor and the other two going out the sides of the pipe plug so that any condensation or moisture inside the motor will drip out and not form inside.

Q So it drains through the part that goes up into the motor and comes out the cross-piece down below?

A Yes, right.

Q Okay. Now you say that when they fill an order they don't know what orientation the motor is going to be in?

A They don't know what recommended orientation the vendor will use in the plant.

Q Okay. Now are there any of these orientations

that might be used that are other than vertical or horizontal?

A There are degrees thereof, I mean in between those two.

Q Okay. Well here is what I am getting at. You say that these pipe plugs, which are places where you can take out the pipe plug and insert a drain plug if you need to, are spaced at 90 degrees around the motor, correct?

A That is what I said.

Q Okay. So, in other words, if we have got one at the top at say zero degrees and then we have got one at 90 degrees, one at 180 and one at 270, right?

A That is right.

Q Now the lowest point on the motor is where condensation would drain to, correct?

A Yes.

Q Okay. Now what if that lowest point doesn't turn out to match one of those 90 degree orientations if the thing is not vertical or horizontal?

A I believe if you look at the size of the motor, the amount of condensation that might accumulate before it reachel the drain plug is very minimal. It is not a large radius type thing where you can have gallons of wate0 holding up. It is a matter of minor amounts.

Q Well, physically if you want to look at the

size, about how big are these motors, how wide are they?

A I believe if you look at Figure 1, although the dimensions aren't on here, they are about 12 inches, you know, across.

Q All right.

A Twelve to less because of smaller motors.

Q So a foot or less?

A Yes, about that.

Q And that is your recollection of them?

A Yes.

Q How far off of horizontal or vertical may these things be installed?

A That depends on the application.

Q Well, let me ask you this as just sort of a general question. Might it be off -- I mean the most you could get off of horizontal or vertical if you have got things spaced at 90 degrees would be at 45 degrees orientation, right?

A That seems logical, yes.

Q Okay. Can you be 45 degrees off of horizontal with one of these?

A I am not familiar with the criteria we are using at Shearon Harris as far as how much or what a percentage is. I know in the valves I have seen I haven't found any that have been more than two or three degrees off of

horizontal or vertical.

Q All right. It says the drain plugs are placed with installation instructions at the time of shipment by Limitorque. Does that mean when the thing comes in you have got a couple of drain plugs in there loose, or does it mean they are already placed into the motor?

A No, they are inside the limit switch housing, affixed to the inside of the housing.

Q Taped in for shipping, right?

A I haven't taken one apart when it first arrived. So I don't know exactly how they affix it.

Q Okay. But it is not installed in the motor when it is shipped?

A That is correct.

Q Okay. So that depends on installation at the Harris plant?

A That is correct.

Q Does QA check the location of those drain plugs when the operators are installed at Harris?

A Well, as indicated, we have a design change that instructs the construction personnel on where to install them and of course that is inspected by the construction inspection people after to make sure that that has been done as part of our design process.

Q Okay. The design document it says is now part of

the work package. Since when has that been included in the work package, do you know?

A I believe it is three to four months old now.

Q So we are talking sometime around June or July of '84?

A Approximately.

Q All right. Was that also the approximate date when the Harris plant engineering secdion instructed construction personnel to do this? I mean did you issue other instructions besides the design document is what I am getting at?

A No, that is the way we would instruct them how to do it.

Q Okay. And HPES there, the part of HPES that did this I gather is you gentlemen's part; is that right?

A It was issued through our group, yes.

Q Okay. The onsite quality inspection organizations you are talking about there in the next to the last sentence on page 11, is that CI as you mentioned earlier, construction inspection?

A In the case of this design change, yes.

Q Now does QA also come along and look at this?

A I don't know.

Q Now the field verification you talk about there, that is what your people are doing, right?

A Yes, what we have done to date, yes.

Q Okay, to date.

As to Answer 17 on page 12, it quotes Item C-6 of Information Notice 83.72. Do you know if this concern was confirmed at Mid,and before they stopped construction?

A The records I have seen show that they had already pursued this quite extensively and I believe they were in the process of writing up a final report. I am not sure if it was ever issued or not.

Q Did you all use the same sort of methodology in that report in your review for Harris?

A I am not sure I understand what you mean by methodology.

Q Well, let me go through this. Let me just start in on a different set questions and drop that question, if I might.

I gather that the discussion that you give after quoting the Information Notice in that answer describes how Shearon Harris deals with this question; is that correct?

A Yes.

Q All right. Now the first thing it says is that the design engineering organizations at Ebasco and CP&L, now the CP&L part of that, is that your section of HPES?

A No. There are other organizations involved in the installation of valves.

End #6

#7-1-SueT

Q What are those organizations?

A The piping group, construction engineering, those types of groups.

Q So that doesn't include your group, or just includes your group and those others?

A It includes both. We are not the only people that review the qualification reports. The line design organizations who have application of these things also have input into the review.

Q Okay. And applications, would that include piping and construction and perhaps other groups besides yours?

A That's right.

Q Okay. What design engineering organizations with EBASCO are involved with this?

A They have a similar setup where they have an equipment -- environmental qualification organization that draws from the line discipline, so that gets looked at from an equipment qualification standpoint and also from a functional line engineering standpoint.

Q Okay. So, when the inspections that are discussed in the next sentence happen, the first one is prior to shipment so would that be prior to shipment at Limitorque or prior to shipment at the valve manufacturer?

A (Witness Yandow) The vendor's QA program would probably ship -- inspection prior to shipment, but I'm only

#7-2-SueT

theorizing here. The one we were talking about in this reference is prior to shipment from our valve manufacturer to us, to CP&L, Shearon Harris.

Q Okay. And they would be checking against the qualification report there; is that correct?

A Against the design documents which would -- may include the EQ report, yes.

Q But might not include the EQ report also; is that correct?

A That's correct. A lot of times, the information is necessary to verify the proper specification compliances, the specification itself on the design drawings that are submitted by the vendor.

Q Now, upon receipt at the Harris site, again is the EQ report one of the things that QA, I guess, at Harris -- let me try to split this into questions.

Who inspects upon receipt at Harris? Is that Harris QA, QC?

A Receipt inspection group, yeah.

Q And they are under QA?

A (Witness Yandow) It's a QA/QC organization.

Q Okay. And would they normally use the qualification report as reference to check against?

A Part of the verification is a certification that is received with the valve which would be a certificate of

#7-3-SueT

conformance or compliance and that has, in some cases, the EQ report. And, then they contact my group and see if that EQ report is indeed the right report and if it's on site and that type of information.

The actual inspection of that was done to the design drawings.

Q Okay. So, it doesn't necessarily involve looking at the EQ report?

A That's correct.

Q Now, then the after installation inspection, is that the inspection that your group is doing now or is that another one?

A Parts of the -- this is further described in E, but a work package is generated when they install a valve or any other piece of equipment, and there is an inspection point in that that they have to inspect at different points in the installation. One of those would be after to see that it meets the work package, the design drawings and that type of information.

Q Then, again that wouldn't include necessarily the qualification report?

A Not necessarily, but the information that is applicable is either in a design drawing or on a spec, or has been relayed in some other manner similar to the design change we described.

#7-4-SueT

Q Okay. But it comes back to your group before you actually are checking to see if the spec and the drawing and the actual item installed match what's in that qualification report; is that correct?

A I wouldn't say that in every piece of equipment our group is contacted, no. But the certification requirements are part of the specification on every piece of equipment, the drawing requirements, the reviews done by EBASCO or Westinghouse or CP&L, QA, that type of thing.

Q By certification requirements, does that include the requirement that it be environmentally qualified by test or otherwise?

A When required, yes.

Q That's what I mean. Okay. Now, as to the O-rings, we can turn over to Page 13 where your Answer 18 continues.

You discuss in the second full paragraph on Page 13 Limitorque's valve operator assembly control system. Have you gentlemen or any of your staff ever audited or inspected that system?

A (Witness Yandow) I've talked to several people that have been -- have either reviewed or seen or talked to people at Limitorque about their inspection and their installation.

Q Are those CP&L people you talked to?

A One of the gentlemen was a contractor for CP&L.

#7-5-SueT

Q All right. So, you have talked to people who have seen it?

A Yes.

Q All right. It says the O-rings are marked by a color code for proper identification. When you inspect, do you look for those color codes?

A No.

Q Can you indicate where the O-rings are in one of these operators on the attached Figure?

A Yeah. If you turn to Figure 2, several of the areas that are -- it's -- you can't really tell in this diagram but the motor is to the left hand side in the upper portion of that assembly and there would be a seal between the electrical components of that motor and the gears that you could see in the breakaway there.

Q Are you referring to Figure 1 or to Figure 2?

A Figure 2.

Q Okay.

A There is also some seals involved where the unit that is pushed to the front here with the dotted lines --

Q Uh-huh.

A -- where that connects up to the operator itself there are O-rings involved and where the torque switch and the limit switch which is on the left there, in that box, are located, is an O-ring between that unit and the operator behind

#7-6-SueT1

it.

Q All right.

A To inspect these, you would really have to disassemble the valve. And we don't feel that's necessary. We don't feel that the Midland concerns relate to the inspection or the installation or assembly of Limitorque, but to the installation of improper operators by Midland personnel. So, we don't have any reason to believe that the assembly procedures used by Limitorque are at fault.

Q Well, you -- so, you are saying you don't disassemble these valves in inspecting them? I mean, these operators?

A No, sir, no more than moving the limit switch housing which is that unit with the holes in it that looks like a gasketed type metal compartment.

Q The one that's indicated with the dotted lines between it and the rest?

A Right. That removes to, of course, perform field wiring and inspections and that kind of thing.

Q Okay. This is the one that has kind of a see-through aspect to it, an outline of the box around it?

A Yes.

Q And then you see this dark equipment inside it? And it has what looks like a seal or gasket where there may be screw holes in it, right, on Figure 2?

47-7-SueT

A Correct.

MR. EDDLEMAN: Okay. Gentlemen, I thank you. This concludes my questioning.

JUDGE KELLEY: Okay. Ms. Moore?

MS. MOORE: The Staff has no questions.

JUDGE KELLEY: Judge Bright.

INDEXXXX

BOARD EXAMINATION

BY JUDGE BRIGHT:

Q Mr. Yandow, I think what I would like to do is just increase my fund of knowledge here.

On these Limitorque operators, I got the idea that they are strictly a go-no go situation. That is, the operator pushes the button, something locks in and it goes completely to the other end of its travel.

Is that the way it works?

A (Witness Yandow) That's right. The operator has a control switch in the control room or wherever the thing is being operated from, which would provide power to the motor through a series of contactors in the motor control center. And that would send power to the valve to make it change state.

Q I guess my question is, does the operator have any other control over this operator?

A Besides the control switch? He could operate it from the motor control center, which is --

Q No, that really isn't it. Well, I guess it's a

#7-8-SueT

matter of, could it be used as a throttling valve? Does the operator have enough control over the travel of the thing, or once he pushes the button does it go all the way and he has no way of stopping it?

A To the best of my knowledge, all of these valves are either opened or closed. There is no throttle -- the throttling is done with other valves, manual valves and that kind of thing.

Q So, is this the only application of Limitorque operators? I mean, in general, not just at Shearon Harris?

A I'm not aware of any that are used for throttling that I'm -- in the safety-related program.

Q In any event, the ones at Shearon Harris are either full up, full out?

A To the best of my knowledge.

JUDGE BRIGHT: All right. Thank you.

BOARD EXAMINATION

INDEXXX

BY JUDGE KELLEY:

Q Can a valve with a Limitorque operator on it also be opened or closed manually?

A Yes. There is a handle, as shown on that Figure 2.

Q So, if something is wrong with it, if you can get to it fast enough, you can do it by hand?

A Yes.

#7-9-SueT

Q Okay. I've never seen a ring that wasn't in the shape of an O. Can you tell me what an O-ring is as opposed to other kinds of rings?

JUDGE BRIGHT: Yes.

JUDGE KELLEY: He can.

BY JUDGE KELLEY: (Continuing)

Q Can you?

A All I can think of would be a gasket which would be different.

Q I'm just curious why an O-ring. What does that mean? It's a component part, is it not?

A That's correct. It's an organic component made out of -- I'm not sure what these are made out of, that seals around some -- two things, to either keep materials from the operator from going into the limit switch housing and the other way around.

Q Kind of like a piston ring?

A I think -- yeah. That would be something like that, yeah.

(Witness Prunty) I think part of it is also related to the cross section. If you cut it across, it's in the shape of a circle. There are seal rings which may be square or --

Q Or flat, I suppose.

A Yes, sir, more like.

#7-10-SueT1

JUDGE KELLEY: I see. Thank you. Mr. Eddleman, does that raise anything else for you?

MR. EDDLEMAN: Just one thing, Judge.

FURTHER CROSS EXAMINATION

BY MR. EDDLEMAN:

INDEXXX

Q As to manual closings of these valves, are many of them located in areas that are high radiation areas in normal plant operation?

A (Witness Yandow) During normal plant operation, no.

Q But in an accident, they might be?

A Containment might be. That's practical.

Q Could some of them outside containment be near a line circulating coolant from inside containment that would be high radiation?

A Yes. Some of these are located in the safety injection recirculation system which would be, of course, a higher level than normal operation.

MR. EDDLEMAN: Okay. That's all I've got.

JUDGE KELLEY: Redirect?

MR. O'NEILL: Just a couple of questions.

INDEXXXX

REDIRECT EXAMINATION

BY MR. O'NEILL:

Q Mr. Yandow, during the cross-examination you described the limit switches that were internal to the Limitorque

#7-11-SueT

operator. I believe there may have been some confusion. Would you please clarify your statement in describing both internal and external limit switches and their functions?

A There is two types of limit switches. The Midland concern was on the internal limit switches. Their function in the valve control circuitry is to deenergize the circuit so the valve, of course, doesn't go beyond its operating capability. If it's a gate valve, you don't want it to go beyond the seat and cause damage to the valve. And that's what the limit switch does for that.

There is a stem mounted on the switch which is external to the operator. It's usually on the valve body itself, I mean on the stem of the valve. And that's used to indicate to the control room the status of the valve. If the valve is totally opened, totally closed, it will be lights on the control switch or near the control switch and the control board that would tell the operator where the valve actually is.

Q So the internal limit switch of the valve operator would not give a readout on the control room as to whether or not the valve was open or shut?

A No, not on a safety application.

Q There was some question with respect to the accuracy of the dimensions as set forth on Figure 4 of one of the terminal blocks. Would you please elaborate a little bit more

#7-12-SueT

on how you take such a diagram and insure that the correct terminal block is installed at the Harris Limitorque valve operator?

A Well, the first thing we did was obtain this information from Limitorque which was a documentation on which terminal box they might use in a RH or H type application. Then, we took the information from the drawings and we -- what the inspection incurred was to measure -- first of all, we usually removed the terminal block in some way to see if the name was on the terminal block if it wasn't clearly visible.

I know, in the case of the GE terminal blocks it was right on the front. In the case of the Marathons and the Buchanans they were on the back, which in some cases wasn't visible unless you took it apart.

Then, we would look at the configuration for height, the width, the point to point distance, and the dimensions in the diagram dimensions which would be the total length.

Q Did you have a sufficient number of dimensions to check in order to take into account any tolerance in those dimensions as listed on Figure 4?

A I believe that in the combination there were some cases where we found that the dimensions didn't quite agree with the drawings. We went back and remeasured and we found

#7-13-SueT

that we had made an error in our measurements. So, one does not -- not one only -- we didn't base our conclusions on just one dimension. It was a combination of all the factors that we see on these drawings.

Q Earlier in your cross-examination answer, you indicated that you personally had inspected approximately ninety percent of the Limitorque valve operators.

Would you please clarify as to which group you were indicating you had inspected ninety percent?

A I was speaking to the sixteen in the containment. I have not been involved in the inspection of the ones in the main steam tunnel, which is Part Two of our program.

I have been involved in setting up the criteria but not actually doing the inspections.

Q One final question, either Mr. Prunty or Mr. Yandow. Are the safety systems in which the Limitorque valve operators are to be used redundant safety systems?

A (Witness Prunty) Yes, they are.

MR. O'NEILL: Thank you. No further questions.

JUDGE KELLEY: Mr. Eddleman.

MR. EDDLEMAN: I think I've got just a few areas here.

INDEXXX

RECROSS EXAMINATION

BY MR. EDDLEMAN:

Q Mr. Yandow, are you playing any role in the inspection

#7-14-SueT

of the Part Three valves, the hundred and seventeen or so?

A We are currently involved in setting up an independent inspection via our construction people to inspect. We will be establishing the criteria and let them do the inspection and review the material after it has been received.

Q So, is that CI that is going to do that?

A I'm not sure I can say which organization and what the title is.

Q But some organization other than your own?

A That is correct.

Q Okay. Do you know what the tolerance is on the accuracy of the dimensions in a diagram such as Figure 4 that you have reviewed in looking at these terminal blocks?

A No.

Q Do the people who are actually looking at these terminal blocks in the field have the drawings like your Figure 4 there with them when they are doing that?

A When I did my inspections, I had brought along, yes, a copy of the pages just to be able to visually see that they were, you know, identical in construction type. I'm not sure exactly what criterion will be established for the larger scope, Part Three.

Q What about Part Two? When you weren't conducting the inspections, was having the diagrams available part of the --

#7-15-SueT1

A They had those available, yes.

Q Were they required to have them with them when they did it?

A No.

MR. EDDLEMAN: Okay. That's all.

JUDGE KELLEY: Okay. That brings us to the end of this particular panel. But I believe Mr. Yandow and Mr. Prunty are going on to the next panel; is that correct?

MR. YANDOW: Yes.

MR. PRUNTY: Yes.

JUDGE KELLEY: It's a little after 12. It seems like it is as good a place as any to eat lunch.

Shall we just break until one o'clock?

(No reply.)

Fine.

(Whereupon, a recess is taken for the luncheon break at 12:05 p.m., this date, October 23, 1984.)

end #7
Joe flws

(1:05 p.m.)

AFTERNOON SESSION

Whereupon,

PETER M. YANDOW

and

ROBERT W. PRUNTY,

resumes the stand and, having been previously sworn, were examined and further testified as follows:

JUDGE KELLEY: Let's go on the record. Can we empanel the next panel?

MR. O'NEILL: At lunch, we realized our two witnesses were too young to have really fully comprehended the analogy of the ight switch that Mr. Eddleman had proposed, and in fact, that analogy wasn't particularly useful, and would like to correct what may be a misimpression on the record as to the applicability of that analogy to a Limitorque operator if that would be okay.

MR. EDDLEMAN: I think the record already reflects that, but I don't have an objection.

JUDGE KELLEY: I am intrigued. You said they are too young? I don't get it, but go ahead.

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REDIRECT EXAMINATION

BY MR. O'NEILL:

Q Mr. Prunty, would you like to clarify the testimony that you gave with respect to an analogy of a light switch

and a Limitorque operator operation?

A (Witness Prunty) The analogy, as I understand Mr. Eddleman gave, dealt with when the Limitorque was in one position, when you take the switch and go to the position again that it will rotate further, and go in the direction opposite of the direction it was in in the beginning.

In other words, you keep rotating a switch, you keep hitting it with power and it changes state each and every time you do that, and that is not a good comparison. If the Limitorque is already open, and you hit it with open power, it does not go shut. It stays in the open position.

If the Limitorque is open, and you hit it with shut power, it goes shut. That actually occurs in the power distribution circuitry. It follows the command that you give it. It does not just automatically go to the next position like some Servo systems do. It is open and you hit it with open power, it does not move.

JUDGE KELLEY: Any question about that, Mr. Eddleman?

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RECROSS EXAMINATION

BY MR. EDDLEMAN:

Q Well, do I take it then there are two separate power connections; one for opening, and one for closing. Is that how it works?

A The power transfer occurs in the motor control

center. The power device that sends power to the belt.

Q Is that -- what I am getting at, is there a little switch or something in the valve operator that just changes the power from the open circuit to the closed.

A It has to do with the polarity that is applied, and that happens back at the contract, or in the motor control center itself.

Q So it is really the polarity of the current that is applied across the motor that makes it --

A That is what makes the motor run in the other direction, and causes the valve to reverse itself.

MR. O'NEILL: Applicant's recall to the stand Mr. Richard B. Miller.

Whereupon,

PETER M. YANDOW,

ROBERT W. PRUNTY,

and

RICHARD B. MILLER,

resume the stand, and having previously been sworn, were examined and further testified as follows:

JUDGE KELLEY: All three have been sworn, right?

MR. O'NEILL: Yes.

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DIRECT EXAMINATION

BY MR. O'NEILL:

Q Gentlemen, do you have before you a written statement

that was filed with the Board and the parties in this proceeding on August 31, 1984?

A (Witness Prunty) Yes, sir.

A (Witness Yandow) We do.

Q Mr. Brunty, would you please identify that document for the record?

A The document is the Applicant's testimony of Robert W. Prunty, Peter M. Yandow, and Richard B. Miller in response to Eddleman Contention 9A, (ITT-BARTON Transmitters.

Q And does that written statement consist of 12 pages of questions and answers, and Figures 1 and 2 attached thereto?

A Yes, it does.

Q Gentlemen, was this testimony including Figures 1 and 2, prepared by you or under your supervision?

A (Collectively) Yes.

Q Are each of your answers identified by your initials?

A (Collectively) Yes.

Q Mr. Miller, do you have any changes or corrections to make to your prefiled written statement?

A (Witness Miller) Yes. One correction on page 8. The 8th line from the top. Near the end of the line, it reads 320 HF, and it should be 320 degrees F.

Q Do you have any other changes or corrections to make, Mr. Miller?

A No.

Q Do either of the other two gentlemen have any changes or corrections to make to the written statement?

A (Witness Prunty) No.

A (Witness Yandow) No.

Q Is this statement as corrected then, true and accurate to the best of your knowledge, information and belief?

A (Collectively) Yes.

MR. O'NEILL: Mr. Chairman, I move that the Applicant's testimony of Robert W. Prunty, Peter M. Yandow, and Richard B. Miller in response to Eddleman Contention 9A, ITT-Barton Transmitters, dated August 31, 1984, be incorporated into the record as if read and received into evidence.

JUDGE KELLEY: Admitted.

(Above referenced document follows)

August 3[illegible], 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	Docket No. 50-400 OL
and NORTH CAROLINA EASTERN	)	
MUNICIPAL POWER AGENCY	)	
	)	
(Shearon Harris Nuclear Power	)	
Plant)	)	

APPLICANTS' TESTIMONY OF ROBERT W. PRUNTY, PETER M. YANDOW AND RICHARD B. MILLER IN RESPONSE TO EDDLEMAN CONTENTION 9A (ITT-BARTON TRANSMITTERS)

Q.1 Please state your names.

A.1 Robert W. Prunty, Peter M. Yandow and Richard B. Miller.

Q.2 Mr. Prunty and Mr. Yandow, are your addresses, occupations, employers, educational backgrounds and professional work experiences described elsewhere in the record of this proceeding?

A.2 (RWP, PMY) Yes, the relevant information is provided in "Applicants' Testimony of Robert W. Prunty and Peter M. Yandow in Response to Eddleman Contention 9 (Environmental Qualification of Electrical Equipment)."

Q.3 Mr. Miller, please state your address, present occupation and employer.

A.3 (RBM) I am a Principal Engineer with the Nuclear Safety Department of Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, PA 15230.

Q.4 State your educational background and professional work experience.

A.4 (RBM) I was graduated from the University of Delaware in 1967 with a Bachelor of Electrical Engineering degree and joined Westinghouse that year in the Field Service Department. After participating in resolving start-up problems at several plants, I transferred to the Engineering Department in 1970. While there, I had lead responsibility for the design and procurement of instrumentation systems and sensors, as well as being the interface between Nuclear Safety and Engineering

for licensing issues. I am the co-author of WCAP-8587, "Methodology For Qualifying Westinghouse WRD Supplied NSSS Safety Related Electrical Equipment," and several IEEE papers on the qualification of electrical equipment. I am the Secretary of the IEEE sub-committee on electrical equipment qualification (NPEC/SC-2) and am a registered Professional Engineer in the State of Pennsylvania. I have also been very active in establishing instrumentation setpoints consistent with safety analysis limits and plant and instrument characteristics and have co-authored a report detailing the methodology that is used for determining plant specific setpoints. I am presently the lead engineer in the Nuclear Safety Department responsible for electrical equipment qualification and am the primary interface on this subject with the NRC and Westinghouse customers.

Q.5 Please elaborate on your professional experience that is directly relevant to the testimony which you are presenting regarding ITT-Barton transmitters used at SHNPP.

A.5 (RBM) The primary emphasis of my job is to perform safety evaluations regarding identified electrical equipment deficiencies. I was very active in this effort regarding the ITT-Barton transmitter problems.

Q.6 What is the purpose of this testimony?

A.6 (RWP, PMY, RBM) The purpose of this testimony is to respond to Eddleman Contention 9A, which states:

> The proposed resolution and vendor's modification for ITT-Barton transmitters has not been shown to be adequate. (Ref. IE Information Notices 81-29, 82-52 and 83-72).

Q.7 How is your testimony organized?

A.7 (RWP, PMY, RBM) First, we provide background information on the ITT-Barton transmitters, including descriptions of the two types of transmitters of concern and their functions. Second, we discuss the concerns about ITT-Barton transmitters addressed in IE Information Notices 81-29, 82-52 and 83-72. We discuss the applicability of the Information Notices to SHNPP, the causes of the testing failures reported in the Information Notices, the safety significance of those failures, and the corrective actions taken by CP&L and Westinghouse.

Q.8 Mr. Yandow, please describe the ITT-Barton transmitters which are addressed in the IE Information Notices referenced in Eddleman Contention 9A.

A.8 (PMY) The transmitters addressed in the IE Information Notices are pressure-type transmitters. ITT-Barton pressure-type transmitters use either a Bourdon tube to measure pressure (see Figure 1, attached hereto), or a bellows assembly to measure differential pressure (see Figure 2, attached hereto), depending on the type of transmitter. In both types of transmitters, pressure changes cause mechanical movement of internal strain gauges, thereby varying the tension. The variation in tension causes changes in electrical resistance of the strain gauges, which is converted into an electrical output by the electronic circuitry of the transmitters.

Q.9 Please discuss IE Information Notice 81-29 as it relates to ITT-Barton transmitters.

A.9 (RBM) Equipment Qualification Notice No. 2, Test Summary Report No. 1 of IE Information Notice 81-29 (September 24, 1981) reported test failures which occurred during the initial qualification testing of ITT-Barton transmitters performed by Westinghouse. Two Model 764 differential pressure transmitters and one Model 763 pressure transmitter exhibited erratic behavior (fluctuating signal or step change in the output) during portions of the test sequence.

Q.10 What was the significance of these test failures?

A.10 (RBM) Significant unpredictable errors in the output of the transmitters were noted which could have resulted in safety analysis limits being exceeded. Subsequent testing and evaluation led to the conclusion that the erratic behavior would not occur until the product had been in use for at least five years.

Q.11 What was the cause of the test failures?

A.11 (RBM) As documented in Equipment Environmental Qualification Notice No. 2, Test Summary Report No. 2 of IE Information Notice 82-52 (December 21, 1982), all the failures resulted from degradation of contacts in the internal circuit connector assemblies of the transmitters.

Q.12 What did Westinghouse do to correct the problem?

A.12 (RBM) As a result of the investigation of the problem, Westinghouse and ITT-Barton determined that it could be corrected by soldering the connector assemblies. The modification was then successfully retested by both Westinghouse and ITT-Barton.

Q.13 Were the modification and the results of the retesting program reported to the NRC Staff?

A.13 (RBM) As indicated in IE Information Notice 82-52, Westinghouse submitted to the Staff a report which described the modification as well as the successful retesting. The Staff approved that test report. "Safety Evaluation Report of Westinghouse Equipment Qualification Documentation WCAP-8587, WCAP-8587 Supplement 1, WCAP-8687 Supplement 2, and WCAP-9714: Seismic and Environmental Qualification of Safety Related Electrical Equipment," (November 10, 1983).

Q.14 Are ITT-Barton Model 763 or 764 transmitters used at SHNPP?

A.14 (PMY) Yes, both Model 763 and 764 ITT-Barton transmitters are used at SHNPP. These transmitters are supplied by Westinghouse and ITT-Barton. As illustrated below, the transmitters are used to perform various safety functions at SHNPP.

Model	Function	Quantity
763	Reactor Coolant Pressure	1
763	Pressurizer Pressure	5
763	Steam Pressure	9
764	Pressurizer Level	3
764	Steam Generator Level	15
764	Steam Flow	6

These transmitters are located throughout the containment building.

Q.15 How did CP&L become aware of the problem with ITT-Barton Model 763 and Model 764 transmitters reported in IE Information Notice 81-29?

A.15 (RWP) CP&L, as the holder of a construction permit for SHNPP, receives IE Information Notices issued by the NRC. IE Information Notice 81-29 was received by CP&L's Nuclear Licensing Department and was distributed to the Harris Plant Engineering Section ("HPES") for evaluation. It was determined by HPES that the Information Notice was applicable to SHNPP.

Q.16 What was CP&L's response to the problem?

A.16 (RWP) Since Westinghouse and ITT-Barton still were investigating the problem, no corrective actions were taken at that time.

Subsequently, IE Information Notice 82-52 was issued, describing the failure mode and noting the modification and successful retesting. Upon receipt of a change notice from Westinghouse, CP&L sent the safety-related ITT-Barton Model 763 and Model 764 transmitters back to ITT-Barton to perform the modification discussed above. In addition, CP&L has reviewed the Westinghouse test report in order to confirm that the modification was adequate.

Q.17 Please discuss IE Information Notice 83-72 as it relates to ITT-Barton transmitters.

A.17 (RBM) IE Information Notice 83-72 (October 28, 1983) reported two additional problems with ITT-Barton transmitters. Equipment Environmental Qualification Notice No. 20, Test

Summary Report No. 1 of IE Information Notice 83-72 reported a negative shift (decrease) in output during initial exposure to a constant operating pressure. This defect occurred during testing by ITT-Barton of a suppressed zero (minimum measurement greater than zero) Model 763 pressure transmitter.

Equipment Environmental Qualification Notice No. 23, Test Summary Report No. 1 of IE Information Notice 83-72 addressed thermal nonrepeatability failures at ~~320HF~~ 320°F of Model 763 and Model 764 transmitters during testing by ITT-Barton. Thermal nonrepeatability failure is the inability of an instrument to repeat a specified output, within allowable limits, when exposed to the same temperature and pressure to which it was initially calibrated.

Q.18 What was the cause of the negative shift in output of the Model 763 pressure transmitter?

A.18 (RBM) On the basis of further testing, ITT-Barton identified the cause to be combined creep in the link wire (between the pressure Bourdon tube and the strain-sensing beam) and in the material used to attach the link wire.

Q.19 Does this negative shift have any safety significance?

A.19 (RBM) No. The only Model 763 suppressed zero pressure transmitters used in safety-related applications at SHNPP are those used to measure pressurizer pressure. Pressurizer pressure provides an input to the overtemperature delta T set point calculation. It also provides reactor trip on high

pressure, and reactor trip and safety injection on low pressure. The effect of this negative shift on overtemperature delta T is minimal, and is also in the conservative direction. Similarly, the effect on low pressure trips is conservative. Credit in the safety analysis is taken for the high pressure trip on loss of load only, and this function would occur less than 0.5 seconds later than analyzed. Since this transient is not limiting, the acceptance criterion for overpressure protection is still met.

Q.20 What, if any, action has CP&L taken with respect to the negative shift problem?

A.20 (RWP) CP&L agrees that this is not a safety problem. However, CP&L will evaluate any modifications recommended when ITT-Barton's testing and evaluation are completed.

Q.21 What was the cause of the thermal nonrepeatability problem in Model 763 and Model 764 transmitters addressed in IE Information Notice 83-72?

A.21 (RBM) Based on a report of excessive errors at abnormal temperature conditions by one of their customers, ITT-Barton performed static temperature calibration checks on several transmitters. As a result of this investigation, ITT-Barton discovered excessive errors at both abnormal and accident temperature conditions and determined two separate causes.

One cause of the errors was ITT-Barton's calibration technique for temperature compensation, which was found to

result in previously unaccounted for errors at both abnormal and accident temperatures. This compensation technique resulted in an overall change in the specified accuracy that was assumed for these transmitters. As part of this calibration technique, the zero output (start point) of the transmitter was elevated in order to be able to observe negative errors. This procedure introduced false (previously unaccounted for) temperature errors which were then incorporated into the transmitter compensation. The transmitters were not checked at the elevated temperatures after the original zero was restored, and were therefore shipped with excessive temperature compensation. The evaluation conducted by ITT-Barton showed that the resultant error would always be in the positive direction.

During the investigation process, ITT-Barton also discovered an electrical leakage path through the wiper arm and shaft of the zero and span calibration potentiometers to the instrument case. The zero and span potentiometers are electrical resistors used to adjust the start point (zero) and total electrical output range (span) of the transmitter. This path only creates significant positive errors at high temperatures and is only of concern during accident conditions.

Q.22 What was the safety significance of the thermal nonrepeatability problem for the SHNPP?

A.22 (RBM) Based on static calibration data received from ITT-Barton on a sample of approximately eighty transmitters, Westinghouse has calculated expected error deviations and

evaluated the effect of any additional deviation on functions performed by these transmitters. Westinghouse notified those plants, including the SHNPP, where adequate margin did not exist for trip or actuation functions and changed the set points to provide adequate margin between the safety analysis limit and the set point. Therefore, there is no safety concern.

Q.23 What can be done to correct the nonrepeatability problem?

A.23 (RBM) The calibration technique problem can be corrected by checking the transmitters at the elevated temperature after restoration of the zero point. This problem can be corrected at the factory. ITT-Barton has also developed a hardware modification consisting of installation of a fiberglass insulator (washer) between the potentiometer shafts and the mounting brackets to interrupt the electrical leakage path through the potentiometers. Westinghouse and ITT-Barton have agreed that any transmitter returned to the factory for other repairs will also have the temperature compensation checked by the new procedure and the insulating washer installed.

Q.24 Has CP&L accepted this resolution?

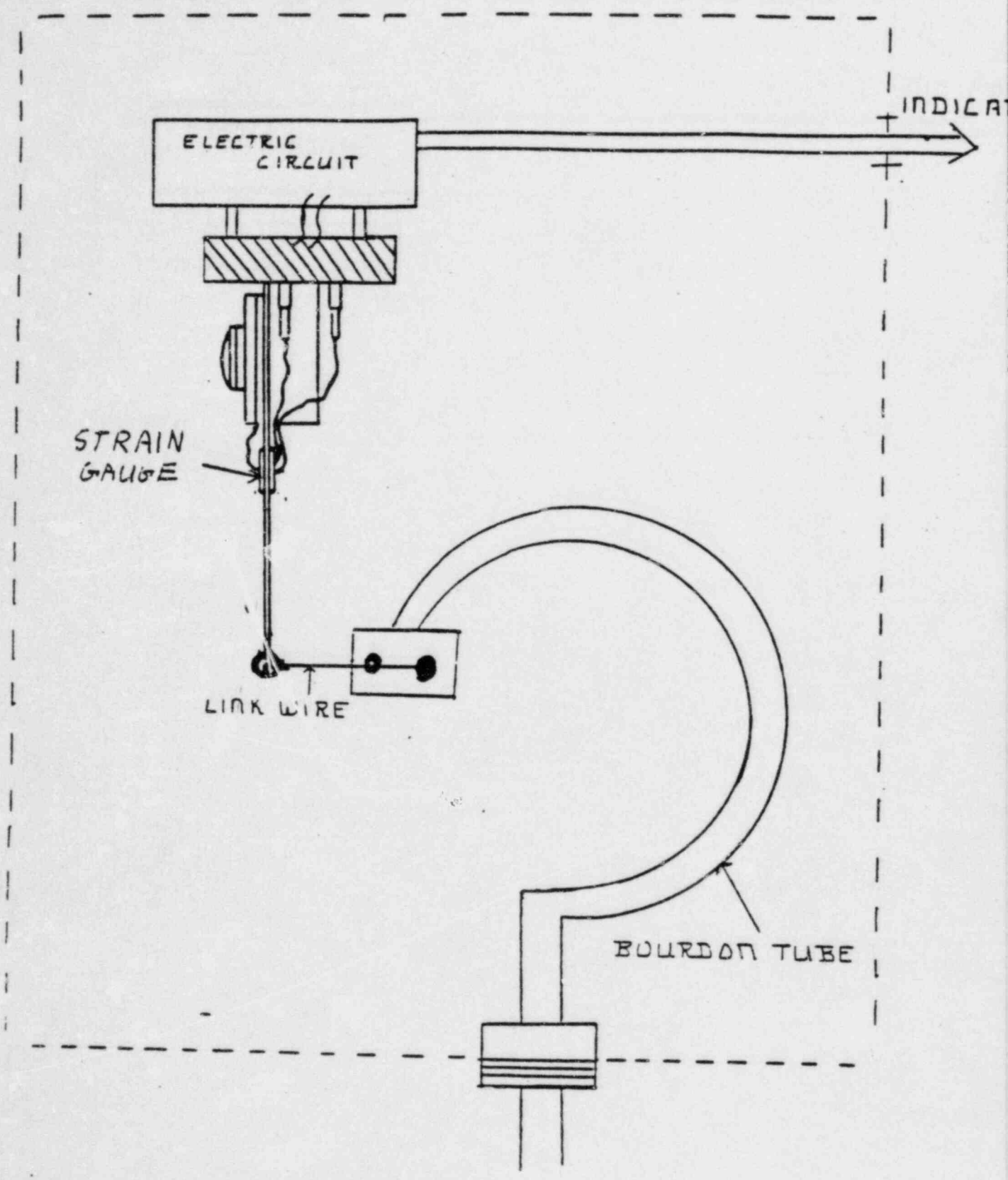
A.24 (RWP) Yes. CP&L has instructed ITT-Barton to perform the modifications on all transmitters returned to the factory for rework pursuant to IE Information Notices 81-29 and 82-52, as described above. The modifications provide additional margin for trip and actuation functions.

Q.25 In conclusion, do the resolutions recommended by Westinghouse and ITT-Barton for the Model 763 and Model 764 transmitters as accepted by CP&L adequately address for SHNPP the potential safety problems with those transmitters identified in IE Information Notices 81-29, 82-52 and 83-72?

A.25 (RWP, PMY, RBM) Yes.

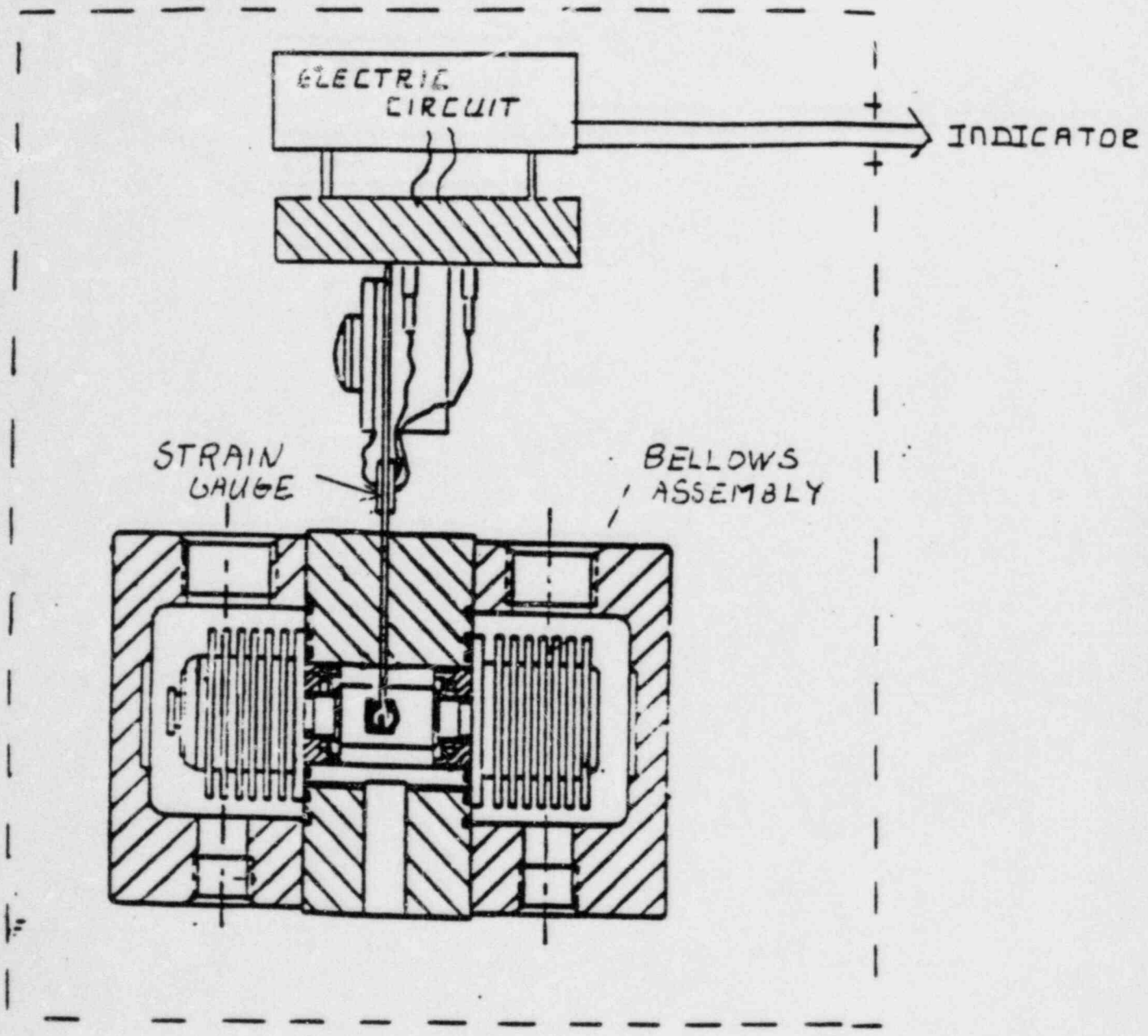
PRESSURE TRANSMITTER

Figure 1



DIFFERENTIAL PRESSURE TRANSMITTER

Figure 2



BY MR. O'NEILL: (Continuing)

Q Mr. Prunty, will you please summarize this statement?

A (Witness Prunty) The purpose of this testimony is to respond to the contention that certain problems identified in the NRC I&E information notices regarding ITT-Barton transmitters have not been resolved.

Our testimony demonstrates that the resolution of the issues raised in the I&E information notices is adequate to demonstrate that applicant's and their vendors have acted responsibly in addressing these concerns.

First, we provide background information on the ITT-Barton transmitters, including descriptions of the two types of transmitters of concern, and their functions.

Second, we discuss the specific concerns, their applicability to Shearon Harris, causes of the testing failures, the safety significance of those failures, and the corrective actions taken by CP&L and Westinghouse.

MR. O'NEILL: Mr. Chairman, I have a couple of supplemental questions before turning them over for cross examination.

JUDGE KELLEY: Is this brief?

MR. O'NEILL: Yes, sir.

JUDGE KELLEY: Okay, go ahead.

BY MR. O'NEILL: (Continuing)

Q Mr. Miller, have you had an opportunity to review Mr. Masciantonio's prefiled testimony on Contention 9A, specifically at pages 8 and 8.

A (Witness Miller) Yes.

MR. EDDLEMAN: I think I am going to object. I think if he is going to give rebuttal to the Staff's witnesses, that he really ought to do it then unless there is a reason why he can't come back, in which case I think the Applicant should have taken it up with me before now.

MR. O'NEILL: I am not proposing rebuttal. I am asking some questions for clarification. I believe it will become self-evident as to how this adds to the testimony.

JUDGE KELLEY: Let's sew where it goes.

BY MR. O'NEILL: (Continuing)

Q At the bottom of page 9, Mr. Masciantonio refers to a Westinghouse analysis which indicates the adequate margin exists for the Shearon Harris plant and the observed negative drift is not a safety concern. He further states this analysis will be reviewed by the Staff for acceptability.

Did you participate in a briefing of the Staff regarding the Westinghouse analysis of thermal nonrepeatability and negative shift in ITT-Barton transmitters?

A (Witness Miller) Yes, I do.

Q Was this briefing at your initiative, or the Staff's

request?

A The Staff's request.

Q Do you recall the date of that briefing?

A Late February of this year. I believe it was February 23rd, 1984.

Q During this briefing, did you provide an analysis of the safety significance of the thermal nonrepeatability and negative shift problems to the NRC Staff?

A Yes, I did.

Q During that briefing, did the Staff have any questions?

MR. EDDLEMAN: Objection. I think the Staff can say whether they have questions, and I don't see what he is getting at here.

JUDGE KELLEY: Can you indicate where you are headed?

MR. O'NEILL: Certainly. What we will establish of this witness is the information that was provided to the Staff, and which Mr. Miller will testify, is sufficient for the Staff to have made a judgment on the acceptability of that analysis.

MR. EDDLEMAN: As to identifying the information, I have no objection. As to whether the Staff can make judgment on it, I think that is the Staff's opinion.

MR. O'NEILL: We also have an opinion on that, and

we would like to set up through this witness, make sure the record is clear as to what information the Staff has been provided, to the extent we may have questions with respect to the Staff's witness as to whether or not they are in a position to indicate what their judgment is.

MR. EDDLEMAN: I think I have a further objection to this which I just thought of, and that is, if this stuff was really available in February, that they certainly should have been able to prefile the information he is asking about.

MR. O'NEILL: Mr. Chairman, the testimony of Mr. Miller describes the analysis that was performed, and indicates that there was no safety significance with respect to these issues.

The Staff in its prefiled testimony indicates that the Staff requires further review . What we are going to establish here is that the Staff certainly is in a position to make a judgment with respect to the lack of any safety significance of these particular issues, and all that we are attempting to do in the supplemental questions is to have Mr. Miller indicate on the record what information was presented to the Staff, when, and whether the Staff had any further follow-up questions with respect to that briefing that Mr. Miller gave at the Staff's request.

MR. EDDLEMAN: If that is all he wants to do, then I withdraw the objection, because certainly anybody can then

ask the staff if they had questions.

JUDGE KELLEY: It seems reasonable from what you describe now. Why don't you finish that out, Mr. O'Neill.

BY MR. O'NEILL: (Continuing)

Q Mr. Miller, my question was: During that briefing, did the Staff have -- any staff members have questions of you?

A (Witness Miller) Yes, during the briefing they did, yes.

Q Did you answer those questions?

A Yes.

Q Since the briefing in February 1984, has the Staff come back to Westinghouse with any further questions?

A Not that I am aware of, no.

Q In your opinion, did you present sufficient information to the Staff in order for them to form a judgment as to the safety significance of the thermal nonrepeatability and negative shift issues?

A Yes.

Q One final question, Mr. Miller. Are any plants presently operating in the United States with Barton transmitters installed similar to the transmitters that will be installed in the Harris plant?

MR. EDDLEMAN: Objection. If the plant hasn't come into operation since this was filed, there is no basis for

this question being asked.

MR. O'NEILL: It clearly bears on the issue of whether the Staff has some judgment with respect to the safety significance of this issue, if indeed, there are a number of plants operating in the United States with Barton transmitters, which are subject to the same thermal nonrepeatability and negative shift problem.

MR. EDDLEMAN: Judge, when I try to bring up other plants, they say this Contention is about the Shearon Harris plant.

I think what is sauce of the goose is sauce for the gander, and they ought to stick to it. If they want to ask the Staff about this, we will see what happens, but I don't see what he has to say about it has any relevance.

MR. O'NEILL: Westinghouse is the vender that supplies these transmitters to a number of plants.

JUDGE KELLEY: Your pending question calls for a yes or no, right?

MR. EDDLEMAN: That is correct.

JUDGE KELLEY: Okay. Overruled.

MR. O'NEILL: Do you recall the question, Mr. Miller?

WITNESS MILLER: Repeat it please.

BY MR. O'NEILL: (Continuing)

Q To your knowledge, are there any plants presently operating in the United States, Nuclear Plants, with Barton

transmitters, that are installed that are similar to the ones that will be installed in the Shearon Harris plant?

A (Witness Miller) Yes, there are.

MR. MILLER: No further supplemental questions. These witnesses are available for cross examination.

JUDGE KELLEY: Okay. Mr. Eddleman?

XXXXXINDEX

CROSS EXAMINATION

BY MR. EDDLEMAN:

Q Well, let me start in on this. Mr. Miller, I believe your counsel indicated he was going to ask you what analysis you provided. What document contains the analysis that you provided to the Staff in February of 1984 concerning these transmitters?

A (Witness Miller) There is no officially transmitted document in February. There are the presentation slides and those that were given to the Staff at the time.

Q Slides and notes. Did the Staff receive a hard copy of the slides?

A To the best of my knowledge, yes.

Q But there is no document that is Westinghouse's analysis of these things written up and given to the Staff, is that correct?

A The thermal nonrepeatability issue was judged as a Part 21 reportability issue by Westinghouse, and that had been previously transmitted to the NRC prior to the February

meeting.

Q What date was that done?

A It was in October of '83. Don't remember the exact date.

JUDGE KELLEY: Can I just ask what particular case was it. Was this a public meeting, in which there was a trans-ript?

WITNESS MILLER: I don't think so.

BY MR. EDDLEMAN: (Continuing)

Q That leads into another thing I wanted to ask you. Was there any record of the questions the Staff asked you and the answers that you gave, any written record to your knowledge?

A (Witness Miller) Not to my knowledge.

Q What is the plant that uses these ITT-Barton transmitters that is now operating in the United States?

A There are several plants. I can give you some examples. Donald C. Cook, Trojan, I believe an Indian Point plant.

Q One o f the Indian Points. Two or three?

A Yes. I can't recall which one right now.

Q All of those plants had their operating licenses before the first of these information notices about these transmitters was issued, did they not?

A To the best of my knowledge, yes.

Q Gentlemen, if we could now turn to your prefiled testimony. Mr. Prunty, I wanted to ask you a couple of questions, a couple of areas about your summary. To your knowledge, beyond the problems identified in the information notices discussed in this testimony, has NRC Staff or a vendor or anybody else brought to CP&L's attention -- and Mr. Miller, if you have other information that bears on this, please put that in -- as to further problems with these ITT-Barton transmitters?

A (Witness Prunty) Not above and beyond what is discussed here now.

(Witness Miller) Yes, there is another Part 21 that has been submitted by Barton regarding a similar negative shift that we are discussing in this testimony. It occurs on the zero -- what is referred to as a zero based pressure transmitter.

Q Are there any zero based pressure transmitters by ITT-Barton planned for use at Harris?

A Yes.

Q What models are those?

A The model is 763. It is really the same model as the suppressed zero that we are discussing here also.

Q Now, in this negative shift, how is that different from a suppressed zero?

A The nature of the shift is the same. The effect

on the transmitter is quite a bit less than magnitude.

The reason for that being that the suppressed zero is really -- electronically amplifies a certain range which will then tend to amplify an error, so you will see a larger error on the output than you would on a zero based transmitter.

Q All right. So, you are saying you would get a larger error on the suppressed zero?

A Yes.

Q Okay. And about what proportion of the signal is the error?

A We have a plus or minus one percent drift allowance for these transmitters at present NRC safety analysis. The negative shift on a suppressed zero was evaluated at approximately four and a half percent. On the zero based pressure transmitters, it was evaluated at being within the plus or minus one percent applications at Shearon Harris.

Q Okay. So, this suppressed zero shift is bigger than the allowance?

A Yes.

Q Could both those shifts occur on the same transmitter?

A I don't understand the question.

Q The two kinds of zero shifts, you said one was within plus or minus one percent, and the other one was about plus or minus four and a half percent.

What I am asking is, could both of those shifts occur on the same transmitter?

A I was explaining the difference in the error on each transmitter. No, they would not occur on the same transmitter. It is really the same negative shift. It just has a different effect -- depending whether you are talking about a suppressed zero or a zero based pressure transmitter.

Q So the zero based error is the one that is less than one percent?

A Yes.

Q All right. Let me ask all of you also. In relation to the summary, the actions in response to the problem. I take it that corrective action has not been completed on these, is that correct?

A (Witness Prunty) The transmitters in question are still at the vendor. I am not sure whether they have completed them, and just haven't shipped them back, or not.

Q Do any of you know whether the suppressed zero shift has been dealt with in the modifications being made to these transmitters for Harris?

A (Witness Miller) There will be no modification for the suppressed zero shift at this time. The vendor has not identified a satisfactory modification.

End 8.
MS fols.

Sim 9-1

Q Mr. Miller, before I get too involved in this, I had a note at the front of the testimony to ask whether you had been able to get ahold of the data items I asked you about on Contention 9C when we were dealing with it on Friday.

A (Witness Miller) Yes.

Q Could you state what those are?

A You asked for the inorganic filler material in a portion of the RTD, as I recall, and that filler, we confirmed with our vendor that that filler was aluminum oxide.

Q Aluminum oxide. Okay. I forgot to ask you this, but let me try it now. Is a solid aluminum oxide, or powder or do you know?

A I believe it is a powder.

Q Okay. Mr. Miller, your Answer 4 I believe discusses your background and professional experience. Do you have a resume?

A No, I don't suppose I have an up-to-date resume, no.

Q Okay. And there is none attached to this testimony?

A No.

Q All right. And your qualifications are given here for both this contention and 9C I take it?

A Yes.

Q Okay. In your education do you have any background in nuclear engineering?

A To the extent that I studied atomic physics courses

in school, yes, I do.

Q Those were physics courses you said?

A Yes.

Q All right. And about how many of those courses did you take?

A I would estimate a maximum of three with a lab involved.

Q All right. When you worked in field services at Westinghouse, is that the service that helps resolve start-up problems at plants?

A Yes.

Q Did you do any work on the Robinson plant, let me ask you that?

A Yes, I believe I did. I was never at the site, if that is the question, no.

Q Okay. As to the plants that were discussed earlier with the ITT Barton transmitters, I believe that was Cook and Trojan and one of the Indian Points, did you work on those with Westinghouse?

A Yes, I have worked on the plants, not at the site, on any of those plants, no.

Q Did you have anything to do with their ITT Barton transmitters during the time that ou were working on those plants?

A Yes, I believe I did.

Sim 9-3

Q Did you have any responsibility for verifying the environmental qualification of ITT Barton transmitters at those plants when you worked on them?

A Yes. I have been responsible for reviewing environmental qualification programs on a generic basis at Westinghouse.

Q So about when were you dealing with those transmitters for those plants? Do you recall?

A These particular model numbers of Barton were first procured by Westinghouse in around '77 I believe. I cannot pinpoint exactly for those plants, but it would have to be sometime after that.

Q And what was your position with Westinghouse in '77?

A I was a lead engineer in the group that did qualification testing.

Q You actually did the qualification testing?

A Supervised it, yes.

Q Okay. Did your group ever do any qualification testing on these ITT Barton transmitters?

A Westinghouse has tested these, yes. Our test engineers and technicians do the actual testing.

Q What I asked you might have been a little different question. Was the group that you were directly personally involved in, were people under your direction performing

actual tests on ITT Barton transmitters?

A Yes, I did supervise the tests, yes.

Q Did those tests pick up any of the problems that are discussed in this testimony?

A No, they did not.

Q Were they done to the same qualification standards that now apply to those transmitters?

A No. They were done to what is referred to as the '71 version of IEEE-323, the primary difference being in the aging of the units.

Q Okay. So the standards that apply here are the '74 standards, and the test you supervised were to the '71 standards which are not as stringent, correct?

A In the area of aging that is true, yes.

Q Okay. Are there any other areas in which the '74 standards are more stringent than the '71's?

A No, I can't think of any significant area.

Q All right. Were you still in charge of this sort of qualification work when the transmitters had to be qualified to the '74 standards?

A I can't recall whether I was in direct supervision of it or not. I do review, like I mentioned before, all of the qualification program results.

Q Okay. When did the '74 standards become applicable to these ITT Barton transmitters, do you recall?

Sim 9-5

A I cannot recall an exact date of the test. I would assume the first test we performed on the transmitters was around 1980 probably.

Q So around 1980 to the best of your recollection?

A For the first program that would involve aging as part of the test, yes.

Q What is the date of WCAP 85/87 that you refer to at the top of page 3 of your testimony?

A That is an ongoing WCAP. We have, based on several meetings with the NRC, been revising it for several years now. It was first written in 1975 and the latest revision was published in 1983.

Q When were you a co-author of it, originally and to date?

A Yes, since the beginning.

Q All right. And there are other authors.

Is that a nonproprietary report?

A Yes.

Q In the title of that report there are the initials WRD. What do those stand for?

A Water Reactor Division.

Q Okay. The Nuclear Safety Department where you are presently lead engineer, how long have you been in that position?

A Approximately two years.

Sim 9-6

Q So since sometime in '82?

A I believe it was the beginning, January 1st, 1983.

Q Okay. And when you say you are the primary interface on this subject with NRC and Westinghouse customers, does that mean that when they have questions about the environmental qualification of equipment that Westinghouse supplies or works on Westinghouse supplied systems that they would go to you principally?

A Yes.

Q Okay. In your Answer 5, Mr. Miller, you say you were very active in the effort regarding ITT Barton transmitter problems. Are you still active in that effort?

A We have no ongoing effort at the moment. We consider the evaluation closed.

Q And what you told me earlier about the four and a half percent margin of error doesn't affect that judgment?

A No. As the testimony indicates, we have evaluated that error and judge it to be acceptable.

Q Well, I thought you had said that that error was one that had not been mentioned in the testimony?

A No. The testimony discusses a suppressed zero transmitter negative shift.

Q But there is a report about it that is not cited in the testimony; is that right?

A No, I don't follow that.

Sim 9-7

Q Well, anyway, the transcript I guess will speak for itself.

If we can refer to page 4. In Applicant's Exhibit 8 where are these ITT Barton transmitters referred to?

A (Witness Prunty) They start out right in Table 3.11.0-1.

Q All right. And that starts in on page 3.11.0-3, correct?

A That is right.

Q And a goodly number of these in the first listings are ITT Barton, correct?

A That is right.

Q Okay. Now where it gives qualification references, are those report numbers?

A (Witness Miller) Yes.

Q Okay. Let's see, the containment pressure sensor is an ITT Barton on page 3.11.0-4, correct?

A Yes.

Q Steam pressure, turbine pressure, containment pressure down toward the bottom, and I don't want to go through these in detail, but there is a goodly number of ITT Barton transmitters in here, correct?

A Yes.

A (Witness Yandow) Excuse me, but you will also notice that there are many different model numbers, and we

Sim 9-8

are only concerned with the 763's and 764's here. There are 351's and 352's, different models.

Q All right. Now to your knowledge, are there any test failures on the other models?

A (Witness Miller) No.

Q Now the functions here are basically to transmit pressure data, correct?

A (Witness Yandow) Where are you looking?

Q The functions of these transmitters are basically to transmit pressure data.

A Are we looking at page 6 now?

Q Well, I was looking at page 4 of your testimony, but also in the Exhibit 8 those pressure transmitters have the same function as is discussed in your testimony in Answer 7, do they not?

A They are either pressure transmitters or pressure transmitters used to transmit level.

Q In other words, to infer the level from the pressure that is indicated?

A To read the level using pressure.

A (Witness Prunty) It is a differential pressure. You have pure pressure and you have differential pressure.

Q Right. And the level reading is which type?

A Differential.

Q Okay.

Sim 9-9

A Flow is also differential.

Q Now the types of application of this are things that are of pretty high safety significance, are they not?

A Yes.

Q And, gentlemen, I think it is obvious, but any time any of you want to add to an answer, please go ahead.

Were all of the models of ITT Barton transmitters in use at the Harris plant qualified by direct test?

A (Witness Miller) Yes.

Q Do you agree?

A (Witness Yandow) Yes. The ones we are talking about, yes.

Q Okay. The others that are listed in the Exhibit 8, were they all qualified by test?

A As you can see, it indicates that there is a test report there, yes.

Q Okay. When an item is qualified by similarity or something like that, would that be in a test report, or would that be indicated as qualified by similarity?

A (Witness Miller) The way Westinghouse handles that, if it should occur, would be to reference the test report and then show the similarity back to the item that was qualified.

Q Okay. In the way the Exhibit 8 FSAR is laid out, would that sort of thing be indicated?

Sim 9-10

A I don't think so.

A (Witness Yandow) Where Westinghouse has provided a report, whether that report be a similarity analysis to an existing report, to a new report or to some other report, that is indicated by referencing the original, like ESE-1 could be a comparative analysis. That is the document you look for to qualify that piece of equipment.

As we said earlier, in all cases that I am aware of all the Westinghouse is test.

Q All right. And in Answer 8 I am now, what is a Bourdon tube?

A It is a mechanical tube that the pressure causes to move as shown in the figure.

Q Now does the pressure cause the whole tube to change shape and this tube seems to bind around sort of like a question mark?

A Yes. Well, it causes the end point, which is the sensed point, to cause movement by pressure being applied at the bottom, at the port at the bottom of the picture.

Q And this is shown on Figure 1, correct?

A That is correct.

Q Now the motion, is it horizontal on this Figure 1? Does it pull that link wire?

A (Witness Prunty) The Bourdon tube tends to want to straighten itself out when you apply a pressure to it.

Sim 9-11

Q So it would push the link wire?

A I am not sure I would agree with that.

A (Witness Yandow) The figure is a representation. I am not sure exactly of the configuration inside. Obviously you can't push a wire. They may be located such that it is inside. This would just indicate the functional part and not the exact assembly of the unit.

Q All right. But, in other words, this tube would apply some strain to that strain gauge? That is the way this gadget works, right?

A That is correct.

Q And the transmitter, is that the part shown as an electric circuit up towards the top, or is that the entire assembly inside the dashed lines on Figure 1?

A The latter, the entire assembly.

Q And likewise on Figure 2 for the differential type?

A Yes.

Q Okay. What is the magnitude of the changes in electrical resistance of the strain gauge that this thing has to pick up?

A I don't know. That is the internal workings of the Barton and I am not aware of that knowledge.

A (Witness Miller) I don't recall exactly either.

Q Okay. How complex is the electronic circuitry that is involved here that converts it into an electrical

Sim 9-12

output?

A I don't consider it complex. It is basically a simple amplifier.

Q So it would take the change in electrical resistance in the strain gauge and just amplify it and send it out; is that the basic function of this?

A It is actually controlling a 4 to 20 milliamp current. It would be a power supply in a downstream rank that maintains the constant current source here. So the transmitter is actually controlling a 4 to 20 milliamp current.

Q And what does it do, vary the current?

A According to the pressure input.

Q Okay. So if you get 20 milliamps out on the other side that means no pressure and that it drops off from there? Is that how it works?

A It depends on the application. If you are going to talk about a simply pressure transmitter, it would be -- four milliamps would represent say a zero pressure and 20 milliamps the full range.

Q Okay. And it is transmitted by current and not by voltage?

A Yes.

Q Okay. Now in Answer 9 you identify the models, and I think we have covered this, but these are the only

Sim 9-13

models in which problems have been identified at the Harris plant?

A (Witness Prunty) To my knowledge, yes.

A (Witness Miller) Yes.

Q Now when you talk about the eratic behavior at the end of that answer of the fluctuating signal, does that mean the signal fluctuates when the pressure itself is not fluctuating?

A Yes.

Q Okay. And a step change is just a sudden jump or drop in the output?

A Yes.

Q Okay. Which portions of the test sequence did these things occur in?

A They were discovered during the high-energy line break.

Q Which exposes the transmitter to what kind of conditions?

A The outside of the transmitter will see a high temperature steam pressure environment. Of course, the transmitters are sealed. So this particular notice refers to a connector on the inside of the transmitter.

Q Yes.

A So the connector on the inside of the transmitter would primarily just see a temperature increase.

Sim 9-14

Q Would it also see irradiation during that test?

A Not during that test, no. That radiation test occurs prior to this test.

Q In an actual high-energy line break you would see all of these things once, including the radiation, would you not?

A Yes. For a loss-of-coolant accident, yes.

Q Okay. Or a high energy-line break?

A Radiation levels due to a high-energy line break such as a steamline break or a feedline break are relatively small.

Q Smaller?

A Yes.

Q Okay. You then say significant unpredicatable errors. What level or range in errors were those that were considered to be significant there?

A I don't recall the exact value. As I remember, we are talking 10 percent or 20 percent errors in some cases.

Q Okay. And that would correspond then to 10 or 20 percent or more of the scale?

A Yes.

end Sim
end take

#10-1-SueT

Q Now, these errors are characterized as unpredictable. Does that mean there is no way of telling when one might occur or be occurring?

A (Witness Miller) The unpredictable refers to whether we could bound the magnitude of the errors or not.

Q All right. So, if an error happens you can't be sure how big it is either, right?

A That's what the unpredictable refers to, yes.

Q Okay. Which safety analysis limits could be exceeded if that sort of significant, unpredictable error occurred?

A It depends on the application of the transmitter.

Q Well, let's take some examples.

A Do you want to pose the examples or --

Q Well, if you can think of them, I would rather you say them. And, then if I want to ask some more I might ask some more.

A Well, one example might be in a pressurizer pressure application where we perform a low, a trip on a low pressure value.

Q Uh-huh.

A And if you were experiencing these unpredictable errors at the particular time that you needed to perform the trip function and they happen to be in a positive direction, then you would not necessarily get the trip in time.

#10-2-SueT1

Q Uh-huh. Now, these errors could be either positive or negative? Is that true?

A As I recall, yes.

Q Okay. So, you could have errors of -- say, if your error were high and your set point were on the high side, then it could trigger a trip or trigger some kind of automatic action before it were necessary or even when it weren't necessary, could it not?

A That's true.

Q And if the error were on the low side and you were coming up against one of these high set points you could actually exceed the set point value before you got your trip, correct?

A That's a possibility. Yes.

Q Okay. And the same way toward the low side. You would have two ways of doing it. If you came toward the low point and it was reading low, then it would trip before the conditions were actually there or if the conditions weren't actually there but were higher, right?

A It could trip before. Yes.

Q And the other example is the one you gave first off, reading high and you come down to the low set point and say your trip is delayed?

A Yes.

Q Okay. Or, I guess if you came down to low set point

#10-3-SueT

and didn't continue below it you might not get the trip at all, even though the variable were low.

Isn't that a possibility?

A Yes.

Q Okay. And these transmitters deal with all the kinds of safety-related matters that are discussed earlier in your testimony, correct?

A I'm not sure I understand that question.

Q Well, let me try to get you the reference. Let me see here.

(Mr. Eddleman is looking through documents.)

Maybe it's not earlier; maybe it's later. Let me go on and we will try to pick that up later if I can find it.

A (Witness Yandow) Can I point out something on the set point, since that came up?

Q Go ahead.

A The establishment of a set point isn't at the point where there is a safety concern. The safety limit is backed off from by the set point. You compensate for any errors in calibration, errors in -- that type of thing. You back off, and the set point has that allowance built into it, which is described later in the testimony, so that the actual exceeding of the safety value is pretty far away.

You maybe exceeded the set point but you are still within the bounds of the safety limit.

#10-4-SueT

Q Okay. Let me inquire a little bit about that. And, again any of you that wants to contribute to the answer, please do.

What sort of margin is incorporated into the set points in general? Is there a standard procedure, or is it different for each one?

A (Witness Miller) The margin that is incorporated between a safety analysis limit and the actual set point accounts for all instrument errors. It might be slightly different, depending on the instrumentation that is used for that particular function.

Q Well, in a sort of standard or ordinary situation for the safety-related set points, what is the margin?

Is it ten percent, twenty percent? What are we talking about?

A It will be on the order of ten to fifteen percent.

Q On the order of ten to fifteen? And that could vary, you said, depending on the --

A Vary slightly, yes.

Q Now, by slightly, do you mean it would go down as low as five or as high as twenty or --

A No. I would say in the region of ten to fifteen for the functions we are talking about.

Q Okay. And the variations would be mostly, if not entirely, within that variation of ten to fifteen?

#10-5-SueT

A Yes, and they are due -- the variations I am discussing are due to errors you might expect during normal plant operation.

Q Uh-huh. Now, several errors might come together in any one of these things; is that true?

A I'm not sure I follow the question.

Q For example, you might have an error of the detection ins-rument and then an error in transmission and then maybe an error in some other instrument that was connected to -- say, the thing on which the set point is set might have an error in it, too. And all those errors would be contributing to the total error that is experienced, right?

A Yes. All those errors are considered, yes.

Q Okay. And the idea is that those won't ever add up to more than ten or fifteen percent. And that's why you back off the set point that far?

A Yes, where the set point is set after you know what these errors are.

Q Okay. And when you get new information about the errors, then you have to go back and reanalyze all of that, right?

A Yes.

Q Okay. Now, the failures of contacts discussed in Answers 11 -- excuse me. I've got another question in

#10-6-SueT

Question 10. It says subsequent testing led to the conclusion that erratic behavior would not occur until the product had been in use for at least five years.

Who reached that conclusion? Was it I.T.T. Barton?

A I.T.T. Barton performed the testing, yes. Westinghouse reviewed that test program and established this year year limit.

Q Okay. And that's based on the actual conditions as compared to the test conditions; is that how you figured that out?

A We adopted five years as a conservative time period. As I discussed before, one of the primary differences in this program was the aging portion of the program. And Barton ran a series of tests on connectors to try to determine at what point in their life this might occur.

Q Uh-huh.

A And based on those test results, we established five years as a conservative time period in order to correct the problem.

Q All right. Now, by connectors, are we talking about the contacts here or are we talking about something else?

A It's the same. The contacts are in the connector, yes.

Q Okay. So, it's the same thing that is discussed in

#10-7-SueT

Answer 11, degradation of contacts.

What are those contacts made out of?

A I imagine the contacts are some sort of steel. All I can recall at the moment is they do have a gold or a tin plating. There were two different kinds of contacts used.

Q And what is the mechanism of degradation of those contacts?

A It was not exactly determined. It could have been from a slight relaxation of the springness of the contacts due to the aging which we also suspect could be caused just by the high temperature in which we did perform the aging, or some slight corrosion effect due to the aging also.

Q Uh-huh. Okay. If you will bear with me for a second, I'm trying to get this noted down.

Are these transmitters a sealed assembly?

A They are sealed, yes. I'm not sure what you mean by a sealed assembly.

Q Well, I mean are the assemblies such that during EQ testing there is no path that is ordinarily left open at the beginning of testing for air or moisture to get inside the transmitter?

A That's true, yes.

Q Okay. Now, when you talk about soldering the connector assemblies, is that just soldering the connections inside or is it soldering the contacts themselves?

#10-8-SueT

A I think that's the same thing, really. The connectors are soldered rather than just pushed together, they will be soldered.

The contacts will be soldered, yes.

Q So, the connector really is just a place where two contacts would fit together, and the solution is simply to solder that connection?

A Yes, make it a hard connection.

Q Okay. With respect to the documentation listed in Answer 13, which one of those documents referred to there, the WCAP, actually describes the modification and which describes the EQ testing on the modification?

A It would be the proprietary report WCAP 8687, Supplement 2, which contains the test report.

Q So, that test report is not a publicly available document?

A It's summarized in WCAP 8587. That's the non-proprietary version.

Q Well, what I mean, does it give all the test data in the non-proprietary version?

A Non-proprietary reports generally don't, no.

Q Okay. The listing of transmitters there in Answer 14, these various functions are -- at least, the top five are very important to safety, are they not?

A (Witness Yandow) Yes.

#10-9-SueT1

Q The qualities of transmitters there, are there other kinds of transmitters that are used in conjunction with these?

A (Witness Prunty) Yes, there are.

Q Okay. So, are there redundant different type transmitters on each of these variables?

A No, not on each and every one.

Q Do you krow which of these functions are entirely performed by these I.T.T. Barton transmitters?

A The safety-related functions are performed only by these I.T.T. Barton's, to my knowledge, with the exception of reactor coolant pressure which has a different instrument, different manufacturer,for redundancy and to eliminate simple failure problem. Reactor coolant pressure does have one additiona instrument inside containment and two located outside containment.

Q And all three of those are different from the I.T.T. Barton on that?

A The one inside containment is different from the Barton. The two outside are Barton's; they are just not the same in containment model. They are not located in the containment environment. They are located outside the containment.

They sense the pressure from the reactor coolant system.

Q They sense it outside the containment?

#10-10-SueT

A Yes.

Q I mean, do they have a -- is there a direct connection?

A Yes. Yes, it is.

(Witness Yandow) It's a remote diaphram type. The pressure is sensed by a remote diaphram which sends a signal to the outside unit where the electronics are.

Q And is that remote diaphram tied into, say, one of the sampling lines or something like that so it actually feels the primary pressure?

A (Witness Yandow) I believe it's tied into the reactor head. This is part of the reactor vessel level system.

Q Uh-huh. And do you happen to know what models those are?

A (Witness Prunty) I don't recall, no.

Q Okay. Any of you?

A (Witness Miller) No, I don't.

(Witness Prunty) But the other items there are not backed up by any other safety-related instrumentation that I'm aware of.

Q I understand. Mr. Yandow, were you thinking about whether there was --

A (Witness Yandow) I was trying to remember if I've seen a description of what the transmitters are. I know we

#10-11-SueT1

have seen reports or documentation. We are going to be getting reports but I'm not sure if I remember the model number.

Q But do you expect to get documentation on it?

A Oh, yes, definitely.

Q Okay. You have not received it yet?

A I think it's scheduled to be coming in pretty soon, but I'm not exactly sure of the schedule. That's a Westinghouse report.

Q I'm going to continue on the next page if you will just turn over to it.

A (The witnesses are complying.)

Q The Harris Plant Engineering Section there, is that again the group that Mr. Prunty and Mr. Yandow are in?

Is that the part?

A (Witness Prunty) Yes. Equipment qualification is part of that group; it's not the whole group.

Q Right. But, yours was the part of that group that got the document? That's where it was referred to?

A Yeah. We are one of the people that gets it. We have some internal regulatory people that also see it. A number of different individuals see the reports.

Q Is your group the one that would primarily be responsible for taking action based on it?

A We are one of the people in the review cycle. It is reviewed by the people that hold the NSSS contract and also

#10-12-SueT

by instrumentation or mechanical or whoever is the applicable person to look at it from a discipline standpoint. A number of people get routed this information for comment and evaluation.

Q Okay. And among those comments might be recommended courses of action?

A That's right.

Q And as to the qualification of this equipment, would it be your group that is primarily responsible for taking that action if it were decided on?

A Not necessarily. If the recommended action involves some repair or replacement, it's likely that the line organization or the contract holder would reorder the new parts or begin negotiations with the vendor to have the item fixed.

Q Uh-huh.

A We could recommend that but we generally don't usurp the line organization's responsibility when it comes to the actual hardware.

Q I understand. Now, it says that it was determined that the Information Notice was applicable to the Harris Plant.

Is that determination made by this routing around and making comments? Is that how that's done?

A Yes.

Q Well, who makes the final determination? Is it a consensus decision, or if there's disagreement who --

A If there is any disagreement, then we get together

#10-13-SueT

and discuss it. Applicability is not something we generally have a problem with. You either have a piece of equipment or you don't.

Q Right. Okay. And then it says the response at that time was since Westinghouse and I.T.T. Barton were still investigating the problem no corrective actions were taken at that time.

Was that time some time in 1981?

A I don't recall specifically the date.

Q Okay. But some time shortly after that Notice came out?

A We didn't have any of these things installed. So, it wasn't anything we had to undo.

Q Uh-huh. Are any of them installed now?

A To my knowledge, of these that were covered by this Notice, no.

Q Covered by the 8129, that is?

A That's right.

Q All right. And, then as to 8252, then some action was taken, correct?

A Yes. 8252 is what evaluated the failure of modes so that some action could be taken.

Q And that issued some time in 1982?

A Right.

Q Okay. The change notice that was referred to there,

#10-14-SueT

was that after 8252?

A I think so. I'm not exactly sure of the sequence, but I believe it was after 8252 when the cause had been noted.

Q Okay. Does that number have -- I mean, does that notice have a number or identifier? Is it change notice number so and so?

A I believe it was issued under a Westinghouse, what they call a field change notice, FCN, what they direct individual plants to do with individual pieces of equipment.

I don't recall the FCN number, but I think it would be plant specific.

Q Uh-huh. Anyway, if you -- or the NRC Staff or anybody wanted to look in your files they could find an FCN that is this notice, correct?

A They could find the FCN that directed that we send it back to Westinghouse or back to Barton for repair, yes. We have that documentation available.

Q Okay. And then it says CP&L has reviewed the test report. Is that your group that reviewed the test report?

A (Witness Yandow) Yes. We have looked at the test report.

Q Okay. And am I correct in that you haven't got the transmitters back from I.T.T. Barton yet?

A (Witness Prunty) They are due back shortly. I

#10-15-SueT

don't think they are back yet. I'm not entirely certain of that. I don't believe they are.

Q Will they be inspected on receipt?

A Yes.

Q Is that QA's job or is that ya'll's job?

A It's a QA/QC receiving inspection function.

Q Will you tell them what to look for?

A When they return, they will return with shipping papers and documentation of what was done as part of the shipping package that comes with it, certificates of conformance, that sort of thing.

I'm not precisely sure sitting here of all the information that's in the packet, but they will inspect it based on that information that comes back with it.

They know what we sent out, and they will know what to expect to receive back in that.

end #10
Joe flws

Q I guess what I am sort of getting at here is either on receipt inspection, or any later inspection, are you going to actually open these things up to make sure that those contacts that were supposed to be soldered were soldered, and things like that?

A (Witness Yandow) I am not aware of any criteria that our receipt inspection people would have to say to do that. That would be done by the vendor's QA organization, and I believe these were shipped back through Westinghouse, so they would be probably involved in the inspections in some way.

Q So vendor QA, ITT-Barton QA, and Westinghouse QA would look at it, but you all wouldn't necessarily look at it at the Harris plant?

A We would reinspect to the original criteria we inspected , and make sure they met the requirements of the reshipment. If there was a certification required, they would make sure it is there. Make sure it was the same model we sent, make sure all the materials is there that need to be there, and the O-Rings are in place, that kind of thing.

Q Now, on these, can you see the O-Rings fairly readily, as opposed to the Limitorques?

A This is a gasket around the head of it.

Q So it is on the outside when you open it up?

A When you open it up, yeah.

Q Do your group have any plans to actually inspect the modifications as made. I mean to actually look inside and see is this connector soldered, and that sort of thing?

A (Witness Prunty) I would suspect we would look at these due to the exposure. I expect we would take a close look at these, yes.

Q Is that required, or is that something you are just going to do?

A I think this is something we would just do. As an additional overlay and assurance.

Q With respect to Answer 17 --

JUDGE KELLEY: Is this a good place for a break?

MR. EDDLEMAN: Sure.

JUDGE KELLEY: Ten minutes.

(Short recess taken)

JUDGE KELLEY: We are back on the record. Mr. Eddleman?

MR. EDDLEMAN: Yes. I guess I would like to just note on the record here the testimony on 9B that we went over is actually in the volume for last Friday, because it was put in the record at that point. I just want to tie that back.

JUDGE KELLEY: Right.

BY MR. EDDLEMAN: (Continuing)

Q Gentlemen, I was just starting in with your Question and Answer 17, at the bottom of page 7 of your prefiled

testimony. Do you have that?

A (Collectively) Yes.

Q All right. That information notice, dated in late October of '83. In other words, about a year ago, you say reported two additional problems with these transmitters, correct?

A (Collectively) Yes.

Q Now, the notice No. 20, is the negative shift, and the notice No. 23 is the thermal nonrepeatability, as stated on page 8, correct.

A (Witness Yandow) Yes.

Q Okay. What are the allowable limits on thermal repeatability as you discuss in the first full paragraph on page 8?

A (Witness Miller) We have specified allowable errors at temperature, depending on the temperature these transmitters expect to see. We have an allowance at 130 degrees F that is on the order of half a percent increase in inaccuracy at that temperature.

Q As opposed to the inaccuracy at what standard temperature?

A Just an increase of a half a percent, at normal calibration, at normal temperatures, we would expect a half a percent.

Q That normal calibration temperature would be

somewhere around 20 celsius, somewhere around there?

A Yes.

Q Room temperature, in other words?

A Room temperature, yes.

Q All right. So you have half a percent, and half a percent, so now you have one percent, is that right?

A Depending on how you combine the errors, but that is essentially true, yes.

Q At most it would be one percent, plus or minus, right?

A Yes.

Q Now --

A Just let me finish the --

Q Certainly.

A At 320 degrees also for those that are going to see a harsh environment we also have a temperature specification. It really runs along the line of having an allowance for all the various conditions it is going to see.

What I mean by that is there would be a total allowance of a ten percent deviation, which would cover radiation errors, and errors due to temperature.

Q Plus or minus ten percent?

A Yes.

Q And that applies at 320 degrees F?

A Yes.

Q Do you break that down as to how much you assign to radiation error and other causes of error.

A It generally is by the vendor. We give the vendor the total allowance, so when he designs his transmitter, he can determine how he wants to use that allowance.

Q So, as long as it meets your spec of plus or minus ten percent, at 320 degrees F, you don't really care how they do it as long as it works reliably.

A Yes.

Q The negative shift causes discussed in Answer 18 on page 8, when you use the term combined creep there, do you mean a combination of creep in the link wire, or creep in the material attaching the link wire?

A Yes.

Q Okay. The suppressed zero pressure transmitters are those used to measure the pressurizer pressure, right. That is in Answer 19.

A Yes.

Q Is that pressurizer pressure indication used for purposes other than the over temperature delta T set point?

A Yes. As I believe is reflected in the answer to Question 19. We talk about a high pressure trip, and a low pressure trip also.

Q All right. Other than those two trips in the delta T, is there any other function in which you use pressurizer

pressure.

A Pressurizer pressure is used in control functions also, but not from these particular transmitters.

Q Well, are you saying there are other indicators of pressurizer pressure that are used for the other control functions?

A There are separate transmitters on Shearon Harris used for control functions. For separation purposes.

Q And none of them are ITT-Barton transmitters?

A I don't recall.

Q These things, reactor trip, initiating safety injection, and things like that, they are important to safety too, aren't they?

A Yes.

Q High importance to safety?

A They are important.

Q If you don't get safety injection, for example, can that lead to serious problems?

A Yes, but I just don't generally distinguish between high and low safety functions. In importance, that is.

Q Okay. In other words, they are all --

A They are all important to me, yes.

Q Okay. How big is the negative shift that you are discussing on the 2nd and 3rd lines there of Answer 19 on page 9. How big is that shift?

A You are referring to the effect of the shift on the over temperature of delta T?

Q Right. But it says the effect of this shift. So I am asking you, how big is the shift?

A Well, the shift as I described earlier from the pressure transmitter itself, we included an allowance of four and a half percent.

Now, there is some gain functions that take place before it is actually applied to the -- developing the over temperature delta T set point, so the effect on that is less than one percent as I recall, and it is, as I noted, in the conservative direction.

Q By gain functions, do you mean the amplification, or reduction?

A In this case it is a reduction, yes. So, the effect of the error would be minimized in this particular application.

Q Okay. And that is for the over temperature part?

A Yes.

Q Now, by being in the conservative direction, what does that mean. Indicating higher temperature than is actual?

A It would tend to bring the over temperature delta T set point closer to a trip condition.

Q All right. So that answer is basically yes, right?

A I think you had better repeat the question if I am going to say, 'yes.'

Q Okay, we will try it again. The direction there is that it indicates a higher temperature than you actually have?

A No, it is not going to indicate a higher temperature, no. It is going to cause -- over temperature delta T set point is made up of three different functions, really. Temperature enters into it, pressure, and also flux.

And what this is going to do is the pressure portion is going to cause the overall set point to be reduced somewhat, which will bring it closer to a trip condition.

Q Okay. So, at a higher pressure, the temperature does not have to be as high to get you to the set point, is that the idea?

A Well, the set point is calculated, and then compared to a delta T for tripping the plant. When the two are equal, you would get a trip condition.

Q And that delta T is defined how?

A Is defined how?

Q Yeah. What is the delta T between?

A It is, on any given loop, it would be the difference between the hot leg and the cold leg temperature.

Q All right. But the tripper that is dependent on pressure and flux also. That is what you are saying.

A The set point. What we developing here is that the over temperature delta T set point.

Q You then say, similarly, the effect on low pressure trips is conservative. How was that? It seems to me if you are pushing it closer to the higher one, that you couldn't also at the same time be pushing it closer to the lower one.

A This is a negative shift, so it will tend to trip sooner on a lower pressure signal.

Q Okay. So, what you are saying is the effect is similar, not the cause.

A Similar refers to the fact that it is conservative.

A (Witness Yandow) I think the point we are trying to make here is that the set point becomes closer to the actual point in the trip, you will get a trip earlier. It is conservative.

In other words, you don't want to trip at that point, but your shift has caused you to trip at that point. So it is a conservative trip.

Q So, if you trip before you would if everything read just perfectly, that is conservative from a safety standpoint.

A That is correct.

Q And that is how you all are using the word, 'conservative' in this analysis, correct?

A That is correct.

Q All right. Now, then it says, accordingly, the safety analysis is taken for the higher pressure tripper on loss of load only, and this function would occur less than half a second later than analyzed.

How do you figure out how much later it is going to trip?

A (Witness Miller) Safety analysis evaluates the total function. So when you have a loss of load, you will know what kind of pressure excursion you are going to see, and you can determine how much later it would occur based on the error that we are predicting.

Q What I mean, is there a method of calculating it. Is there some document that shows how you calculate that if you have, say, a one percent error, that you trip half a second late?

A I am not sure I understand the question. The safety analysis could do that, yes, because it does define the pressure excursion.

Q Okay. Now, is the way that you did it to basically add your expected error from this cause to the pressure curve that you have?

A Yes.

Q And just see how much later that means you go through the trip?

A Right.

Q Okay. And does that analysis of where you go through the trip already take into account the other sources of error?

A Yes.

Q Okay. In Answer 20, it says CP&L agrees this is not a safety problem. Does that mean agrees with Westinghouse?

A (Witness Prunty) Yes.

Q All right. It then says that CP&L will evaluate modifications recommended when ITT-Barton's testing and evaluations are completed.

Do you have any idea, any of you, when that is expected. Those two actions are expected to be complete?

A (Collectively) No, I don't.

A (Witness Yandow) We haven't discussed it with Barton to that level.

Q All right. Okay. Then, the thermal nonrepeatability it says, in Answer 21, based on a report of excessive errors, at abnormal temperature conditions.

Who was the customer that reported this? Is that known.

A Witness Miller) I believe it was Baltimore Gas and Electric.

Q Is that Calvert Cluss?

A I can't say that for sure.

Q It was a nuclear plant where this happened?

A I believe so, yes.

11-12-Wal

Q Okay. And excessive errors, does that mean outside the probability -- I mean the error allowances that we discussed above? Ten or fifteen percent?

A Yes.

End 11.
MS fols.

Sim 12-1

Q And then it says as a result of this investigation ITT discovered excessive errors. Does that mean ITT Barton did some more tests?

A Yes. The first part of the response identifies the concern expressed by their customer that they found excessive errors at abnormal temperatures, at approximately 130 degrees Fahrenheit. Barton did a series of tests and discovered this error also occurred at the higher temperatures, like 320 degrees.

Q So in this case the abnormal temperature means 130F and the accident temperature means approximately 320F, correct?

A Yes.

Q Were the transmitters on which this had been discovered, have they already gone through EQ for those temperatures?

A Yes.

Q But this error was not discovered there?

A No, it was not.

Q Is the EQ on these transmitters performed basically sequentially out until you get to the point of the accident simulation?

A Yes.

Q Is the temperature used in testing, is it a higher than normal operating temperature?

Sim 12-3

A For the accelerated aging portion of the test, that is true, yes.

Q And then in the accident portion you go through what, a day, with the actual temperature and some accelerated aging further, is that the way that works?

A Yes.

Q So in that test you wouldn't have very long under the actual temperature conditions that the thing would normally operate at. You would always be accelerating your termal aging and therefore at a higher temperature; is that right?

A That is true.

Q When you do the other parts of the test, would you come down to the normal operating temperature or down to ordinary room temperature to do your vibration or radiation test?

A They are done at ordinary room temperature, yes.

Q The operating temperature of these things, it says 130F is an abnormal temperature. Is that abnormally high for the operation of these things?

A No.

Q Is it abnormally low?

A I don't know how you are using the term abnormal. We expect the conditions, the ambient conditions around the transmitter to change somewhat during the course of operation

Sim 12-3

of the plant. So we allow for that in our accuracy analysis and we define a number of accuracy value for that.

Q In other words, if you determine the accuracy at 130 degrees Fahrenheit, then you determine an error that is going to be caused in the transmitter or its output by fluctuations around that temperature where the transmitter is; is that what you are saying?

A Yes.

Q And 130 Fahrenheit is considered to be sort of the middle of that range; is that the idea?

A No, it is the upper portion of the range.

Q I thought one of your earlier answers that you said that when they identified these things at abnormal temperature, it was 130 Fahrenheit?

A Yes, in that region. I don't know the exact value of the temperature at the Baltimore Gas and Electric plant. It was in the upper portion of the range.

Q Some somewhere around 130 as best you remember?

A Yes.

Q All right. Then it says the compensation technique, and this is on page 10, the compensation technique resulted in an overall change in the specified accuracy that was assumed for these transmitters.

The first question is what was the accuracy that was assumed?

Sim 12-4

A This has to do with the Barton internal specification for calibration of the transmitters at temperature. I explained before that we give them a 10 percent allowance. They will design their transmitter, and then by performing temperature compensation on each and every transmitter ensure that they are within that specification on that transmitter.

Q So the temperature compensation is intended to reduce the error to make sure it stays within the 10 percent limit that you specify?

A Yes. Let's just take an example. They may split the error in half, five percent for radiation and five percent for temperature. So they will calibrate each transmitter to the five percent for temperature, and that is what this refers to.

Q In other words, they would reject it if it were over five percent temperature error under those conditions that you just mentioned; is that the idea?

A Yes, if they could not calibrate it within that limit, they would reject it, yes.

Q Now is this compensation technique used on the transmitters that are put through the enviromental qualification tests?

A Yes.

Q Excuse me. Let me look back at the first part of that answer.

Sim 12-5

(Pause.)

Now did that compensation technique introduce error?

A The response to Question 21 does go into that. In order to see the negative errors that might occur at high temperature, Barton elevated the zero output of the transmitter. Otherwise the transmitter would just cut off at a low value and it would not be able to determine the magnitude of the errors so that they could then introduce temperature compensation to cover that.

What was discovered here was just the fact of elevating that zero introduced the need for additional temperature compensation. Then at the very end of the process before the transmitter is shipped the zero output is restored towards normal value of four milliamps and this temperature compensation that you added to cover for that is still there, but it is not needed, and therefore an error is introduced.

Q So they raised the zero to what range?

A From say four milliamps to six milliamps.

Q And then when they restore the zero they don't put it back to four milliamps?

A They restore it back to four milliamps, but the transmitter is not checked at temperature again. The only spot where it was checked to temperature was when the zero was elevated to six milliamps.

Q So the test condition in order to see those errors

you had to elevate the zero. Then when you put it back, you had to check the rrors at the normal zero; is that what we are getting at?

A Yes.

Q Is it possible to see the real errors at elevated temperature with the zero normal?

A Yes.

Q Well, why didn't they just do it that way then?

A That was the error in the calibration procedure. I am not sure whether you are referring to the beginning of the calibration procedure or the end. As I explained at the beginning, they want to be able to see the magnitude of the errors so they will know how much to compensate for, and that was the reason for elevating the zero, because there was some concern that they would not be able to see the total magnitude of the error is it was negative because the output would cut off at slightly below four milliamps and you would just not see the error.

Therefore, the technician doing the job would not know how much to calibrate for.

Q Right.

A So they go through this exercise and at the very end if they had checked the transmitter after restoring the zero, if they would check it at temperature, they would have discovered this problem. It just wasn't part of the procedure.

Sim 12-7

Q Then I gather that checking for the accuracy at temperature was also not part of the receiving inspection either at the plant where this was noted or at the Harris plant; is that right?

A (Witness Prunty) No,it was not part of the receiving inspection. It would have been part of check-out later on, I believe.

Q Resultant error would always be in the positive direction. Does that mean that the thing would always indicate a higher temperature than it has got, or a higher pressure than it has got?

A (Witness Miller) Yes, it would be in the positive direction on the output of the transmitter.

Q Okay.

A It is a pressure and not a temperature.

Q But it could get outside this 10 percent overall limit; is that the idea?

A Yes.

Q And how far outside could it get?

A It depends on the transmitter. We evaluated this total problem and, for instance, a differential pressure transmitter as we determine would still be within the 10 percent even with these particular errors that we are discussing here.

Q But there are others that would not?

Sim 12-8

A The pressure transmitters we determined would not. They would exceed the 10 percent.

Q And the straight transmitters of a single pressure are outside, right, and the differential ones are within, or have I got that backwards?

A I believe you said it correctly, yes.

Q The straight pressure is the one that is outside 10 percent?

A Yes.

Q Then the other cause is this electrical leakage path. Now is that cause incorporated into the margin of error or is that a new cause of error that was picked up in these tests?

A This cause was determined during the test that Barton did to find the error reported by Baltimore Gas and Electric, yes.

Q And it says create significant positive errors at high temperatures. Does significant again mean pushing outside your plus or minus 10 percent range?

A In combination with the calibration procedure error it could. As I described on the pressure transmitters, the evaluation was done with both errors at the same time.

Q And the high temperatures there, what range of temperature does that refer to?

A We determined on accident conditions only I believe

Sim 12-9

by doing a series of tests on the potentiometers that cut-off is somewhere around 280 degrees. It is at least a temperature above that temperature to cause an error.

Q 280 and up. Now this is a Westinghouse test you are talking about here or an ITT Barton test?

A These were done by ITT Barton.

Q Is it Westinghouse's analysis that gives you that 280F range?

A That was determined from Barton's tests. It was very obvious that the plots were not causing any problem below that value.

Q The static calibration data referred to in the beginning of Answer 22 at the bottom of that page, what is statis calibration?

A It is the same as I described earlier for the compensation, temperature compensation technique problem. At Barton we require of our transmitter vendors that they do a temperature compensation on each transmitter. Static refers to the fact that they put in an oven at 320 degrees and compensated.

Q The sample AD transmitters, are they all the models that -- or are they all from the models that are of concern at Shearon Harris?

A Yes.

Q Is it about half and half? I think there were two kinds?

A Oh, yes.

Q So that about 40 of each?

A Approximately, yes. I don't remember the exact numbers.

Q And so you take the calibration data from each one of those and then you calculate an expected error deviation, right?

A Yes.

Q So ITT Barton did those tests and then you calculated the deviation from the data, right?

A Yes.

Q And what is that deviation?

A As I said before, the differential pressure transmitters did not exceed the original 10 percent allowance. The suppressed zero pressure transmitters, as I recall, exceeded it by on the order of three percent.

Q So like 13 percent?

A Yes.

Q And the wide-range pressure transmitters during the accident conditions exceeded closer to six percent.

Q So they would be about 16 percent off?

A Yes.

Q And is that a typical deviation, or is it the maximum?

A We did a statistical reduction of the data from these AD transmitters to arrive at that value.

Q So it is a statistical mean; is that what we are

Sim 12-11

talking about?

A It is a mean plus two standard deviations taking into account the sample size also.

Q So it is about a 95 or 97 percent confidence level?

A We would refer to it as 95, yes.

Q So 19 out of 20 times the actual deviation of one of these things would be below the limits that you have just discussed, right?

A 19 out of 20 times did you say?

Q That is 95 percent.

A Okay, fine.

Q Correct?

A Correct.

Q Now you say you notified plants where adequate margin did not exist for tripper actuation functions. What tripper actuation functions at the Harris plant did not have adequate margin?

A The pressurizer pressure function only. We raised the set point slightly for the low pressure trip.

Q Now the adequate margin between the safety analysis limit and the set point, was that the margin that Mr. Yandow was talking about before where the set point has a set back from the actual condition where you have a problem?

A Yes.

Q Correct?

Sim 12-12

A There is a safety analysis limit established and then you would factor in all the instrument errors and set the set point.

Q I just want to double check with Mr. Yandow that that was correct?

A I am sorry.

A (Witness Yandow) That is what I meant, yes.

Q Okay. Now have you submitted information about these changes in set points to the NRC for review?

A (Witness Miller) Who is the question directed to?

Q Well, I guess to the CP&L witnesses as CP&L and then to you as Westinghouse if you would be the one to submit it.

A I will answer first. We did submit the Part 50.55(e) to the NRC.

Q When did you do that?

A I would say approximately November of '83.

Q And that covered the Harris plant?

A Yes.

Q And has CP&L made any separate or additional submission of data to the NRC about this, to your knowledge, gentlemen?

A (Witness Prunty) I do not recall a separate submittal from CP&L on this, no.

Q You say you do not?

A I do not.

A (Witness Prunty) I agree. I am not aware of any

Sim 12-13

separate submittal.

Q Now, Mr. Miller, as to Answer 23 about the calibration technique problem, is this another step beyond where we were? I thought we had a problem where you set up the zero point to pick up the negative errors and you set it back and you don't catch the errors that are still there, and those errors are current normal and elevated temperatures. You have to check them both places after you reset the zero point, correct?

A (Witness Miller) Yes.

end Sim
end take 12

#i3-1-SueT

Q Okay. And that's the thing that you say can be done at the factory?

Is Barton doing that for Harris? Do you -- do any of you know?

A (Witness Prunty) Yes, they are. The ones that we sent back for the pin modifications under IE Notice 8129, they are also performing this modification.

Q That's all of them, right? That's all the Barton transmitters for Harris?

A That's all of them that were applicable to these notices. Subsequent Barton transmitters that we may receive will already have these modifications installed.

Q Okay.

A In other words, the manufacturing techniques, of pin soldering and putting in the washer plus the change in the calibration procedure will prevent this from happening on future Barton's that we may receive. So, this was a particular batch that we already had. We sent them back upon Westinghouse's direction.

Q Right. And that batch, though, is going to perform the safety functions at Harris; is that right?

A Yes.

Q Okay. Are CP&L or Westinghouse auditing or checking on I.T.T. Barton as to how they performed that -- how well they performed -- calibration?

#13-2-SueT

A (Witness Miller) We have reviewed and approved their new calibration procedures, yes.

Q But, do you, or will you, check on how they actually do it as opposed to reviewing the procedures?

A Our QA people do that.

Q Do you know if they have done it?

A I would assume so. It has been -- the procedure has been changed now for over a year. I would imagine they have had an opportunity to review it by this time, some actual calibrations.

Q Do you know if the results of any such review have been made available to the NRC Staff?

A I'm not aware of that, no.

Q Okay. Now, are there any I.T.T. Barton transmitters from the Harris plant that are back to I.T.T. Barton's factory for other repairs, as are mentioned in the last part of Answer 23?

A (Witness Prunty) The other repairs referred to are the ones covered in Notices 8129 and 8252, and then that was for the soldering of the pins and the installation of the washer and the calibration technique change in 8372 are all being accomplished concurrently.

Q Okay. Now, have transmitters recalibrated in these ways, and modified in these ways, that we have discussed been put through qualification testing again?

#13-3-SueT

A (Witness Miller) No, not for the temperature non-repeatability problem. Only for the connector problem as we discussed earlier.

Q Okay. But no other actual test beyond that, right?

A No.

MR. EDDLEMAN: Okay. Gentlemen, I appreciate your time here. That concludes my questioning.

Thank you.

JUDGE KELLEY: Thank you, Mr. Eddleman. Ms. Moore?

MS. MOORE: May I have a moment?

JUDGE KELLEY: Sure.

(Pause.)

CROSS EXAMINATION

BY MS. MOORE:

INDEXXXX

Q Mr. Miller, I believe in response to one of Mr. Eddleman's questions, you stated that you had changed certain set points for Shearon Harris; is that correct?

A (Witness Miller) Yes, we changed one set point, the low pre[illegible]zer pressure trip function.

Q [illegible] stated you submitted that change in a 5055.E report to the Staff; is that correct?

A Yes.

Q Are you aware of to whom that report was addressed?

A I believe we send them to D. Young, but I'm not

#13-4-SueT

absolutely sure.

Q And do you happen to know the exact date of that report?

A It would have been in -- around the first of November but I don't remember -- of last year, but I don't remember the exact date.

MS. MOORE: The Staff has no further questions.

JUDGE KELLEY: Nothing further from the Staff?

MS. MOORE: I would like to retract my last statement.

JUDGE KELLEY: I thought you might be considering it.

MS. MOORE: I have one further question.

JUDGE KELLEY: Okay.

BY MS. MOORE: (Continuing)

Q Did you receive a response, any kind of response, from the Staff to that report?

A Not that I recall other than the request for the presentation earlier this year. I don't recall a written response, no.

MS. MOORE: Fine. Thank you.

JUDGE KELLEY: The Board has no questions. Did the Staff questions invoke anymore from you, Mr. Eddleman?

MR. EDDLEMAN: No.

JUDGE KELLEY: Redirect?

#13-3-SueT

(Mr. O'Neill nodded in the negative.)

JUDGE KELLEY: Okay. Does that take us to D, Mr. O'Neill?

MR. O'NEILL: Yes, sir. We can excuse this panel.

JUDGE KELLEY: Entirely different people?

MR. O'NEILL: Right.

JUDGE KELLEY: Are you gentlemen coming back, or is that --

MR. PRUNTY: Yes.

MR. YANDOW: Later on.

JUDGE KELLEY: Okay. Mr. Miller, will we see you back also?

MR. MILLER: No, I don't believe so.

(Laughter.)

JUDGE KELLEY: Well, we appreciate you coming back. It was a trip for you.

Gentlemen, Mr. Yandow and Mr. Prunty, we will see you later. And, Mr. Miller, thank you very much. We appreciate your appearance. You are excused.

(The panel of witnesses stood aside.)

JUDGE KELLEY: Do you want to stretch at least before we put the next -- let's just take a couple of minutes.

(Whereupon, a recess is taken at 3:17 p.m., to reconvene at 3:25 p.m., this same day.)

JUDGE KELLEY: Okay. Back on the record. Mr.

#13-6-SueT

O'Neill.

MR. O'NEILL: The Applicants call to the stand Richard M. Bucci and Edwin J. Pagan.

JUDGE KELLEY: Gentlemen, good afternoon. Would you raise your right hands, please?

(The witnesses are sworn by Judge Kelley.)

Whereupon,

RICHARD M. BUCCI

and

EDWIN J. PAGAN

INDEXXXX

were called as witnesses by and on behalf of the Applicants, Carolina Power and Light Company and North Carolina Eastern Municipal Power Agency, and having first been duly sworn were examined and testified as follows:

DIRECT EXAMINATION

BY MR. O'NEILL:

Q Would each of you please state your full name and employer for the record?

A (Witness Bucci) Richard M. Bucci, employed by Ebasco Services Incorporated.

(Witness Pagan) Edwin J. Pagan, employed by Ebasco Services Incorporated.

Q Do you have before you a written statement that was filed with the Board and the parties in this proceeding on August 31, 1984?

#13-7-SueT

A (Witness Bucci) Yes.

(Witness Pagan) Yes.

Q Mr. Bucci, would you please identify that statement for the record?

A (Witness Bucci) This is the Applicants' testimony of Richard M. Bucci and Edwin J. Pagan in response to Eddleman Contention 9.D, instrument cables.

Q And does that written statement consist of twelve pages of questions and answers?

A Yes, it does.

Q Was this testimony prepared by you or under your supervision?

A Yes.

(Witness Pagan) Yes.

Q If you would turn to Page 7, Line 7, of the testimony, there is a blank. Should that blank be filled in with the Numeral 8 for Applicants' Exhibit 8?

A (Witness Bucci) Yes.

(Witness Pagan) Yes.

Q Do either of you have any changes or corrections to make to your prefiled written statement?

A (Witness Bucci) No.

(Witness Pagan) No.

Q Is your statement then true and accurate to the best of your knowledge, information and belief?

#13-8-SueT

A (Witness Bucci) Yes, it is.

(Witness Pagan) It is.

MR. O'NEILL: Mr. Chairman, I move that the Applicants' testimony of Richard M. Bucci and Edwin J. Pagan in response to Eddleman Contention 9.D, instrument cables, be incorporated into the record as if read and received into evidence.

MR. EDDLEMAN: May I have a moment to check this real quick?

JUDGE KELLEY: Yes.

(Pause.)

MR. EDDLEMAN: Okay.

JUDGE KELLEY: No objection?

MR. EDDLEMAN: No.

JUDGE KELLEY: So admitted.

(The testimony of Mr. Richard M. Bucci and Mr. Edwin J. Pagan follows.)

August 31, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	Docket No. 50-400 OL
and NORTH CAROLINA EASTERN	)	
MUNICIPAL POWER AGENCY	)	
	)	
(Shearon Harris Nuclear Power	)	
Plant)	)	

APPLICANTS' TESTIMONY OF RICHARD M. BUCCI AND EDWIN J. PAGAN IN RESPONSE TO EDDLEMAN CONTENTION 9D (INSTRUMENT CABLES)

Q.1 Please state your names.

A.1 Richard M. Bucci and Edwin J. Pagan.

Q.2 Mr. Bucci, please state your address, present occupation and employer.

A.2 (RMB) I am employed as an Associate Consulting Engineer in the Corporate and Consulting Engineering Department of Ebasco Services Incorporated, 2 World Trade Center, New York, New York 10048.

Q.3 State your educational background and professional work experience.

A.3 (RMB) I was graduated from Pratt Institute in 1972 with a Bachelor of Engineering (Electrical) degree, and as a member of the Tau Beta Pi and Eta Kappa Nu Engineering Honor Societies. I attended the University of Illinois Graduate School of Electrical Engineering in Urbana-Champaign as a Research Assistant from 1972 through 1973, and joined Ebasco Services Incorporated in early 1974. My initial responsibilities at Ebasco included assignments as an electrical engineer on several Ebasco projects. These assignments included system and physical design, preparation of equipment specifications, electrical one-line diagrams, equipment economic and technical evaluations and review of nuclear equipment qualification programs.

In 1976 I was assigned to the Shearon Harris Project for which my responsibilities included the above functions, as well as preparation of electrical sections of the FSAR,

monitoring of vendor supplied information, and engineering support of construction activities. I was Ebasco's Lead Electrical Engineer for the Shearon Harris Project from 1979 to 1983, and was responsible for all electrical engineering and design activities performed by Ebasco on this project. One of these activities was the implementation of the environmental qualification program for all electrical equipment.

In 1983 I became the Section Leader for nuclear services in the Corporate and Consulting Electrical Engineering Department at Ebasco. My responsibilities include managing nuclear consulting services for electrical systems and equipment, and development of corporate programs, guidance and positions on nuclear plant electrical systems. I am also Ebasco's Corporate Equipment Qualification (EQ) Program Manager, responsible for development and implementation of Ebasco's EQ Program. I head a multi-disciplined EQ Program Committee which oversees and develops guidance for EQ efforts on all Ebasco nuclear projects.

I am a registered Professional Engineer in the state of New York and a member of IEEE (Power Engineering Society) and the American Nuclear Society (ANS). I have authored a paper entitled "Developing and Maintaining Equipment Qualification Programs: A Computer-Aided Approach," which I presented at the 1983 ANS Winter Meeting.

Q.4 Mr. Pagan, please state your address, present occupation and employer.

A.4 (EJP) I am employed by Ebasco Services Incorporated as a Senior Electrical Engineer. My business address is 2 World Trade Center, New York, New York 10048.

Q.5 State your educational background and professional work experience.

A.5 (EJP) I received a Bachelor of Engineering (Electrical) degree from the City University of New York in 1978. I joined Ebasco in March 1981 as an Electrical Engineer on the Shearon Harris Nuclear Project. I am currently the Equipment Qualification Task Leader for SHNPP. My responsibilities include developing and implementing the EQ program and supervising the work of the EQ group, which consists of nine multi-disciplined engineers for non-NSSS equipment. I have reviewed and checked various EQ test reports and performed executive reviews (final checks) of most documentation packages. I have also trained engineers to review test reports, written FSAR qualification sections, provided responses to NRC EQ questions and interfaced with CP&L on all EQ related matters. In 1983 I spent four and one-half months at the SHNPP site to assist in evaluating the qualification of the NSSS vendor supplied Class 1E equipment. At Ebasco I have also had overall engineering resposibility for all plant cables, electrical containment penetrations, DC systems, and uninterruptible power supplies. Responsibilities included specifying, purchasing, performing calculations, reviewing plant layout and vendor drawings, and resolving field problems.

Prior to March 1981, I was employed by the Consolidated Edison Company of New York ("Con Ed"). Two years were spent in Quality Assurance ("QA") performing audits, surveys and inspections of Class 1E equipment manufacturers' QA programs to determine compliance with 10 C.F.R. 50 Appendix B. In addition, I witnessed testing and manufacturing of Class 1E equipment. Other QA responsibilities included field verification of equipment and pipe walkdowns at Indian Point Unit 2. At Con Ed I also spent seven years in the Electrical Engineering Group. Four of those years required performing engineering tasks associated with Indian Point Units 2 and 3. The remaining three years required performing engineering tasks associated with high voltage substations. My engineering responsibilities at Con Ed were similar to those at Ebasco, with the addition of writing construction specifications, power plant instruction manuals and lighting standards. I also spent two years in Con Ed's Estimating Group, where I estimated the costs (labor and material) of various projects.

Q.6 What is the purpose of this testimony?

A.6 (RMB, EJP) The purpose of this testimony is to respond to Eddleman Contention 9D, which states:

> The qualification of instrument cables did not include adequate consideration and analysis of leakage currents resulting from the radiation environment. These leakage currents could cause degradation of signal quality and/or spurious signals in Harris instrument cables.

Q.7 How is your testimony organized?

A.7 (RMB, EJP) First, we describe instrument cables and their safety functions. Second, we describe how instrument cables are environmentally qualified for use at SHNPP. Finally, we explain how qualification of the cables assures that leakage currents due to radiation will not cause degradation of signal quality or spurious signals in a way which would impair the safety functions of the cables.

Q.8 What is an instrument cable?

A.8 (RMB, EJP) An instrument cable, in its simplest form, is an electrical cable constructed of a conductor, insulation, shield, drain wire, and overall jacket. More complex constructions include various multiples of these basic components. Instrument cables are designed to conduct low power electrical signals.

Q.9 What safety functions are performed by instrument cables in a nuclear power plant?

A.9 (RMB, EJP) During normal operation, instrument cables are used to conduct electrical signals containing information about plant operating conditions, such as reactor coolant system pressure, reactor coolant system temperature, and containment radiation levels. These signals are transmitted from measuring instruments throughout the plant to indicating and control devices in the control room and other locations. In the event of an accident, instrument cables transmit the protective action signals required to achieve safe plant shutdown, to mitigate the consequences of the accident, and to monitor plant conditions during and after the accident.

Q.10 What kinds of instrument cables are used at SHNPP?

A.10 (RMB, EJP) There are several thousand circuits utilizing instrument cables in the SHNPP design. The instrument cables used are of various types, and have been purchased from several different vendors. The types of instrument cable used at SHNPP are included on the list of electrical equipment in FSAR Table 3.11.0-2 (Applicants' Exhibit 8).

Q.11 Where are these cables located in the plant, and to what environmental conditions will they be exposed?

A.11 (RMB, EJP) Instrument cables are located throughout the plant. Because most instrument cables are routed through more than one plant area, these cables will be exposed to a variety of environmental conditions. For example, many cables are routed from instruments inside the containment to indicators in the control room.

Q.12 Please describe how instrument cables at SHNPP were qualified for the environmental conditions to which they could be subjected.

A.12 (RMB, EJP) Instrument cables at SHNPP required to be environmentally qualified by 10 C.F.R. § 50.49 were qualified by test. The test methodology employed is the one set forth in IEEE 383-1974, "IEEE Standard for Type Tests of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations" (1974). IEEE 383-1974 is endorsed by NRC Regulatory Guide 1.131, "Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants" (August 1977).

In the tests, instrument cables were subjected to thermal aging, radiation, and other design basis accident conditions (as applicable). Each type of instrument cable used at SHNPP was qualified for its worst case location, i.e., for the most severe environmental conditions that any part of a cable of that type could experience.

In addition, during testing the SHNPP instrument cables were exposed to substantially higher radiation doses than the most severe doses to which they actually could be exposed under normal and accident conditions. For example, a sample of Samual Moore thermocouple wire, which is used in the SHNPP containment, was irradiated during testing with a total dose of 2×10^8 rads. According to conservative radiation calculations, the maximum normal plus accident dose which this instrument cable could receive at SHNPP is 5×10^7 rads, one fourth of the dose which the cable sample received during testing.

Following the tests described above, the instrument cables were required to pass a voltage withstand test, which subjected the cables to additional electrical and mechanical stresses beyond those they will experience in service. The voltage withstand test indicated that margin still existed in the integrity of the insulation after qualification testing.

Q.13 What are leakage currents?

A.13 (RMB, EJP) Leakage current is that portion of an electrical signal carried by a cable which is conducted through the insulation to ground.

Q.14 What is insulation resistance?

A.14 (RMB, EJP) Insulation resistance is the resistance of the cable insulation to the flow of leakage current.

Q.15 What is the relationship between leakage current and insulation resistance?

A.15 (RMB, EJP) Leakage current and insulation resistance are inversely proportional. That is, as insulation resistance decreases, leakage current increases (provided voltage remains constant). This relationship is described by Ohm's Law, which is a fundamental concept in electrical engineering.

Q.16 What causes leakage currents in instrument cables?

A.16 (RMB, EJP) Leakage currents occur when insulation resistance is too low, for example, when organic cable insulation has degraded as a result of environmental stresses.

Q.17 What are the safety implications of leakage currents in instrument cables for nuclear power plants?

A.17 (RMB, EJP) Depending on the sensitivity of the particular instrument to which the cable is connected, a leakage current could affect the accuracy of transmitted information. If the instrument is safety-related, plant safety could be impaired.

Q.18 Was leakage current or insulation resistance measured during qualification testing of instrument cables used at SHNPP?

A.18 (RMB, EJP) Yes. Leakage current is sensed by a measurement device and converted by the device to an insulation

resistance value, which is recorded. Leakage current values are not recorded because such values, to be meaningful, depend on circuit parameters such as cable length, operating voltage, instrument accuracies and resistances, and other resistive sources (e.g., connectors), which vary from circuit to circuit. Since insulation resistance is an inherent property of the insulation material, it can be expressed as a constant value (in per unit length). These insulation resistance values can then be used to analyze the possible effects of leakage currents on instrument circuit accuracy.

Q.19 How frequently was insulation resistance measured during the qualification testing of SHNPP instrument cables?

A.19 (RBM, EJP) At a minimum, insulation resistance was measured prior to testing, after irradiation, and at frequent intervals during the remainder of the design basis accident testing (e.g., pressure, temperature, humidity, chemical spray).

Q.20 (RBM, EJP) Why was insulation resistance not measured during radiation testing?

A.20 (RBM, EJP) Changes in such conditions as pressure, temperature and humidity can affect insulation material in a way which causes fluctuations in insulation resistance during testing. Radiation, however, causes cumulative change in organic cable insulation material. This cumulative change does not result in fluctuations in insulation resistance during testing. Therefore, there is no reason to measure insulation

resistance during radiation testing. Insulation resistance measurements made before testing and after irradiation adequately account for any changes in insulation resistance which could affect the accuracy of electrical signals.

Q.21 Does irradiation of instrument cable during qualification testing result in significant decrease in insulation resistance?

A.21 (RMB, EJP) No. For example, in one Samuel Moore thermocouple wire test sample, the insulation resistance before irradiation was 8.75×10^{10} ohms per 1000 ft. The insulation resistance after irradiation was 1.75×10^{10} ohms per 1000 ft. This value was almost an order of magnitude higher than the minimum allowable insulation resistance for new cable of this type (3.4×10^{9} ohms per 1000 ft.) according to Insulated Cable Engineers Association Standard S-68-516, "Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy" (1976). Insulation resistance values of these magnitudes indicate negligible leakage currents in the circuit.

Q.22 Have the possible effects of leakage currents on instument circuit accuracy been analyzed for SHNPP instrument cables?

A.22 (RMB, EJP) Ebasco has reviewed insulation resistance values following irradiation for each type of instrument cable used at SHNPP. As discussed above, the potential effects of irradiation on insulation resistance (and therefore leakage currents) are negligible for the SHNPP instrument cables.

In addition, Ebasco currently is performing insulation resistance calculations which will consider, along with the appropriate circuit parameters, the insulation resistance measurements taken during the entire qualification test sequence. The results of the calculations must show that the quality of the instrument signals will not degrade to a point where the instrument may not be capable of performing its safety function. These results will be documented in the individual instrument cable qualification packages.

Q.23 Mr. Bucci and Mr. Pagan, in your opinions, does the environmental qualification of instrument cables at SHNPP "include adequate consideration and analysis of leakage currents resulting from the radiation environment"?

A.23 (RMB, EJP) Yes. Environmental qualification testing was conducted according to the applicable standards. Insulation resistance measurements were taken on aged and irradiated test samples. These insulation resistance values have been reviewed to ensure there will be no adverse effect on the safety functions performed by SHNPP instrument cables as a result of leakage currents caused by radiation.

#13-9-SueT

BY MR. O'NEILL: (Continuing)

Q Mr. Bucci, would you please summarize your testimony for the record?

A (Witness Bucci) Yes. The purpose of our testimony is to address Eddleman Contention 9.D which states: The qualification of instrument cables did not include adequate consideration and analysis of leakage currents resulting from the radiation environment. These leakage currents could cause degradation of signal quality and/or spurious signals in Harris instrument cables.

We disagreed with this contention, the allegation of this contention, because environmental qualification testing of Shearon Harris Nuclear Power Plant instrument cables included taking insulation resistance measurements on aged and irradiated test samples.

Leakage currents would be indicated by these insulation resistance measurements. These insulation resistance values have been reviewed, and it has been determined that the change in insulation resistance due to radiation exposure was negligible. Therefore, qualification of the cables assures that leakage currents due to radiation will not cause degradation of signal quality or spurious signals in a way which would impair the safety functions of the cables.

MR. O'NEILL: Thank you, Mr. Bucci. Mr. Bucci and Mr. Pagan are available for cross-examination.

#13-10-SueT

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JUDGE KELLEY: Thank you. Mr. Eddleman.

CROSS EXAMINATION

BY MR. EDDLEMAN:

Q Gentlemen, under what conditions is the insulation resistance measured that you just referred to in your summary?

A (Witness Bucci) Under what conditions is the insulation resistance measured?

Q Yes.

A It is measured during the environmental qualification testing.

Q During the testing or after the test?

A During and after the testing.

Q In the accident portion, is the measurement conducted continuously during the test?

A No, it's periodic during the accident portion.

Q And what is the periodicity? How often is it done?

A The periodicity varies. Intervals range from minutes to on the half hour.

(Witness Pagan) It also depends on the length of the test itself. At the beginning of the test, you have more frequent insulation resistance measurements. After the peaks have been duplicated in the test chamber and you are at, what we call the tail end of the test, the ion measurements are separated.

#13-11-SueT

Q By peaks there, you mean the peak conditions of temperature and pressure and the like?

A Yes.

Q Okay. When you measure an aged sample, is that measured under the combined environmental conditions that it would be subjected to in normal operation, or is that just measured in the lab at normal temperature and pressure?

A (Witness Bucci) When we measure the aged sample?

Q It said -- I believe you said in your summary that you measured insulation resistance on both aged and irradiated samples.

A Yes. Could you repeat your question?

Q Sure. I will try. When you measure the insulation resistance on an aged sample, under what conditions do you perform that measurement?

A It's measured -- it's usually measured under the conditions that are occurring during the test at that time; however, if it's one of the measurements that are taken after aging but before putting into the LOCA chamber it's measured under normal environment conditions in the lab.

Q Uh-huh. And the irradiated samples -- again, we are talking about normal lifetime testing that's accelerated the radiation, correct?

A Yes.

Q And under what conditions then, once you have completed

#13-12-SueT

that irradiation phase would you measure the resistance of the cable? Insulation resistance, I mean.

A Under what conditions, do you mean?

(Witness Pagan) Could you please explain what you mean more specifically by conditions?

Q Well, let --

A Are you getting at -- well, please explain what you mean by conditions?

Q Okay. I mean, for example, you could measure resistance in an environment where the air is dry and the temperature is normal room temperature and the pressure is normal atmospheric pressure or close to it, like you probably would in a lab where there is nothing else going on. You just take it out and measure the resistance across it, across the insulation.

A (Witness Bucci) On the cable that has been radiation aged for the normal environment, it is measured in a normal environment.

Q You mean a normal lab environment; is that correct?

A It would be normal lab environment.

Q Basically as I described it in clarifying the question?

A I believe the normal lab environment temperature and humidity conditions would be the same as the normal conditions in the plant.

#13-13-SueT

Q Really?

A Yes. Temperature, humidity.

Q Well, isn't the normal temperature in a lot of parts of the plant 40 or 50 degrees Celsius?

A At a maximum.

Q And that's not very normal in a lot of labs, is it?

A Well, it depends how you are talking about normal. Normally, in the plant I wouldn't expect the maximum temperature to appear. I would expect the maximum temperature to appear at times and at other times it would be much lower.

Q But in most laboratories the maximum temperature of the air in the lab, other than doing some test or something that generates a lot of heat, I would take to be --

A 25 degrees.

Q Yeah.

A It could be that in the plant normally. And yet it could be 40 degrees maximum.

Q Did you -- in checking on this, do you evaluate what the typical temperatures are in the plant in making these tests, or do you just go with the maximum?

A Go with the maximum normally.

Q Uh-huh. And are the temperature, pressure, humidity and the like recorded when you make the tests on the aged or on the irradiated samples, as we have been discussing,

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in the lab or when those tests are made?

A It's not a requirement. If you mean are they ever, yes.

Q They are sometimes, but it's not required to be recorded?

A That's right.

Q Okay. On the particular samples of cable that are the same types being used at Harris, do you know if that information was recorded?

A To the best of my knowledge, no.

Q All right. And if it were recorded, would it be in the lab test reports to your knowledge?

A (Witness Pagan) I haven't seen any in the lab test reports.

Q You haven't seen any in the lab test reports?

A I haven't seen any of the temperatures and pressures under which the insulation resistance was measured in the qualification test reports.

Q In the reports?

A Right.

Q Okay. And I take it, Mr. Bucci, you haven't either?

A (Witness Bucci) I've seen in some reports. Not necessarily -- I haven't seen them in any reports that were done specifically for Shearon Harris.

#13-15-SueT

Q Now, by specifically for Shearon Harris, was a set of special tests done for Shearon Harris or were these tests of insulation on cable types that are used at Shearon Harris?

A For example, I've seen them in tests by Sandia labs or other laboratories like that. They were generic tests that were done, not for a specific plant.

Q Uh-huh. And were any of those tests used in the qualification of this cable for Harris, any of those test results, to your knowledge?

A Were they used in the qualification? We have reviewed and -- I guess you could say we used the tests as evidence of qualification, yes.

Q And which of those recorded the temperatures under which the resistance of the aged or irradiated samples were measured, do you recall?

A No.

Q Are the conditions during the LOCA simulation test, are they actually recorded as they are going on, do you record pressure and temperature and humidity and radiation level in the test chamber when you are going that LOCA simulation?

A Yes.

Q And is that part of the lab report on those?

A Yes, it is.

(Witness Pagan) I would like to comment on your question. You indicated that you are interested in the LOCA

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tests and you also indicated the parameters that are found during the LOCA simulation, and you included reference to radiation. And it should not be interpreted by the question to mean that radiation is used, or that test samples are exposed to radiation simultaneously with the LOCA.

Q All right. So the LOCA conditions, temperature, pressure, humidity, alike, are separately applied from the radiation, correct?

A Yes, it is.

Q Is the irradiation that simulates the LOCA exposure applied before or after the other variables, the temperature and pr ssure and steam and the like?

A (Witness Bucci) The radiation is applied before the LOCA test.

Q Okay. The radiation for both normal life and the LOCA simulation?

A Is before the LOCA test, yes.

Q Correct?

A It's not after the test.

Q Right. So you irradiate first and then you apply the other LOCA parameters, right?

A For the LOCA portion of the test.

Q Right.

A Yes. Irradiation is first.

Q Okay. In the performance of these tests, what

#13-17-SueT

acceptance criteria for insulation resistance -- let me rephrase that.

When these tests are made, are there specified in the test procedures insulation resistance criteria for the tests?

A Insulation resistance criteria? The criteria, it's specified to measure the insulation resistance. There is not a minimum value, accpetance value, specified in 383. I think that's actually 383-74 which is the standard for a cable type test.

Q All right. So that's the standard under which these type tests are conducted on the cable, right?

A Yes.

Q Okay. Now, is there any criterion as to say signal accurance or leakage currents or anything like that in the standard that would relate to insulation resistance in these cables?

A Yes. Adequate performance considering the function of the cable --

Q All right.

A -- has to be demonstrated.

Q Is there any definition of adequate performance?

A Well, for an instrument cable, adequate performance would be maintaining the integrity of the instrument cable throughout the test, and insulation certainly is a measure of

#13-18-SueT

whether it maintained its integrity.

Q Now, by integrity do you mean physical integrity or integrity of function?

A Function.

Q Okay. And that function is to deliver the signal that is transmitted over that cable in basically usable form to the other end?

A I refer to my testimony. Let me find the function of instrument cable. On Page 6 --

Q Yes.

A -- it does agree with the statement that you just made, yes.

Q The information that is discussed there in that Answer 9, which I take it is the one that you are referring to --

A Yes.

Q -- those variables that are mentioned here are quite important to safety, are they not?

A They are all safety-related functions.

Q I mean, if you all of a sudden didn't know what the reactor coolant system pressure was, or thought it was different than it was, that could have some serious safety significance, couldn't it?

A Yes. That's why they are safety functions.

Q All right. Okay. Approximately at what voltages and

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currents is this information transmitted in the Shearon Harris Plant design?

A Well, it varies depending on the type of instrument, but generally if it's a voltage signal it would be in millivolts and if it's a current signal it would be in milliamps, very low levels. Low as opposed to control power.

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Q Are you gentlemen aware of any concerns expressed by Sandia National Laboratories, concerning the insulation resistence criteria used in tests like these?

A Tests like these?

Q Type tests.

A For cables?

Q Yes.

A I am not aware of concerns expressed by Sandia on instrument cable insulation resistence other than the concerns that we address in our qualification testing.

Q Now, which concerns are those?

A They would be the ones I mentioned that are required by the cable tie testing. That is, they are a measure of the cable performance, and they should be monitored.

Q And that measurement is basically -- how well does it transmit the signal, is that right?

A Yes, you could describe it in those terms.

Q All right. What amount of error or distortion in the signal would be acceptable in one of those tests?

A It depends on the type of instrument again, and it also depends on the specific function of that instrument. I couldn't give one range that would be acceptable for all instruments.

Q Well, let me ask you this. How many different types of instrument cable are used at the Harris plant?

A Well, I will point you to our testimony again. We used -- the next page, page 7, we used various types of cables. Several types. These are included in our Exhibit No. 8.

Q All right. Let's refer to Exhibit 8, then. Now, let me first ask -- I believe Mr. Prunty and Mr. Yandow are the sponsors of this exhibit. Did you gentlemen contribute information that is used in this exhibit?

A Yes, we did.

Q Okay. And would that include the information on cable types that is in here?

A Some of the information on cable types, yes.

Q Would it include all of the instrumentation -- I mean information on instrumentation cable types that is in this exhibit, to your knowledge?

A It would include all the information on non-NSSS than the supplied instrument cables.

Q Okay. Now the NSSS vendor is Westinghouse, right?

A Yes.

Q Now, where Westinghouse supplied the instrument cable, would your -- would thzt come within your review?

A It would not come within our normal scope of review. Could you clarify the question? Would what come within our review?

A We are talking about NSSS vendor supplied cable, and I took it you said that that didn't come within your normal

scope of review.

A Meaning the qualification of that?

Q Right. You don't normally check the qualification of the instrument cable that Westinghouse supplies, is that a fair summary?

A That is true.

Q Okay. In preparing this testimony, did you check back on the environmental qualification of instrument cable supplied by Westinghouse?

A Yes, through CP&L.

Q How do you mean, 'through CP&L?'

A Well, we checked with CP&L on the qualification of the Westinghouse instrument cables.

Q Did you --

A Just through our normal work with CP&L.

Q You mean -- did you ask them what the kinds of cable were, and actually get the qualification reports?

A No.

Q All right. Now, I believe before we got into this, I was going to ask you about where the different type of cable for instruments at Harris were listed in Exhibit 8. Do you have that?

A Yeah. We stated in our testimony, on page 7, it is listed as FSAR Table 3.11.0-2.

Q All right. And I believe that that table begins on

page 3.11.0-8, does it not?

A That is correct.

Q And is this, for example, the 300 V instrumentation communication and computer input cable; is that one of them?

A Yes, the 300 volt instrumentation cable.

Q Okay. And thermal coupler cable?

A Yes.

Q The Anoconda instrumentation cable?

A Yes.

Q Was the Anoconda instrument cable some of the stuff you reviewed, right?

A Yes.

Q The instrumentation cable from American Insulated Wire Corporation, on the next page, about third from the top?

A Yes.

Q What about this triaxial cable from Boston Insulated Wire and Cable. Is any of that --

A (Witness Pagan) We reviewed that also.

Q What I wanted to ask you was, is some of that instrumentation cable?

A Yes, it is.

Q I am not finding readily, as I look through the rest of this, more instrumentation cables. Do you know if there are others that are on the list?

A (Witness Bucci) There are no more on the list.

Q Okay. And this table is the table of EBASCO purchased safety related equipment, right?

A The title is EBASCO purchased safety related equipment.

Q Okay. And that is all to be qualified to IEEE 323 1974, right?

A That is indicated in the right most column.

Q So you could pick it up off of that as to which it would be qualified for.

A Yes.

Q Okay. Now, the Westinghouse supplied instrumentation cable would be in Table 3.11.0-1?

A I would have to look in the table, but that table, 3.11.0-1 is NSSS supplied safety related equipment.

Q Well, then logically you would expect the cable or something that uses the cable to be listed in there wouldn't you, since it is safety-related.

A Yes, you would logically, although I am not sure right away how the table is organized.

Q Okay. Well, I will be glad to give you some time to look at it. I have another question I want to come back to on the other table, and make sure I don't forget it.

A For example, there is, under equipment, it lists system, in some cases, and instead of being a specific piece of equipment.

So, a cable might be -- might not be exclusively listed, but it would be part of the system. For example, nuclear instrumentation system.

Q So, in any event you could examine this table and see whether a cable was listed explicitly for any part of it. Now, would this table identify what kind of cable is involved if it doesn't actually list it?

A The cable would identify the manufacturer of the equipment or system, and model number or drawing number. It would give a qualification reference, and indicate whether qualification was per 323 71 or 74. That is all the information that you could tell from this table.

Q So, you would really have to know which one of these things -- you can -- you have to know which one of these things include cable, where it doesn't say it on it, for the Westinghouse supplied portion, right?

A That is true from this table, yes.

Q Right. Let me ask you, back on Table 3.11.0-2, on these, there are no environmental qualification report references that I see, is that correct?

A Yes. This table was not intended to be an all-inclusive table. It is a quick reference. Four columns of information given.

Q Well, are there records maintained that would be available, say, for the Staff when they are auditing this

stuff, that actually say which is the EQ report by which various kinds of instrument cable are qualified?

A Yes. There is a very detailed information available to the staff, and we have submitted to the staff, in fact, that gives that information.

Q Now, let's see. Excuse me a minute. The best I recall, there wasn't any discovery on Contention 9 after we specified the seven parts that we are dealing with here, is -- does that correspond to your recollection, gentlemen?

MR. O'NEILL: Objection to that question to our witnesses on this. They may not be in a position to answer it fully in any event, nor do I see any relevance to this contention.

We have let quite a few questions go that we believe are irrelevant to getting to the very, very narrow issue of this contention, and that is whether or not in the qualification test leakage currents are taken into account.

The testimony does not need to discuss all of the qualification reports for all instrumentation cable. The testimony very directly explains how that is taken into account in general in qualification testing.

I think other than to satisfy the curiosity of Mr. Eddleman, these questions largely have been irrelevant to this very narrow issue.

MR. EDDLEMAN: I think Mr. O'Neill's characterization

of this testimony in general is correct, but I don't know if I agree with him about the rest of what he said.

At any rate I think I will withdraw that question, because I don't think it makes a lot of difference.

BY MR. EDDLEMAN: (Continuing)

Q Let me ask the witnesses if they have available to them the questions and answers from Interrogatory responses on Contention 9 that have been filed in this proceeding?

A Yes, I believe we have.

Q Okay. Could you refer to Interrogatory 9-8, which I believe appears on page 20 of the April 17, '84 Interrogatory Responses by Applicants?

JUDGE KELLEY: You people may want to take a minute to take that out.

WITNESS BUCCI: Page 20?

MR. EDDLEMAN: Yes.

WITNESS BUCCI: Yes.

BY MR. EDDLEMAN: (Continuing)

Q The information being made available concerning these cables EQ test, does that fall within SER 3.11, to your knowledge?

A I want to answer yes, but I don't know to what extent you are referring to the information on cable qualification.

Q Okay.

A The information I just described that we provide

to the Staff has been provided under this SER item.

Q Okay. About when was that done?

A I am not sure the exact date. I believe it was as we said in the original schedule, on or about July 1st, 1984.

A (Witness Pagan) Around that time we submitted the master list to the client, who in turn submitted it to the NRC Staff.

Q So you prepared the original master list, and then sent it to CP&L and they sent it to the Staff?

A We prepared the original master list for balance of plant equipment.

Q Which is everything but the NSSS?

A That is correct.

Q Okay. And does that include -- the information provided to the Staff, does that include the specific qualification test reports or identification of the qualification test reports, where the insulation resistence of this instrumentation cable was measured?

A The information that we provided to the client identifies the instrumentation cables, and it also identifies via reference the qualification reports used to qualify those instrument cables.

Q So, it does identify those reports?

A Yes, it does.

Q Do you know if there were any test failures in

attempts to qualify any of this instrumentation cable.

MR. O'NEILL: Objection. Once again, this is outside the scope of this issue. This issue goes only to whether or not qualification tests take into account leakage current, not any issue that Mr. Eddleman cares to raise about the qualification test in general.

JUDGE KELLEY: Let me just ask, does the later testimony of reporting of failures encompass this kind of inquiry?

MR. O'NEILL: 9G specifically talks about type testing. It addressed very specifically the only issue that was raised in the contention, and in general does discuss how Applicants ensure that they are aware of all relevant information.

MR. EDDLEMAN: Since it appears that these two gentlemen are part of the 9G panel, I think the best thing to do would be to carry it over to that, but I am not agreeing that it is irrelevant, because if you say do these tests take this into account, and there had been a failure that resulted from a leakage current or some other cause with respect to one of these other contentions, then I think you would have a whole different situation. If there is a failure, it is certainly relevant to the question of whether the equipment is qualified.

JUDGE KELLEY: But you are going to take it up in

9G?

MR. EDDLEMAN: Right. Because these gentlemen are on that panel, I don't think there would be any problem. Whatever they know, they will still know then.

JUDGE KELLEY: Hopefully.

MR. EDDLEMAN: I hope. I haven't checked the memory qualification of anybody, especially not myself.

BY MR. EDDLEMAN: (Continuing)

Q Let's see. Let me ask you. Has EBASCO witnessed any of these type tests on this instrumentation cable?

A (Witness Bucci) I have not witnesses any type tests on the cables.

A (Witness Pagan) I have not personally witnessed any tests.

A (Witness Bucci) However, EBASCO has.

Q Do you know if EBASCO witnessed any specific type tests, four instrument cable at Harris, that either Westinghouse supplied or other, to your knowledge?

A I am sorry, could you repeat that. It sounded like the same question.

Q I think it is a little different. I believe you said that although you as individuals have not witnessed type tests of this cable, instrumentation cable for Harris, that EBASCO had, is that right?

A I don't believe EBASCO has witnessed any LOCA tests

for Shearon Harris cables.

We have witnessed other kind of type tests that relate to qualification, but not the LOCO tests.

Q And by, 'we' in that last entry, you mean EBASCO?

A Right.

Q Okay. What I wanted to ask you was do you know if you know, which of the type tests for the Harris instrumentation cables were witnessed by EBASCO personnel?

A No, I don't know the specific.

Q All right. Let's see. Mr. Bucci, in your qualifications on page 2 of your prepared testimony, -- let me back up just one second and ask both of you. I think this may have already come out, but was this testimony prepared jointly by you or under your direction and supervision?

A (Witness Pagan) Yes.

A (Witness Bucci) Yes, it was.

Q Okay. And Mr. Bucci, with respect to the last paragraph on page 2, it is your responsibility to assure Harris project -- was that the first time you had anything to do with the Harris project?

A Yes. 1976.

Q Preparation of the electrical sections of the FSAR were part of your responsibilities then, and does that still continue?

A I still have input to that.

Q Would monitoring of vendor supplied information at that date, when you started up with Shearon Harris, have included environmental qualification?

A Yes.

Q Okay. And then, as lead electrical engineer from '79 to '83, your responsibility was implementation of the EQ program.

Now, does that mean actually making -- doing the tests of the qualification of the equipment, or making sure that you have all the records together to show that it is qualified.

A No, it means making -- implementing the program which includes the testing and the review of the testing, and the records.

Q So, you would actually cause the test to be done? Is that part of your responsibility?

A Yes, I have caused tests to be done. I haven't done them myself.

Q Right. But you would say we need a test of this item, and have a test done?

A Yes.

Q Okay.

A That wasn't my decision to make alone, however.

Q But you would recommend tests in some instances?

A Yes, I would make them.

Q And some of those recommendations were accepted?

A Yes.

Q Okay. Was all of this instrumentation cable from Harris qualified by actual tests?

A Yes.

Q Including the Westinghouse supplied to your knowledge?

A To my knowledge, all the Westinghouse instrument cable was also qualified by tests, yes.

Q You know it was, that is what you are saying?

A To the best of my knowledge, yes.

Q Well, have you checked it for each type of cable that Westinghouse supplied for the Harris plant that there was a qualification test? Have you done that?

A No. This is from my knowledge from working on the Shearon Harris probject for several years, and interfacing with Westinghouse personnel during that time.

Q And that is the extent of your knowledge of it, right?

A No, I could go on.

Q Well, please go ahead.

A We had -- we have routinely had meetings with Westinghouse ever since the inception of the project, and many of those meetings have discussed qualification of electrical equipment cables and other wires, so I believe I

have fairly good knowledge of how Westinghouse qualifies their cables, especially harsh environment cables such as the ones we are speaking of.

Q And, -- but you don't, you haven't made any specific check of the information you received in those meetings, is that what you are saying?

A I have made checks, but it is not under -- it is not one of the things -- we don't review the Westinghouse qualification test reports for the Shearon Harris project.

Q Do you basically take Westinghouse's word for it, is that what you are saying?

A No, that is an area under CP&L's organization. That review.

Q All right. The computer-aided approach that is discussed down at the bottom of your Answer 3, is that a sort of approach that is used to keep track of these reports at the Harris plant? The EQ reports for things like instrument cable?

A Yes, that table described the approach we are using on the Shearon Harris project.

Q So, could you then, if you wanted to find the Westinghouse reports that show qualification, or supposed to show qualification of the instrument cables for Harris, you could retrieve them through this information system?

A Yes, you could.

Q All right. Excuse me a second. Mr. Pagan, in your Answer 5 on page 4, it says that you are currently the equipment qualification task leader for the Shearon Harris plant.

Does that basically mean that you are in charge of overall equipment qualification work for the Harris plant that EBASCO does ?

A (Witness Pagan) For the balance of plant equipment, yes.

Q Right. Again, balance of plant means everything that is not Westinghouse?

A That is correct. Well, everything that EBASCO supplies.

Q Everything that EBASCO supplies. Okay. Do you know if there are any suppliers of instrument cable for the Harris plant other than EBASCO and Westinghouse?

A That supply other instrument cables?

Q Yes.

A Well, they would be furnished either by EBASCO or Westinghouse.

Q So, it would come through one of the other of you, EBASCO or Westinghouse, all instrument cables, right?

A Yes.

Q In the description of the EQ that says there are nine multi-disciplined engineers. Does that mean these are

people with degrees in two areas of engineering or more, or --

A No, it doesn't. It means that the engineers could have degrees in mechanical engineering or electrical engineering.

Q In other words, that there are different disciplines among the nine engineers, not necessarily that each one is two different disciplines.

A That is correct.

Q Okay. It said that you had also had -- this is down toward the bottom of that answer -- overall engineering responsibility for all plant cables. Is that for the Harris plant?

A Yes, it is.

Q So, it begins your responsibilities. Did those responsibilities include EQ for those cables?

A At the time I was reviewing qualification reports for cables as well.

Q Okay. Have you actually reviewed all of the qualification reports for all the cables that are supplied to EBASCO?

A No, not personally.

Q How many or what proportion of them have you personally reviewed?

A I would say about three or four.

Q And that is three or four out of how many?

A Well, some cable purchase orders have more than one report. Okay? So, there may be a total of maybe seven or eight qualification reports associated with balance of plant cables, and out of those seven or eight, I might have reviewed three or four.

End 14.
MS fols.

Sim 15-1

Q Mr. Bucci, in your review of these do you actually look at these EQ reports?

A (Witness Bucci) I am sorry. I missed one word, these blank reports. Could you repeat the word before reports?

Q I think there may not be a word. Let me try to ask the question again.

In your review of the Harris instument cables, would you look at the EQ reports on them?

A Yes.

Q Would you happen to know which or the three or four that Mr. Pagan would like to add?

A For instrument cables?

Q Yes.

A No, I don't know.

Q Okay. I was trying to get it at the answer to whether if he hadn't seen them you had. Have you reviewed all of them, all seven or eight, or however many there are yourself?

A I believe at one time or another I reviewed all seven or eight in some capacity, yes.

Q In some capacity. Did you review them with respect to the question of leakage currents and insulation resistance, all of them?

A Yes.

Q Okay, that ties that down.

Mr. Pagan, let's see, I believe you received your

Sim 15-2

degree in electrical engineering in 1978. Do I gather from your additional answer on page 5 that you were working with Consolidated Edison at the time that you received that degree?

A (Witness Pagan) Yes, I was.

Q Okay. Which two years did you spend in QA with ConEd?

A Well, I went into QA in May 1979 and I left it in March of 1981.

Q Okay. So basically about the last two years of your employment was with ConEd?

A That is correct.

Q It says you witnessed testing and manufacturing of Class 1E equipment. Did that include these cables?

A No, it wouldn't have.

Q Let's see here. Your Answer 8 on page 6, and you are giving a basic description of an instrument cable, and you describe it as a conductor, an insulator, a shield, a drain wire and an overall jacket. What is the drain wire?

A The drain wire is the bare wire that is in direct contact with the metallic part of the shield that would bring any shield current straight to ground. In effect, it is another conductor.

Q So it is what grounds the shield?

A That is correct.

Q Now in one of these cables the shield would be located outside the insulation, correct?

Sim 15-2

A (Witness Bucci) Yes.

Q Okay. So would the order typically be from the inside conductor, then insulation and then shield and drain wire and then the overall jacket?

A Yes.

Q Now when you measure the resistance of the insulation, are you measuring to the outside of the jacket or are you measuring to the shield?

A To the shield.

Q And the shield is grounded?

A Yes, during the measurement.

Q In these EQ tests were the shields also grounded for those measurements?

A Yes.

Q Then you discuss more complex constructions, including various multiples of these components. Is that things like multiconductor cables?

A (Witness Pagan) Yes.

A (Witness Bucci) Yes.

Q Okay. But, again, would the shield be generally outside the insulation on these shield or shields?

A Yes.

Q And when you measure insulation resistance, would you measure it from each conductor to the shield in a multi-conductor configuration?

Sim 15-3

A You would measure each conductor's insulation resistance separately.

Q And would measure it to the shield?

A To the shield and with the other conductors grounded to the shield at the same time.

Q Right. So you would measure resistance from conductor to shield and also from conductor to conductor in that situation?

A That is true.

Q The normal operation signals that you discuss in Answer 9, these are generally important to safety, are they not?

A Yes.

Q And under accident conditions I think we already agreed that these functions would be quite important to safety?

A Yes.

Q Okay. Do the protective action signals that are discussed there toward the bottom of page 4 include signals that would initiate actions necessary for safe plant shutdown?

A Yes.

Q Mr. Pagan, do you have something to add?

A (Witness Pagan) Yes. You referenced page 4, if I am not mistaken.

Q You are right, and I misspoke. It is page 6.

A Okay.

Q Let's see. The signals are transmitted throughout

Sim 15-4

the plant to devices in the control room and other locations. Are there other areas where a lot of these instruments come together?

A Yes, there would be other areas. The control room is the main area.

Q Okay. The various types of cable, do you have a listing of all the types of cable either in Applicant's Exhibit 8 or elsewhere?

A Well, the list that we gave to the staff includes the type of each cable.

Q Do you have a copy of that list with you?

A No.

Q Do you remember what the types are?

A Yes.

A (Witness Pagan) Yes.

Q Can you tell me what they are then, please?

A Well, by types ---

A (Witness Bucci) Can you be a little more explicit on type? I am not sure what you mean by type.

Q Well, okay. I don't necessarily mean each individual, you know, say if you got one that -- well, for each manufacturer, and then each manufacturer would have different configurations of conductors perhaps or different sizes of cable and so on, right?

A Yes.

Sim 15-5

Q Is there some sort of general description like you would say, well, maybe this one is a hypalon insulated something or other from so and so company, or is that how you do it?

A Do you what to know whether they jacket the materials of construction or ---

Q Well, the insulating material is the thing of most interest here I would think, that and the configuration of the cable and the manufacturer.

A We submitted a list -- actually a CP&L letter to the NRC that gave a detailed list of each cable, its insulation material type, the size of the conductor and the configuration and manufacturer. That was a list that CP&L furnished to the NRC.

My counsel can probably help me on the exact date.

MR. O'NEILL: Mr. Chairman, I would object now to the questioning of these witnesses to go through the listing of all types of cable.

If Mr. Eddleman had a question about any one particular type as to whether or not leakage currents were a problem and hadn't been taken into account, he of course had a copy of that letter of I believe April 26th, 1983 which we were required to file with him and all the other parties.

I think this cross-examination really has been in the form of discovery, additional discovery without getting

Sim 15-6

to any line that goes to the issue of this contention.

I think we have gotten to a point where it is really not very productive and would suggest that the Mr. Eddleman be directed to move on to something that has to do with the contention.

MR. EDDLEMAN: Well, I don't recall this letter in my files. It may have very well been served, as counsel says. I've got so much stuff that I could have overlooked it, particularly that far back in time.

What I was trying to get at is in some of these things you have a list, and there doesn't appear to be anything in the testimony or in the exhibit, Applicant's Exhibit 8 that really lists them. So I was trying to get out well, which ones they are. Without the information here it is kind of hard for me to ask well, you know, is this one or that one have a problem with the current because I don't know which ones they are.

JUDGE KELLEY: Wouldn't one infer from the absence of a list in the testimony that the witnesses don't think a list is necessary in order to take a position on the issue?

MR. EDDLEMAN: Well, they might not think it is necessary for them to take a position, but it would sure help me in asking them questions.

JUDGE KELLEY: Well, it would help us all if you got to the point though about leakage and then came at it from

Sim 15-7

the standpoint of are there exceptions to your analysis, does this handle the "X" cable problem and then maybe from the other end it would be more productive.

MR. EDDLEMAN: Well, let me go on with that.

JUDGE KELLEY: I think the objection is well taken. Let's get to leakage.

MR. EDDLEMAN: All right.

BY MR. EDDLEMAN:

Q Now the standards that are discussed in Answer 12 basically show the setup and the types of requirements that you have to go through to determine this leakage; is that correct?

A (Witness Bucci) Could you rephrase that?

Q I will try. What I am trying to do is get where the Judges and everybody else wants me to go and I want to go, too, as quick as I can while not overlooking this part of the testimony.

Let me just jump down to Question 13 and then I will come back to 12 in a little while. Question 13 is what is a leakage current conducted through the insulation to ground, and that current is determined by the overall resistance of the insulation, correct?

A Yes.

Q Now if you have an induced defect or a deterioration of the insulation, the resistance would tend to be lower, right?

A Yes.

Q Okay. Then your Answer 15, you say that leakage current and insulation resistance are inversely proportional. That would be true at any time. In other words, if you instantaneously measure the resistance at a given voltage, that would tell you what the current would be, right?

A Yes.

Q And Ohm's Law doesn't have any exceptions, does it?

A Yes, it does, but not for this material.

Q Okay. In other words, for measuring resistance here, you wouldn't be dealing with any exceptions to Ohm's Law?

A That is correct.

Q All right. Now are the currents themselves actually measured in these qualification tests?

A Yes. I refer you to our Answer 18 on the bottom of that page which reads that a leakage current is sensed by a measurement device and converted to a resistance factor which is recorded.

Q All right. What sort of measuring device is that?

A Well, it can be called a resistance tester or mega Ohm meter. There are several different test devices.

Q Now I thought you said the current is sensed by this device. Does it actually measure the current or does it measure the resistance?

A It senses the current and reads out the resistance.

Sim 15-9

Q Okay. So it measures --

A It measures both.

Q --- measures resistance by sensing current; is that correct?

A Yes.

Q And then you record a resistance value, which I gather is some sort of electrical output from this device?

A It is data from the device meter.

Q But I mean is it hooked up to a recorder or does somebody come around and read it at certain intervals or how is that done?

A It can be done either way. I am not sure how it is done in each case.

Q Okay. But would the method by which this is done be reflected in the report, the EQ report on it?

A Usually all the test devices would be listed, yes.

Q All right. Now it says leakage current values are not recorded because such values to be meaningful depend on circuit parameters such as cable length, operating voltage, instrument accuracies and resistance and other resistive sources, for example, connectors which vary from circuit to circuit.

When a cable is being qualified are all those parameters for the cable as it is being qualified specified?

A No. They are not known at that time, the length

Sim 15-10

of each circuit, for example, would not be known at that time.

Q Well, what I mean is for the cable that is actually being tested, the one that you are actually testing, would you ---

A Oh, the test sample?

Q Yes.

A Yes, they are all known.

Q Okay. So you know the length and you know the operating voltage, the accuracy of the test instruments and so on. You know all that?

A Yes.

Q All right. And so you would take this resistance per unit length and use that in sort of an electrical engineering analysis of the effects of leakage current, correct?

A Yes.

Q Okay. Now how do you decide what amount of leakage current is tolerable?

A From the instrument itself. Each instrument has an instrument circuit -- excuse me, has an accuracy requirement reflected on the project documents.

Q Okay. Now you test the cable in what you think is the most limiting condition of its exposure, correct?

A We test the cable per the required environmental conditions in accordance with the standards.

Sim 15-11

Q And that is the most limiting condition, as I think is testified to elsewhere in your testimony, isn't it?

A Yes.

Q Okay. And then the question of whether this leakage current value or resistance value which, you know, enables you to compute leakage current is acceptable depends on the requirements, the accuracy requirements at each instrumentation circuit, correct?

A Yes, it does.

Q Okay. And what I am getting at is when you analyze for this then do you look at the most limiting requirement for accuracy on any instrumentation circuit in which that cable is actually used?

A Well, that would be the first try, yes. If it met that it would meet all the other circuit requirements.

Q Okay. Now is this analysis part of the EQ package?

A Yes, it would be part of the package.

Q All right. Now have you run into any cases where it didn't meet the most demanding or onerous accuracy requirement of the circuit?

A Well, with regard to the effect of radiation on the insulation resistance, there was no need to do that calculation since there was virtually no effect. The insulation resistance before and after irradiation were virtually the same, as we stated in our testimony. Let me refer you to page

11 ---

Q Page 11 is it?

A 11, yes, Answer 21.

Q All right. Now this is one example. Is this the greatest deterioration that was in any of these EQ reports you reviewed?

A No.

(Pause.)

It is a typical example. It is indicative of the same performance -- it is indicative of this performance in other cables also. I don't know what the exact values are for the other cables. This might be somewhat higher or lower.

Q Well, if you don't know what the values are for the other cables, how do you know that this one is typical?

A Because I remember reviewing all the values and picking this one out as a typical value with very little variation.

Q All right. But you don't know what the values are?

A Well, I don't know exactly what they are, no. It is very little variation from these readings, which are substantially high readings.

Q All right. By substantially high, you mean high resistance, right?

A Yes.

Q Okay. Now you say you don't measure resistance

Sim 15-13

during irradiation, and you say that the radiation caused cumulative changes in organic cable insulation material.

Could the fact of being irradiated itself cause a change in resistance while you are measuring it?

A Yes.

Q If I can rephrase that and maybe make it a little clearer. If you got your cable hooked up to the equipment that measures the resistance of the insulation on it, could the measured value of the resistance change if you changed the conditions of the cable simply by irradiating it, that is, irradiation is going on at the same time you are measuring the resistance? Could that reduce the resistance?

A Well, not to any significant extent at these values of radiation doses. You must keep in mind that these are accelerated values. So these are higher than the values that you would see normally. Seeing any change in insulation resistance due to being irradiated at that time would be due to very high radiation doses, which would excite electrons.

Q All right. Now that is a high radiation dose rate, correct?

A Yes, very high.

Q Okay. In the accident simulation do you use the actual dose rate that you expect?

A Very close to it.

Sim 15-14

Q Close higher or close lower?

A It could be higher or lower. It is less than an order of magnitude away from it.

Q So if the dose rate is, I don't know, say 10 to the 7th rads per hour, perhaps you would be somewhere between 10 to the 6th and 10 to the 8th in the test?

A Yes.

JUDGE KELLEY: Let's take a break for 10 minutes.

(Whereupon, a short recess was taken.)

end Sim
end Take 15

#16-1-SueT

(The hearing is resumed at 4:48 p.m. after the recess.)

JUDGE KELLEY: Okay. Can we pick up again? We are back on the record. Mr. Eddleman can resume.

MR. EDDLEMAN: Okay.

BY MR. EDDLEMAN: (Continuing)

Q Okay. Gentlemen, with these resistance measurements that are taken during these EQ tests, what sort of error is there in the measurements of resistance themselves?

A (Witness Bucci) Generally, insulation resistance can be measured with less than ten percent tolerance.

Q And what conditions, if there are any, that are typical causes of not being able to be measured within ten percent are there?

A Well, a typical condition is moisture on the cable surface, the insulation surface, and you pick up additional conductance due to that moisture. Sometimes it's shunted to ground by a guarded circuit.

Q Uh-huh. Now, if the cable were actually performing its function under similar conditions of moisture, would the actual resistance be degraded to the same extent?

A No. The insulation resistance cable would appear to be better than it did under that test where you picked up additional current due to the moisture.

Q Well, where does the current come from in the test?

#16-2-SueT

A The testing device.

Q The additional current comes from the tester?

A Yes, from the voltage across the insulation.

Q And that voltage dissipates and causes that additional current. There is an additional energy drain on the tester; is that what you are getting at?

A Yes.

Q Okay. In the documentation of these resistance measurements is an error estimated or is a calibration of the test instrument? Or, how do you record that?

A The test instrument is calibrated per the calibration procedures of the tester, test lab. And the insulation resistance is generally measured in accordance with the testing standards for measuring insulation resistance.

Q And these would be specified in the test procedure?

A No, they would probably be part of the testing facility's procedures.

Q Uh-huh.

A Part of their program would be to do the test in accordance with industry established methods.

Q Right. And if Ebasco or the NRC or somebody were auditing them, they would check to see if they followed those procedures, right?

A (Pause.)

Yes.

#16-3-SueT

Q So, the --

A I can't answer that -- I'm not a quality assurance engineer.

Q Okay.

A I agree it's a logical statement.

Q Your answer is as far as you know, they could check it?

A Yes.

Q Okay. Now, so when the resistance measurements are recorded in the test is there an error assigned to them at the time they are recorded?

Are they just written down with whatever numbers they come out and the error figured later?

A The resistance measurements are recorded and reported in the test report, the measured values are reported.

Q Uh-huh. So, that's -- in other words, if I'm sitting there reading the instrument, let's say just as a hypothetical of this, and the level at one point is ten to the eleventh ohms, and then next it's five times ten to the tenth, and next it's four times ten to the tenth. I just write down the values that I was getting on my instrument. I wouldn't say this is ten to the eleventh, plus or minus ten percent, or something like that?

A No. Ten percent of ten to the eleventh is a pretty small number. You have to keep in mind the magnitude of the

#16-4-SueT

resistance that we are dealing with.

Q What do you mean --

A So, it's not critical that it's plus or minus ten percent.

Q Well, don't you mean that ten percent of ten to the eleventh is a big number but since it's a big resistance it doesn't matter?

A Yeah, a relatively small number.

Q Okay. So, the current that comes through a resistance that big, even if it were off ten percent, would not vary much.

That's what you are getting at, isn't it?

A Yes.

Q Okay. But the -- is there any way to determine off the test report to what accuracy the resistance values were likely measured or were measured?

A No, not from the test reports but from the industry standards where insulation resistance testing, I have a very good idea of what the accuracy of those readings are.

Q And that's the plus or minus ten percent we discussed earlier?

A Maximum, yes.

Q Maximum of plus or minus ten percent? Okay. The actual insulation materials that are used on these cables, what are they? Do you know?

#16-5-SueT

A Well, there are various types of insulations. That was the information we spoke about earlier on the list of cables.

Q I mean, is it some of it neoprene or some of it hypalon? Do you know what they are off the top of your head?

A Yes. I can give you examples.

Q All right. Please, do.

A EPR.

Q Ethylene propylene rubber?

A Ethylene propylene rubber.

Q Uh-huh. And are there others?

A Tefzel. EPDM.

Q EPDM, I'm not sure what that stands for. Can you help me out?

A Ethylene propylene diamine monomer.

Q Diamine monomer? Okay. Others?

A Cross-linked polyolefin.

Q Cross-linked polyolefin.

A Yes.

Q We were talking earlier about the accelerated irradiation testing these things undergo. Are any of these materials subject to greater deterioration at lower dose rates of radiation?

A Can you define what you mean by deterioration?

Q Well, let me try to do that and also define something

else a little better than I did.

By deterioration here, I'm talking about the deterioration of the material properties which would include resistance among other things; also, you know, physical integrity. Is it cracked or swollen, that sort of thing?

I wanted to say stretchability but that's not the right term. Elasticity, that sort of thing. Physical properties of the material. Deterioration in the meaning that they have lower levels of the desirable properties or higher levels of the undesirable properties.

Are we fairly clear about what I'm getting at now?

A Yes. Well, the desirable property on the instrument cable, as you stated, is the electrical property --

Q Uh-huh.

A -- leakage currents. And I have not seen any reports of significant dose rate effects on the electrical properties.

Q Uh-huh. Have there been tests on the dose rate effects on electrical properties?

A Yes.

Q And who conducted those tests? Do you know?

A Well, one example is Sandia Laboratories.

Q All right. If I can back up a little bit, I believe I jumped over your Answer 12 earlier. I think we agreed that all of these instrument cables at Harris, as far

#16-7-SueT

as you know -- strike that.

This first part of the answer lays out the Federal Regulation 5049 requiring environmental qualification and then describes the test methodology in the Regulatory Guide that NRC Staff supports it in, correct?

A Yes.

Q Okay. And the tests, as described at the top of Page 8, are sequential except for the non-radiation part of the LOCA test?

A Yes.

Q Now, have --

A There have --

Q Go ahead.

A There have been simultaneous tests performed on some instrument cables that we used as a general statement, generally it was sequential.

Q What were some of the things that were tested for simultaneously in those simultaneous tests?

Was radiation part of it?

A Yes.

Q Uh-huh. And what were the things that were combined with radiation in those tests, if you recall?

A Yes. It was combined thermal and radiation aging, and then combined radiation and the steam exposure for the LOCA portion.

#16-8-SueT

Q And were resistance values measured during those tests also?

A Yes.

Q And that would be reflected in these reports, the EQ reports?

A That would be reflected in the report itself, yes, the IR values.

Q Okay. When you talk about worst case location, that is most severe environmental conditions that cable could experience, you've got different sorts of condition that vary, radiation, temperature, perhaps impact of objects.

How do you determine which is the most severe environmental condition?

A Well, it depends on what parameter you are talking about.

Q In other words --

A Generally, it's the highest.

Q You just take the highest level of each severe environmental condition it can be exposed to and combine them all? Is that how you do it?

A Yes.

Q Okay. You say that's generally true. Are there any significant exceptions for --

A No, no significant exceptions.

Q Okay. Are there any exceptions to your knowledge?

#16-9-SueT 1 Let's nail it down.

2 A There would be no exceptions to qualifying the
3 cables or testing the cables to more severe environmental
4 conditions than they would be exposed to in the plant.
5 Q Let me see if I understand that. You say exceptions
6 to more severe environmental conditions, do you mean that
7 there were no cables that were tested at conditions that are
8 less severe than they could be exposed to at maximum?
9 A Could you clarify that?
10 Q I will try. Okay. I think that we've got a less
11 than and more than combined.
12 A The conditions would be equal to or greater than
13 what they would see in the plant.
14 Q Okay. The test conditions are either actually or
15 by accelerated techniques simulating, equal to or greater than
16 what they would see in the plant; is that your answer?
17 A Yes. Usually they are greater.
18 Q Okay. Now, in the Samuel Moore thermal couple
19 wire there, I think that's Samuel, e-l, actually. Isn't that
20 a typo there?
21 A It's Page 8?
22 Q Yes. Just a little bit above the middle
23 MR. O'NEILL: Applicants stipulate to a typo.
24 MR. EDDLEMAN: I just want him to find it because
Ace-Federal Reporters, Inc.
25 I've got a question about what follows it.

#16-10-SueT

BY MR. EDDLEMAN: (Continuing)

Q In the second full paragraph, coming down to the sixth or seventh line there, where Samuel Moore occurs on the left side, Page 8 --

A Oh, Samuel is spelled wrong.

Q Yeah. I wanted you to find that. Your counsel has stipulated it is spelled wrong.

A Yes, I have it.

Q So, it was irradiated during testing with a total dose of two times ten to the eighth rads.

Do you know over what period that dose was delivered? How many hours?

A I don't know exactly. I would think it would be several days.

Q On the order of a hundred hours?

A On that order.

Q All right. The voltage withstand test that happens at the end, it says subjects the cable to additional electrical and mechanical stresses.

Is the additional electrical stress just the voltage?

A Well, the additional electrical stress is -- the voltage is the input to these stresses. The cable is stretched, is bent around a mandrel at the time. So, you have pressure acting on it also. The voltage supplies the electricity in this

#16-11-SueT

case.

Q And it's subjected to a higher than normal operating voltage, right?

A Yes.

Q Now, you say that the test indicated that margin still existed. How much margin was indicated in that test?

A Well in IEEE383, the standard, the consensus as written in that standard is that it's actually more severe than two LOCA cycles.

Q I kind of lost you.

A I don't have the exact data on that, but the standard does say that that voltage would stand tests that would be more severe than subjecting the cable to two LOCA cycles.

In other words, it shows substantial margin remains in the cable after it has already gone through LOCA cycle.

Q I see. Let's turn now back to -- I'm looking at Page 11, the testimony. Is it your position as to the discussion up in the first full sentence on the top of that page that the deterioration of insulation resistance of these cables in actual use won't be to any significant degree greater than what's shown up in these EQ tests?

MR. O'NEILL: I'm sorry, Mr. Eddleman. What sentence are you referring to?

MR. EDDLEMAN: Top sentence on Page 11. Did I

#16-12-Sue1 misspeak?

JUDGE KELLEY: It didn't seem to me to fit with the question either.

MR. EDDLEMAN: It may not be. Let me try this again, gentlemen.

BY MR. EDDLEMAN: (Continuing)

Q With respect to that first full sentence on Page 11 of your testimony, is it your position that the actual change in the resistance level of insulation on this instrument cable will not, or cannot, change more in actual use in the plant, including a LOCA if it happened, than the change that's measured in these EQ tests after all this simulation?

A Yes, in my opinion.

Q Okay. In Answer 21, is this thermocouple wire test sample another typical one, or it's the same one. I have already asked you that. I'm sorry.

The minimum allowable insulation resistance, can that be found in standard references for the other types of insulation that we have been discussing beyond ethylene propylene rubber?

A Yes.

Q Okay. On Page 12, you talk about Ebasco currently performing insulation resistance calculations which will consider, along with appropriate circuit parameters, the insulation resistance measurements taken during the entire

#16-13-SueT

qualification test sequence.

Now, appropriate circuit parameters, are those those the length of circuit and accuracy requirements and other things that are discussed previously in your testimony as --

A Yes.

Q -- effecting the allowable leakage current in wire? Is that --

A Yes, those are the same parameters we discuss on Page 10 in Answer 18.

end #16
Joe flws

Q Those would be the limiting ones on those circuits, right? Those are appropriate parameters. In other words --

A They would be the parameters applicable to the circuit.

Q Okay. Is that something that is being done under you gentlemen's direction?

A Yes.

Q Mr. Bucci, it is in your department, is that right?

A It is not in my department, but it is under my technical guidance or direction.

Q Okay. It says the -- is there a schedule for when these are likely to be completed for Harris?

A Well, they would have to be completed before the cable would be considered qualified for its application in the plant, so it is the same schedule as completion of qualification.

Q All right. So, this documentation would have to be included in the qualification packages before the NRC comes to look at them, is that right?

A For the NRC --

Q Alters or accepts them?

A Yes.

MR. EDDLEMAN: Thank you very much, gentlemen. That concludes our questions.

JUDGE KELLEY: Mrs. Moore?

MRS. MOORE: The Staff has no questions, Your Honor.

BOARD EXAMINATION

XXII INDEX

BY JUDGE BRIGHT:

Q I believe you gentlemen stated that these are ordinarily millivolt systems.

A (Witness Bucci) If it is a millivolt signal, yes. The power supply voltage would be in volts. For example, a transmitter with a range of two milliamps to 20 milliamps would be driven by a supply voltage of 40 volts, 45 volts.

But in the case of a thermal coupler, for example, it would be a millivolt signal, varying from, say, ten millivolts to 20 millivolts.

Q Okay. But we are talking about --

A Small.

Q We are not talking about microvolts.

A No.

Q Okay. What is the normal resistance of your instrument lines?

A Do you mean the insulation resistance?

Q No, I mean you just sit there and you apply a voltage, and what is the resistance?

A The resistance of the wire itself, it varies on the length, of course --

Q Say for a thousand feet?

A A thousand feet of No. 16 would probably be -- I believe it is about 2 Ohms.

Q Two ohms for a thousand feet?

A Yes.

Q Now, let's see. If you plug it into the old standard IR --

A That is the series resistance, not the insulation resistance.

Q If you take a thousand feet of this, and you apply a voltage, the same way you are measuring this resistance, and apply a voltage between the -- okay, between the amplifier and your detector. Now, that is what you are working with, isn't it?

A Yes.

Q Then, -- now we are talking about the resistance of that line.

A The resistance of the line, shunted by and parallel with any insulation resistance.

Q I agree with that. We haven't come to that yet. I am just trying to get an idea of what kind of resistance we are working into.

Now, on one end there is the amplifier, and I assume it is very high.

A Yes. You would be working into I would say less than ten ohms, anyway, on the cable, plus the resistance of the

transmitter itself, or whatever other instrument there was. It would also be in series.

Q Okay. Could we express that in the current equals the applied voltage divided by the resistance?

A Yes.

Q Okay. For a thousand feet, and it is two ohms, you say?

A Cable alone, yes.

Q Cable alone. Okay. Two ohms. So that would be the voltage divided by two ohms, is that correct? If I transposed this thing right, going back to my sophomore --

A In the case of, for instance, the transmitter, it would be the supply voltage divided by the transmitter resistance, plus the two ohms of the cable resistance.

The transmitter resistance, a typical value would be two thousand ohms.

Q Two thousand ohms for a thousand feet?

A No. Two thousand ohms for the transmitter itself. The cable resistance in that case is negligible, because it is only two ohms. So, you have a total of two thousand two ohms in the circuit, driven by a power supply voltage of, for example, twenty volts. So it would be twenty divided by two thousand, or ten milliamps.

Q Okay. So you would get ten milliamps to work into your amplifier?

A That is correct.

Q Okay. Now, what if you looked at the actual current that would be siphoned away from this by your resistance leakage. Your line loss, over and above what you have just for the regular line.

Now, looking at your figures here on Answer 21, you had a change in insulation resistance of seven times ten to the tenth ohms per thousand feet.

A Yes.

Q Then, does that come out on a simple resistance basis as the current is equal to the voltage divided by seven times ten to the tenth?

A Pretty much, yes.

Q That is the change in the current loss due to the breakdown in the insulation resistance.

A Yes, that is pretty much it, yes, sir.

Q Okay. And in figures, then, how much would that be in terms of current presented to the amplifier?

A It would be too small to measure. But in figures, it would be approximately two times ten to the minus ten amperes. Or two times ten to the minus seventh milliamperes.

Q Okay. So you are comparing your loss through resistance breakdown due to all of these factors of two times ten to the minus ten?

A Ten to the minus ten, using eight times ten to the

tenth ohms in a thousand feet of cable.

Q And that is compared with how many --

A Ten milliamps. At the least two milliamps.

Q So two compared to --

A Two times ten to the minus ten.

Q And that would be the actual loss?

A Yes. It would be unmeasureable. It is non-existent.

Q How do you measure this? Do you use something like a vacuum tube volt meter, or a meger of some type or other?

A A meger tester could be used, yes. Any testing device that could apply -- it is DC voltage that is usually applied.

Q Yes.

A Between two electrodes, with an insulation sampling between them would measure it. Measure the current flow.

Q Why is this standard that you quote here set at three point four times ten to the ninth ohms per thousand feet?

A Well, I believe the reason that is such a high minimum is because the standard is looking to find what is considered in the industry to be a high quality cable insulation, and it is not an immuned acceptable value that will function in the circuit. It is much, much higher than that.

Q You mean practically it is higher than that, or --

I don't get the drift of your last comment.

A It is much higher than is required for the function that the cable will perform, but it is an industry-agreed on acceptable value to indicate a high quality insulation.

Q So that basically if you have that kind of insulation resistance, would it be fair to say that that allows you to disregard it?

A Yes, sir.

A (Witness Pagan) I think that is the point we want to make here.

JUDGE KELLEY: Mr. Eddleman, anything else?

MR. EDDLEMAN: Nothing further.

JUDGE KELLEY: Okay. Mr. O'Neill?

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REDIRECT EXAMINATION

BY MR. O'NEILL:

Q Mr. Bucci, at one point during your colloquoy with Judge Bright, you compared two milliamps to ten -- two times ten to the minus ten milliamps. If I followed you correctly, I believe you indicated that it was two times ten to the minus ten amps, two times ten to the minus seventh milliamps, is that correct?

A (Witness Bucci) That is correct.

Q So the comparison would have been two milliamps with two times ten to the minus seventh milliamps for purposes of the example you were discussing.

A I believe so. Yes, that is right.

MR. O'NEILL: Thank you.

JUDGE KELLEY: Is that it? Anything else? Anything else Mr. Eddleman?

MR. EDDLEMAN: Nothing on that.

JUDGE KELLEY: So, were we to proceed, we would go to the -- we would go to 9E, correct, which is the same gentlemen plus Mr. McLean.

Let us confer for just a minute, okay?

(Board confers)

JUDGE KELLEY: We are back on the record now.

MR. McNEILL: Applicants call to the stand Edward M. McLean.

JUDGE KELLEY: Fine. Thank you.

Whereupon,

EDWARD E. McLEAN,

RICHARD M. BUCCI,

and

EDWIN J. PAGAN,

resumed the stand and, having been previously sworn, were examined and testified as follows:

JUDGE KELLEY: Mr. McLean, good afternoon. Raise your right hand, please.

(Witness McLean sworn by Judge Kelley)

DIRECT EXAMINATION

BY MR. O'NEILL:

Q Mr. McLean, please state your full name and employer for the record?

A (Witness McLean) My name is Edward E. McLean, my employer is Carolina Power and Light.

Q Gentlemen, do you have before you a written statement that was filed with the Board and the parties in this proceeding on August 31, 1984?

A (Collectively) Yes, we do.

Q Mr. Bucci, for the record, will you please identify that document?

A (Witness Bucci) The Document is the Applicants testimony of Richard M. Bucci, Edwin J. Pagan, and Edward M. McLean, in response to Eddleman Contention 9E, Physical Orientation of equipment.

Q Gentlemen, does that document consist of fourteen pages of questions and answers with Attachments A and Attachment B thereto?

A (Collectively) Yes.

Q And gentlemen, was this testimony prepared by you or under your supervision?

A (Collectively) Yes.

Q Are each of your answers identified by your initials?

A (Collectively) Yes, they are.

Q Do any of you have any changes or corrections to make to your prefiled written statement?

A (Collectively) No.

Q Then is your statement true and accurate to the best of your knowledge, information and belief?

A (Collectively) Yes.

End 17.
MS fols.

Sim 18-1

MR. McNEILL: Mr. Chairman, I move that Applicant's testimony of Richard M. Bucci, Edwin J. Pagan and Edward M McLean in response to Eddleman Contention 9E, Physical Orientation of Equipment, be incorporated into the record as if read and received into evidence.

JUDGE KELLEY: The motion is granted.

(The testimony referred to follows:)

August 31, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY and NORTH CAROLINA EASTERN MUNICIPAL POWER AGENCY	)	Docket No. 50-400 OL
	)	
(Shearon Harris Nuclear Power Plant)	)	

APPLICANTS' TESTIMONY OF RICHARD M. BUCCI, EDWIN J. PAGAN AND EDWARD M. MCLEAN IN RESPONSE TO EDDLEMAN CONTENTION 9E (PHYSICAL ORIENTATION OF EQUIPMENT)

Q.1 Please state your names.

A.1 Richard M. Bucci, Edwin J. Pagan and Edward M. McLean.

Q.2 Mr. Bucci and Mr. Pagan, are your addresses, occupations, employers, educational backgrounds and professional work experiences described elsewhere in the record of this proceeding?

A.2 (RMB, EJP) Yes, the relevant information is provided in "Applicants' Testimony of Richard M. Bucci and Edwin J. Pagan in Response to Eddleman Contention 9D (Instrument Cables)."

Q.3 Mr. McLean, please state your address, present occupation and employer.

A.3 (EMcL) I am employed by Carolina Power & Light Company ("CP&L") as a Project Mechanical Engineer. My business address is the Shearon Harris Nuclear Power Plant, P.O. Box 101, New Hill, North Carolina 27562.

Q.4 State your educational background and professional work experience.

A.4 (EMcL) I graduated from North Carolina State University in 1968 with a Bachelor of Science Degree in Mechanical Engineering. I joined the Navy in March 1969 and served as missile officer aboard the U.S.S. Bainbridge until March 1972. I joined CP&L in April 1972 as a Heating and Cooling Engineer in the Customer Services Department. I transferred to what is now the Harris Plant Construction Section of the Harris Nuclear

Project Department in June 1974. I have been involved in engineering support of construction at the SHNPP, Brunswick Steam Electric Plant, and the H.B. Robinson Nuclear Plant for the last ten years. My major responsibilities at the SHNPP have included developing and supervising the storage and maintenance program for the equipment and materials onsite, designing temporary mechanical facilities, and providing engineering support for the installation of piping, equipment, HVAC duct work, and hangers. My major responsibilities during two assignments at the Brunswick Plant included start-up of HVAC equipment and supervising the mechanical engineering support group. This group was responsible for providing engineering support for piping, hangers, and equipment. I also acted as the CP&L night shift representative responsible for all phases of construction. At the Robinson Plant during an assignment lasting ten months I provided engineering support for the mechanical construction activities. For the past two and one-half years I have been responsible for providing engineering support for the installation of equipment at the SHNPP. I am a registered professional engineer in North Carolina.

Q.5 Please elaborate on your professional experience that is directly relevant to the testimony which you are presenting regarding physical orientation of electrical equipment at SHNPP.

A.5 (EMcL) The group that I have supervised for the past two and one-half years is responsible for providing engineering

support for the installation of both mechanical and electrical equipment. We develop work packages that provide design information to field supervision personnel and provide process control sheets associated with work packages to ensure that quality control inspections are made.

Q.6 What is the purpose of this testimony?

A.6 (RMB, EJP, EMcL) The purpose of this testimony is to respond to Eddleman Contention 9E, which states:

> There is not sufficient assurance that the physical orientation of equipment in testing is the same as the physical orientation of equipment installed.

Q.7 How is your testimony organized?

A.7 (RMB, EJP, EMcL) First, we discuss circumstances in which physical orientation of safety-related electrical equipment is a potential concern. Second, we describe the process by which physical orientation of such equipment at SHNPP is controlled, from qualification testing of the equipment, to installation design, to physical installation of the equipment in the plant.

Q.8 What is meant by "physical orientation of equipment"?

A.8 (RMB, EJP) Physical orientation of equipment refers to the mounting location with respect to a set of rectangular coordinates, its angular position, its location with respect to other items in the plant and installation interfaces.

Q.9 When is physical orientation of safety-related electrical equipment a concern with respect to environmental qualification of the equipment?

A.9 (RMB, EJP) Physical orientation of electrical equipment in the SHNPP generally does not affect environmental qualification. For most electrical equipment, environmental conditions are identical regardless of the orientation. Physical orientation is more likely to be related either to seismic qualification or to operability of the equipment.

There are circumstances in which physical orientation of electrical equipment could affect environmental qualification. For example, if an electro-hydraulic valve operator were installed upside down, hydraulic fluid could potentially leak onto the cable terminations -- possibly causing corrosion of the electrical connections. Another example could be improper orientation of a battery charger, which could result in inadequate ventilation -- raising the temperature of the components above the expected normal operating temperature and potentially shortening the qualified life of the equipment.

Q.10 What information is received from vendors concerning physical orientation of electrical equipment?

A.10 (RMB, EJP) The environmental qualification test reports, provided by vendors of electrical equipment which is qualified by testing, describe and/or provide sketches or photographs of the test set-up, including physical orientation of the test equipment. A typical photograph of a test set-up for a level transmitter is shown on Attachment A hereto. (Attachment A shows test set-up in a thermal aging chamber indicating the vertical orientation of the level transmitter.)

Orientation is addressed in a variety of ways. The vendor may test the equipment in the most limiting orientation, i.e., the orientation determined by engineering analysis that results in the most severe environmental conditions. In that case, the equipment would be environmentally qualified for any physical orientation. The vendor may instead test in a single orientation which is not the most limiting condition, and either qualify the equipment by analysis for other orientations or simply specify the test orientation as the only permissible orientation. Or, finally, the vendor may test the equipment in several orientations.

Vendors also are required to provide technical manuals containing installation and maintenance instructions. Finally, the vendor provides mounting drawings which include specific instructions for orientation.

Q.11 Who receives this information?

A.11 (RMB, EJP) Vendor supplied information is sent by the vendor to the responsible design organization.

Q.12 What does Ebasco, as a design organization, do with the vendor supplied information?

A.12 (RMB, EJP) With regard to physical orientation for a particular piece of equipment, Ebasco reviews the test orientation or orientations against the design drawings which Ebasco has prepared for installation of the equipment at the SHNPP. Orientation during testing must either be identical to the installation shown on the design drawings, or the equipment must

be able to be qualified by analysis for a different orientation. In addition, Ebasco reviews the vendor mounting drawings and technical manuals to make sure that they are consistent with the qualification test set-up. If there are any discrepancies, inconsistencies or ambiguities concerning physical orientation of the equipment, Ebasco requests further information from the vendor as necessary.

Q.13 With regard to physical orientation, please describe Ebasco's procedures for preparation, control and review of installation design drawings and for documentation of corrective actions concerning physical orientation.

A.13 (RMB, EJP) Physical installation drawings are prepared based on vendor supplied information and the specific physical conditions at the equipment location. During their preparation, the drawings are reviewed by affected engineering disciplines (e.g., civil, mechanical and electrical engineering) to ensure adequate consideration of applicable aspects of the plant design. In addition, in some cases the installation drawings are sent to the equipment vendor for his review and concurrence prior to issuance to the field.

As a part of the SHNPP environmental qualification program, vendor qualification reports are also specifically reviewed to ensure that physical orientation during testing was consistent with the installation drawings. Any concerns resulting from this review are documented in the qualification review package as outstanding items which require resolution

prior to considering the equipment environmentally qualified. Should resolution of a concern require a change to the installation drawing, a design change notice ("DCN") must be issued. The DCN is subject to the same review as the original drawing for the area affected by the DCN. In addition, the DCN is tied to the drawing by the design change procedure so that all affected personnel are made aware of the change. After final approval, the DCN is issued to the field personnel for implementation. It is subsequently incorporated on the installation record drawing.

For example, Attachment B -- which is an instrument installation drawing for the safety-related level transmitter depicted in Attachment A -- indicates the original approval and revision status. This example also indicates the DCN's that have been incorporated on the drawing via the above-described procedures. (The required physical orientation of the level transmitter is clearly indicated in Attachment B, consistent with the orientation during the qualification test set-up as shown in Attachment A.)

Q.14 How does CP&L assure that safety-related electrical equipment is installed according to the installation drawings?

A.14 (EMcL) CP&L assures that safety-related electrical equipment is installed according to the installation drawings through detailed procedures for control of design documents, preparation of installation work packages based on design documentation, installation performed in accordance with work

packages and work procedures, and quality inspection to verify proper installation.

Q.15 How does CP&L control installation drawings and other design documentation at the SHNPP?

A.15 (EMcL) Installation design drawings and documents are transmitted by Ebasco to CP&L's Document Control Center ("DCC"). The construction engineer, following written engineering procedures, then obtains the drawing from the DCC. The DCC will automatically issue subsequent revisions, DCN's, and field change requests ("FCR"), to holders of controlled drawings.

Q.16 What does the construction engineer do with this information?

A.16 (EMcL) In preparing for the installation of equipment at the SHNPP, the construction engineer prepares a work package that generally includes Ebasco installation design drawings, vendor drawings, vendor manuals, process control sheets, and design changes in the form of FCR's and DCN's.

Q.17 What is done with the work package?

A.17 (EMcL) The work package is given to the field superintendent responsible for installing each piece of equipment. The field superintendent ensures the equipment is installed according to the design documents and notifies the quality inspector when he reaches inspection points for quality related activities. These inspection points are indicated on the process control sheets.

The quality inspector prepares inspection documents corresponding to the process control sheets developed by the construction engineers. The inspectors refer to the work packages when they make their inspections. Physical orientation is one of the required inspections.

Q.18 What happens if the construction personnel are unable to install the equipment in accordance with the work package?

A.18 (EMcL) If a change in installation orientation is required which exceeds the design tolerances contained in the work package -- e.g., if the orientation of a motor control center needs to be changed in order for it to fit into its allotted space -- the construction engineer writes a FCR. The FCR must be reviewed and approved by the responsible design engineer. The design engineer evaluates the FCR based on the design drawing and available vendor information. If necessary, the design engineer obtains additional information from the vendor or Ebasco.

If the design engineer approves the FCR, it is submitted to the DCC, is forwarded to the construction engineer, and becomes part of the work package. Construction personnel then install the equipment based on the FCR.

A design change in the form of a DCN might also come from Ebasco. This would occur if the equipment were installed prior to Ebasco having received the vendor qualification test report and Ebasco, on reviewing the report, identifies a

limiting condition with respect to installation orientation which is inconsistent with the original design drawing. In this situation, the same procedures would be followed as those controlling a FCR initiated by construction personnel.

Q.19 What corrective actions are taken if the FCR is denied?

A.19 (EMcL) A FCR is seldom denied. The cases in which a FCR is denied usually relate to FCR's submitted by the construction engineer for economic reasons and disapproved by the design engineer. In such cases, the construction engineer can still complete the work in accordance with the original design documents. If the installation cannot be completed as designed and the design engineer does not agree with the resolution proposed by the construction engineer, he should provide an alternate resolution. If the design engineer denies a FCR and the installation cannot be completed as designed, work stops. The quality program will not allow work to be completed and accepted until the installation agrees with design documents.

Q.20 Please describe how CP&L's quality inspection/verification program for SHNPP helps to assure proper installation orientation of safety-related electrical equipment.

A.20 (EMcL) Inspection points are specified on the process control sheets in the work package. These inspection points are for such items as location, elevation, orientation, and anchor tightening. Certain installations require that the

construction engineer prepare process control sheets without predesignated inspection points. The construction engineer refers to design documents to prepare the appropriate inspection points. The inspection points are written in the form of a command with spaces for craft and inspector signatures for acceptability of completion of each command. These process control sheets are reviewed by the quality inspector and the resident engineer responsible for equipment installation. An inspection point is designated for those activities that affect the quality of the installation. There is an inspection point for almost every activity performed on the equipment. Until the inspection points for a piece of equipment are accepted, the installation is not acceptable and the procedural requirements are not satisfied.

Q.21 Who conducts these inspections?

A.21 (EMcL) Construction inspections are generally conducted by quality inspectors, who, depending on the equipment, may be either Construction Inspectors or Quality Control Inspectors. The inspector reviews the installation of the equipment according to the design information in the work package. The quality inspector records the inspections on inspection reports. If there is a discrepancy a nonconformance report is written and a "hold tag" is placed on the equipment, which may limit the work that can be performed. Each nonconformance report requires a specific disposition, i.e. rework, repair, scrap, or accept as-is, which requires design engineering approval.

Q.22 What additional assurance is there that electrical equipment is correctly installed with respect to physical orientation?

A.22 (EMcL) Through industry-wide programs, problems experienced by one utility are reported to other utilities and reviewed and evaluated by these other utilities. Problem experienced by equipment suppliers are also reported to the utilities that purchased their product. Engineering, Licensing and Corporate Nuclear Safety personnel are involved in problem evaluation.

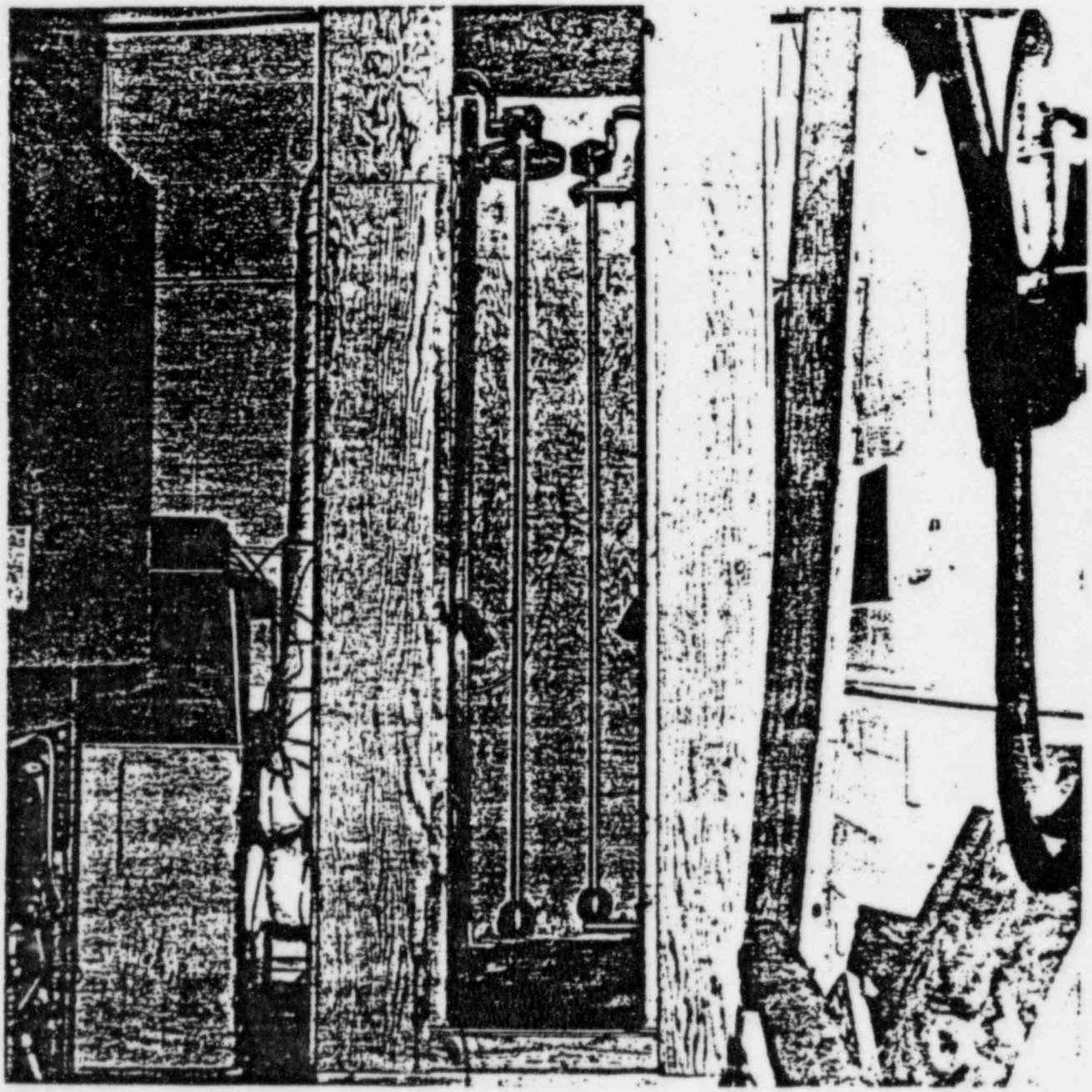
The construction personnel both in engineering support and field installation have accumulated years of experience in their work. Reporting potential problems is encouraged by management.

Finally, the start-up organization checks the equipment in its various modes prior to operation. These programs and the experience of SHNPP construction personnel provide additional assurance of the quality of installation of electrical equipment.

Q.23 In conclusion, do you believe that there is sufficient assurance that safety-related electrical equipment is installed so that physical orientation of the equipment does not prevent the equipment from being environmentally qualified?

A.23 (RMB, EJP, EMcL) Yes. Procedures established by CP&L and Ebasco require that installation design drawings reflect physical orientation limitations determined from review

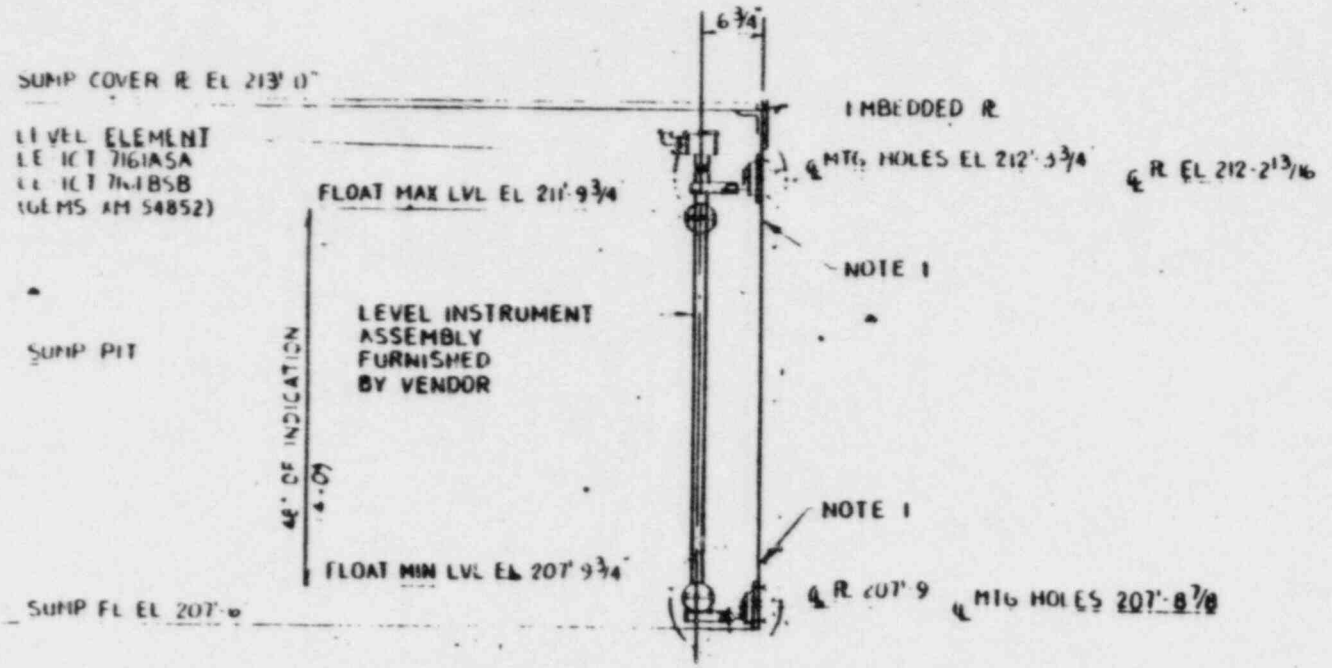
of environmental qualification test reports. Procedures for preparation of work packages and quality inspections ensure that installation of electrical equipment is in accordance with design drawings.



PHOTOGRAPH IV-3

TRANSMITTERS INSTALLED IN THERMAL AGING CHAMBER
WITH HEATING UNIT ATTACHED

Attachment B



CONTAINMENT BLDG SUMP LEVEL INSTRUMENT INSTALLATION
NARROW RANGE

FINAL	1
F/DCN-	REV
FCR'S/DCN'S INCORPORATED ON THIS DWG	

APPROVED FOR CONSTRUCTION
(CE-14331)

NUCLEAR SAFETY RELATED

NOTES:
1. FOR SUPPORT DETAILS OF GEMS MOUNTING BRACKET SEE DWG CAR 2166 B 431 SH X 38

EBASCO SERVICES INCORPORATED

CAROLINA POWER & LIGHT CO.
SHEARON HARRIS NUCLEAR PP
UNIT NO. 1
INSTRUMENT INSTALLATION

CAR 2166
B-431

Sim 18-2

MR. McNEILL: Mr. Bucci and Mr. McLean, could you please summarize your testimony.

WITNESS BUCCI: Yes. The purpose of our testimony is to address Eddleman Contention 9E which states "There is not sufficient assurance that the physical orientation of equipment in testing is the same as the physical orientation of equipment installed."

We disagree with the allegation in this contention because procedures established by CP&L and Ebasco require that installation design drawings reflect physical orientation limitations determined from review of environmental qualification test reports.

Procedures for preparation of work packages and quality inspections ensure that installation of electrical equipment is in accordance with the design drawings.

In our testimony we discuss circumstances in which physical orientation of electrical equipment is a potential concern.

Secondly, we describe the process by which physical orientation of such equipment is controlled from qualification testing of the equipment to installation design, to physical installation in the plant.

Mr. McLean of CP&L will discuss more specifically the measures used to control physical installation of equipment.

Sim 18-3

WITNESS McLEAN: The purpose of our testimony is to describe the procedures used at the Harris plant to ensure that equipment is physically oriented during installation in accordance with the design requirements. These procedures are used to control design documents, control work performed, to ensure inspections are conducted and quality related activities in completed items and to ensure that design changes are properly completed.

MR. McNEILL: Thank you, gentlemen.

This panel is available for cross-examination.

JUDGE KELLEY: Thank you.

Mr. Eddleman.

CROSS-EXAMINATION

XXXXXXX

BY MR. EDDLEMAN:

Q Gentlemen, let me try to start in here. I may skip around a little. I didn't quite finish my preparation. May I refer you to your Attachment B, first, which I believe is the last page of this testimony.

(Pause.)

I take it this is a drawing for the installation of something where there are design changes; is that correct?

A (Witness Bucci) Well, in our testimony we describe the sketch and why we have attached it. If I can refer you to the correct page. That would be page 8, the second

Sim 18-4

paragraph. Attachment B, it is an instrument installation drawing for a safety related transmitter, level transmitter.

It indicates on the drawing the original approval and the revision status, and this example also indicates design change notices that have been incorporated on the drawing.

Q All right. Now if we actually turn to the drawing, I don't know if I just got a bad copy of it or what, the list of revision on this I can't really read. Are your copies legible as to the revision list?

A The exact dates or initials, et cetera, of the revision status cannot be clearly read on my copy either. However, that was not our consideration when we attached it.

The purpose is described in the testimony on page -- beginning on page 7, I believe. It is for the purposes of comparison with the previous attachment, Attachment A, and it was met to show that physical installation on a design drawing considers physical installation of the equipment during tests. So we were trying to show the -- we were showing the overall orientation of the level transmitter as opposed to exact dates or names of revisions.

Q All right. Well, that may have been what threw me off a little bit. I thought the idea was that this was one that showed a design change.

A Yes, it does in the right-hand corner of the drawing. It shows the method by which our procedure for DCN's are

reflected on a drawing, and it is a simple indication that certain DCN's or FCR's were incorporated on the drawing and it lists the DCN or FCR numbers that were incorporated.

Q And those are listed up in the top little box above the thing that says FCR's and DCN's incorporated on this drawing?

A Yes.

Q Okay. I take it the actual drawing that is used is a little bit bigger than that so it is easier to read; is that correct?

A It is essentially bigger, yes.

Q Okay. All right. And the fine print on this that you can't read at all or almost can't read doesn't have anything to do with the reason you put this in?

A Nothing whatsoever. I believe that is a contractual statement between Ebasco and CP&L.

Q Okay. So if we want to see how orientation is checked from the test report to a diagrams, these Attachments A and B are intended to represent typical examples?

A Yes.

Q And if there is a design change that would change the orientation of a piece of equipment at Harris, is that reviewed against the test report when it is proposed, the EQ test report I mean?

A Yes.

Sim 18-6

Q All right.

A In our testimony on that question we describe the process by which such a proposed change would be reviewed by the involved disciplines, including environmental qualification.

Q Does that start on your page 8 or is it page 9?

(Pause.)

A It starts on page 7.

Q Okay.

A At the bottom of the page and continues onto page 8.

Q The documentation that you describe down there at the bottom of page 7, any concerns resulting in this review are documented in the qualificationreview package as outstanding items, would any such concern always be documented as a quality control or quality assurance document?

A Let me just read that before I answer.

(Pause.)

I am sorry, could you repeat the question?

Q Well, what I am saying is if there were concerns about orientation from the review versus the equipment qualification package, would those always be documented as QA documents, that is not documented in some other way, but actually documented as things under the control of QA?

A Well, yes. This qualification review package that we specify in the last line on page 7 is a quality assurance

Sim 18-7

document.

Q And the procedures require that such a concern be documented as a QA document; is that correct?

(Pause while the Board confers.)

JUDGE KELLEY: Sorry.

MR. EDDLEMAN: I didn't know if you were starting to ask a question, Judge.

JUDGE KELLEY: No. Go ahead.

BY MR. EDDLEMAN:

Q Do you recall the question I asked?

A (Witness Bucci) Could you repeat it, please?

Q Sure. Do the regulations require or the procedures at Harris require that any such concern, that is about the orientation of the piece of equipment, be documented on a QA document?

A (Witness McLean) You are asking about questions at Harris. Now this is design information done by Ebasco.

Q Well, okay, but designed for Harris, right? In the specific case of the Harris plant do Ebasco's procedures then require that any concern about the comparison of the EQ report orientation of a piece of equipment in the place to be installed be documented as a QA document?

A (Witness Bucci) Yes.

MR. McNEILL: Mr. Eddleman, I don't understand what a QA document is, and perhaps you could define what you mean

Sim 18-8

by that.

MR. EDDLEMAN: All right. A controlled document which is required to be retained for quality assurance purposes.

WITNESS BUCCI: Yes. Our engineering procedure for review of a qualification report has a specific portion which directs the reviewer to review the physical orientation and any concerns must be documented by the reviewer in the package.

BY MR. EDDLEMAN:

Q And that package is as I described. It is a QA document that has got to be retained?

A (Witness Bucci) Yes, it is retained for the life of the plant. It is a QA document, yes.

Q Okay.

Mr. McLean, I notice that this is an answer as to how Ebasco sets up the drawings. When it gets to your attention or to your department do you also review this comparison between the EQ test orientation of a piece of equipment and the design drawings for hot it is to be installed?

A (Witness McLean) No, I do not.

Q All right.

I have got a little bit more prepared, but at some point I am going to have to -- probably I can go another 10 minutes with these folks at most.

JUDGE KELLEY: Do you want to go five and then stop at a quarter of? How is that?

Sim 18-9

MR. EDDLEMAN: I will try for it. Fine.

BY MR. EDDLEMAN:

Q Mr. McLean, I want to go back to your qualifications simply because they are the earliest part of this and I have already gotten to it. When you on page 2 down at the bottom, your answer begins there about your background and experience. You say you transferred to what is now the Harris plant construction section of the Harris Nuclear Project Department in June '74. I gather it had another name then, but did it have the same kind of responsibilities as the construction section has now?

A (Witness McLean) Yes, it did.

Q And you were working in construction?

A Yes, that is correct.

Q All right. Then engineering in support of construction, have you been assigned to the site at Brunswick or Robinson at various times?

A Yes, I have.

Q And what periods were those, if you know?

A I transferred to Brunswick temporarily in 1976, July of '76 through November of '76. I came back to Harris in November of '76 and transferred to the H. B. Robinson plant in June of 1977. I came back to the Harris plant in approximately March of 1978. I transferred back to the Brunswick plant on July the 7th of 1980 and transferred back to the

Sim 18-10

Harris plant on July 7th, 1981.

Q Okay. And your responsibilities at the Harris plant during the times you were there are as described there at the top of page 3, where it says "My major responsibilities at the SHNPP"?

A Yes, they adequately describe my responsibilities.

Q All right. And is providing engineering support for the kinds of things mentioned here still part of your responsibility?

A Not all of them.

Q Which ones, please?

A I provide engineering support now for equipment installation and HVAC duct work installation, and let me also add HVAC duct work hanger installation.

Q Duct work and hangers just for that duct work; is that right?

A That is correct.

Q Now at the Brunswick plant it says, if I read it right,that you were the CP&L night shift representative for all phases of construction. Was that like the third shift?

A There weren't but two shifts.

Q The first and the second, and this was second?

A This was the second, but it wasn't the night shift, and this was not my entire responsibilities there. I did this for a period of what I estimate is for two months.

Sim 18-11

Q And you did other things as well. Now your present responsibilities at the Harris plant, is it all in equipment installation and HVAC duct work and duct work in hangers, is that all of it or is there more?

A That is what I answered. Now I might add that I noticed that I put down that I was responsible for designing temporary mechanical facilities at Harris. I still retain that responsibility and support of the equipment installation.

Q So, in other words, if you need some kind of a temporary facility for some of this equipment installation, you would have an overall responsibility for that?

A Overall responsibility might be too broad a term, but, yes, I do have responsibility for most of it.

Q All right. The installation of equipment at the Harris plant, how much of this equipment that you have to check on the orientation of installation for had been installed at the time you came back to the Harris project in I think you said July of 1981? Do you know? Can you estimate that?

A I can estimate it for you as being approximately 20 percent.

Q Twenty percent. And since you took on your present responsibilties I take it sometime in early 1982, about what percent had been installed before you took that on, if you can estimate?

A Would you explain where you get '82 as shifting my responsibilities?

end Sim
end Take

#19-1-SueT

Q Well, I may be misreading but at the bottom of your Answer 4, down toward the bottom of Page 3, right above where Question 5 occurs, it says: For the past two and a half years I have been responsible for providing engineering support for the installation of equipment at the Harris plant.

And I just took two and a half years backwards from now and said that would be early in '82. Now, have I misread what you are saying there?

A (Witness McLean) You are approximately correct. I can't remember when I took the responsibility for equipment installation in addition to HVAC installation that I had at that time. But it would be roughly the beginning of '82 or the end of '81.

Q Okay. Then, my question is roughly what percentage of this equipment which has to be installed in the right orientation had been installed at the point where you shifted responsibility, if you know?

A I am giving you a very rough estimate, but the answer I gave you before is applicable now, roughly twenty percent.

JUDGE KELLEY: Is this a good enough place to break now? Are you about through with this --

MR. EDDLEMAN: Yeah. I just want to clean that up if I can with one little thing.

#19-2-SueT

JUDGE KELLEY: All right.

BY MR. EDDLEMAN: (Continuing)

Q So, roughly twenty percent had been installed at both July of '81 and early '82, approximately, right?

A My answer that I gave you for July of '81 I meant to apply when I took responsibility for the installation of equipment at the Harris plant.

So, what I was really referring to was early 1982.

Q All right. And you wouldn't know what it was in July of '81, is that --

A No.

MR. EDDLEMAN: Okay. That clears that up. Thank you.

JUDGE KELLEY: Okay. This seems like a good enough place. We just wanted to get a little bit of a start in this topic, and our plan would be to resume at 9 o'clock tomorrow morning and pick up directly with you at that point.

So, you are excused for the evening.

(Whereupon, the hearing is recessed at 5:45 p.m., October 23, 1984, to reconvene at 9 o'clock a.m., on Wednesday, October 24, 1984.)

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