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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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GENERAL PUBLIC UTILITIES CORPORATION, :
JERSEY CENTRAL POWER & LIGHT COMPANY, :
METROPOLITAN EDISON COMPANY and :
PENNSYLVANIA ELECTRIC COMPANY, :

Plaintiffs,

80 CIV. 1683

(R.O.)

-against-

THE BABCOCK & WILCOX COMPANY and :
J. RAY McDERMOTT & CO., INC., :

Defendants. :

- - - - -x

Continued deposition of Metropolitan
Edison Company, by MICHAEL J. ROSS, taken by
Defendants, pursuant to adjournment, at the
Host Inn, 4751 Lindle Avenue, Harrisburg,
Pennsylvania, on Wednesday, November 18, 1981
at 9:10 o'clock in the forenoon, before Joseph
R. Danyo, a Shorthand Reporter.

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PDR ADOCK 05000289
T PDR



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-and-

K. ANN McDONALD, ESQ.,

of Counsel

Also Present:

SUSAN HANSON

-oOo-

1
2 M I C H A E L J. R O S S, having
3 been previously duly sworn, resumed and was
4 examined and testified further as follows:

5 EXAMINATION (continued)

6 BY MS. WAGNER:

7 Q Are you aware that you are still under
8 oath?

9 A Yes.

10 Q Y u and your counsel came in this morning
11 with a large box containing approximately six looseleaf
12 binders. Are those binders which belong to you?

13 A Yes, they are.

14 Q Can you tell me generally what the contents
15 of the binders are?

16 A Generally, they are training materials that
17 I had in my possession.

18 Q Can you tell me if those training materials
19 are materials which you had before March 1979?

20 A To the best of my recollection, without
21 going through every page, they are long before March of
22 1979.

23 MR. MacDONALD: Basically, as we said
24 yesterday, they are primarily Unit 1 training
25 material.

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A They are primarily Unit 1.

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Q Is there by any chance any Navy training material in there?

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A No, there is not.

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Q Just one little question about something I asked you about yesterday.

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I asked you a couple of questions about what you saw in the control room when you arrived on March 28, 1979. One of the things I asked you about was pressurizer level.

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Do you recall when you first saw pressurizer level on that day, when you first knew that the level was off-scale high, whether you knew that because you looked at the pressurizer level indication or that somebody told you that?

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A I am not sure. My recollection is that someone told me it was off-scale high.

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Q Were you familiar prior to March of 1979 with thermocouples, what thermocouples were?

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MR. MacDONALD: In general?

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MS. WAGNER: Yes.

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A I was familiar with thermocouples in general.

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Q What are thermocouples?

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A A device to sense temperature.

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Q Similar to a thermometer?

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A Similar, except they produce electrical output.

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Q Were you familiar with in-core thermocouples?

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A When you say familiar --

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Q Had you ever heard of in-core thermocouples?

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A Yes, I had. It wasn't something that we used or used daily or even took readings on.

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Q Is it correct that you did use in-core thermocouples while you were in the Navy with some greater regularity?

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A On occasions, I used in-cores, but it was more of a mechanical type thing where you had to take a readout with a box and wasn't something that was displayed, and it was under only certain conditions that you would look at them.

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Q Did you understand when you went to look at them what it was you were getting from them, what information was being transmitted to you?

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A I understood we were looking for core temperatures. Basically, the only time we used them, it wasn't during an accident or an on-line situation.

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It was special conditions when we would look at them.

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Q But you do understand if they told you something, what they were telling you was the temperature inside the coolant wherever they were located?

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A Yes. You had to know the location.

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Q During the time that you were at TMI, either Unit 1 or Unit 2, were you familiar with an operating procedure which called for the filling of the reactor coolant system full and venting gases out of various parts of it after a maintenance outage or during a cooldown?

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A Yes.

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Q During the time when you were using such a procedure, was the reactor coolant system full of water?

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A No, not necessarily. It may or may not have been.

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Q The procedure didn't require that you fill it full?

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A The procedure required you to fill it, and that was the purpose of the procedure.

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Q Are you making a distinction between what the procedure said and what actually happened? When

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you used such a procedure, was the reactor coolant system filled with water or not filled with water, or was it filled with something else?

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A It was normally filled to some level. It may not have been totally full. It may not have been totally drained down. Someplace in between.

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Q Do you recall when you were using that procedure -- and by "you," I mean when that procedure was used by Met Ed -- whether or not you were required to keep the pressurizer level at or below certain levels?

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A No, I don't.

Q Had you ever heard of the concept prior to

March 1979 of going solid?

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A Yes.

Q What did that mean to you prior to March

1979?

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A It meant taking the system water solid without a surge volume available in the pressurizer. It was something that we were taught at TMI to avoid in all cases.

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Q Why was it you were taught to avoid it?

A Basically, B&W had given us limits and precautions that required us not to ever do that. Our

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procedures reflected that and our training on the simulator and tech specs also reflected that.

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Q Did you have any idea at any time why you weren't supposed to do it?

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MR. MacDONALD: Aside from the limits and precautions.

7

8

Q Aside from the procedures telling you not to do it, did you have any idea why?

9

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A B&W in one of the training courses they gave us one of the reasons was that they used centrifugal high-pressure injection pumps and the plant really didn't have installed equipment or designed to be operated in the solid mode.

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Q Do you have any idea what would happen if it was in the solid mode?

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A I felt with this particular equipment it would be very hard to control pressure. It was something we ought to avoid.

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Q Why would it be harder to control pressure in a solid system than it would if it were not a solid system?

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MR. MacDONALD: You are talking about his understanding prior to the accident?

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MS. WAGNER: Yes.

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A During solid system operation, you don't have a surge tank available to you, so any change reflects a change in pressure, whether it would be temperature or addition or reduction of water.

Q I take it even when you do have a surge tank, a change in any parameter will cause some kind of a change? Isn't that correct? If you have a surge tank, and your temperature goes up, something happens, whether or not you have a surge chamber, is that not correct?

MR. MacDONALD: Something happens to what?

Q There is a change in parameters in the system. I am trying to understand. I would think no matter what the system is doing, if the temperature goes up, something occurs. So why is it different if you have a solid system from when you don't have a solid system?

A When you have a solid -- water tends to expand or contract. When a system is solid, it tends to expand and will cause a pressure increase since it had no space to expand into the pressurizer or into the surge tank.

Q Was it your belief prior to March 1979 that if the system were filled solid during power operations,

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2 that it would break the system?

3 MR. MacDONALD: What do you mean by break?

4 MS. WAGNER: Cause the pipes to fall apart.

5 MR. MacDONALD: Cause a rupture in some
6 primary system piping?

7 MS. WAGNER: Yes.

8 A My understanding was that it could cause a
9 failure because the design of the high-pressure
10 injection pumps was greater than the design of the
11 system itself.

12 Q. Just so I understand, are you saying if
13 high-pressure injection was on and the system was
14 solid, there was no method for relieving the increased
15 pressure at all which would keep up with the HPI, so you
16 could have some kind of rupture of the piping? Is
17 that what you were saying?

18 A No. I think you have tied my recollection
19 why I should stay out of solid to high-pressure
20 injection.

21 Q Could you repeat then again what it was
22 you were saying? I didn't understand.

23 A My understanding of why you didn't want to
24 operate solid was because of the concept that the
25 high-pressure injection pumps' discharge pressure and

1
2 design pressure was greater than the design pressure
3 of the system itself, the reactor coolant system, so it
4 was an undesirable situation to get into.

5 Q Why? What does the design of the HPI
6 pumps -- what happens to them in a solid system?

7 A Their output pressure, so in a solid
8 system theoretically you can go to the output
9 pressure of the high-pressure injection pumps which
10 exceeds the design pressure of the reactor coolant
11 system by six or seven hundred pounds.

12 Q Which means what?

13 A Which means it is very bad.

14 Q You break the HPI pumps?

15 A It means you could overstress the reactor
16 coolant system.

17 Q Is there no method of relieving the reactor
18 coolant system other than a bubble if it is in the
19 pressurizer?

20 A No. The reactor coolant has relief valves,
21 but the relief valves aren't there to get you out of
22 a situation you got into that you weren't designed to
23 operate at. Solid operation was not part of the
24 design of the B&W plants.

25 Q Did you believe prior to March 1979 that

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the relief valves would not provide sufficient relief protection in such a situation?

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A I am really not sure what I believe. I believe they would open, but I also believe it was very undesirable to put water through them. I just felt it was a bad way of controlling the plant if the design point of the relief valves was reached since the relief valves were designed to protect the plant from overpressure. I could never see us getting into that situation.

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Q Did you have any understanding just as a design matter whether or not the relief valves, if they had to be used for some reason, whether it was good or not or would not provide sufficient relief in such a situation to prevent overpressurizing the system?

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A I guess my knowledge prior to 1979 was that it was designed basically to prevent the plant from going solid from a transient, not from a high-pressure injection pump transient, a transient being a trip of some kind, an increase of pressure. I think I would associate code safeties with high-pressure injection.

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Q You did not have any kind of understanding prior to the accident as to whether the safeties or

1
2 relief valves would provide enough protection even
3 with HPI on to prevent overpressurization?

4 A No, I never tied the safeties to the
5 high-pressure injection pumps itself.

6 Q Was it your understanding prior to March
7 1979 that the bubble in the top of the pressurizer was
8 intended to prevent the kind of overpressure situation
9 that you just talked about?

10 A Yes. I think the bubble, my recollection of
11 what the bubble was there to do was give you a surge
12 volume, and a bubble to give you an indication of
13 volume so you didn't take the system solid and have
14 the opportunity to take it above its design pressure
15 through some malfunction or misoperation.

16 Q I believe you testified yesterday that you
17 were aware that it had happened on occasion that a
18 bubble had formed somewhere other than in the
19 pressurizer in the hottest point in the system, I
20 believe you said, wherever that would be.

21 Did you have any understanding that if a
22 bubble did form somewhere else in the system other
23 than the top of the pressurizer, that that bubble would
24 provide protection against overpressurization as well?

25 MR. MacDONALD: I object. I am not sure

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2 that is exactly what his testimony was from
3 yesterday. I am not sure he testified to that
4 prior to the accident.

5 But regardless of what it was, if you
6 just want to use that to bring him back and ask
7 a question based on that, you may.

8 MS. WAGNER: Whatever I characterized your
9 testimony, whatever you said is certainly what
10 you said.

11 BY MS. WAGNER:

12 Q Do you know what I am asking you now?

13 MR. MacDONALD: Could you restate the
14 question?

15 Q Did you have any opinion prior to March
16 '79, if you had a bubble somewhere other than in the
17 pressurizer, that that bubble would provide
18 overpressure protection in the same way that the bubble
19 in the pressurizer would?

20 MR. MacDONALD: You are asking if, based on
21 his training, whether he had an understanding?

22 MS. WAGNER: Based on whatever training he
23 had, whether he had any understanding.

24 MR. MacDONALD: I object to that. I don't
25 think he testified prior to the accident he knew

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2 that the bubble existed in that primary system.

3 My objection just was I don't think he
4 testified prior to the accident that he was
5 aware that there was such a bubble transfer. I
6 think he testified that it was after that he
7 learned about that. Your question assumes --

8 MS. WAGNER: Whatever he testified, I am
9 wondering if he can answer the question.

10 MR. MacDONALD: My objection still stands,
11 that there is no foundation for that.

12 Go ahead.

13 BY MS. WAGNER:

14 Q Did you have any opinion prior to March
15 1979 that if a bubble formed in some place in the
16 reactor coolant system other than in the top of the
17 pressurizer, that that bubble would provide the same
18 overpressure protection that the bubble in the
19 pressurizer provides?

20 MR. MacDONALD: I object to his opinion.

21 MS. WAGNER: Understanding.

22 A Based on my training, I really had no
23 understanding of what a bubble would do someplace else
24 as far as pressure control.

25 Q Were you ever given any training on how to

1
2 maintain pressure if for some reason the pressurizer
3 was not providing pressure control?

4 A Prior to 1979?

5 Q Yes. Prior to March 1979.

6 A I had received training in solid plant
7 operation as it related to a Navy plant.

8 Q What was that training?

9 A The modes of control, basically of pressure,
10 keeping in mind that the systems are a lot different
11 and the components are designed to do that.

12 Q Can you give me some idea what it was you
13 were trying to do in the Navy?

14 A Basically, we would take an alternate
15 source and float a bottle pressurized source, another
16 surge chamber, on the system. We would be able to
17 control pressure in a solid mode by the fact that we
18 had a system of positive displacement pumps which we
19 could regulate the output on and control the pressure
20 increase and regulate the amount of volume removed, so
21 we could set up a stable pressure control. Basically
22 the plant was designed to do that.

23 Q But you did not have any understanding
24 prior to March 1979 how to provide pressure control in
25 a solid commercial system and not a Navy system if you

1
2 lost the pressure control provided by the pressurizer?

3 A Here again, B&W system, my training steered
4 me away from that, told me at all costs to avoid that.
5 I had training at other systems that said it was all
6 right to go solid, but those systems were in fact
7 designed and had different control modes than we had
8 and different pumping arrangements than we had.

9 Q This is systems other than the Navy?

10 A Yes.

11 Q Which systems were those?

12 A Saxton Nuclear.

13 Q What were you taught to do at Saxton?

14 A Pretty much the same thing as the Navy.

15 At Saxton, part of our procedures and our equipment
16 design was such that during the start-up we would go
17 solid, but here again the plant was specifically
18 designed and procedures specifically tailored to do that.

19 Q Had you ever heard of any situation at
20 Three Mile Island or any other B&W nuclear plant prior
21 to March 1979 in which the pressurizer emptied during
22 normal operation, emptied at a time it wasn't supposed
23 to be emptied?

24 A Yes.

25 Q What had you heard about that?

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A I read event reports that said it happened and some of the places it happened and what action they took to restore it. Basically, that it did happen and what they did after to restore it.

Q Do you recall what they did after to restore it?

A The major item was a vent of the control rod drive systems.

Q What did that do for them?

A Vent any nitrogen or gas that was trapped in the pressurizer out of the control rod drive systems themselves, so if you would insert the control rods, you wouldn't do damage to them.

Q But if the plant was up and running and the pressurizer emptied for some reason, that was the first thing they did, was vent the control rod drive systems?

MR. MacDONALD: His recollection of what he learned?

MS. WAGNER: That's right.

A My recollection of what I learned from that was they took care of whatever their problem was, restored it to normal, and then vented the control rod drives.

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Q Prior to March 1979, had you been to any training in how to achieve natural circulation in a nuclear power plant?

A We were trained in how to achieve natural circulation. I don't recall us practicing that at the B&W simulator where we actually watched it be established and watched the parameters for any length of time, that being the practical section. It was more of a thing we talked about but didn't stress.

Q And you got no training on that except at the B&W simulator, is that what you are saying?

A We had a natural circulation procedure on the plant, and of course we trained on all procedures. We had some training. My point was, the training wasn't stressed as it is today.

Q Did you understand prior to March of 1979 that there was any kind of envelope of pressure and temperature which you had to be in in order to achieve natural circulation?

A I don't recall a curve that said this is a natural circulation curve or anything like that.

Q So I can make my question perhaps a little clearer, did you believe at any time you were not able to use the reactor coolant pumps, for some reason

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natural circulation would just occur, or did you believe at that time that there were certain system parameters that had to be met before natural circulation could occur?

A My recollection prior to the accident was, the major parameters that you had to meet was raising steam generator levels, and with that being raised, you would achieve natural circulation.

Q You didn't have an understanding that there were any primary system parameters that had to be met?

A When you say I didn't have an understanding, I don't recall that being stressed.

Q Do you recall it being mentioned at all or did you have no understanding of it at all?

A I am sure some primary parameters were mentioned in our training.

Q You don't recall at the moment what they were?

A No, I do not.

Q I believe you testified yesterday that you had heard at some point of an event which occurred at TMI-2 in March 1978 in which the PORV had remained open at a time when it should have been shut, is that

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correct?

MR. MacDONALD: Is that correct, what he
said yesterday?

Q Is it correct that you have heard of that?

MR. MacDONALD: Prior to the accident?

MS. WAGNER: Prior to the accident.

A I believe that is correct.

Q When did you first hear of that event?

A I am not sure.

Q Do you recall how you first heard about it?

A No.

Q Did you hear about it because you were in
the control room at the time or did somebody tell you
about it, to the best of your recollection?

A To the best of my recollection, I was not
in Unit 2 control room because my duty station in 1978
was Unit 1. My only knowledge would be I heard it
someplace.

Q Did you ever see any written report on
that event?

A I can't recall.

Q Were you aware that Metropolitan Edison
had filed a licensee event report on that event?

A I don't recall specific knowledge.

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Q You don't recall giving any training on
that LER?

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A Not specifically.

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Q Generally?

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A No.

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Q What did you hear about the event?

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A My recollection is that whatever the
initiating event was, they had a trip that caused the
pressurizer level to go off-scale low. It was a
severe transient.

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Q You did not know what the initiating event
was?

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A Something to do with the feedwater system.

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Q Did you have any understanding, did you
have any knowledge of what had happened to the PORV
during that event?

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A No.

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Q I just want to make sure we are talking
about the correct event.

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21

You testified yesterday, I believe, that
you had heard of an event in which for electrical
reasons the PORV had remained open when it should have
been shut. That is the event I am talking about now.
Is that the event you are talking about now?

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A No.

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Q Which event were you talking about so we can clarify your testimony?

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A I know there was some transient that caused a pressurizer level to go off scale. I am not sure I relate that to the PORV transient at this time. You are saying what my recollection is of an incident. I recollect an incident. That is my recollection of it.

Q Now you are talking about the one with the PORV remaining open?

A Yes.

Q Were you in the control room for that event?

A No.

Q So again just to clarify your testimony, do you believe you heard about that event because somebody told you about it?

A The PORV incident?

Q Yes.

A Yes, I believe someone told me about it.

Q Do you recall ever reading any report including an LER on that event?

A No, I don't recall.

Q Were you aware that Met Ed had filed an LER

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on that event?

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A No.

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Q You don't recall giving training on that event either?

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A No, I do not.

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Q But I take it you do recall knowing that for one reason or another, the PORV had remained open at a time when it should have been shut?

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A Yes, and I am not sure exactly how I got that information.

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Q Do you remember whether or not prior to March 1979 you ever considered the failed-open PORV, for whatever reason, at a time when it should have been shut, to constitute a loss of coolant accident?

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A No, I think I just work off my recollection before the accident. I would have classified it as a loss of coolant accident.

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Q We had some testimony yesterday about the pressurizer failure procedure. I believe you testified that one of the symptoms of a failed-open PORV is the actuation of HPI, automatic actuation of HPI at 1600 pounds.

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Do you recall that that is in fact one of the symptoms of a failed-open PORV in the procedure

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which is B&W Exhibit 304?

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A Under the procedure I have in front of me, it is not listed as a symptom.

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Q Just for the record, does that have a Babcock & Wilcox exhibit number on it? It is Exhibit 305. Is it listed as an automatic action?

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A Yes.

Q Did you have any understanding prior to March of 1979 why that was an automatic action for a failed-open PORV?

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A Yes, a failed-open PORV would cause a reduction in plant pressure and possibly actuate the high-pressure injection system.

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Q Do you recall with respect to the March 29, 1978 incident, the PORV failed-open incident, whether you had any information given to you as to what happened to pressurizer level during the incident?

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A I am confused on the two incidents now. The incident I remember is a pressurizer level off-scale low.

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Q The incident which you are talking about, was that a cooldown incident which occurred perhaps in April 1978?

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A I am confused now on the two incidents,

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because it has been so long and I haven't been involved in the two for quite a period of time.

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Q Did you have any understanding with respect to the incident where the pressurizer level was off-scale low as to whether the pressurizer had in fact emptied?

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A No. I recollect some study being done on it to find out whether or not it had. I don't recall any details.

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Q Do you recall having seen a copy of that study?

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A No, I don't believe I ever did see a copy or recall seeing one.

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Q Did anyone ever tell you with respect to that incident that steam bubbles had been formed in the hot legs of the reactor coolant system?

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A No.

19

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Q Do you recall anyone ever telling you that a bubble had been formed in the upper head of the reactor vessel?

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A No, not that I ever recall.

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Q Do you recall any instruction at or about that time as a result of that incident that all prior transients were to be reviewed with your operating

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2 staff?

3 A No.

4 Q I believe you testified yesterday, and
5 correct me if I am wrong, that there was an incident
6 which caused Met Ed to install in the TMI-2 control
7 room an indicating light for the PORV.

8 To the best of your recollection now, is
9 that the transient which resulted in the failed-open
10 PORV or is it the other one we are talking about?

11 A To my recollection, when you say "failed
12 open," opening of the PORV.

13 Q Staying open when it shouldn't have been.
14 I show you B&W 79, which is a report,
15 one of several reports concerning the April 23, 1978
16 transient, and I will ask you if you have seen it
17 before.

18 A I believe I have seen it, but I don't have
19 any specific recollection of what is inside of it.

20 Q Do you recall anyone telling you after
21 that incident that the reactor coolant system primary
22 pressure had reached saturation conditions outside
23 of the pressurizer?

24 A No, I do not.

25 Q We spoke yesterday I believe also of an

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2 event which occurred in September 1977 during which
3 the steam bubbles had been formed in the hot legs of
4 the reactor coolant system of TMI-2, and I believe you
5 testified that you were not familiar with that, is
6 that correct, that you were not familiar with that
7 event?

8 A That's correct.

9 Q Were you at all involved with TMI-2
10 during the time when it was undergoing hot functional
11 testing?

12 A It is hard for me to fix the time period.
13 I left there early '78. It was around January. I
14 believe I may have had the very beginning of it, but
15 I am not sure.

16 Q What is the hot functional testing?

17 A Basically, it is taking the plant to a hot
18 pressurized condition and doing some test functions
19 to prove that it performs as it is supposed to.

20 Q Is fuel in the reactor at that point?

21 A In a lot of plants it is not. I don't
22 recall in Unit 2 whether it was or not.

23 Q If there is no fuel in the reactor, how is
24 the system heated up?

25 A Heated up by use of reactor coolant pumps.

1

2

Q How is it cooled down?

3

4

A Cooled down by dumping the steam to the condenser.

5

6

Q And I take it you turn off the reactor coolant pumps?

7

A You could.

8

Q You don't have to?

9

A Right.

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Q You do not recall hearing, I take it, of an incident during hot functional testing during which for several days there was a steam bubble in each of the hot legs of TMI-2 which resulted in a very high pressurizer level?

15

A I do not.

16

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Q Do you recall hearing of an event in December 1978 again occurring at TMI-2 in which the pressurizer was believed to have emptied and in which it was believed that saturation had formed in the upper head of the reactor vessel?

21

22

23

A My recollection is I know of an event where the pressurizer was emptied. I don't recall ever having saturation formed anyplace else.

24

25

Q And the event about which you are talking is the one we already discussed this morning?

1
2 A I am not totally sure, but I know of an
3 event where the pressurizer was --

4 Q You are not familiar at this time of
5 knowing of two events in which the pressurizer emptied
6 prior to the accident?

7 A No. They kind of run together for me as
8 one.

9 Q Were you aware prior to the accident of an
10 incident during the start-up of TMI-2 in which damage
11 was caused to a makeup pump as a result of faulty
12 alignment of valves?

13 A No.

14 Q Did you learn of such an incident after
15 the accident?

16 A Not that I recall.

17 Q Are you aware of any incident, again at
18 TMI-2, in which damage was caused to reactor coolant
19 pump seals during a test of the reactor coolant pumps?

20 A Not that I recall.

21 Q Do you recall hearing prior to the accident
22 of an event which occurred at the reactor at Rancho
23 Seco, which belongs to the Sacramento Municipal Utility
24 District, in which all indications were lost because
25 somebody dropped a light bulb in the console and the

1

2

PORV opened and depressurization occurred?

3

A I recall the incident on the light bulb.

4

I don't recall the Rancho Seco.

5

Q Do you recall how you learned about that

6

incident?

7

A No, I do not.

8

Q Do you recall what you learned about it?

9

A Basically, it was initiated by a loss of

10

a light bulb or by a light bulb problem.

11

Q Do you recall hearing about the failure

12

open of the PORV? And I mean by the fact that it was

13

open when it should have been shut, for whatever

14

reason?

15

A No.

16

Q Do you recall anything else about that

17

incident?

18

A I recall the incident. That is all.

19

Q Do you recall whether or not any training

20

was administered on that incident?

21

A My recollection is some training was done

22

on that incident. That is I believe why I recall it.

23

Q Do you recall that you gave training or that

24

you received training on the incident?

25

A I am not sure.

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Q Do you recall whether or not you saw any written documentation either in the training context or outside of it concerning that event?

A No, I do not.

Q Are you familiar or do you remember being familiar with a valve at Unit 2 called RCV 137?

A In Unit 2?

Q Yes.

A No, I do not.

Q Is there such a valve in Unit 1?

A Not to my knowledge.

Q How about RCV 155? Does that ring a bell?

A No.

Q How about RCV 3?

A It rings a bell because it is a valve in my unit.

Q Which one is it in your unit, that is, Unit 1?

A A block valve for the spray valve.

Q Of the pressurizer?

A Yes.

(Recess taken.)

BY MS. WAGNER:

Q Are you familiar with a term called DNB?

1

2

A Yes, I am.

3

Q What is DNB?

4

A DNB is the initials for departure from nucleate boiling.

6

Q What does that mean?

7

MR. MacDONALD: His understanding today?

8

MS. WAGNER: Yes.

9

A It means that you have reached the point where nucleate boiling is no longer happening, nucleate boiling being small bubbles, and you are starting to form a larger amount of boiling, big bubbles.

13

Q What is DNBR?

14

A That is the ratio that expresses this concept.

16

Q The ratio between what and what?

17

A The ratio between the flux at the hottest channel and the flux at DNB, the point at which DNB will take place.

20

Q What are you referring to when you refer to the hottest channel?

22

A When we looked at DNB, we always looked at the hottest localized channel, and that is what I mean when I say the hottest channel, that mythical channel that exists someplace that has all the worst cases

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point to it and refers to localized boiling in that area.

Q Is that a channel that is theoretically somewhere in the reactor coolant system?

A It is a specific fuel channel, one of the many channels that exist around the fuel rods themselves.

Q Is the channel through water? It is not a channel in the fuel, is that correct?

A It is a channel of water between the fuel rod and another fuel rod.

Q Where did you first learn about DNB and DNBR, if you can recall?

A I am not sure.

Q Do you believe it was prior to March 1979?

A Yes.

Q Did you ever use that concept in the operation of a commercial nuclear plant?

A Yes, we did.

Q In what way did you use it?

A DNB is something we were taught to avoid, but it also was something you couldn't see.

Q How could you tell if you had it?

A The training material had you look at four

1
2 parameters, that being power, flow, temperature, and
3 pressure.

4 Q And if you had it, what would you do to get
5 away from it?

6 A Really, our training never said if you had
7 DNBR, what you did to get away from it. It said that
8 your protective system kept you from getting to it.

9 Q I show you now a document which has not
10 been previously marked, but I prefer not to mark it as
11 an exhibit right now. It is a document entitled
12 "Nuclear Power Preparatory Training Core Performance 4,
13 a Course for Metropolitan Edison Company by a Videotape
14 by NUS Corporation, Rockville, Maryland," and the
15 production numbers are 10811243 to 10811473.

16 My question is, have you ever seen this
17 before?

18 MS. WAGNER: A similar book was marked in
19 Craig Faust's examination.

20 MR. MacDONALD: Was this part of a larger
21 exhibit?

22 MS. WAGNER: I think this was the whole
23 document, but I think that was his personal copy,
24 which is why this one is different.

25 A I don't recall seeing this.

1
2 Q Do you ever recall prior to March 1979
3 receiving any training in "core performance"?

4 MR. MacDONALD: You mean the subject, the
5 title of a course?

6 MS. WAGNER: Yes. Not necessarily the
7 title of a course. In that topic, core
8 performance.

9 A Yes.

10 Q Do you have any recollection now as to
11 what kinds of things would be taught to you which would
12 be classified under the term "core performance"?

13 MR. MacDONALD: Any recollection of what
14 kinds of things were taught to him?

15 MS. WAGNER: That's right.

16 A My recollection is the type of things were
17 linear heat rates, how to calculate an actual peak,
18 a radial peak. Those types of items were taught in
19 that course.

20 Q Did that course include, to the best of
21 your recollection, discussions of how heat is
22 transferred in a reactor?

23 MR. MacDONALD: You are asking if he recalls
24 whether it did?

25 MS. WAGNER: Yes.

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A I don't recall.

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Q I would like to show you now a page and ask you if you have seen this page of the document, and I will read what paragraph it is I am referring you to.

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It says, "The reactor coolant in a PWR system is kept under pressure to prevent bulk boiling in the core. In the case of an abnormal transient, where this pressure is lost and some steam is generated in the core, how will we know it? We will see a large increase in level in the pressurizer until pressure is built back up above the saturation value corresponding to the temperature in the core. The steam bubbles will then condense and the level will drop back down close to its normal value."

17

18

Have you ever seen that particular paragraph before?

19

A No.

20

21

Q Is there anything in that paragraph which you did not know prior to March 1979?

22

23

A Yes, the concept of an increase in pressurizer level.

24

25

Q I show you a document previously marked as B&W Exhibit 275. I believe the entire exhibit is the

1
2 LER which was filed by Metropolitan Edison on the
3 accident at Three Mile Island on March 28, 1979.

4 What I am going to show you is a part of that exhibit
5 which is attachment D, a sequence of events.

6 My question is going to be, have you ever
7 seen that before?

8 A I have seen this.

9 Q Did you have any role in the preparation
10 of that document?

11 A Not to my recollection.

12 Q Did you ever review that document?

13 A Not to my recollection.

14 Q Did you ever review any similar sequence of
15 events concerning the accident, whether or not it was
16 in the final form which you see it now in, whether it
17 was a draft, in order to prepare this?

18 A Not that I can remember.

19 Q When did you see the document?

20 A I remember seeing it mainly because of its
21 bulk size.

22 Q Do you remember in what context you saw it?

23 A No. I don't remember.

24 Q Have you ever read it through, just this
25 part of it?

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2

A I never read it through.

3

Q Have you read parts of it?

4

A I have looked at it.

5

6

Q Have you ever seen anything in it with which you disagreed?

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A I never studied it that long to draw a conclusion.

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Q I refer you now to a figure, and at the back of it there is a bunch of graphs. One of them is Figure 60. It is about three pages from the end.

My only question about that is, do you have any idea who prepared that document?

A No, I do not.

Q I take it you did not prepare it?

A No.

Q I have a few more questions concerning the time at which you arrived on the site on the day of the accident.

When did you first hear about the accident which began on March 28, 1979?

A My first contract was a call from a Unit 1 shift foreman, and he was concerned about feedwater chemistry on Unit 1. That was early in the morning, 4:30, 20 to 5:00.

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Q Did you subsequently go to the site?

3

A Yes, I did.

4

Q You first went to TMI Unit 1?

5

A Yes.

6

Q You remained there for some short period of time and then you went to TMI-2, is that correct?

7

8

A That's correct.

9

Q I believe you testified yesterday that one of the things you noticed shortly after you arrived in the Unit 2 control room is an increase on the source range monitor.

10

11

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Do you recall, not your testimony, but that you had seen an increase in the source range monitor sometime shortly after you arrived in the Unit 2 control room?

17

18

A I remember becoming aware of the source range increase.

19

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Q I would like to refer you to two charts which are in the back of that. They are Figures 56 and 57. On these figures, two graphs appear on each one of them, and I am referring you primarily to the bottom ones which are called source range channel NI-1.

Have you seen these graphs before?

A I don't recall seeing these.

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Q Do you know when you were referring

yesterday to the source range monitors whether another way of referring to those is source range channel NI-1? Is that the same instrumentation you were talking about?

A Yes, they are the same instruments.

Q Looking at the graph, is it possible for you to say, to pick out a point on either one of those graphs which would be about the points when you first noticed the source range indicators at the time you went into the control room?

A No, I don't think it would be possible. I had become -- they were high. It is not like I saw them increasing. I was aware they were high and it did bother me.

Q What did you mean by "high" at that point?

A They should be decreasing, and at some point they were at a very high level, higher than the level they should have been.

Q What was the level at which they should have been?

A That period of a trip, they should have been down in low counts, very low counts.

Q Just for a lay person, can you tell me what

1
2 you consider a low count?

3 A At that point they should have been less
4 than 30 counts, less than 20 counts.

5 Q Is it correct that both of these charts
6 show counts in excess of 30 and they don't show
7 anything lower than 30?

8 MR. MacDONALD: You are asking him to look
9 at the chart?

10 MS. WAGNER: I want to see if I understand
11 what the chart means.

12 Q If you don't understand what the chart
13 means, fine.

14 A I don't understand their axis.

15 Q On the left-hand side, they say "counts
16 per minute, log decades." Does that mean anything to
17 you?

18 A Yes, that means it was four decades of
19 indication to me. I don't know what they meant.

20 Q Four decades means 40, is that correct?

21 MR. MacDONALD: What it means to Mr. Ross?

22 MS. WAGNER: Yes.

23 A It means somewhere around ten to three
24 counts or a thousand to me.

25 Q So to clarify your earlier testimony, when

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you say the count should have been below 30, is that what you said, how did that relate to decades?

3

4

A That would be, you would be someplace between one and two decades at that point.

5

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Q That is what would be below this chart, if we could translate it into the language of this chart?

7

8

A That is my understanding, having not seen this chart before.

9

10

Q But you don't recollect when you arrived in the control room at what particular point it was?

11

12

A No. Just higher than it ought to be.

13

14

Q Is it correct that somebody called you from the TMI-2 control room when you were in the TMI-1 control room to ask you to come over to TMI-2?

15

16

A Yes, it is.

17

Q Was that Bill Zewe?

18

A That is my recollection.

19

20

Q When he called you on the phone, do you recall whether he made any comment to you at that time as to whether there was any high indication on the source range monitors?

21

22

23

A I don't recall any discussion on source range indication at all, or really any specifics at all.

24

25

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2 Q I now would like to refer you to Figure 4
3 in that pile, which is also part of Exhibit B&W 275,
4 and I will hand you a copy of it. That is a chart,
5 as I understand it, of pressurizer level and pressure
6 in the time period between one hour before and eight
7 hours after the turbine trip on March 28, 1979.

8 I wonder if you could look at this chart
9 and tell me at which level the pressurizer was, as far
10 as you can recall, when you first entered the control
11 room or within minutes after you entered the control
12 room, whenever you first noticed it.

13 A My recollection on the pressurizer level
14 is that it was very high.

15 Q It would have been, by very high, do you
16 think close to 400?

17 A Yes.

18 Q At that time, I believe you testified that
19 reactor coolant system pressure was quite low, is that
20 correct?

21 A That is my recollection.

22 Q Is there any point on this graph that you
23 can pick out where the two parameters are the way they
24 were when you first had information about them on the
25 day of the accident?

1
2 MR. MacDONALD: He didn't have any direct
3 information in terms of looking at them.

4 MS. WAGNER: I am asking him for
5 information based on whatever his information
6 source was.

7 MR. MacDONALD: I object. I don't think
8 there is any foundation.

9 Q Is it correct that --

10 MS. WAGNER: I think there was a foundation
11 he knew something about this.

12 MR. MacDONALD: I am not directing him not
13 to answer. My objection stands.

14 Q I am wondering if you can pick out any
15 point on this chart, looking at pressurizer level and
16 the reactor coolant system pressure lines there,
17 if any space in this chart would be about what you saw
18 or what you had information about, whether you saw it
19 or not, concerning pressurizer level and pressure at
20 the same time.

21 A I could surmise it could be someplace
22 between two and a half and three hours.

23 Q I am just trying to understand how this
24 graph is written. As I read the graph, at about two
25 and a half hours, the pressurizer level is about, a

1
2 little over 300 or around 300. Is that correct?

3 MR. MacDONALD: Are you asking him to tell
4 you what he understands? He didn't write the
5 graph or draw the graph. He has no information
6 of what the author of the graph meant by the
7 readings on the graph. He can take a guess.

8 MS. WAGNER: I am not asking him to tell
9 me whether this graph is a good graph or bad
10 graph.

11 Q My question is based upon your testimony as
12 I understand it. It looks to me as if the time you
13 pointed out we have a pressurizer level about 300 and
14 a pressure at about 700, and I don't think that that
15 comports with what you have testified to previously,
16 so I am wondering if that is in fact what you intended
17 to say.

18 MR. MacDONALD: That is what my objection
19 is based on. There is no understanding of what
20 the parameters were when he was in the control
21 room. He said it was high and pressure was low.
22 He didn't look at the indicators.

23 Having him look at a graph and speculate
24 on where the parameters might have been when he
25 walked in is not doing anybody any good.

1
2 MS. WAGNER: He testified he had
3 information shortly after as to the level and as
4 to the pressure, and I am asking him to see if I
5 can figure out on this graph where it would put
6 it on this graph. I am just asking him to clarify
7 his testimony.

8 MR. MacDONALD: I object. I don't think
9 there is any basis for looking at a graph based
10 on what his prior testimony is to determine
11 when he walked in.

12 It is a simple resolution. Ask him when
13 he came in the control room.

14 BY MS. WAGNER:

15 Q You previously testified that you arrived
16 in the control room sometime which is shown between
17 two and a half and three hours on this graph. Do you
18 wish to change any of that testimony based on my
19 reading of this graph? You can certainly agree or
20 disagree with it.

21 A No. I don't wish to change any of my
22 testimony.

23 Q I am not suggesting it was wrong. I just
24 wondered if this is still the place on the graph that
25 you think is closest to what you remember seeing when

1

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you walked in.

3

MR. MacDONALD: Objection. He didn't see

4

it when he walked in.

5

MS. WAGNER: Or hearing about it shortly

6

after he walked in.

7

MR. MacDONALD: I don't think his testimony

8

was made on what he heard shortly after he

9

walked in as to both parameters.

10

Q Do you have anything further to say? I

11

think your counsel will let you answer the question.

12

A No. My previous testimony is what I

13

recollect and what I told you now is what I recollect.

14

Q Is it correct that you recall that the

15

block valve for the PORV was shut at some time after

16

you arrived in the Unit 2 control room?

17

A My understanding is it was shut prior to me

18

arriving there or near the same time.

19

(Recess taken.)

20

BY MS. WAGNER:

21

Q Is it correct that you recall that you

22

gave some testimony to the NRC I&E people at or about

23

April 25, 1979?

24

MR. MacDONALD: I think he testified to

25

that yesterday.

1
2 MS. WAGNER: Yes, he did, but if I asked
3 him that question, you would say --

4 A Yes.

5 Q I refer you to page 10 of that testimony
6 and specifically to a question and answer in the middle
7 of the page.

8 "HUNTER: You did not go behind there. O.K.
9 What about the computer -- did you make a pass at the
10 computer at that time?

11 "ROSS: One of the shift supervisors at
12 that time was trying to ascertain the position of
13 RC-RV2 -- it was Ken Bryan. At that time he reported
14 back to us that it was 200-something degrees on his
15 thermocouple, which is a fairly low reading, and
16 about that time we went in and isolated it."

17 Were you asked that question and did you
18 give that answer?

19 A My recollection is I was there. I don't
20 remember that answer specifically.

21 Q Do you believe there is anything wrong with
22 this transcription?

23 A I have no reason to believe there is
24 anything wrong with that transcription. I have no
25 reason to believe that what I said today is also,

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anything wrong with that.

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Q I am not suggesting there is anything wrong with that. I was just inquiring as to whether this testimony was also correct.

6

7

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9

Did you have any role at all in any kind of analyses or evaluations after the accident as to what had happened either to the plant or the equipment or operator action or anything like that?

10

A No.

11

12

13

Q Were you involved at any time in interviewing any operators of the plant with respect to their actions on the day of the accident?

14

15

A I don't recall interviewing any of the operators.

16

17

18

Q Whether you interviewed them personally or not, do you recall being at all involved in that process?

19

A No.

20

21

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MS. WAGNER: I would like to mark as B&W Exhibit 306 a document which consists of a front page memorandum from J. G. Herbein to G. P. Miller and others, dated June 18, 1979, and following that front cover memo are a series of I believe telexes or telecopies from the

Subcommittee on Energy and the Environment, and some questions and some graphs appear to be attached.

(Document, the front page a memorandum from J. G. Herbein to G. P. Miller and others, dated June 18, 1979, with attachments, was marked B&W Exhibit 306 for identification, as of this date.)

Q Have you seen that document before or any part of it?

A I don't recall seeing the document.

Q As you will note, the document refers to "Jim Floyd, Mike Ross, and Bill Zewe are to meet with the operators so that they have a common understanding of the question."

Do you have any recollection at this time as to what that is referring to?

A I have a recollection of some questions that had to be answered by the operators for somebody, but I don't recall this document.

Q Do you recall what those questions concerned? Are they the questions that are appended to this document?

A I can't say for certain.

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Q Do you recall what you did with respect to talking to the operators?

A No, I do not.

Q Do you recall if you talked to the operators at all?

A No, I do not.

Q Do you recall meeting with Jim Floyd and Bill Zewe to discuss a common understanding of the questions?

A No.

Q Since the accident in March of 1979, have you spoken with Bill Zewe or Ed Frederick or Fred Scheimann or Craig Faust about their actions on the day of the accident?

A Since when?

Q Since March 1979.

A I did.

Q For what purpose?

A I don't recall, but I remember talking about actions.

Q Do you believe you were talking to them just out of personal curiosity or because you had an assignment to do something in particular?

A I am not sure.

1
2 Q Have you spoken to anybody other than
3 counsel about your deposition here?

4 A No.

5 Q Have you spoken to anybody else who has
6 been deposed in this lawsuit by us about his
7 deposition?

8 A No.

9 Q Do you recall if you spoke --

10 MR. MacDONALD: Just a minute.

11 (Discussion off the record between the
12 witness and his counsel.)

13 Q With respect to the documents that have
14 been produced to us today and yesterday --

15 MR. MacDONALD: He just has a clarification.

16 THE WITNESS: My clarification is that
17 I have spoken to Ron Toole, not specifically
18 about the deposition, but we have talked about
19 the subject of the deposition but not any details
20 or anything that we have mentioned something
21 about the deposition. I wanted to clear that up.

22 Q Did he say he enjoyed his deposition?

23 A No, he did not.

24 Q With respect to the documents produced to
25 us by you today and yesterday, can you tell me if any

1
2 documents, if any pages were taken out of those
3 notebooks prior to producing them to us by you or by
4 anybody else?

5 A To my knowledge, no material has been
6 removed from those books.

7 Q Are you involved at all in the cleanup
8 of TMI-2?

9 A No, I am not.

10 MS. WAGNER: No further questions at this
11 time.

12 (Lunch recess taken at 12:00 noon.)
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A F T E R N O O N

S E S S I O N

1:10 p.m.

M I C H A E L J. R O S S resumed

and testified further as follows:

EXAMINATION (continued)

BY MS. WAGNER:

Q I would like to show you a document which --
a large binder which you produced to us today, and
my only question is the same question I basically asked
this morning, whether that binder contains documents
which you received before March of 1979. The first
page of the document is 8.1 Unit Transient Response.
There are a number of tabs in the documents, and it is
about four inches thick.

A To the best of my recollection, it is
stuff from before the accident.

MS. WAGNER: I have no further questions.

EXAMINATION BY MR. MacDONALD:

Q Do you recall testifying previously in
this deposition on the subject of your duties
regarding review of procedures for Unit 1 and Unit 2
sometime in the early 1970's?

A Yes, I do.

Q Could you explain to us in a little more

1
2 detail what your responsibilities and duties were
3 with regard to that procedure?

4 A When I talked about my procedure
5 involvement, to be just a little more specific, what
6 we were doing was red-lining draft procedures that
7 had been provided to us by either our vendor on the
8 NSS system, B&W, or our AE or perhaps component vendors.
9 We were taking the draft procedures, field walking
10 them, making them site specific as to locations, as
11 to ranges of instrumentation, that type of thing.

12 Q Did you yourself ever substantively draft
13 or write any of the operating or emergency procedures
14 for Unit 2?

15 A No, I did not. We received our drafts
16 from either AE's or B&W.

17 Q Do you recall earlier in your deposition
18 where you were testifying on the subject of training
19 you had had prior to the accident on heat transfer,
20 fluid flow?

21 A Yes, I do.

22 Q Could you explain for us in a little more
23 detail your understanding of what that training was and
24 the importance you placed on it?

25 A To amplify a little more on what

1
2 importance I placed on it, I placed the importance on it
3 that our vendors placed on it, B&W, and also the NRC
4 placed on it.

5 As of now, the NRC has a separate exam
6 section for heat transfer. As such, it will get more
7 emphasis. It will be a more emphasized subject
8 everywhere.

9 Q Did you believe prior to the time of the
10 TMI-2 accident in March of 1979 that your training
11 in reactor theory was something that was important
12 for your knowledge of nuclear steam supply systems?

13 A Yes, I did. In fact, it was emphasized
14 reactor theory training by virtually everybody,
15 including the NRC.

16 Q Do you recall earlier in your testimony
17 speaking on the subject of loss of coolant accidents
18 and your understanding and training prior to the
19 accident of the relationship of LOCA's to core damage?

20 A Yes.

21 Q Would you explain for us in a little more
22 detail what that understanding was?

23 MS. WAGNER: I object, because I believe it
24 is asked and answered.

25 MR. MacDONALD: I am asking for a little

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2 more detail in the course of his testimony on
3 this particular subject.

4 A To amplify my previous words on that, yes,
5 I understood a LOCA as bad. I understood that if you
6 drained all of the water out of the core, you could get
7 fuel damage.

8 What I was trying to say was that prior to
9 the accident, we had no way or we had no training that
10 told us this is how you know core damage is imminent.
11 This is what you should look at. We had no saturation
12 indicators. We had none of the new stuff you have
13 now nor did we have emphasis that says these five
14 items will tell you that you have core damage instantly
15 as we do now.

16 Q Do you recall testifying earlier in your
17 deposition on the subject of reactor coolant pumps and
18 net positive suction head curves?

19 A Yes.

20 Q Could you explain for us in a little more
21 detail what your understanding was prior to the time
22 of the accident of the relationship of net positive
23 suction head curves to the reactor coolant pumps and
24 reactor coolant system?

25 A My understanding was the net positive

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2 suction head curve for the reactor coolant pump was
3 specific to the reactor coolant pump. In other words,
4 that curve kept you from having a loss of net positive
5 suction head specifically at the eye of the impeller
6 of the pump. If you formed any lack of pumping due
7 to a loss of net positive suction head, we never
8 associated that curve with anything corewise or the
9 reactor coolant system itself.

10 Q Did you ever have any training from B&W,
11 Met Ed or any other vendors that would make that
12 association?

13 A No. We never had any training either at
14 the B&W simulator, Met Ed or any architect-engineer
15 that I can recall to make that association.

16 Q You testified earlier on the subject of
17 departure from nucleate boiling. Do you recall that?
18 Do you recall testifying on that subject?

19 A Yes.

20 Q And you were testifying in relation to
21 DNB and channels within the reactor coolant system.
22 Do you recall testifying on that subject?

23 A Yes.

24 Q Could you explain for us in a little more
25 detail where those channels that you were speaking of

1
2 in relation to the subject of DNB were located?

3 MS. WAGNER: Objection.

4 Q In the reactor coolant system.

5 I will break it down.

6 Were they in the hot leg or the cold leg
7 of the reactor coolant system?

8 MS. WAGNER: Objection.

9 A When I thought of the DNB concept, I thought
10 of a very local concept, the concept being the hottest
11 single rod in one bundle of rods, localized to
12 one fuel assembly within the core.

13 Q That is inside the core?

14 A Inside the core.

15 Q Do you recall testifying earlier on the
16 subject of the PORV and the light indicator that was
17 installed sometime after March 1978 at TMI-2?

18 A Yes.

19 Q Would you explain for us in somewhat more
20 detail what your understanding was or what training
21 you received in relation to that light indicator in the
22 PORV on Unit 2?

23 MS. WAGNER: Objection. I believe the
24 prior testimony was that he received no training.

25 MR. MacDONALD: I am just asking for more

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2 detail. You may not have gotten all the detail
3 in your questions. I think if you look back as
4 to what his answer was, you will see that his
5 answer is consistent. I am asking for any more
6 details on training he received.

7 MS. WAGNER: Is this training about the
8 light you are asking for?

9 MR. MacDONALD: About the PORV or the light
10 indication after the time it was installed,
11 anything relating to that subject.

12 MS. WAGNER: My objection stands.

13 A Although I can't recall specific training
14 on the light, I do recall PORV training, either
15 emergency procedures or in the course of training
16 itself. We never had what I would call a specific
17 item that we trained on and say this is how to diagnose
18 a PORV, but my feeling is the light being installed
19 was a new item in the control room, and that light being
20 very similar to the devices the operator uses every
21 single day, his whole goal in life as he looks at
22 position indicators, he has a lot of them in the control
23 room, and it would be natural for him to use that as
24 an indicator.

25 Q Did you have any understanding prior to the

2 time of the accident as to, based on your training,
3 what indications you would rely on primarily for
4 indication of valve position in the PORV prior to the
5 time of the accident?

6 A PORV position indication, of course, there
7 were items listed that would tell you it was open.
8 Here again, we just had installed a fairly new light
9 in the control room. It was consistent with the very
10 essence of the operator's training as to light
11 indication or position indication. I feel he would
12 have used that. It would be very natural to use that.

13 Q Do you know who in terms of what companies
14 participated in the recommendation of that light
15 indication to be put in the control room of Unit 2 to
16 indicate position of the PORV?

17 MS. WAGNER: I object. He indicated before
18 he didn't know who was involved in that.

19 Q I am just asking the question, regardless
20 of your recollection.

21 A My understanding is it was put in in
22 concurrence with our NSS vendor.

23 Q Do you recall testifying earlier on the
24 subject of the condensate polisher bypass valve in
25 Unit 2?

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2 A Yes, I did.

3 Q Could you tell us, based on your firsthand
4 knowledge prior to the accident at TMI, whether or not
5 that valve was ever used prior to the accident?

6 MS. McDONALD: Objection.

7 MS. WAGNER: Could I hear the question
8 again?

9 (Question read by the reporter)

10 MS. McDONALD: Objection. He answered that
11 very question and he already gave an answer.
12 Are you asking him to change an answer?

13 MR. MacDONALD: I am not asking him to
14 change testimony. I am asking him to explain
15 the basis of the question that I have asked.
16 You will see when we go back on the basis of
17 the question you asked, his answer is very
18 consistent.

19 MS. McDONALD: The objection stands.

20 A When I talked about the operation of that
21 valve, I am speaking for myself. I know of no use.
22 I don't know whether or not Unit 2 used it, because I
23 was in Unit 1 much of the time.

24 Q On the day of the accident, March 28, 1979,
25 could you tell us when you, to the best of your

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recollection, entered the control room at Unit 2?

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A To the best of my recollection, I entered the control room about the time or shortly thereafter the PORV block valve was closed. I perceive that time to be somewhere around 6:30 in the morning, or I recollect that time to be 6:30 in the morning.

Q What was your recollection of your understanding of what the parameters relating to pressurizer level on the reactor coolant system pressure were when you entered the control room?

MS. WAGNER: I object to the question.

That has been asked and answered. Are you asking him for additional testimony or different testimony?

MR. MacDONALD: I never ask for different testimony. I am asking perhaps for a little more detail than your question alluded to.

MS. WAGNER: My question asked for all available details.

A My understanding of the parameters, it is hard for me to tell when I had that knowledge of what the parameters were. It is hard to tell how I got it, but I know what I thought they were shortly thereafter or upon entering. It was no concise time. I can't

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2 relate it with a time. It was within some time
3 period it was given to me.

4 Q Did you learn both pressurizer level and
5 reactor coolant system pressure at the same time?

6 A Not necessarily. I learned of them. I am
7 not even sure I got them at the same time.

8 Q Do you recall testifying earlier in your
9 deposition on the subject of operator input into the
10 layout of the control room at TMI-2?

11 A Yes.

12 Q Could you explain for us in a little more
13 detail what exactly from your firsthand knowledge you
14 knew about operator input in the control room at
15 TMI-2?

16 MS. WAGNER: I object to the question. I
17 asked that precise question and an answer was
18 given to it.

19 A My knowledge stems from me. My distinct
20 knowledge. I don't know of any operator input, but
21 I don't know that there wasn't any operator input.

22 Q Prior to the time of the TMI-2 accident,
23 could you tell us whether or not you received from B&W,
24 doing simulator training, training on the use of the
25 computer?

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2 MS. WAGNER: I object to the question. No
3 foundation. Which computer are you referring to
4 and was it in the simulator?

5 MR. MacDONALD: The computer at the
6 simulator.

7 MS. WAGNER: What computer? The simulator
8 is a computer.

9 MR. MacDONALD: The computer that was
10 alluded to earlier in the deposition.

11 BY MR. MacDONALD:

12 Q You recall testifying earlier about the
13 computer in the control room at TMI-2?

14 MS. WAGNER: Again he is welcome to clarify,
15 but --

16 Q Do you recall testifying on that subject?

17 A Yes.

18 Q Do you recall prior to the time of the
19 TMI-2 accident whether or not when you attended the
20 B&W simulator, you received any training from B&W at
21 the simulator regarding the use of that computer during
22 transients?

23 A We never received any training from B&W
24 at the simulator that tied the computer nor the
25 monitoring of the computer to any transients.

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2 Q Do you recall earlier in your deposition
3 testifying regarding training that you either gave or
4 received in relation to transients that had occurred
5 at TMI Unit 1 or 2?

6 A Yes.

7 Q Would you explain for us in more detail
8 what your understanding was prior to the time of the
9 accident as to what transient training you either
10 gave or received in relation to transients at either
11 TMI Unit 1 or 2?

12 MS. WAGNER: I object to the question.

13 Asked and answered several times.

14 A Although I don't recall specific instances
15 of training, I know training was done, and I don't
16 recall what made us do it. Again, I know it was done.
17 I don't know what the document was that says "You
18 must do it," but I know that training was done.

19 Q Is that on transients that occurred at both
20 Unit 1 and Unit 2 prior to the time of the accident?

21 A Yes, it is.

22 Q Prior to the time of the TMI-2 accident,
23 did you receive any training from B&W, either at the
24 simulator or otherwise, which related to transients
25 which had occurred at plants other than Three Mile

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2 Island?

3 A Yes, we did. In fact, one occurrence I do
4 remember was early on, Duke Power was having trouble
5 running feed pumps in parallel, and they were using the
6 unit or having a trip on it due to a feed pump
7 transient, while at the simulator they ran us through
8 parallel operation, and many times, even though at TMI
9 Unit 1 it wasn't a problem to us.

10 Q Do you recall anytime prior to the TMI-2
11 accident whether or not you received training from
12 B&W on simulator or otherwise on a transient that
13 occurred at Davis-Besse, on any transient that occurred
14 at Davis-Besse?

15 A No, we never received any training on that
16 transient.

17 MS. WAGNER: Which transient are you
18 talking about?

19 MR. MacDONALD: Any transient occurring
20 at Davis-Besse.

21 Q Do you recall receiving any training?

22 A We received no training on any transients
23 that occurred at Davis-Besse.

24 Q You don't recall receiving any transient
25 training then prior to the time of the TMI-2 accident

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2 on a transient that occurred at Davis-Besse in or
3 about September 1977?

4 MS. WAGNER: Objection.

5 A No, I do not.

6 MR. MacDONALD: I have no further questions.

7 (Recess taken.)

8 BY MS. WAGNER:

9 Q Did you understand prior to March 1979
10 who was the operator of TMI-2? Who was the entity with
11 responsibility for running that plant?

12 A Yes.

13 Q Who was that?

14 A Metropolitan Edison.

15 Q I take it it was not Babcock & Wilcox?

16 MR. MacDONALD: For actually hands-on
17 operation of the plant?

18 MS. WAGNER: That's right.

19 A No, it wasn't Babcock & Wilcox, although
20 they provided us with much input for operation of the
21 plant.

22 Q But ultimately it was Met Ed who ran that
23 plant, isn't that correct?

24 A That's correct.

25 Q Based on that, did you feel that Met Ed had

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2 any responsibility whatsoever to make sure that its
3 procedures were good procedures?

4 MR. MacDONALD: I object to what you mean
5 by "good procedures." He testified to what
6 review process had been performed.

7 Q Did you believe that Met Ed had any
8 responsibility for insuring that the procedures were
9 adequate for keeping the plant protected from damage?

10 MR. MacDONALD: Objection. I am not quite
11 sure what that means, if it has any meaning
12 in terms of licensing documents. Mr. Ross may
13 not be aware.

14 A Yes, Met Ed had a licensing responsibility.
15 I believe the architect-engineer and also Babcock &
16 Wilcox had a responsibility. They designed and
17 helped operate the plant in a manner of speaking.

18 Q Do they have a license to run the plant,
19 to the best of your knowledge?

20 A To the best of my knowledge, they don't
21 have a license to run the plant. However, they
22 designed it. They had their design approved by
23 somebody.

24 Q Are you aware of any review whatsoever
25 performed by Metropolitan Edison prior to 1979 with

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2 respect to training? By that, I mean are you aware of
3 whether Met Ed made any decisions on any training
4 that was given to its operators, or did B&W decide
5 the entire content of all the training given to all
6 of the operators?

7 A I don't know for a fact what percentage
8 was involved in either one of those, but it was a
9 responsibility that was shared. We relied on B&W for
10 that input, a lot of it.

11 Q You did not believe at that time that you
12 personally or Met Ed as an entity had responsibility
13 for insuring that your operators were appropriately
14 trained to run the plant?

15 A We felt we had a responsibility. We also
16 felt that our best source of input were the people
17 who designed and built the plant, B&W.

18 Q How did you know that?

19 A B&W designed and built it. They had a
20 simulator for it. We felt that was our best input.

21 Q Is the simulator an exact replica of the
22 TMI-2 control room?

23 A No.

24 Q Were there things in the TMI-2 control room
25 that were not present at the simulator?

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A There were.

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Q Was the simulator intended to be an exact duplicate of every function of the TMI-2 plant?

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MR. MacDONALD: Objection.

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Q Did you understand it was intended to show you an exact replica of every function in the TMI-2 plant?

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A I understood it was not to show you an exact replica, but it was to show you virtually an exact replica of the NSS supply system.

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Q You testified a couple of times about net positive suction head curves. Was it your understanding prior to the accident that the temperature at the suction of the pump was the same or different as the temperature in the reactor coolant system, the average temperature, let's say?

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A Again, when we looked at an NPSH curve, we associated it with the pump. We made no association with the core or with the core temperature itself. We looked specifically at that entity, the pump impeller and the pump itself.

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Q Did you have any knowledge, regardless of what the curve had to do with, as to whether or not the temperature at the pump suction head would be the

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same or different from the temperature, the average temperature of the reactor coolant system?

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A If I step back and look at it, again I would know they would be close to the same, but again, when we looked at NPSH and we associate a curve, we associate it with a local component.

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Q Do you know whether prior to March 1979 you had any understanding as to whether the pressure at the suction of the pump would be the same or different from the pressure of the reactor coolant system?

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A I was aware there would be some difference. I was also aware that I never related the pressure at the NPSH or at the suction of the pump with the pressure of the core. We looked at that curve. That curve told us we were worried about that pump.

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Q You mentioned that you knew there would be some difference. Can you give me any idea of the quantitative amount of the difference?

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A Small. There were pressure drops in the loop.

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Q Would it be a couple of pounds or a thousand pounds?

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A Twenty-five pounds.

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Q At TMI-1 today, is there any direct indication of the water level in the core?

A You have to describe "direct."

Q Is there any dial you can look at which tells you there is X feet of water in the core or the core is covered or the core is uncovered? Something that is very direct in telling you the water level in the core.

A No, there is not.

Q Isn't it correct that you testified there is no need for such an indication?

A That's correct.

MS. WAGNER: I have no further questions.

BY MR. MacDONALD:

Q Could you tell us in response to Ms. Wagner's last question why you understand after the accident that there is no need for a level indicator at TMI-1 in relation to water level in the core?

A It is true that I testified that no water level indicator is necessary, but that testimony is based on the additional training we have had now, the additional practice, the installation of thermocouples that read out in the control room, the installation of the T-sat. meter that displays saturation margin to

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the operator and all the emphasis on procedures and use of those instruments. My testimony means it is not necessary because of all these additions and training, and that includes simulator training.

MR. MacDONALD: I have no other questions.

(Time noted: 2:00 p.m.)

MICHAEL J. ROSS

Subscribed and sworn to
before me this day of
198 .

CERTIFICATE

STATE OF NEW YORK)
: ss.:
COUNTY OF NEW YORK)

I, JOSEPH R. DANYO, a Notary
Public of the State of New York, do hereby
certify that the continued deposition of
MICHAEL J. ROSS was taken before
me on WEDNESDAY, NOVEMBER 18, 1981 consisting
of pages 202 through 276;

I further certify that the witness had
been previously sworn and that the within
transcript is a true record of said testimony;

That I am not connected by blood or
marriage with any of the said parties nor
interested directly or indirectly in the matter
in controversy, nor am I in the employ of any
of the counsel.

IN WITNESS WHEREOF, I have hereunto set my
hand this 7th day of November,

Joseph R. Danyo
JOSEPH R. DANYO

I N D E X

WITNESS	PAGE
Michael J. Ross (resumed)	204

E X H I B I T S

B&W
FOR IDENTIFICATION

306	Document, the front page a memorandum from J. G. Herbein to G. P. Miller and others, dated June 18, 1979, with attachments	252
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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

-----X
GENERAL PUBLIC UTILITIES CORPORATION, :
JERSEY CENTRAL POWER & LIGHT COMPANY, :
METROPOLITAN EDISON COMPANY and :
PENNSYLVANIA ELECTRIC COMPANY, :

Plaintiffs, :

80 Civ. 1683 (RO)

-against- :

AFFIDAVIT

THE BABCOCK & WILCOX COMPANY and :
J. RAY McDERMOTT & CO., INC., :

Defendants. :

-----X
STATE OF PENNSYLVANIA)
 : ss.:
COUNTY OF DAUPHIN)

I have read the transcript of my deposition taken on
November 17 and 18, 1981 and together with the attached correc-
tions, it is accurate to the best of my knowledge and belief.

Michael J. Ross
Michael J. Ross

Signed and sworn to before me this

28th day of October, 1982.

Cathy L. Schaub
Notary Public
CATHY L. BREY, Notary Public
Londonderry Twp., Dauphin County, Pa.
My Commission Expires Oct. 24, 1993

Corrections to M.J. Ross Deposition

August, 1982

<u>Page</u>	<u>Line</u>	<u>Correction</u>
46	8	"wrote" should read "worked"
173	19	"leaving" should read "relieving"
174	4	"leaving" should read "relieving"
213	22	"think" should read "don't think"
235	6	"is" should read "is not"
243	23	"ten to three" should read " "ten to the third"
264	6	"McDonald" should read "Wagner"
264	10	"McDonald" should read "Wagner"
264	19	"McDonald" should read "Wagner"