

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, :

-against-

: 80 CIV 1683
(R.O.)

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

Defendants.

-----x

Continued deposition of METROPOLITAN
EDISON COMPANY, by JAMES R. FLOYD, taken
by Defendants, pursuant to adjournment,
at the offices of Davis Polk & Wardwell,
Esqs., One Chase Manhattan Plaza, New York,
New York, on Friday, February 19, 1982, at
9:30 o'clock in the forenoon, before Joseph
R. Danyo, a Shorthand Reporter and Notary
Public within and for the State of New York.

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SUSAN HANSON

* * *

1
2 J A M E S R. F L O Y D, having been
3 previously duly sworn, was examined and
4 testified further as follows:

5 EXAMINATION (continued)

6 BY MS. WAGNER:

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

9 A Yes.

10 Q Do you still have a license on a nuclear
11 reactor?

12 A No.

13 Q When did you stop having a license?

14 A I believe it was November 1981.

15 Q Was the license that expired a cross-
16 license for TMI-1 and 2?

17 A No.

18 Q What was it?

19 A It was a license on Unit 2 for cold
20 shutdown only.

21 Q When did your cross-license for operation
22 of the units expire?

23 A Right after the accident, March 28, 1979,
24 we split personnel between the two units and I was
25 assigned to Unit 2. At that time, we gave up the

2 cross-license.

3 Q At some point in your training, at any
4 time, did you come to understand how a nuclear
5 reactor works?

6 MR. SELTZER: What training are you
7 talking about?

8 MS. WAGNER: Any training.

9 MR. SELTZER: Navy training included?

10 MS. WAGNER: Absolutely anything.

11 A As a previous holder of a senior reactor
12 operator's license, I must answer yes.

13 Q Do you still know how the nuclear
14 reactor works?

15 MR. SELTZER: Let me object. That
16 question is overly broad. I think it is
17 unfair since there are infinite degrees to how
18 well one can understand how a reactor works.
19 There is no way anybody can understand your
20 question, to what degree, you are asking, does
21 he understand how a reactor works.

22 Q Do you have a general understanding of
23 how it is that a nuclear reactor produces electricity?

24 A Yes.

25 Q How does it do it? I mean generally.

2 I don't want to know every single valve.

3 A The reactor is merely a heat source to
4 generate steam to turn the turbine, which is a prime
5 mover, to produce relative motion between the
6 current carrying conductor and the magnetic field
7 in the main generator.

8 Q Is it correct that a B&W nuclear reactor
9 is designed to have both a closed system, called the
10 primary system, and a secondary system, which is
11 not the same thing as the primary system?

12 A Yes.

13 Q Is it correct that the heat from the
14 nuclear core is circulated through the primary system?

15 A Yes.

16 Q Is it correct that at some stage in
17 the process, the heat is transferred to the secondary
18 side?

19 A Yes.

20 Q Do you know where it was that you learned
21 these things?

22 A No.

23 Q Do you think you knew them before the
24 accident?

25 A Yes.

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Q At TMI-2, do you know what was the normal operating average temperature of the primary system?

A Above 15 percent power, it was 581 degrees Fahrenheit.

Q Do you know what was the normal pressure at which the system operated above 15 percent power?

A 2200 pounds per square inch.

Q Did you understand at that time what the boiling temperature of water was at atmospheric pressure?

A Would you define "at that time"?

Q Prior to the accident.

A Restate the question.

(Question read back.)

A Yes.

Q What was it?

MR. SELTZER: At what elevation?

MS. WAGNER: At sea level.

A 212 degrees Fahrenheit.

Q In that case, why was it that the water in the primary system was not boiling when it was at 581 degrees Fahrenheit?

A The overpressure on the system created

2 by the pressure in the pressurizer prevents boiling
3 until you reach saturation temperature.

4 Q Was it your understanding that a
5 pressurized water reactor was not intended to operate
6 at saturation temperature in a primary system
7 outside of the pressurizer?

8 All my questions relate to your
9 understanding prior to the accident.

10 A Do you mean all temperatures of the water
11 in the reactor coolant system should be below
12 saturation temperature?

13 Q I mean that water should not be in a bulk
14 boiling mode.

15 A Yes, I knew that before the accident.

16 Q Do you know where you learned that?

17 A No.

18 Q Do you have any understanding of what
19 would happen in the primary system of a pressurized
20 water reactor if the water had reached a
21 bulk boiling stage in the primary system outside of
22 the pressurizer?

23 A Yes.

24 Q What was your understanding would be the
25 results?

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A Net steam formation.

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Q Did you have any understanding as to what effect that net steam formation would have on the reactor coolant system, if any?

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A Yes.

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Q What was that understanding?

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A As the size of the new steam bubble grew, the pressurizer level would increase.

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Q Where would the new steam bubble grow? At different places or in any particular place?

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A As long as the reactor coolant pumps are in service, I don't think you wind up with a discrete interface between steam and liquid but in fact the steam will be entrained in the reactor coolant system flow.

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Q Do you recall where you learned about steam formation in the reactor coolant system?

19

A No. That is too long ago.

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Q Did you know prior to the accident what the saturation temperature was for water which was at 2200 pound pressure?

23

A Yes.

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Q What was it?

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A Approximately 647 degrees Fahrenheit.

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Q Did you know what saturation pressure was for water which was at 581 degrees temperature?

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A No.

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Q Did you believe while you were supervisor of operations for Unit 2 that the operators at Unit 2 had an understanding of the system similar to what you have just described to me?

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MR. SELTZER: You mean every detail that he just described?

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MS. WAGNER: Yes.

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A No, I do not believe they had that knowledge prior to the accident.

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Q What is your lack of belief based upon?

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A I don't believe they had as deep an understanding of bulk boiling as I had.

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Q Do you have any understanding as to why you had a greater understanding than they did?

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A I had --

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MR. SELTZER: I object. There is no foundation that this witness interviewed or examined the operators to know why their knowledge was not identical with his.

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MS. WAGNER: I asked him if he had any basis for his understanding which he has given

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2 already. If he does not have a basis, he can
3 say so.

4 MR. SELTZER: He may know why he knows
5 things, but I am objecting to your asking him
6 why he knows why others didn't have the
7 knowledge.

8 MS. WAGNER: If he knows why, he can tell
9 me. If he doesn't know why, he can tell me.

10 (The record was read back.)

11 A My background was of greater diversity
12 and longer in time than the operators, and therefore,
13 I had more time to think about systems.

14 Q Prior to the accident while you were
15 supervisor of operations for either unit, did you
16 think it was important that operators understand
17 what you have testified you understood about the
18 system and the effect of bulk boiling in the reactor
19 coolant system outside the pressurizer?

20 MR. SELTZER: When you say "the effect
21 of bulk boiling," are you referring to his
22 testimony that as a new steam bubble grew,
23 pressurizer water level would rise?

24 MS. WAGNER: Yes, I am.

25 THE WITNESS: Would you reread her

question.

(Question read back.)

A No.

Q Was there any reason why you didn't think it was important?

MR. SELTZER: Are you asking him whether he discussed this with anybody or put it in writing at all before the accident?

MS. WAGNER: No, I am asking him if he has any reason why he didn't think it was important, whether it is in writing or not.

MR. SELTZER: You are into an area where your partners have precluded our examination of B&W witnesses. Your partners have frequently lectured me that to ask somebody about their thoughts previously unexpressed in writing or orally is improper examination. Are you saying now that you think this is a proper area of inquiry?

MS. WAGNER: First of all, I don't believe that my partners have taken the position that an unexpressed opinion had prior to the accident is an unfair ground for examination. However, whatever their position is, it is also

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2 my understanding that any objection that you have
3 to these questions has been waived on your behalf
4 by your associate, Myron Kirschbaum, who did
5 so at a deposition that I was taking of Mr.
6 Potts, so I had understood that his waiver would
7 apply to these kinds of questions regardless
8 of what the position of my partners might be
9 in depositions.

10 MR. KIRSCHBAUM: Since it has been
11 mentioned that I allegedly made a waiver, I
12 would like to respond to that. At the deposition
13 of Mr. Potts, what I did was I withdrew an
14 objection that I had made to questions that had
15 been asked of Mr. Potts. I did not make any
16 waiver of objections either for the future
17 nor did I waive any objections that may have
18 been made in the past. In addition, I believe
19 that I made my position at that time clear that
20 it was based on the fact that we were hoping
21 that in response to the action I was taking of
22 withdrawing an objection as to present belief,
23 that we would have a reciprocal withdrawing of
24 objections on the other side, which has not
25 occurred.

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2 MS. WAGNER: I believe I told you I was
3 not offering any reciprocal withdrawing of
4 objections, but nevertheless you went ahead and
5 withdrew your objection.

6 First of all, I don't think you
7 accurately reflected the position of my
8 partners, and secondly, I believe this objection
9 has been waived.

10 MR. SELTZER: I am very pleased if you
11 think that I misstated the position of your
12 partners, because it would certainly open up
13 areas of inquiry that had previously been
14 blocked, and I look forward to that.

15 Go ahead with your question.

16 MS. WAGNER: For the record, let me state
17 that I, too, may misunderstand my partners'
18 position, and as you may understand, my partners
19 have the authority to tell me what to do
20 which I do not have over them; however, I
21 believe that my statement is correct.

22 Let's reread the question.

23 (Question read back.)

24 A While I was supervisor of operations for
25 Units 1 and 2, I don't recall that thought ever

1
2 entering my conscious mind.

3 Q The thought of whether it was important
4 or not?

5 A The phenomena I described about bulk
6 boiling and pressurizer level.

7 Q You didn't have a thought as to whether
8 that was an important thing to tell the operators or
9 not?

10 A No, just I didn't have the thought enter
11 my conscious mind while I was working at Three Mile
12 Island.

13 Q I am not sure what thought you are talking
14 about now.

15 A The thought about bulk boiling causing
16 expansion of the reactor coolant system volume and a
17 consequent rise in pressurizer level.

18 Q Am I misremembering your prior testimony?
19 Didn't you testify earlier today that you did know
20 that?

21 A I knew that before the accident at Three
22 Mile Island Unit 2.

23 Q Did you know prior to the accident at
24 Three Mile Island that operators at TMI used
25 pressurizer level as at least one indicator of system

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2 inventory?

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A It was the primary indicator of system inventory I think it would be safe to say.

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Q Isn't it correct, however, that if the result of bulk boiling in the reactor coolant system was to lead to high pressurizer level, that pressurizer level would not in such a situation be an accurate indicator of inventory?

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MR. SELTZER: Are you asking him if that was something that came into his mind while he was at Three Mile Island before the accident?

MS. WAGNER: First of all, I would like to ask him if he agrees now with that statement.

MR. SELTZER: I think even under your interpretation of the Davis Polk & Wardwell rule, that would not be a permissible area of inquiry.

MS. WAGNER: I think it would be since you waived your objection. However, why don't we start with whether he thought that prior to the accident.

(Record read.)

Q Did you ever know prior to the accident that when the reactor coolant system was in a bulk

boiling mode the pressurizer level was not an accurate indicator of system inventory?

MR. SELTZER: Are you asking him did this come into his mind while he was at Met Ed?

MS. WAGNER: Yes.

A The answer to that would have to be no.

Q Whether or not you recall having a specific thought to that effect, is that something you knew just as you knew what you have previously testified that the result of boiling in the reactor coolant system would be a rise in pressurizer level?

A Yes.

Q Do you know what during normal operations is the normal pressure of the steam generator at the reactor at TMI-2?

A Primary or secondary side?

Q Steam generator pressure.

A Main system pressure?

Q Yes.

A It is variable with power level from about 900 to 925 pounds per square inch.

Q What was the normal operating temperature of the steam generator at TMI-2?

A 592 degrees Fahrenheit.

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Q Did the steam generator during normal operations operate in a saturated mode?

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A Portions of it did.

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Q Do you recall what was the normal operating pressure of the pressurizer at TMI-2?

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A In the B&W supplied system, there is no indicator of pressurizer pressure supplied.

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Q Whether or not there is an indication of it, do you know what the normal operating pressure in the pressurizer was?

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A Only from what I have been told by B&W.

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Q What did they tell you?

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A It is effectively the same pressure as loop pressure, which is hot leg pressure.

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Q Am I correct that you previously testified that was 2200 psig in normal operation?

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A Yes.

19

Q Do you know what the normal temperature was in the pressurizer during normal operations?

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A I already testified to that question, too, this morning, 647 degrees Fahrenheit.

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Q That was the temperature in the pressurizer?

24

A Yes.

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Q Did the pressurizer normally operate in a

2 saturated mode?

3 A Normally, yes.

4 Q Do you know if the operators at TMI-2
5 while you were supervisor of operations had any
6 knowledge as to under what conditions a bubble could
7 be transferred out of the pressurizer and into
8 some other portion of the reactor coolant system?

9 MR. SELTZER: You are asking him whether
10 before the accident he knew whether they knew
11 what you have just asked?

12 MS. WAGNER: That's right.

13 A I don't know.

14 Q Before the accident, did you have any
15 belief as to whether it was important or not important
16 that they know this, that they know the conditions
17 under which the bubble could be transferred?

18 A To the best of my recollection, B&W never
19 spoke about transferring bubbles out of pressurizers,
20 and, therefore, it was not a highlight of the training
21 program.

22 Q Regardless of whether it was a highlight
23 of a B&W training program, did you have any understanding
24 or opinion as to whether it was an important thing for
25 operators to know?

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2 MR. SELTZER: Isn't that the same question
3 you asked him seven or eight minutes ago about
4 whether a phenomenon had ever entered his
5 mind?

6 MS. WAGNER: I believe that we have had
7 testimony that there are at least two ways of
8 transferring a bubble, and I think his prior
9 testimony today related to only one such fashion.
10 I believe he gave testimony yesterday about another
11 circumstance.

12 A Your question centered on my knowledge or
13 understanding as I remember the question, so I respond
14 to my understanding of the question.

15 Q The question is did you think prior to
16 the accident that it was important for the operators
17 to know under what conditions a bubble would shift
18 from the pressurizer to some other portion of the
19 reactor coolant system?

20 A Prior to the accident at Three Mile
21 Island, the question was never phrased that explicitly.
22 Therefore, I cannot testify to what I thought about
23 that question before the fact.

24 Q Just so the record is clear, I believe
25 that yesterday you testified about a situation in which

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as a result of overfeed in the secondary side, primary side would cool down, and if you allowed it to cool down beyond a certain point, the pressurizer would empty and the steam space would go into the reactor coolant system. Regardless of what you testified yesterday, is that an accurate statement of an understanding you had prior to the accident?

A Yes.

Q When I asked you previously whether you knew whether operators knew about the shifting of the bubble phenomenon, were you addressing both what you have described this morning and what I just described, or were you only addressing the previous situation?

MR. SELTZER: I don't understand. What is the previous and what is the current situation?

Q Were you addressing both situations?

MR. SELTZER: Why don't you ask about each situation separately and then the record will be clear, instead of making it a compound question?

Q Did you have any knowledge prior to the accident as to whether or not operators knew that in an overcooling situation the bubble could leave the pressurizer because the pressurizer emptied?

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A I do not know if that was part of the operator's knowledge or not, other than my own.

Q Did you think it important that they know about that phenomenon?

A Had it been asked as explicitly as you are asking it this morning, I am sure it would have been emphasized.

Q Had you ever encountered in real life any instance of that phenomenon?

MR. SELTZER: You mean had he ever been working on a reactor system that had drained the pressurizer dry and pushed the bubble out of the pressurizer?

MS. WAGNER: Had he ever heard of that happening someplace in a real nuclear reactor whether or not he was actually present?

A There was some concern that that might have happened at TMI-2 in one of our transients, but an analysis by B&W showed that it did not take place.

Q Why was there concern about it?

A The concern was at the engineering level, not at the operator level, because at the engineering level I think we understood some of the

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ramifications of that.

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Q Do you know if the control room at TMI-2 contained steam tables prior to the accident?

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A It is my belief that a set of steam tables was kept in the control room before the accident.

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Q Did you know prior to the accident how to use steam tables?

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A Yes.

Q Did you know whether or not the TMI-2 operators knew how to use steam tables?

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A It was instructed by the training department. Whether the instruction was effective or not, I don't know.

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Q Were you familiar prior to the accident with the high pressure injection system at TMI-2?

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A Yes.

Q Is it correct that high pressure injection would be automatically actuated at an RCS pressure of 1640 psig?

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A And decreasing, yes.

Q Is there any other actuation set point for automatic actuation of HPI?

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A Four pounds reactor building pressure rising.

Q Do you know or did you know prior to the

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2 accident why there was a set point based on reactor
3 building pressure?

4 A I have a belief. I don't know that it
5 is knowledge, but it was my belief that it was to
6 provide redundancy.

7 Q Do you have any understanding of how it
8 would provide redundancy?

9 A On either a loss of coolant accident or
10 a main steam system break inside the reactor building,
11 it may either be the first signal or an immediate
12 backup signal to trip the reactor.

13 Q When you say "the signal," do you mean the
14 reactor building pressure signal?

15 A Yes.

16 Q Is that because on a loss of coolant or
17 a steam leak inside the reactor building, inventory
18 will go into the reactor building and increase its
19 pressure?

20 A The increasing reactor building pressure
21 is not a function of increase in reactor inventory as
22 it is with energy.

23 Q Why does energy increase in the reactor
24 building?

25 A The air is being heated by the hot steam.

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Q Were you aware of any discussion at either Metropolitan Edison or General Public Utilities prior to the accident with regard to elimination of the 1640 psig HPI actuation set point?

A I was not aware of any such discussions.

Q Did you have any understanding prior to the accident at Three Mile Island as to whether the TMI-2 operators knew that a B&W pressurized water reactor during normal operations was not supposed to be run in a saturated fashion? And when I say "saturated fashion," I mean did they know that the reactor coolant system in the primary system outside the pressurizer was not intended during normal operations to be in a bulk boiling mode?

MR. SELTZER: You are asking him did he know whether the operators knew this?

MS. WAGNER: Yes.

MR. SELTZER: I object. No foundation that the operators and he discussed this.

MS. WAGNER: If he doesn't know, he doesn't know.

A In the normal operating mode, I believe the operators understood that the reactor protection system prevented the condition that you describe.

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Q Did you have an understanding prior to the accident of why the reactor protection system would prevent such operation or did prevent such operation?

A Yes.

Q What was that understanding?

A It comes back to the bulk boiling question.

Q Can you be more specific?

A It is also tied to the large LOCA where the core does become at least partially uncovered and the need to quench a Zirc water reaction, which may take place.

Q Is it your testimony that the reactor protection system prevented operating in a saturated mode because of the problems associated with bulk boiling in the reactor coolant system?

A That is at least part of my answer, yes.

Q What was your understanding of the problems of operating in such a mode?

MR. SELTZER: You are talking about problems of normal operation generating electric power?

MS. WAGNER: I am talking about the

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2 problem during normal operation having
3 a system operated in the bulk boiling
4 fashion.

5 MR. SELTZER: You are asking for his
6 understanding before the Three Mile Island
7 accident?

8 MS. WAGNER: Yes.

9 A That condition is routinely tolerated in
10 the boiling water reactors, and, therefore, I don't
11 think I can briefly explain why it is not allowed in
12 pressurized water reactors.

13 Q Can you explain it at some length?

14 MR. SELTZER: I don't think it is
15 appropriate to get into a lecture on the
16 mechanics of a system. If you have a more
17 specific question, maybe that would be more
18 to the point.

19 Q My question is did you know prior to the
20 accident why you weren't supposed to run a B&W
21 reactor with boiling in the RCS.

22 A I must quibble with your use of the
23 word "boiling."

24 Q I am referring to bulk boiling.

25 A Thank you. The condition of no net

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steam generation from the core exit which is a condition that precludes bulk boiling was established to limit clad temperatures and hence center line fuel temperatures.

Q Did you have an understanding prior to the accident of why the system was designed to limit the temperature on the fuel cladding?

A Yes.

Q What was your understanding?

A It is a dual concern. The heat removal from the surface of the cladding is done much less efficiently with steam as a heat sink than water as a heat sink, and hence the cladding itself if it gets too hot, it could possibly fail, and at the same time the cladding temperature is rising, the center line fuel temperature and all other fuel temperatures as well will also be rising and could lead to center line melting of the fuel.

Q Were you aware prior to the accident that the B&W reactor was designed to trip on a variable temperature pressure curve?

A Yes.

Q Did you have an understanding prior to the accident of why the variable temperature-pressure

2 trip was available?

3 A Yes.

4 Q What was your understanding?

5 A To limit the departure from nucleate
6 boiling or prevent the departure from nucleate
7 boiling.

8 (Continued on following page.)

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Q In the reactor coolant system?

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A Yes.

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Q Prior to the accident, were you familiar with the low pressure injection system?

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A Yes.

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Q What was the purpose of the low pressure injection system?

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A To deliver a large volume of cold water to keep the core covered with a large reactor coolant system break.

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Q Was there any relationship, did you understand prior to the accident that there was any relationship between the purpose of the low pressure injection system and the purpose of the high pressure injection system?

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A Yes.

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Q What was your understanding?

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A Those two systems coupled with the core flooding tanks theoretically, but not in reality, protected us from a spectrum of break sizes, and that is so stated in the FSAR.

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Q Why do you say theoretically but not actually or not in reality?

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A After the unit was in operation and we

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2 operators, and I include myself with all licensed
3 operators on TMI-2 at this point, thought we were
4 protected by the transient analysis provided by
5 Babcock & Wilcox until they came out with their
6 modifications for the small break LOCA.

7 At that point in time we recognized that we
8 had been vulnerable and we had not had the protection
9 that had been insured by the vendor.

10 Q Which guidelines for small break LOCA are
11 you referring to?

12 A The ones that we incorporated into our LOCA
13 procedure, the administrative controls which involved
14 cross-connection of HPI discharge.

15 Q Did you have an understanding when you
16 discovered or heard about the new small break
17 instructions of what were the conditions for which you
18 had not previously been protected?

19 A Yes.

20 Q What were those conditions?

21 A It was a break of limited size with a
22 failure of one of the two high pressure injection pumps
23 to deliver water to the reactor coolant system for
24 whatever reason.

25 Q In some break of limited size, one HPI pump

1
2 was not going to be sufficient? Is that what was
3 discovered?

4 A Yes.

5 Q Did you have an understanding as to why in
6 such situations the lack of protection would not be
7 compensated for by the low pressure injection system?

8 A The vulnerability was not to all break sizes
9 but only to certain break sizes. Had the break gotten
10 bigger, then the low pressure injection system could
11 have protected us, but it was a very limited range of
12 break sizes for which we were not protected.

13 Q Is that because for that limited range of
14 break sizes, the system would not depressurize to the
15 point of low pressure injection?

16 A Yes.

17 Q Did you have any understanding of why the
18 system would not depressurize to that point?

19 A The break was not big enough to allow the
20 system to depressurize.

21 Q Wouldn't it be true that any size break,
22 if you just let it go, all the water would go out
23 eventually?

24 A If you are not feeding it.

25 Q So why wouldn't the system depressurize?

1
2 A It would, if you are not feeding, but if
3 you have one HPI pump running, you are feeding the leak.

4 Q But I take it you understood that in that
5 situation you weren't feeding the leak enough, because
6 if you were, then you wouldn't be unprotected, isn't
7 that correct?

8 MR. SELTZER: In other words, you are asking
9 before they got the instruction from B&W to
10 cross-connect the high pressure injection lines,
11 did he have an understanding that there wasn't
12 enough HPI fed in to cover the leak?

13 MS. WAGNER: That's right.

14 A I have lost my train of thought.

15 Q I believe --

16 MR. SELTZER: I think it is going to take
17 probably more than a few questions to finish
18 this off. Do you want to take a short recess?

19 MS. WAGNER: Let me try to do it in a couple
20 of questions.

21 Q I believe it is your testimony that there
22 is a certain range of break sizes for which one HPI pump
23 would not provide sufficient water to provide you
24 protection. Is that correct?

25 A Yes.

1
2 Q If one HPI pump would not provide
3 sufficient inventory, why would the system not
4 depressurize to the low pressure injection set point?

5 MR. SELTZER: Do you mean why wouldn't it
6 depressurize before the core had uncovered and
7 there was fuel damage?

8 MS. WAGNER: No. Why wouldn't it
9 depressurize to the set point of low pressure
10 injection?

11 MR. SELTZER: Ever? Before the end of time?

12 MS. WAGNER: The witness has testified that
13 the system would not so depressurize, and I am
14 asking him why.

15 A You are forcing me to a conclusion which
16 seems logical but I am not sure it is applicable, and
17 that is to get me to saturation in the reactor coolant
18 system.

19 MR. SELTZER: I wouldn't assume what she is
20 trying to get you to. I didn't hear her suggest
21 that.

22 A I do not believe that was my understanding
23 of the reasons for the small break LOCA change.

24 Q Can you tell me what was your understanding?

25 A No.

1
2 Q Because you don't recall it or because
3 you didn't have one?

4 A Because I don't recall it.

5 (Recess taken.)

6 BY MS. WAGNER:

7 Q Do you recall during the time you were
8 supervisor of operations for either unit at TMI,
9 whether there was training administered to reactor
10 operators of one unit concerning events which occurred
11 at the other unit?

12 A Are you now leaving the small break LOCA
13 issue?

14 Q Yes.

15 A I would like to add to one of my previous
16 answers before we leave that area to make the record
17 complete. That is, on the answer where I referred to
18 the fact that the FSAR said we were protected from all
19 breaks until the small break LOCA came along, we then
20 assumed we were protected in all breaks again, but we
21 were still deceived by B&W in that we were not protected
22 from small breaks at the top of the pressurizer and the
23 indications that would result from that break.

24 I think that would make my previous answer
25 complete.

1
2 Q Are you testifying that if a break occurred
3 at the top of the pressurizer, the system was not
4 designed to withstand that break?

5 A If you include in your definition of
6 system the procedures, then that is true. That combined
7 system of hardware plus paper was not designed to handle
8 that break because the LOCA procedures supplied by B&W
9 gave misleading symptoms for that break.

10 Q What was it about the procedure that would
11 result in the system being unprotected in the event of
12 a break at the top of the pressurizer?

13 A The operator was told, instructed through
14 the procedure to expect a decreasing pressurizer level
15 when in fact it was an increasing pressurizer level, so
16 he would get into the wrong procedure for that break.

17 Q How, if he got into the wrong procedure, was
18 the system not protected in the event of that break?

19 A Depending on which procedure he then
20 thought he was in, he could do something that was
21 detrimental to the system.

22 Q What procedure would he be in?

23 A I don't know.

24 Q Was it your understanding prior to the
25 accident that the system was protected against small

1
2 breaks even if operators deliberately turned off all
3 redundant HPI trains?

4 MR. SELTZER: Turned it off at what point?

5 MS. WAGNER: At the time of the break.

6 A The operators had no procedures which would
7 allow them to do that.

8 Q Was it your understanding that the system
9 would be protected if in the event of a small break for
10 some reason the HPI system was disabled because it fell
11 apart or a bomb hit it or something?

12 A It is my belief that the first line of
13 defense in a nuclear plant control room is the reactor
14 plant operators, and they operate by properly approved
15 procedures, and as such, I would not expect the plant
16 to be designed against sabotage or whatever you are
17 referring to.

18 Q So is it correct that it was your
19 understanding prior to the accident that if for some
20 reason no HPI was available, the system would not
21 necessarily be protected in the event of a small break?

22 A That is true.

23 Q Do you recall whether prior to the accident,
24 operators in one unit were ever given training in
25 occurrences, reportable occurrences, at the other unit?

1
2 A For those of us who were cross-licensed, it
3 was mandatory that we be trained on both units, so your
4 question only has relevance if applied to the people
5 who were not cross-licensed, but it is my belief that
6 all licensed people at TMI were cross-fertilized in
7 the other unit.

8 Q Were you aware in 1977 of a proposal that
9 TMI-2 operators be given an hour's worth of training
10 in previous reportable occurrences at TMI-1?

11 A I don't recall that instance.

12 Q I would like to show you a document which
13 has been previously marked as B&W 72. I would like to
14 show you at the same time a memorandum which has been
15 previously marked B&W 73, which relates to the same
16 subject as B&W 72.

17 Have you seen B&W 72 before?

18 A I don't recall having seen B&W 72 before.

19 Q Do you recall having seen B&W 73 before?

20 A No.

21 Q I will note for the record that your name
22 appears on both as a recipient of a carbon copy.

23 B&W 72, the subject of B&W 72 is
24 "Incorporation of Unit 1 and other plant operating
25 experience into the Unit 2 training effort."

1
2 In the second paragraph of the document,
3 there is a question asked, "In other words, could you
4 devote maybe one hour of training or less to talking
5 about some of the significant things that happen
6 industrywide as they might be relative to Unit 2 in the
7 training program?"

8 Do you recall ever having discussions with
9 anybody concerning training of one hour or less about
10 significant industrywide things?

11 MR. SELTZER: Do you mean in addition to
12 what he said earlier about Unit 2 people being
13 trained on Unit 1 occurrences?

14 MS. WAGNER: That's right.

15 A It is my recollection that during some of
16 my requal training, I heard such lectures being given,
17 and they were not limited to one hour or less. If there
18 was enough material, the self-study time was reduced
19 to the extent that it impinged on the discussions which
20 were applicable.

21 Q B&W 73 says, "A minimum one-hour training
22 program is being prepared covering industry experience,
23 Unit 1 experience, and reportable occurrences from
24 similar units."

25 Do you remember the training described here

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2

or is it what you described in your previous answer?

3

A I think I described both at once.

4

5

Q The paragraph indicates that Nelson Brown will conduct the course on certain dates. Do you know who Nelson Brown is?

6

7

A He was a Met Ed or GPU employee in the training department.

8

9

10

Q Do you recall his giving lectures on this subject?

11

A No.

12

13

14

Q During the time you were supervisor of operations for either unit, did you ever see documents entitled technical data reports?

15

16

A Yes, because it rings a bell. I recall TDR's, and it seems to fit.

17

Q Do you recall what TDR's were?

18

A No.

19

20

Q Do you recall how often you used to see them?

21

A No.

22

Q Do you recall what their subject was?

23

24

A Their title is fairly suggestive but I don't recall.

25

Q Do you ever recall receiving training

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2

concerning a TDR?

3

A I have no recall of such a thing.

4

Q Do you recall knowing what topical reports

5

were?

6

A Yes.

7

Q What are topical reports?

8

A The ones I remember were issued by B&W in

9

the 1-WW-O-XX series.

10

Q What is a topical report?

11

A It was usually used as a tool to convey

12

technical information and data to the Nuclear Regulatory

13

Commission.

14

Q Under what circumstances would you see such

15

a report?

16

A I learned about their existence fairly early

17

on in my training program with B&W. I recognized their

18

value and sought them out.

19

Q What was their value?

20

A It was an in-depth analysis as opposed to a

21

condensation or summary of that analysis which is what

22

would normally appear in the FSAR or in fact the whole

23

document could have been incorporated in the FSAR by

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reference.

25

Q Where did you go to get them?

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A We kept a file of them in the central office under that title, and so I knew which file drawer to go to to find them.

Q Is this the central office at Three Mile Island?

A Yes.

Q Is that in a building or in a trailer? Did it move?

A It moved also.

Q Do you ever recall seeing safety department summaries?

A No, I do not.

Q Do you recall knowing what they are?

A . No.

Q Did you ever, while you were supervisor of operations for either unit, review on a periodic basis documents which concerned reportable events at other plants?

MR. SELTZER: Is this different from the questions yesterday about LER's?

MS. WAGNER: Yes, documents other than LER's.

A Your use of the word "ever" and "periodic" in one question leads me to great consternation.

1
2 Q Was it part of your job routine as a
3 supervisor of operations to review such documents?

4 MR. SELTZER: You mean documents other than
5 LER's or summaries of LER's?

6 MS. WAGNER: Documents other than LER's
7 because I don't believe we discussed summaries of
8 LER's yesterday.

9 A I don't believe it was part of my job
10 description to do so, but it was part of my personal
11 desire to stay abreast of the industry to read what I
12 could get my hands on.

13 Q What could you get your hands on?

14 A It varied from day to day.

15 Q Can you give me any idea of the things you
16 got your hands on more frequently than other things?

17 A No, I don't recall.

18 Q Do you ever recall seeing a publication
19 entitled "Current Events - Power Reactors"?

20 A Yes.

21 Q Is that a document which you saw regularly?

22 A No.

23 Q How often do you think you saw it; once a
24 year, ten times a year?

25 A I can't remember.

1
2 Q Did you ever see a document entitled
3 Nuclear Power Experience?

4 A Yes.

5 Q Do you know how often you saw that?

6 A No.

7 Q What was it?

8 A It was a summary generated by someone about
9 experience at nuclear power plants.

10 Q Do you recall that it would have descriptions
11 in it or did have descriptions in it of transients at
12 other plants?

13 A My memory of it is not that accurate.

14 Q Do you recall that Current Events - Power
15 Reactors discussed transients at other plants?

16 A My memory is not that detailed.

17 Q When you were reviewing these documents, was
18 it part of your purpose to gain information about
19 transients at other plants?

20 A I cannot recall if that was my desire.

21 Q Do you recall, what was your purpose in
22 reviewing these documents?

23 A Personal information.

24 Q Did you ever tell anybody else about something
25 that you read in one of these reports?

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A I have no specific recall of any such communication, but if it applied to us, I would have discussed it with the operators.

Q When you say "if it applied to us," do you mean if it concerned the TMI plants or if it was something that could be relevant to the TMI plants?

A Something that could be relevant to the TMI plants.

Q Do you ever recall seeing an Atomic Energy Clearing House document?

A Yes.

Q What was that?

A It was one of the thicker reports that came around, as I remember, and it was usually routed to us at least for periods of time for department heads to read and initial.

Q Do you recall if that document ever contained information about transients at other plants?

A I cannot recall any specific examples, but I believe it did.

Q Prior to the accident, were you familiar with meetings known as users' group meetings?

A Not from firsthand knowledge, but I knew they were taking place.

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Q What were users' group meetings?

3

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A It was my understanding that the utilities who had purchased B&W reactors had formed this group as an exchange of information center.

6

7

Q Do you recall who, if anybody, from Three Mile Island attended these meetings?

8

9

A Normally the station superintendent or, in his absence, a unit superintendent.

10

11

12

Q During the time you were supervisor of operations for Unit 2, who was the station superintendent?

13

14

15

A I can't keep the years straight when Mr. Herbein left and when Mr. Miller became station superintendent.

16

17

Q Was Mr. Miller station superintendent until the time of the accident?

18

19

20

A He may have had a title change before the accident, but I don't recall when that would have taken place either.

21

22

Q Who was the unit superintendent for Unit 2 while you were operations supervisor?

23

24

25

A I think initially it was Gary Miller, and then it was Jim Seelinger in an acting capacity, and then it was Joe Logan.

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Q Did you ever discuss with any of these people users' group meetings?

A The normal flow of information was that the person who was at the meeting would write some notes and circulate them for our use. Whether any of those notes stimulated discussion, I don't recall.

Q Do you recall seeing such notes?

A Yes.

Q Did you read them?

A Yes.

Q Do you recall ever having any questions about them?

A I have no specific recall.

Q Do you recall ever speaking with anybody at another plant about a transient which occurred at that plant?

A I can recall no specific conversations that would meet those conditions.

Q Do you recall generally that this is something you did on occasion?

A I was on occasion in contact with people at other plants, usually counterparts of my own title, and the subjects were not restricted to transients or anything else but just how are things going there, how

1
2 are things going here, type of things.

3 Q Did you have regular meetings with people
4 who were supervisor of operations at other plants?

5 A No.

6 Q Did you know prior to the accident of an
7 entity called the Owners' Group?

8 A I don't recall such a group.

9 Q I take it then you were not a participant
10 in such a group, as best you can recall?

11 A No.

12 (Continued on Page 207)

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Q Do you ever recall any change in procedures at TMI-2 based upon a transient occurring at another plant, prior to the accident?

A I understand "prior to the accident." It is "ever recall." Now I am trying to recall a recall, and it gets very difficult. No, I do not.

Q Do you recall that after procedures were put in place for either one of the units any changes ever being made in them?

A Yes.

Q Do you recall if there was any type of information which would generally motivate such changes?

A I don't think I can limit it to any one category of things that prompted changes.

Q I believe that you testified yesterday that you were involved to some extent in the promulgation of procedures for TMI Unit 1, is that correct?

A Yes.

Q What was your role in that effort?

A I was a member of PORC and as such in Unit 1 I reviewed almost all of the procedures as a PORC member. Some of the people working for me were

1
2 tasked with preparing balance of plant procedures,
3 review and possible revision of B&W draft procedures
4 on the nuclear steam supply system, and so the
5 administration of that work was also part of my
6 responsibility in Unit 1.

7 Q Do you recall ever writing any procedure
8 yourself?

9 A Yes.

10 Q Do you remember which ones or one you
11 wrote?

12 A I think I was the first author of AP-1012,
13 which was shift relief and log entries. I imagine
14 I was the author of many revisions to many procedures,
15 but I can't tell you specifically which ones.

16 Q Did you have any procedure by which you
17 would author revisions to procedures?

18 A Yes, in order to change an approved
19 procedure, there were two possible routes. A temporary
20 change notice called a TCN and a permanent change
21 review, PCR. The normal mode, the preferred mode,
22 was to make a permanent change in the procedure. There
23 was a form invented for doing this. Instructions
24 were promulgated on how to fill out the form, and the
25 flow of the paper through the completed updated

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procedure. The need arose to change procedures in a much more expeditious fashion, and so the temporary change notice was invented which accomplished the same steps in a more expeditious manner and was subject to more thorough review after the fact within the next seven days, and again instructions were promulgated on how to fill out that piece of paper and the flow path of that piece of paper and how to implement the change on a temporary basis until the procedure could be retyped.

12

Q Do you ever recall being aware that a

13

temporary change notice to a procedure was put into effect?

14

15

A Yes.

16

Q Under what circumstances would the need

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for speed be such that you would use the temporary

18

change notice as opposed to the permanent change

19

review?

20

A It could be something as simple as a

21

typographical error in the final product and we are

22

out in the field trying to conduct this procedure,

23

and it needs to be changed before we can proceed.

24

Q I would like to refer you to the testimony

25

which you gave before the President's Commission

1
2 which was identified yesterday, specifically to page
3 20 and line 20, actually line 18. There was a
4 question.

5 "Question: Who on site would have been
6 involved in that review?" And I believe that review
7 refers to review of procedures.

8 And the answer is, "The plant operations
9 review committee has that responsibility. There
10 may have been several of the emergency procedures that
11 I personally wrote."

12 Do you recall being asked that question
13 and giving that answer?

14 A No, I do not.

15 Q Would there be any method today of
16 ascertaining whether you had personally written an
17 emergency procedure?

18 MR. SELTZER: When you say "personally
19 written," do you mean written from scratch
20 as opposed to reviewed and revised something
21 that B&W had initially drafted?

22 MS. WAGNER: I am referring to the witness'
23 prior testimony.

24 MR. SELTZER: That doesn't help a great
25 deal if the witness says he doesn't recall giving

1
2 it. I am asking you since you have made it
3 your question whether you are talking about his
4 writing from scratch or working from something
5 that B&W has first written?

6 MS. WAGNER: I would like to read in in
7 response to your comment a previous question
8 and answer. The question is, "Who drafted the
9 initial operating and emergency procedures for
10 Unit 1?"

11 "Answer: Those that were in B&W's scope
12 of supply would have had the first draft written
13 by B&W and then massaged rather severely by
14 our staff. Those outside the B&W scope of
15 supply would have been drafted by our people
16 initially."

17 BY MS. WAGNER:

18 Q Do you recall being asked that question
19 and giving that answer?

20 A No, I do not.

21 Q The testimony would indicate that B&W
22 provided draft procedures and that then they were
23 massaged severely.

24 Do you recall that happening?

25 A No, I do not.

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Q Do you have any reason to believe that you did not give the testimony I have read into the record?

A No, I do not.

Q Do you have any reason to believe that the testimony when you gave it was not truthful?

A My choice of words was probably dictated by the mental state which I was in in a first time under oath situation with twelve rather formidable people facing me, and with hindsight was probably a poor choice of words, but those are the words on that record, but I would like to change them and they should probably be changed.

Q I take it when you were responding to that question, you were to the best of your understanding responding truthfully?

A Yes.

Q I believe I asked you a question if there were any procedures, emergency procedures, which you personally wrote, could one ascertain now which ones those were, and I will start out asking the question, if you had written any from scratch, could one ascertain that information?

A While this statement that you referred to

2 on line 22, the emergency procedures that I personally
3 wrote, was probably and to the best of my recollection
4 was accurate on the day I gave it, there is much
5 in this testimony that in hindsight and with additional
6 facts that have come to light, I would like to change
7 and go on the record and now say that that was just
8 plum wrong, but at the time I gave it, it was to the
9 best of my ability.

10 I have no recollection now that I ever
11 personally wrote an emergency procedure, and it would
12 be very difficult, the historical file maintained
13 on all procedures in the plant are the final approved
14 copy, and we can go back in time to the files that are
15 available at TMI, and we can say this procedure was
16 changed on this date in this way and that these are
17 the people who reviewed that change, but we could not
18 find out who the author of that change was, unless
19 we could have the PCR or the TCN attached to it, in
20 which case, the author would be known.

21 On initial draftings, there were not PCR's
22 or TCN's, so for changes you could identify the author
23 but for what we consider our initial draft, I don't
24 believe it identified the author.

25 Q I believe you testified previously that

2 you think you were the author of AP-1012, is that
3 correct?

4 A Yes, I remember that to the best of my
5 recollection today.

6 Q To the best of your recollection, when
7 you authored that procedure, did you sign it in any
8 fashion? Put your name on it so someone would know
9 that you had authored it?

10 A No.

11 Q Is there any information which has come
12 to your attention since the time when you gave the
13 testimony to the President's Commission based upon
14 which you no longer believe your answer concerning
15 your authoring emergency procedures is correct?

16 A I don't know that I even said that it was
17 incorrect here. I just said that I have no recall
18 that would allow me to substantiate that statement.

19 Q And, therefore, you don't have any
20 information presently indicating that it is not
21 correct?

22 MR. SELTZER: I don't think it should be
23 stretched out of recognition with what his
24 original words were. He says there may have
25 been several emergency procedures that he

1
2 personally wrote in. He didn't say there were
3 any emergency procedures that he wrote.

4 MS. WAGNER: I am asking if he has any
5 information now to indicate that what he said
6 previously was incorrect.

7 MR. SELTZER: "May" includes both the
8 possibility that he did write them and that he
9 didn't write them, so it is hard to imagine a
10 state of facts that would be inconsistent
11 with that statement.

12 MS. WAGNER: If he now knows that he
13 didn't write them, that state of facts would
14 be inconsistent with the statement he gave
15 previously. If he now knows that, I would like
16 to know if he has information about that.

17 A I do not have such information.

18 Q I would like to refer to page 21 of your
19 testimony before the President's Commission to line
20 9. The question is, "The drafts that B&W sent you,
21 were they actually drafts of procedures or more like
22 outlines?"

23 "Answer: Some people may consider them
24 procedures. They have the necessary steps which had
25 to be accomplished, the 'how to' accomplish this

1
2 step was probably not in sufficient detail to satisfy
3 us, so we would go through and add the proper valve
4 numbers on the 'h w to' end of it to make it workable
5 and readable for the operator to take into the field and
6 actually do it. And this was true of operating
7 procedures as well as emergency procedures."

8 Do you remember being asked that question
9 and giving that answer?

10 A No, I do not.

11 Q Do you recall the process which is
12 described in that answer?

13 A Yes.

14 Q Do you recall whether the Nuclear Regulatory
15 Commission was in any way involved in review of the
16 procedures for TMI-1?

17 A The Nuclear Regulatory Commission at the
18 King of Prussia level had to make a declaration to
19 the NRC Washington-Bethesda level that our procedures
20 were adequate to operate the plant prior to the
21 issuance of an operating license. In order for them
22 to make that statement, they came into the field and
23 at least made a spot check of some procedures, if
24 not all, and the statement by the NRC people in King
25 of Prussia to the NRC in Washington is a tacit approval

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of all those procedures since they think the plant
can be safely operated by the use of those procedures.

3

4

Q And you recall that process occurring
with respect to the TMI-1 procedures?

5

6

A Yes.

7

Q Although the government agency was
probably the AEC at that point?

8

9

A Yes.

10

Q For the TMI-1 procedures after a B&W draft
was received, what were the various -- who were the
various groups of people or who were the various persons
who worked on those procedures?

13

14

A I don't remember.

15

Q Do you recall to whom the draft would
initially go?

16

17

A It was probably forwarded, but it is a
probably. I don't know.

18

19

Q I am asking you for a position rather
than a specific person, if that helps at all.

20

21

A I vaguely recall that the procedures were
sent from B&W to the plant superintendent.

22

23

Q Do you recall ever seeing a B&W draft?

24

A Yes.

25

Q Do you recall where you got it from?

2

A No.

3

Q Do you recall what you did with it?

4

A Probably reviewed it.

5

Q Do you recall ever making any changes

6

on any such draft?

7

A This testimony which I gave in front of

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the President's Commission about adding valve numbers

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and pump numbers and names and clarification of

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terminology from what might have been B&W terminology

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to our terminology was traditionally accomplished, and

12

I am sure I had a hand in that at some point along

13

the line. But if you are talking about substantive

14

changes, then that is a different story.

15

Q Did you give substantive review to any

16

draft procedures from B&W?

17

A To the best of my ability, yes, but I did

18

not have an independent safety analysis to work from

19

on the emergency procedures.

20

Q How did you give it a substantive review?

21

A By knowing what I could learn about the

22

transient analysis that supported that procedure to

23

see that the mitigating circumstances were taking

24

place in the procedure.

25

Q And you believe you did that on occasion?

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A Yes.

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Q Did you ever have occasion to speak with engineers at General Public Utilities about review of these procedures?

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A In Unit 1, General Public Utilities engineers did not take a very large measure of activity in the review of procedures. It was primarily a Met Ed evolution.

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Q I would like to show you what has been previously marked as B&W 418, which is a draft of a loss of coolant procedure.

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A No, I have no such recollection.

Q Do you recall being aware at any time prior to the accident at Three Mile Island that it was possible for the initial symptoms of a transient to resemble more than one transient and, therefore, initially it would be difficult to tell which of two transients you had?

A Yes.

Q Do you recall any specific instances of such a situation?

A We trained diligently on differentiating between a loss of coolant accident, a steam line

1
2 break inside the reactor building, and a dropped
3 control rod since all lead to decreasing reactor
4 coolant system pressure and level as we thought of
5 in those days.

6 (Continued on following page.)
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Q So you thought it was possible the operators could get confused by the initial symptoms?

A There were unique symptoms for each, but there were also two redundant symptoms for each, so we trained on the differences.

Q I would like to refer you to the third page of B&W 418 under the section entitled "Description." There is a sentence at the end of the second paragraph which says, "However, the operator should assume the cause of the symptoms described above is a system rupture or leak unless another cause can be immediately established."

Do you recall ever being aware that this sentence was in the draft B&W procedure for a loss of coolant?

MR. SELTZER: I thought he said he didn't recall ever seeing this draft procedure.

MS. WAGNER: I am asking was he ever aware this was in the draft procedure, whether he saw it or not.

MR. SELTZER: The second question is subsumed in the first.

MS. WAGNER: No, someone could have told him about it.

2 A I have no recollection of this sentence
3 being in this draft.

4 Q Do you have any recollection as to why this
5 sentence was removed from the procedure which was
6 eventually put into operation at TMI-1?

7 MR. SELTZER: Objection. No foundation.

8 MS. WAGNER: You direct him not to answer?

9 MR. SELTZER: I didn't hear me say that.

10 Q Would you answer it, please?

11 A I have no such recollection.

12 Q Do you recall that that sentence is not
13 or was not in the procedure for operation of TMI-1
14 prior to the accident at Three Mile Island?

15 A No, I was not aware of the omission.

16 Q Do you recall ever being given any training
17 by Metropolitan Edison to the effect that if you do
18 not know which of the three things you had, a reactor
19 coolant leak, a steam break, or a dropped rod, that
20 you should assume that it was a leak?

21 A I have no recollection that said the
22 operator wouldn't know. I think we worked on the
23 premise that we could tell.

24 Q What was the unique symptom or what were the
25 unique symptoms for a loss of coolant?

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A Radiation in the reactor building.

3

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Q How was the operator to determine radiation in the reactor building?

5

A Either of several methods.

6

Q Can you describe them for me?

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A Basically, a GM detector in the dome of the reactor building, and we also had a particulate iodine and gaseous radiation monitor on the atmosphere of the reactor building.

11

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Q Do you recall having an understanding with respect to the unique symptoms of the loss of coolant as to at what time in the development of a loss of coolant event these monitors were supposed to alarm?

15

16

A I don't recall a time or time delay being stressed.

17

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19

Q Do you recall understanding that the monitors would immediately alarm if there was a loss of coolant?

20

21

A I don't recall the immediacy of the radiation alarms.

22

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Q Was it your understanding then of the list of symptoms for a loss of coolant, all of the symptoms did not have to occur simultaneously in order for there to exist a loss of coolant?

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2 MR. SELTZER: I object. We don't have in
3 front of us the loss of coolant accident
4 procedure that you are talking about. I don't
5 know if you are talking about one procedure in
6 1971, Unit 2's procedure on the day of the
7 accident or Unit 1's on the day of the accident.
8 Therefore, it is very unclear what symptoms and
9 what procedures you are talking about.

10 MS. WAGNER: I am talking about Mr. Floyd's
11 understanding of how procedures were written.
12 Was it necessary as far as he understood it for
13 a particular procedure to apply that all of the
14 symptoms in that procedure occur simultaneously.

15 MR. SELTZER: I object. If you are talking
16 about all the procedures, there must be 50 or
17 a hundred procedures.

18 MS. WAGNER: I am talking of emergency
19 procedures.

20 MR. SELTZER: All the emergency procedures?

21 MS. WAGNER: Yes.

22 MR. SELTZER: I object, as vague and
23 ambiguous. I don't want you to answer a question
24 that is that vague and ambiguous.

25 If you want to talk about a specific

1
2 procedure, I think it is fair to ask the witness
3 about that, but not about all emergency
4 procedures.

5 BY MS. WAGNER:

6 Q Did you have any understanding as to the
7 philosophical basis for listing of symptoms in
8 emergency procedures?

9 MR. SELTZER: What do you mean by
10 philosophical basis?

11 Q Did you have any understanding as to why
12 some symptoms would be listed and others wouldn't?

13 MR. SELTZER: I object. There is no
14 foundation that a symptom that would exist for
15 an accident or a transient would not be listed.

16 Q Do you believe it would be a symptom of a
17 loss of coolant accident for the core to melt down?

18 MR. SELTZER: Does he believe today?

19 MS. WAGNER: Yes.

20 MR. SELTZER: What do you mean by the word
21 "symptom"?

22 Q Do you know what the word "symptom" means?

23 MR. SELTZER: It is your question.

24 Here is the problem. A core melt seems more
25 like an effect rather than a symptom as I

1
2 normally understand the word "symptom," but if
3 you have a different meaning.

4 MS. WAGNER: My understanding of "symptom,"
5 which I understand is a fairly common word in
6 the English language, is that it is an indication
7 of something having occurred or in the process of
8 occurring.

9 MR. KIRSCHBAUM: I don't believe that is a
10 correct definition.

11 MS. WAGNER: In any case, that is my
12 definition.

13 Based on that definition, I would like the
14 witness to answer the question. If he saw a
15 meltdown occur, would he think that maybe a
16 loss of coolant accident was in process.

17 A I am not sure that I would know how to
18 recognize a meltdown, and therefore, I would be
19 hypothesizing as to how I would respond to those
20 symptoms.

21 Q Have you ever heard that core melt is an
22 indication of a loss of coolant?

23 MR. SELTZER: When you say "is an
24 indication," you mean that operators should look
25 for core melt as a signal that they have a loss

1
2 of coolant?

3 MS. WAGNER: No, I am asking if one had
4 a meltdown, would that be such a signal, whether
5 or not they should look for it.

6 A I thought I just responded to that question.

7 BY MS. WAGNER:

8 Q Has anybody ever told you, that is my
9 question.

10 A I don't recall ever hearing that statement
11 before.

12 Q Do you ever recall seeing that statement
13 in any procedure for a loss of coolant?

14 A I don't recall seeing that statement.

15 Q Can you think of any reason why it is not
16 in a loss of coolant procedure?

17 MR. SELTZER: I object. The witness has
18 already said it is a hypothetical.

19 MS. WAGNER: The witness says it is not in
20 the procedure. I am asking why it is not. That
21 is not hypothetical.

22 A I would like to set the record straight.

23 The witness did not say it does not appear
24 in a procedure. I said I haven't heard or seen it.
25 I did not deny it existed in a procedure.

1
2 Q Based on the fact that you have neither
3 seen it nor heard it being in a procedure, do you have
4 any knowledge as to why it is not in a procedure?

5 MR. SELTZER: He just told you he doesn't
6 know whether it is in or not, so to ask him why
7 it is not rests on a lack of foundation.

8 MS. WAGNER: He says he has never heard
9 that it is in it. I am asking whether he has
10 ever heard of a reason why.

11 MR. KIRSCHBAUM: He hasn't heard that it
12 isn't there. He just hasn't heard that it is
13 there.

14 MS. WAGNER: Has he heard any reason why it
15 isn't there?

16 A No, I have not.

17 BY MS. WAGNER:

18 Q Did you have any involvement in the
19 drafting of procedures for Unit 2?

20 A I had some involvement in drafting of
21 procedures for Unit 2.

22 Q I show you a transcript of testimony or an
23 interview of James. R. Floyd before the United States
24 Senate and ask you if you recall that interview.

25 A I don't remember this particular interview.

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Q Do you remember any interview with the United States Senate or some representatives thereof?

A I have a vague recollection of having talked to the Hart Committee. I don't know if this is the same document or not.

Q I would like to refer you to the last page of this transcript, which is called "Certificate," and it says, "I certify that I have reviewed the attached transcript of my interview with the staff of the Senate TMI investigation and I have made such corrections necessary as to make it an accurate verbatim record of said interview."

The page appears to be signed by James R. Floyd on November 30, 1979.

Do you recall having signed that certificate?

A No, but it is my signature.

Q I refer you to page 36 of that testimony, to a question which starts on line 13, and the answer that follows:

"Ms. Giannelli: Do you know who I guess put together the operating procedures for Unit 2?

"Mr. Floyd: I have to have a very vital hand in that. It really, I guess, was the PORC

1
2 responsibility, Plant Operations Review Committee.
3 But as a member of that group and as the operations
4 supervisor and as the man with the most years of nuclear
5 operating experience, why, the operating procedures
6 were very much in my domain." [A]

7 Do you recall being asked that question
8 and giving that answer?

9 A No.

10 Q Do you have any reason to believe that that
11 is not your answer?

12 MR. SELTZER: He said he doesn't recall
13 giving it.

14 MS. WAGNER: I am asking if he has any
15 reason to believe that what is written here is
16 not truthful.

17 MR. SELTZER: That is another question.

18 MS. WAGNER: I will ask that question.

19 MR. SELTZER: You are withdrawing the first
20 question?

21 MS. WAGNER: For the moment, he can answer
22 the second question.

23 MR. SELTZER: You are asking based on his
24 present recollection, is what you just read
25 accurate?

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MS. WAGNER: I am not asking if my reading was accurate. I am asking if he, as far as he knows, gave that testimony.

MR. SELTZER: If he were asked that question today, would he give that answer? Is that a fair way to phrase it?

MS. WAGNER: That is one question.

MR. McBRIDE: Why don't you answer Mr. Seltzer's question.

BY MS. WAGNER:

Q The question is, if you were asked the question today, would you give the same answer?

A I would give substantially the same answer.

Q Can you describe for me what it was that you did with respect to promulgation of Unit 2 procedures, emergency and operating procedures?

A No, I cannot. I don't remember.

Q Do you remember generally what your role was?

A To schedule the preparation of the procedures in the order of priority in which we needed them and to see that that schedule was followed and met.

Q Do you recall ever being involved in any

1

2 substantive review of procedures for Unit 2?

3 A I have no specific remembrances, but it is
4 something I certainly did.

5 Q Do you remember what was used as the raw
6 material for Unit 2 emergency procedures?

7 A Not in every case, no.

8 Q Generally?

9 A Generally, I believe they were B&W draft
10 procedures on the NSS scope of supply.

11 Q What did you do with those draft procedures,
12 to your recollection?

13 A I don't recall.

14 Q The only thing you recall about the whole
15 process is that they involved a B&W draft?

16 A And that I was intimately involved in the
17 handling of them after we got the drafts, and I have
18 no specific recall as to what we did with them to
19 convert them into approved procedures for use in the
20 plant.

21 Q Is there any way I could find out what you
22 did to them?

23 A Recreating what went on before Rev. 0
24 would be difficult in a detailed step-by-step basis.
25 If you could find from your records an original copy

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2 of the draft that was first sent, such as you produced
3 here on DP 51202-6, and you could say this is what
4 we offer them and this is what their Rev. 0 came out
5 looking like, you could then reconstruct two end
6 points, a beginning point and a final point, and from
7 that final point forward, then it would not be hard
8 to trace the record of what happened to the procedure
9 over the years in our revision process, but there is
10 that hole in the front end before it became Rev. 0,
11 Three Mile Island didn't keep a record of it.

12 Q Do you recall who was involved in working
13 on those procedures for Unit 2?

14 A Writing the procedures for a nuclear power
15 plant is a major effort and many, many people are
16 involved. I believe we had some people who were
17 dedicated solely to that function, but I don't know
18 who all participated in it.

19 MS. WAGNER: I would like to have marked
20 as B&W 467 a three-page document entitled
21 "TMI Station, Brief Overview of Unit 2 Procedure
22 History," dated May 25, 1979.

23 (Three-page document entitled "TMI Station,
24 Brief Overview of Unit 2 Procedure History,"
25 dated May 25, 1979, was marked B&W Exhibit 467

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for identification, as of this date.)

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Q Have you ever seen B&W 467 before?

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A No.

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Q On the front page of the exhibit there is a paragraph, "Note, it should be noted that some of the draft procedures originally expected from B&W were subsequently deferred. This was due to the fact that what would have been given to MEC/GPU from B&W would have been almost identical to those obtained for Unit 1. Therefore, MEC/GPU utilized the Unit 1 procedures, which allowed B&W to pursue other tasks."

Do you recall whether or not Unit 1 procedures were used in some instances as the drafts for Unit 2 procedures?

A No, I do not recall that.

Q You don't recall one way or the other?

A I don't recall one way or the other.

Q The next paragraph describes the review that was given to Unit 2 procedures and indicates, "1, procedure written; 2, procedure received NUC independent review; 3, procedure reviewed by PORC (or staff if not NUC safety related), and 4, procedure reviewed by unit superintendent."

Do you recall that process of review for

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Unit 2 procedures?

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A I don't recall that specifically, but I believe that is the way it was done.

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BY MS. WAGNER:

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Q There is a section here entitled

"Procedure Verification," and it describes a program called "Procedure verification/red line program." Do you remember that?

A Yes.

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Q Can you describe it?

A The red line program was the first use of the procedure in the field, and at that one instance we were able to merely mark up the copy of the procedure in our hands and go ahead and proceed as though we had an approved procedure in our hands, and it was then returned to the PORC for incorporation as a revision to the procedure, but that was only done on some system operating procedures. It could not be done on things like plant start-up, initial criticality, and emergency procedures.

Q To the best of your recollection, was there no red line procedure for emergency procedures?

A That is true. Those were all formally reviewed before being implemented.

Q How were they reviewed?

A Usually had a quorum in the control room, a PORC quorum.

Q With the PORC quorum in the control room, what happened?

A The necessity for change and the mechanics of the change could be discussed by the cognizant review body and approved before being implemented.

Q Would the PORC quorum in the control room

2 run through the procedure somehow? How was it that
3 the verification process worked?

4 A The PORC had already reviewed that
5 procedure, the draft that was trying to be implemented,
6 so they were not unfamiliar with what the intent of
7 the procedure was, and the reason for the desired
8 change as well as the mechanics of the desired change
9 when discussed could then be approved and implemented.

10 (Discussion between the witness and his
11 counsel)

12 Q Just so I understand your testimony, is
13 what you just described a process which was gone
14 through for the purpose of verifying or red lining
15 emergency procedures?

16 A No, I guess I am saying we could not red
17 line emergency procedures. In lieu of that, changes
18 had to be approved by PORC before they could be
19 implemented.

20 Q Aside from changes, how did the original
21 procedure get approved?

22 A The original procedure was dry-runned, if
23 you will. We walked through it in the control room,
24 and assuming you had these indications, you would want
25 to start this pump and look at that flow meter. That

1
2 does not always lead you to a successful procedure,
3 but it is the best you can do rather than imposing
4 accidents on your plant to see if your procedures work.

5 Q A paragraph further down on page 2 of B&W
6 467 says, "It should be noted the NRC performed an
7 in-depth review of TMI-2 procedures from June 20 to
8 July 8. This review (314 hours by six inspectors)
9 resulted in a few minor comments and corrections."

10 Do you recall the NRC in-depth review
11 described in that paragraph?

12 A No, I do not.

13 Q Do you recall any NRC review?

14 MR. KIRSCHBAUM: Of TMI-2 procedure?

15 MS. WAGNER: Yes.

16 A No, I do not.

17 MR. McBRIDE: I assume your question was
18 limited to prior to the accident.

19 MS. WAGNER: Yes, all my questions are prior
20 to the accident unless so stated.

21 (Lunch recess taken at 12:00 noon.)
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AFTERNOON SESSION

1:30 p.m.

JAMES R. FLOYD, resumed.

EXAMINATION (continued)

BY MS. WAGNER:

Q I would like to refer you to your President's Commission testimony again to page 32 to a question and answer which begin on line 21. Actually, two questions and answers.

The first question is, "And at that point were you involved in the drafting of procedures for Unit 2?"

"ANSWER: Yes, ma'am.

"QUESTION: Could you explain that process?"

"ANSWER: Well, there we pretty much relied heavily on Unit 1's procedures. We had invested a tremendous amount of time and effort into the Unit 1 procedures -- at that point in time I think they were being held up by the NRC as an industry standard: 'This is the way procedures ought to look in a nuclear power plant' -- since they were telling other stations this, it seemed reasonable that we in Unit 2 would use our own expertise that we had developed in Unit 1's procedures, and basically just modified the procedures

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2 where possible from Unit 1 to Unit 2, and used
3 effectively the same procedure."

4 Do you recall being asked those questions
5 and giving those answers?

6 A No, I do not.

7 Q Do you recall at this time the NRC holding
8 up Unit 1's procedures as an industry standard?

9 A No, I do not.

10 MS. WAGNER: I would like to have marked
11 as B&W 468 a seven-page document which is entitled
12 "NRC Inspection 77-04" dated February 3, 1977.

13 (Seven-page document entitled
14 "NRC Inspection 77-04," dated February 3,
15 1977, was marked as B&W Exhibit 468 for
16 identification, as of this date.)

17 Q Have you ever seen this document before?

18 A Not that I remember.

19 Q Do you know whose handwriting it is in?

20 A No, I do not. It is not mine.

21 Q I refer you to the second page of the
22 document in which it has written a question, "How
23 do changes to procedures get reviewed by operations?
24 Revision review book not yet implemented for Unit 2.
25 NRC wants a date."

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2 Do you recall at any time when you were
3 supervisor of operations for Unit 2 the NRC querying
4 you as to how changes to procedures get reviewed
5 by operations?

6 A No, I do not.

7 Q Further down on the page there is a
8 reference to standing orders, and the document says,
9 "JRF resolved with GPM."

10 Do you recall whether there were any
11 standing orders for Unit 2?

12 MR. SELTZER: Standing orders regarding
13 what?

14 MS. WAGNER: I don't know what.

15 MR. SELTZER: If you don't know what,
16 how can you ask the question?

17 MS. WAGNER: I just did ask the question.

18 MR. SELTZER: But standing orders regarding
19 fire drills --

20 MS. WAGNER: Regarding anything at all.

21 MR. SELTZER: -- how to run the air
22 conditioning in the control room?

23 MS. WAGNER: Anything.

24 MR. SELTZER: What do you mean by a
25 standing order?

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MS. WAGNER: Whatever this document means by it.

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MR. SELTZER: The witness says he doesn't recall ever seeing this document.

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BY MS. WAGNER:

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Q Have you ever heard of something called a standing order?

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A In Unit 1, I did.

10

Q Did you ever hear of any in Unit 2?

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A I don't recall ever having issued any standing orders in Unit 2.

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Q Do you recall whether there were any in Unit 2, whether or not you issued them?

14

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A I don't recall any standing orders in Unit 2.

16

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Q Do you remember having any conversations with Gary Miller about Unit 2's standing orders?

18

19

A No, I do not.

20

Q The next page of the document under a paragraph numbered II, Section A, No. 1, there is a statement, "Responsibility of operators not clearly defined (i.e., who is responsible for authorizing return to rated power). After a run-back occurs, where do we delineate operators' responsibility to

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follow procedure believe indications."

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was clearly defined?

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A No, I have no such recollection.

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Q Where for the operation of Unit 2 was delineated the operators' responsibility to follow procedures?

12

MR. SELTZER: Follow procedures for what?

13

MS. WAGNER: For running the plant.

14

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A It would appear as though the writer of this memo thought it appeared in administrative procedure 1009.

17

18

19

Q Do you have any independent recollection of whether it appeared in administrative procedure 1009?

20

A No, I do not.

21

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Q Do you recall what the subject matter of administrative procedure 1009 was?

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A No, I do not.

24

25

Q Do you know where for the operation of Unit 2 was delineated the operators' responsibility

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to believe indications?

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A I know it was delineated but I cannot reference the document.

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Q Do you know generally what type of document it was delineated in?

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A It was delineated in one of the administrative procedures, but which one I can't put my finger on at this point in time.

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Q Do you recall ever hearing of a TCN log associated with Unit 2?

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A Yes.

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A Going back to the discussion we had earlier on the record, TCN's were meant to be implemented in short order, and there was an urgent need to put them into practice, and so the shift foreman was assigned the responsibility to maintain a record of all TCN's that were currently in effect in the plant.

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Q Was there any responsibility on the part of the control room operators for reviewing the TCN's on a periodic basis?

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A What they were supposed to review on a periodic basis was delineated in an administrative

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2 procedure, and I believe it was 1012, and I don't
3 recall if TCN's were part of that listing of
4 things they were supposed to review or not.

5 Q Do you recall whether the emergency
6 procedures for Unit 2 were indexed?

7 A Yes, the emergency procedures for Unit 2
8 were indexed.

9 Q Do you recall how the index was set up?

10 A 2200 or 2300 series of numbers, and
11 it was broken into two subsections, one labeled
12 "Emergency" and one labeled "Abnormal Procedures."

13 Q Was the index simply a numerical list of
14 procedures or were they categorized in some fashion
15 other than what you just described?

16 A I know of no further characterization
17 beyond what I have already described.

18 Q Is it correct that in 1977 you were
19 assigned responsibility for generating the standard
20 technical specifications for Unit 2?

21 A I have no recall of ever having had such
22 a broad mandate as that but I was active in the
23 development of the technical specifications for
24 Unit 2.

25 Q I show you a document which has been

1
2 previously marked as B&W 297 and ask you if you have
3 ever seen that document before.

4 A Yes, I have seen this document.

5 Q Do you recall --

6 MR. SELTZER: Is this the complete
7 exhibit? It says at the top it is Attachment 1
8 and it doesn't have the reporter's stamp on it.

9 MS. WAGNER: I think it is the complete
10 exhibit. This is obviously not a copy of the
11 exhibit that was stamped. We will check that
12 and change the record if necessary.

13 Q Do you believe you received this document
14 in the ordinary course of your business as supervisor
15 of operations for Unit 2?

16 MR. SELTZER: You asked him if he recalls
17 receiving it in the regular course of business?

18 MS. WAGNER: Yes.

19 A I don't recall receiving it.

20 Q But you recall having seen it?

21 A Yes.

22 MR. SELTZER: Can we clarify something?

23 (Discussion off the record between the
24 witness and his counsel.)

25 MR. SELTZER: I assume when you asked

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2 "Do you recall seeing it," you didn't mean --
3 does he recall seeing from having seen it in
4 the last week in preparation for this
5 deposition?

6 MS. WAGNER: You are right. I meant
7 seeing it at or about the time it is dated.

8 A I don't recall seeing it at or about the
9 time it was dated.

10 Q When do you recall seeing it?

11 A Several days ago.

12 Q For the first time?

13 A That is the only time I can recall.

14 Q Paragraph 1 of the document says,
15 "J. R. Floyd, be the Unit 2 detailed technical
16 specification individual."

17 Do you recall being so designated?

18 A No, I do not.

19 Q Do you recall any discussions with Gary
20 Miller about technical specifications?

21 A There were many discussions with Gary
22 Miller on technical specifications and I recall none
23 of them in detail.

24 Q What generally were they about?

25 A Technical specifications.

1

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Q What about the technical specifications?

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A Are they getting written, are they getting approved, are they being implemented, are the procedures being written to support them. Any number of things that could have been, but I recall none of them.

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Q Do you recall ever having any discussion about the substance of the technical specifications?

MR. SELTZER: Do you mean at or about the time the tech specs were being written?

MS. WAGNER: At any time prior to the accident.

MR. SELTZER: With anyone?

MS. WAGNER: With Gary Miller.

MR. SELTZER: I don't understand. Are you asking him does he recall ever discussing any tech spec at any time before the accident with Gary Miller?

MS. WAGNER: He already told me that he has had many discussions with Gary Miller about the tech specs, and he described the procedural discussions he had.

I want to know if he ever discussed the substance of any technical specification with

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Gary Miller.

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A I can recall no specific discussion of technical matter on the tech spec with Gary Miller, but I would put it into the same category as the other items I listed for you.

7

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Q Do you recall any discussion of the substance of any technical specification with any other individual?

10

11

A Not specifically, but there are many other individuals involved.

12

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Q Were you aware that Mr. Seelinger had been instructed to assign an engineer to call both Davis-Besse and Crystal River to obtain a current copy of their technical specifications?

16

17

18

A I don't recall that.

19

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22

Q Do you recall being assigned to that task yourself?

23

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A No, I do not.

Q Do you recall any discussions with Mr. Seelinger about the technical specifications of Davis-Besse?

A No specific examples.

Q Do you recall generally such discussions?

A Yes.

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Q Do you recall discussions generally with Mr. Seelinger about the technical specifications of Crystal River?

A Yes.

Q Do you have any understanding as to why Mr. Seelinger was asked to obtain technical specifications from Davis-Besse or Crystal River?

A No, I do not.

Q Subparagraph 3 of this document, B&W 297, says "J. R. Floyd to interface/interact with procedure writers, the NRC, B&W, B&R, and other utilities. This means that I expect calls to be made to Davis-Besse, Crystal River and the NRC around once a week to determine changes and items of interest in the program. J. R. Floyd to promptly review changes to the STS as they come in for their effect in corporation into our program, any immediate actions and requirements for interfacing at that time."

Do you recall interfacing with procedure writers during the time you were supervisor of operations for Unit 2?

MR. SELTZER: You mean any interface at all with procedure writers?

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MS. WAGNER: Any interface.

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MR. SELTZER: Not just on the STS or
tech specs?

5

MS. WAGNER: On any basis.

6

7

A I generally remember interfacing with
procedure writers on Unit 2.

8

Q On what basis?

9

10

A To check on the status of the work and
possibly to add to the work product.

11

12

13

Q Do you recall making calls around once a
week to Davis-Besse concerning items of interest
to the STS program?

14

A I do not so recall.

15

16

Q Do you recall making such calls to
Crystal River?

17

A No, I do not.

18

19

Q Do you recall making such calls to the
NRC?

20

A No, I do not.

21

22

23

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Q Regardless of whether you specifically
remember any specific calls, do you recall generally
that this was a part of your job responsibility in
1977?

25

A I do not recall that it was generally

part of my job responsibility in 1977.

Q Do you ever recall hearing anything about the STS at Davis-Besse?

A This memo has refreshed my memory to the effect that I believe someone in our staff, and from this memo it leads me to believe it is Jim Seelinger, acquired copies of those two sets of technical specifications and laid them out beside ours and went through a page-by-page, line-by-line comparison to see where they differed.

Q What was the purpose of that comparison?

A To see how standard a standard tech spec was.

Q How standard is a standard tech spec?

A I don't recall the results of that review.

Q Do you recall if any of your technical specifications were changed as a result of this comparison?

A I have no specific remembrance of any changes as a result of that comparison.

Q Do you have any general recollection?

A No.

Q Paragraph 4 of this document says, "J. R. Floyd to provide a training program to the

1

2

shift supervisors, shift foremen," and I believe it says "CRO's."

3

4

Do you recall setting up a training program for personnel concerning the STS?

5

6

A I recall talking to the supervisor of training and agreeing with him to schedule various sections of the STS into the normal requal training program until all sections of the STS had been covered in the requal week.

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Q How did the STS differ from the technical specifications in Unit 1 in general?

12

13

MR. SELTZER: Objection. No foundation.

14

Q Were they different?

15

A Yes.

16

Q How were they different?

17

A Primarily in format, not in substance.

18

Q Do you know who somebody called M. B. Basila is?

19

20

A Yes, that would be Mark Basila.

21

Q Who was he?

22

A A young engineer on our staff employed by Metropolitan Edison.

23

24

Q Do you recall any discussions with Gary Miller, Mr. Seelinger, and Mr. Basila concerning

25

the technical specifications of Davis-Besse?

A I have no specific or general recollection of such meetings, although I would believe they took place.

Q Do you recall ever seeing procedures from Davis-Besse other than the technical specifications?

A No.

Q Do you recall seeing procedures from Crystal River other than the technical specifications?

A No.

MS. WAGNER: I would like to have marked as B&W 469 a five-page document dated 3/14/77, a memo from Gary Miller to, among other people, Mr. Floyd.

(Five-page memo from Gary Miller to Mr. Floyd and others dated 3/14/77 marked B&W Exhibit 469 for identification, as of this date.)

BY MS. WAGNER:

Q Do you recall first of all seeing the document before?

A No, I do not.

Q I would like to refer you to page 4 to the bottom to the sentence numbered 11 which says,

1
2 "Interface and contact program with other utilities
3 and NRC J. R. Floyd responsibility - JGH/GPM memo
4 along with J. L. Seelinger."

5 I take it you don't recall seeing that
6 section of the memo either?

7 A No, I do not.

8 Q Does this refresh your recollection
9 concerning any contact with utilities about their
10 procedures as opposed to just their STS's?

11 A No, it does not.

12 Q Do you recall while you were supervisor
13 of operations for Unit 2 ever attending any meetings
14 of the GORB?

15 A I was not a member of the GORB, but I did
16 make some presentations to them when they were in
17 session.

18 Q Did you make presentations about any
19 particular subjects?

20 A Only operations.

21 Q Do you recall how frequently you made
22 such presentations?

23 A No, I do not. I don't know their meeting
24 frequency.

25 Q Do you believe you made presentations

1
2 more than once a year?

3 A I believe I made presentations whenever
4 they met.

5 MS. WAGNER: I would like to have marked
6 as B&W 470 a two-page document on the letterhead
7 of Metropolitan Edison Company entitled "Proposed
8 Agenda for the October 12 to 13 TMI-2 GORB
9 Briefing."

10 (Two-page document on letterhead of
11 Metropolitan Edison Company entitled "Proposed
12 Agenda for the October 12 to 13 TMI-2 GORB
13 Briefing" marked B&W Exhibit 470 for identification,
14 as of this date.)

15 BY MS. WAGNER:

16 Q Have you seen B&W 470 before?

17 A Not to my recollection.

18 Q Referring to subparagraph II on page 1, it
19 is entitled "System Turnover and Operational Status -
20 J. R. Floyd." Subparagraph B is "Significant Problems."

21 Do you recall any significant problems
22 with system turnover in or about September 1977?

23 A I have no such recall.

24 Q Do you recall any significant problems
25 concerning operational status at or about that time?

1

2

A No.

3

4

Q Do you recall making a presentation at
or about that time to the GORB?

5

A No.

6

7

Q Did you ever keep notes of proceedings
before the GORB?

8

A No.

9

10

11

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Q When you made presentations before the
GORB, would you sit through an entire meeting with
them, or just come in and make a presentation and
leave?

13

14

15

16

A The reason for this agenda being published
was so we would have some idea of when we would need
to be there. We presenters were not normally tied
up for the whole meeting.

17

18

19

Q Subsection V is entitled "Standard
Technical Specifications Status," and subsection B
refers to "Significant LCO Problems."

20

Do you know what LCO problems are?

21

22

23

A In the context of the standard technical
specification, it refers to a limiting condition of
operation.

24

25

Q Do you recall any problems at or about
this time with respect to a limiting condition of

1

2

operation?

3

A None specifically.

4

Q Do you recall any generally?

5

A No.

6

Q Do you recall whether during the

7

time you were supervisor of operations for TMI-2 the

8

operators of that unit were given training with respect

9

to emergency procedures?

10

MR. SELTZER: During what time period?

11

MS. WAGNER: During the time he was

12

supervisor of operations for Unit 2 before the

13

accident.

14

A I had a general recall of that. No

15

specific detail.

16

Q Do you generally recall how the training

17

was administered?

18

A Two types of training took place. One

19

was lecture by the training department in the

20

training classroom. The other one was where the

21

man would take the procedure in his hand and walk it

22

through so he knew where the controls were located to

23

implement that emergency procedure.

24

Q Do you know if prior to the accident the

25

operators were trained that there was a procedure, an

1
2 emergency procedure, applicable to every conceivable
3 type of emergency which could occur at TMI-2?

4 MR. SELTZER: When you say conceivable,
5 do you mean credible or do you mean --

6 MS. WAGNER: I mean conceivable.

7 MR. SELTZER: That the imagination of mind
8 could conceive?

9 MS. WAGNER: That's correct.

10 A I don't think the operators had that
11 impression nor were they taught to have that
12 impression.

13 Q Do you know if they were given any training
14 as to what they were supposed to do if a situation
15 came up for which they could not figure out that there
16 was any applicable emergency procedure or other
17 procedure?

18 MR. SELTZER: Objection. No foundation
19 that there was any credible accident which the
20 operators conceived of for which there was no
21 drafted procedure.

22 Q You can answer the question.

23 A I have no recall of such training.

24 Q Do you understand your counsel's
25 distinction between credible and conceivable?

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2

A Yes.

3

Q What is the difference?

4

A Credible in the nuclear industry is fairly well determined by the Nuclear Regulatory Commission, and it's bounded, although not very credibly.

7

Q What are the bounds?

8

A They are not necessarily continuous, and that is why they are hard to describe. One condition that is traditionally imposed is one active failure may take place during any accident, and the reactor core must be maintained in a safe condition.

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(Continued on following page.)

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2 Q Did you have any understanding prior to the
3 accident of what kind of events were included in the
4 term "active failure"?

5 A Yes.

6 Q What were they?

7 A A valve that fails to move that is commanded
8 to move, a pump failing to start that is called upon to
9 start, or any other piece of machinery that was demanded
10 to function and did not function. Check valves I think
11 might have been excluded from that definition, because
12 they are opened by system pressure.

13 Q Did the NRC analysis include failures of
14 any piece of equipment in a nuclear plant as a defined
15 active failure?

16 A No, I don't think so.

17 Q Do you recall what, if any, limitation there
18 was?

19 A They were only interested in nuclear safety
20 related items.

21 Q So was it your understanding that an
22 accident was considered incredible by these NRC
23 definitions if it involved two active failures of
24 safety-related equipment in the nuclear steam system?

25 A No, I do not think they would consider that

1
2 incredible, because the first failure could have been
3 the initiating event. After the initiating event, you
4 had to be protected against one active failure.

5 Q So if you had an initiating event of two
6 active failures, that would be without the bounds of
7 this definition?

8 A I will not so restrict the NRC's definition
9 but that might be an accurate representation of what I
10 believed their definition to be.

11 Q That was my question, what you understood
12 that definition to be. That is what your understanding
13 was, is that correct?

14 A Not necessarily incredible but not necessary
15 to be protected against.

16 Q Did you personally have an understanding of
17 an incredible accident which was different from the NRC's
18 definition?

19 MR. SELTZER: I don't understand. What are
20 you asking?

21 MS. WAGNER: I believe the witness just
22 indicated that an event which involved a failure
23 and two active failures would be incredible he
24 understood by the NRC definition, but not
25 necessarily by what he thought. I am wondering

1
2 if he had an understanding which was different
3 from the NRC's.

4 MR. SELTZER: I hope you and Mr. Floyd and
5 whoever reads the record understands that
6 "incredible accident" is a term of art, and what
7 people may say is incredible to them is not
8 necessarily inconsistent with what the NRC would
9 say, but it might be inconsistent with what the
10 term of art embraces.

11 MS. WAGNER: I understand that the term of
12 art embraces something that the NRC has defined.

13 BY MS. WAGNER:

14 Q Is that not correct?

15 A It has been the intention of my answers in
16 this series of questions to tell you that I don't know
17 what the NRC's definition of incredible is. I know
18 they have such a definition. I have tried to explain to
19 you some of my definitions of what is incredible, but I
20 am not suggesting that my definition of incredible is
21 either concurrent with or is to be imposed upon the
22 NRC.

23 MR. SELTZER: Did you mean congruent
24 instead of concurrent?

25 THE WITNESS: Yes, that would be a better

1
2 word.

3 MS. WAGNER: I object to your changing the
4 witness' testimony.

5 MR. SELTZER: I just wanted to make his
6 testimony congruent with what he is trying to
7 express.

8 BY MS. WAGNER:

9 Q Did you ever receive any training concerning
10 the NRC's requirements for the design of a nuclear
11 reactor?

12 A No.

13 Q Did you ever read, prior to the accident,
14 10 CFR Part 50?

15 A Yes.

16 Q Under what circumstances did you read it?

17 A I don't recall.

18 Q Do you recall what it is about?

19 A Generally, yes.

20 Q What is the subject matter of 10 CFR
21 Part 50?

22 A I remember on the record yesterday as having
23 answered that question.

24 Q Could you give a brief answer today?

25 MR. McBRIDE: Are you asking the current

1
2 status of Part 50 or pre-accident?

3 MS. WAGNER: Pre-accident.

4 Q If I asked it yesterday, I apologize.

5 A It is my understanding that 10 CFR Part 50
6 is a Federal regulation which governs the design,
7 construction, operation and testing of nuclear power
8 plants.

9 (Recess taken.)

10 BY MS. WAGNER:

11 Q Prior to the accident, do you know if
12 the operators at TMI-2 were taught that a procedure
13 might be applicable to a situation even if not
14 every one of the symptoms listed in the procedure was
15 present?

16 A Yes.

17 (Continued on following page)
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2 Q When they were taught to follow procedures,
3 do you know if they were taught to follow each step
4 in the procedure, eliminating none of them?

5 MR. SELTZER: This is for each and every
6 procedure?

7 MS. WAGNER: Yes.

8 A Both operating and emergency procedures
9 were meant to be followed step by step in
10 chronological order--in numeric order -- excuse me --
11 and not to go to step 5 before you completed step 4.

12 Q Once an operator had determined that a
13 particular procedure was applicable, do you know if he
14 was ever taught that he could use his own judgment to
15 decide not to follow the procedure?

16 A Only if he decided that it was no longer
17 applicable and then some other procedure was more
18 applicable.

19 Q Could he stop following a procedure in the
20 middle of it in such a situation?

21 MR. SELTZER: You mean in such a situation
22 being where he decides that a procedure is
23 nonapplicable?

24 MS. WAGNER: Where he starts following
25 procedure A and concludes somewhere in the middle

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of following it that it is not applicable any longer.

A As I remember, your question started out with could an operator, and he was probably not so instructed, but he probably could.

Q I meant, do you know if he was instructed that that was an appropriate course of proceeding?

A I don't believe such instruction took place.

Q Do you know if ever operators were taught whether in the event of a conflict between an emergency procedure and an operating procedure, one was to take priority over the other?

A It is my belief they were instructed that emergency procedures took priority over operating procedures.

Q I would like to show you a document which has been previously marked B&W 305 and ask you if you have seen that document before.

A I have not seen this particular document, which is a reduced size of the emergency procedure on TMI-2, but I am familiar with TMI-2 procedure.

Q Can you tell me where in the procedure are listed the symptoms of a failed open POPV, if anyplace?

1
2 A I believe Section B on page 2 would be
3 applicable.

4 MR. McBRIDE: Do you mean page 2 of the
5 document or numbered page 2.0?

6 THE WITNESS: Numbered 2.0 on the actual
7 procedure itself, as opposed to the document.

8 Q And you are referring to Section B-1 or B-2?

9 A B-1 and B-2 are not mutually exclusive.

10 Q Could you tell me what symptoms here
11 relate to a failed open PORV?

12 A Under Section B-1 entitled "Symptoms," item
13 2, reactor coolant system pressure is below 2205 psig
14 and RC-R2 fails to close.

15 Q Are those the only two symptoms?

16 A Symptom No. 3 also appears to apply, RC-R2
17 discharge line temperature is above the 200 degree
18 Fahrenheit alarm on the computer point 204, and symptom
19 No. 4 also appears to apply, the RC drain tank
20 temperature and pressure are above normal on the
21 control room rad waste disposal control panel 8-A.

22 Q Is there anything else that appears to be
23 designated as a symptom for a failed open PORV?

24 A Not under this heading entitled "Symptoms."

25 Q Is RC-R2 the PORV on Unit 2?

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2

A Yes.

3

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Q The item numbered 3 under "Symptoms," is the number 402 in that line a reference to a specific computer point?

6

A Yes.

7

8

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Q Item No. 4 refers to RC drain tank pressure and temperature above normal. Do you know what was considered the normal RC drain tank pressure?

10

11

A Within two or two and a half pounds gauge pressure for the temperature.

12

13

Q And what was the normal temperature, if you can recall?

14

15

16

A I cannot recall normal temperature on the tank. It would probably be ambient in the reactor building.

17

18

19

Q Is it correct that the procedure does not refer to pressurizer level activity as a symptom of an open PORV?

20

A It is true. It does not.

21

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Q Under B-2, Immediate Action, Section 2, are the actions listed under A, B and C therein actions which would be taken automatically by the system in the event of an open PORV and would not require operator action?

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A That is true. They are automatic.

3

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Q Did you know prior to the accident why the reactor system was designed so that in the event of a failed open PORV all pressurizer heater banks come on fully below 2105 psig?

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8

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A They were not designed to come on full because the electromatic relief valve was stuck open. They are normally controlled to come on at 2105 with a decreasing pressure.

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Q Do you know why, and this is before the accident, did you know why one of the automatic actions in the event of a failed open PORV was HPI actuation at 1600 psig?

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A Again, the logic on setting the high-pressure injection set point was to protect the plant from any down pressure transient, no matter what it was caused by, and the fact that in this procedure we are talking about a PORV does not mean that it was the PORV failure that dictated the set point.

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(Continued on next page)

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Q To the best of your recollection, did operators at TMI-2 receive instruction on this procedure?

A I have no specific recollection of instruction on this procedure, but I have a general recollection that they were trained in all emergency procedures.

Q Prior to the accident in 1979, had you ever heard of a PORV failing open in a real life situation?

A Yes.

Q More than once? Not more than once had you heard it but had it happened more than once, to the best of your recollection?

A I believe it happened more than once, to the best of my recollection.

Q Do you recall how many times?

A A multiplicity of times.

Q Do you recall any of them specifically?

A Yes.

Q Can you tell me whatever you recall specifically.

A On TMI Unit 2, and I can't give you the date, but we had a failure of the inverter feeding

1
2 vital bus 2-IV which is the power supply to this
3 valve, and on loss of that power supply, the valve
4 failed open.

5 Q Do you recall any other incidents
6 specifically?

7 MR. SELTZER: These are incidents that he
8 recalls knowing about before the Three Mile Island
9 catastrophe?

10 MS. WAGNER: That's right.

11 A I cannot be specific but it seems to me
12 that it had been an industry problem, and it goes
13 fairly far back in time. Ten years as opposed to ten
14 months.

15 Q Prior to the accident, was it your
16 understanding that a failed open PORV constituted a
17 loss of coolant?

18 A Yes.

19 Q In the TMI-2 control room, was there
20 information available to the operators about pressure
21 and temperature in the reactor coolant drain tank?

22 A This procedure says it is on panel 8A which
23 is in the Unit 2 control room.

24 Q Is it correct that that is a panel which
25 did not face into the control room?

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A It did not face into the normally occupied area of the control room, but it was visible if you walked around and looked at it.

Q Prior to the accident, were you satisfied with that placement of the temperature and pressure indication of the reactor coolant drain tank?

MR. SELTZER: You mean did he ever express in words any dissatisfaction with its placement?

MS. WAGNER: My question is was he dissatisfied, whether he expressed it or not.

MR. McBRIDE: I thought your question was was he satisfied.

Q At this point, were you satisfied, whether you expressed it or not? Were you satisfied with the placement of the reactor coolant drain tank information whether or not you expressed that satisfaction to anybody?

MR. SELTZER: Objection. No foundation that the witness had formulated a state of mind about the location of the pressure and temperature readings for the reactor coolant drain tank.

Q You can answer the question.

A I have a vague recollection that we once proposed moving it before it was installed even, placing it where it would be more visible to the

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operator.

Q Were you a proponent of that notion that it should be placed in a different position?

A Yes.

Q Did you express that view to somebody?

A That is about as specific as I can get, somebody.

Q Were you given any reason for why your position was not adopted?

A I do not recall.

Q Do you know why your position was not adopted, whether or not somebody told you?

A No, I do not.

Q Aside from the indication on the rad waste panel, 8A, was there any other method by which the operators could determine reactor coolant drain tank pressure and temperature?

A I do not recall if reactor coolant drain tank temperature and pressure fed into the 855 computer or if they were on the multipoint recorders associated with that computer.

Q I believe you indicated yesterday that the drain tank level you thought was not on the computer because it had to be manually fed into the computer,

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2

is that correct?

3

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A It was manually inputted for the purpose of leak rates, which indicates to me that it was not inputted as a normal parameter.

6

7

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Q Were you aware that in 1978 a change was made so that it was the normal input into the computer? It became a normal input into the computer?

9

MR. SELTZER: When?

10

MS. WAGNER: Sometime in 1978.

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MR. SELTZER: So you are asking him whether your just stating it now is going to refresh his recollection even though that is contrary to what he just testified?

MS. WAGNER: That's right.

A No, I do not so recall.

Q Prior to the accident, did you believe that your operators, the operators at TMI-2, were able to identify a failed open PORV?

A Yes.

Q What did you base that belief on?

A The fact that they had been trained in the emergency procedures and were considered proficient in their use.

Q I would like to show you a document which

1
2 has been previously marked as B&W Exhibit 272, and it
3 is a copy of the loss of coolant procedure for TMI-2.
4 Have you seen that procedure before?

5 A I don't know that I have seen it, this
6 annotated copy that is marked 272, and I don't know
7 that I have looked at Revision 11 specifically, but
8 it is not an unfamiliar procedure to me.

9 Q I would like to refer you to the page
10 numbered 1.0 of the procedure. The first Section A
11 concerns leak or rupture within capability of system
12 operation. Is it correct that the items under Symptoms
13 are symptoms of a loss of coolant within the capability
14 of system operation?

15 MR. SELTZER: Are you asking him to verify
16 that today he would consider these to be the
17 appropriate symptoms or just to say --

18 Q Were these the symptoms the operators of
19 TMI-2 prior to the accident understood were symptoms
20 of this event, according to their training?

21 MR. SELTZER: I object. There is no
22 foundation that he knows what the operators
23 understood.

24 A If this revision were in effect, then these
25 are the symptoms they would be familiar with.

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Q Was it your understanding prior to the accident that all of the symptoms listed herein, 1.121.6, were necessary in order to make this procedure applicable?

A No.

Q Which ones were not necessary?

A Generically, symptoms were listed as possible indications and not all of them had to be present to fully describe the situation. This was merely a compilation of some of the more important symptoms that may be present, not meant to be exhaustive, nor all-inclusive.

Q Whatever symptoms did occur in order to clue the operator in that some procedure was applicable, were they all supposed to occur simultaneously?

A No.

Q Was there any limit to the time period within which they could occur?

A I have no recollection of knowing any time limit associated with the occurrence of symptoms.

Q The procedure indicates that one unique symptom of a loss of coolant inside reactor building is "particulate iodine and gas monitor alarm on HP-R-227'reactor building air sample.'"

1
2 Is that a single monitor or three monitors
3 being referred to?

4 A It is a single pump passing air past three
5 different radiation detectors.

6 Q Did the three detectors detect radiation in
7 different items? Was there a particulate detector
8 and an iodine detector and a gas detector?

9 A Yes.

10 Q Was the intent of the procedure, to the
11 best of your recollection, that if any one of those
12 monitors alarmed, it was a symptom of loss of coolant?

13 A I don't have a recollection to that effect.

14 Q Do you recall whether you knew prior to
15 the accident how the monitors worked?

16 A Yes.

17 Q Was it possible for one of them to alarm
18 without the other ones alarming?

19 A Yes.

20 Q Do you know if there was any procedure in
21 effect for insuring that these monitors were accurately
22 calibrated?

23 A There was a surveillance program as required
24 by the technical specification which required periodic
25 testing and calibration of this radiation monitor.

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Q Do you know who -- and by "who" I mean what title, what position -- was responsible for insuring accurate calibration?

A Accurate calibration would be a function of the instrument and control shop.

Q Do you remember what the procedure called for as the test for accurate calibration?

A No, I do not.

Q Do you recall the frequency required for testing?

A No, I do not.

Q Does this procedure address the conditions under which you may terminate high pressure injection after it has automatically actuated?

A This Section A of the procedure, the follow-up action does bring on safety injection manually, but I do not believe it refers to automatic initiation of safety injection.

Q Does part B address automatic actuation?

A Yes, that is one of the symptoms.

Q Does part B address circumstances or conditions under which HPI may be terminated after it has automatically actuated?

A On page 10 of the procedure, under step

1
2 3.5, it gives you permission to throttle the high
3 pressure injection flow, and on page 10.2, step 3.6.3
4 reads shut off HPI pumps.

5 Q What conditions have to be in effect for
6 Section 3.6.3 to be applicable?

7 A LPI has to be in service with a flow rate
8 above 750 gallons per minute each.

9 Q I would like to refer you now to page 7.0
10 of that procedure to Section 2.2.2, the small break
11 LOCA response. Is this the addition to the procedure
12 which you were testifying about earlier which came as
13 a result of the small break LOCA guidelines and the
14 cross-connecting of HPI?

15 A This is the start of that section, yes.

16 Q Section 2.2.2.1 indicates that certain
17 actions must be taken "within two minutes of the LOCA."
18 Do you know where that time requirement came from?

19 A I think it came from B&W, but I cannot
20 be sure of that.

21 Q Did that require recognition of a LOCA
22 within two minutes of its initiation, to the best of
23 your recollection?

24 A It required recognition of a small break
25 LOCA within two minutes.

1
2 Q Prior to the accident at Three Mile Island
3 in March 1979, were you generally aware of how the
4 reactor coolant pumps worked?

5 A Yes.

6 Q Had you ever encountered the concept of
7 cavitation?

8 MR. SELTZER: What do you mean by
9 "encountered"?

10 Q Had it ever come to your attention?

11 A The thought or the actual action?

12 Q The thought.. Did someone tell you what
13 cavitation meant?

14 A Now you have gotten two questions here
15 mixed up in my mind. Cavitation in a pump, cavitation
16 in a reactor coolant pump; which do you prefer to
17 address?

18 Q When did you first hear about cavitation in
19 a pump?

20 A Years ago.

21 Q What is cavitation in a pump?

22 A The formation of vapor phase bubbles in the
23 impeller of the pump and the subsequent collapse of
24 those bubbles.

25 Q That whole process is called cavitation?

1

2

A I don't know if the collapse is part of the definition of cavitation or not.

3

4

Q Had you ever heard that cavitation could occur in a reactor coolant pump?

5

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A Yes.

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Q Did you have an understanding as to what the condition of the reactor coolant system would have to be in order to result in cavitation in a reactor coolant pump?

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A The NPSH curve is transmitted to us by B&W, and NPSH is net positive suction head, and it is designed to prevent cavitation. It was our guideline for pump operation.

15

Q What is net positive suction head?

16

A The pressure required to prevent cavitation.

17

18

Q Is that a variable pressure depending upon temperature?

19

A In a water system, yes.

20

Q Is that why the NPSH curve is a curve?

21

A Yes.

22

23

Q Because it differs, depending on the temperatures and pressure?

24

A Yes.

25

Q Do you know whether TMI-2 operators

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received instruction concerning the NPSH curve?

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A It was part of the reactor coolant pump operating procedure, and as such they would have received instruction in it.

6

(Recess taken.)

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Q Do you recall whether prior to the accident, operators were taught to do something if they were exceeding the NPSH curve?

10

11

A By exceeding it, you mean operating below it?

12

Q Yes.

13

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16

A I believe the limit and precaution talks about not going below the NPSH curve. I don't recall if there is a procedure on what to do if you find yourself below the NPSH curve.

17

18

19

Q Do you recall ever hearing of one thing you might do in that circumstance is increase pressure in your reactor coolant system?

20

21

MR. SELTZER: When you say one thing you might do --

22

Q One thing you should do.

23

A It seems reasonable.

24

25

MR. SELTZER: Just tell her if you recall that is what was taught.

1

2

A I withdraw my answer.

3

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MS. WAGNER: I object to your instructing him to withdraw an answer which makes perfectly good sense to me and I am sure was taught.

6

7

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Q Do you recall one thing you might do in the event you were operating below the NPSH curve, or should do, was try to increase pressure?

9

A Yes.

10

11

12

Q Do you recall how an operator might go about increasing the pressure? What were the options available to him?

13

A Turn on the pressurizer heaters.

14

Q Did he have any other options?

15

16

MR. SELTZER: Other options that he was taught?

17

18

MS. WAGNER: Other options that Mr. Floyd knew about prior to the accident.

19

A Other ways to increase plant pressure?

20

Q Yes.

21

22

MR. SELTZER: If the operator found out he was below the net positive suction head curve?

23

MS. WAGNER: Yes.

24

25

A I know of no other way he could increase plant pressure.

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Q Was another thing that he should do, if he found himself below the net positive suction head curve, is reduce temperature?

5

6

A It would be another way to get back on the safe side of the curve.

7

8

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Q Do you recall what the options available to him were which would result in a reduction in temperature?

10

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A Depending on what mode of heat removal he had in effect at the time, whether he was steaming the steam generators, he could increase his feed and steaming rate to the steam generators.

14

15

16

If he was on decay heat, he could increase the flow in the decay heat system or in the decay heat closed cooling water system to effect greater cooling.

17

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Q Can you think of any other method?

A Those are the two normal methods of cooling.

Q If the operators discovered they were below the net positive suction head curve, would the use of HPI result in either lower temperature or higher pressure in the reactor coolant system?

23

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MR. SELTZER: Objection.

Are you asking him to give you the results of thought processes he had on this subject

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before the accident?

3

MS. WAGNER: Yes.

4

MR. SELTZER: You don't want him to figure

5

out the answer today?

6

MS. WAGNER: No. I want to know what he knew

7

before the accident.

8

A Before the accident, I believe that the use

9

of HPI could have raised plant pressure and might have

10

aided the cooling.

11

Q Did you ever hear of the concept of going

12

solid in a reactor coolant system?

13

A Yes.

14

Q What to your understanding, prior to the

15

accident, was meant by that term?

16

A Going solid was meant to be operating without

17

a steam bubble in the reactor coolant system.

18

Q Was that considered a good thing or a bad

19

thing for normal operation of the system prior to the

20

accident?

21

A Undesirable.

22

Q Did you understand why it was undesirable?

23

A Yes.

24

Q Why was it undesirable?

25

A If the system is liquid full, there is no

1
2 compressible fluid available in the system to act as a
3 shock absorber, and therefore any slight change in
4 temperature will effect a large change in pressure.

5 Q Was it your understanding prior to the
6 accident that if the reactor coolant system had a
7 bubble not in the pressurizer but someplace else, that it
8 could be described as a solid system?

9 MR. SELTZER: In other words, the
10 pressurizer is full to the roof and there is a
11 bubble someplace else?

12 MS. WAGNER: Right.

13 A Would I before the accident have described
14 that as a solid system? Is that the question?

15 Q Yes.

16 A No, I would not have described that as a
17 solid system.

18 Q Do you know if the operators at TMI-2 were
19 trained prior to the accident as to what they would see
20 if a system went solid?

21 A The only experience, and hence I think
22 training that the operators at TMI-2 had on solid
23 operation was for hydrostatic testing.

24 Q During hydrostatic testing, did the system
25 exhibit the sensitivity to pressure changes that you

1

2

described previously when it was solid?

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A The pressure changes I described previously were induced by temperature changes, and during the hydrostatic test heat is neither added to it nor removed from the system, therefore you are not susceptible to those type pressure changes.

8

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Q While you were in the Navy, did you ever see a system operated as a solid system, a reactor coolant system operated as a solid system?

11

12

13

A No.

Q Did you know that the reactors in the Navy

could be operated in a solid mode?

14

15

A No, they could not. It was what they call the semi-solid mode.

16

Q What did semi-solid mean?

17

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A To me, semi-solid meant that you were adding water to the reactor coolant system at the same time you were removing water from the reactor coolant system, and hence your pressure was controlled by the rate of addition and removal of water. Hence, the system was not truly solid.

23

24

25

Q Did such a semi-solid system exhibit sensitivity to pressure and temperature such as you described previously?

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A Yes.

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Q Were you familiar prior to the accident with a procedure --

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A May I clarify my last answer?

6

Q Sure.

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A While my previous description of pressure sensitivity to temperature changes was not quantified, in the semi-solid system of operation, if reactor coolant system pressure started increasing, the amount of let-down was automatically increased because of the increased driving head of the pressure in the system, so the pressure tended to be self-limiting in the semi-solid mode, while in the actual solid mode it would not be so self-limiting, so semi-solid is safer than solid.

Q Were you familiar prior to the accident with a procedure which came into effect after a LOCA and was for the purpose of boron control?

A I do not have a clear memory of such a procedure.

Q I refer you to your President's Commission testimony, pages 146 to 147. The testimony appears to be about a procedure for post-LOCA boron control.

I would like you to read the testimony, please, on pages 146 and 147 and tell me if that

1
2 refreshes your recollection at all with respect to the
3 existence of such a procedure.

4 A I have completed reading the testimony on
5 pages 146 and 147.

6 Q Does it refresh your recollection with
7 respect to a procedure for post-LOCA boron control?

8 MR. SELTZER: He said there he is not sure
9 "whether or not that ever found its way into our
10 procedure or not. I can't say until I go back
11 and check procedures in both units to see if
12 I can find a number for you."

13 Q Do you recall checking the procedures?

14 A No, I have not.

15 Q Do you recall today whether any such
16 procedure existed at TMI?

17 A No, I do not recall that today, but I do
18 recollect from just reading this testimony, it is
19 very confusing and I was in a very confused state of
20 mind when I said those things. Like very much of my
21 prior testimony, it could have been an error.

22 In this case I left enough if's and maybe's
23 and when's to not have testified wrong, but in fact I
24 think I was in a confused state of mind when I gave that
25 testimony.

1
2 Q I take it when you gave this testimony, you
3 believed it was truthful as far as you knew?

4 A Yes, at the time I gave it, I believed it
5 to be the truth.

6 Q And you have no recollection now as to what
7 procedure it was that you believed might have existed?

8 A I also said it might have been in a B&W
9 topical report, and I have not searched those for it
10 either, and it could very well be in there but I have not
11 made a record search to substantiate this statement one
12 way or the other.

13 Q Right now you have no recollection one way
14 or the other of the existence of such a procedure, is
15 that correct?

16 A I cannot recall such a procedure.

17 MS. WAGNER: That is all for today.

18 (Time noted: 3:50 p.m.)
19

20 -----
JAMES R. FLOYD

21 Subscribed and sworn to before me
22 this day of 1982.
23
24 -----
25

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
JAMES R. FLOYD was taken before
me on February 19, 1982 consisting
of pages 160 through 291;

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 24 day of FEBRUARY 1982,

Joseph R. Danyo
JOSEPH R. DANYO

I N D E X

WITNESS

PAGE

James R. Floyd

162

E X H I B I T S

B&W FOR
IDENTIFICATION

- | | | |
|-----|---|-----|
| 467 | Three-page document entitled
"TMI Station, Brief Overview
of Unit 2 Procedure History,"
dated May 25, 1979 | 233 |
| 468 | Seven-page document entitled
"NRC Inspection 77-04", dated
February 3, 1977 | 240 |
| 469 | Five-page memo from Gary
Miller to Mr. Floyd and others,
dated 3/14/77 | 254 |
| 470 | Two-page document on letterhead
of Metropolitan Edison Company,
entitled "Proposed Agenda for
the October 12 to 13 TMI-2 GORB
Briefing" | 256 |

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NOTARIES PUBLIC

June 23, 1982

DAVIS POLK & WARDWELL, ESQS.
One Chase Manhattan Plaza
New York, New York

ATT: Ms. Karen Wagner

Dear Karen:

Enclosed please find the original and one copy of page 280 of the February 19, 1982 session of the James R. Floyd deposition transcript, correctin line 7 from HPI to LPI.

This correction was made per the discussion between all parties, after my stenographic notes were checked to confirm the correction.

A copy has also been sent to Kaye Scholer.

Yours truly,

Joseph R. Danyo
JOSEPH R. DANYO

IRD/JW

cc: Richard C. Seltzer, Esq.
Kaye Scholer Fierman
Hays & Handler, Esqs.

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