

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK

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

Plaintiffs,

80 CIV. 1683

:(R.O.)

-against-

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

Defendants. :

-----x

Continued deposition of Richard W. Zechman,  
taken by Defendants, pursuant to adjournment, at  
the offices of Davis, Polk & Wardwell, Esqs.,  
One Chase Manhattan Plaza, New York, New York,  
on March 25, 1982 at 10:00 o'clock a.m., before  
Catherine Cook, a Shorthand Reporter and Notary  
Public within and for the State of New York.



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PDR ADOCK 05000289  
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## A p p e a r a n c e s :

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Present:

SUSAN HANSON

ooo

R I C H A R D        W.        Z E C H M A N, having been  
previously duly sworn, was examined and continued  
to testify further as follows:

EXAMINATION BY

MR. FISKE:

1  
2 Q Mr. Zechman, you realize that you continue  
under oath this morning?

3 A Yes, I do all day today, certainly.

4 Q In some testimony that you gave at the end  
5 of the day yesterday, you said that operators had been  
6 trained to look at, among other things, pressurizer  
7 level in order to terminate high pressure injection.

8 MR. MacDONALD: Are you asking what he  
9 testified?

10 MR. FISKE: It is a preliminary question.

11 A That wasn't all inclusive. That was one of  
12 the things, we maintained pressure and level of high  
13 pressure injection. That's not all inclusive.

14 Q I don't think you listened to the question.  
15 The question was, didn't you testify yesterday that  
16 in determining whether to terminate high pressure  
17 injection after it had come on in the course of the  
18 transient, one of the things the operators would do  
19 would be to look at pressurizer level?

20 A One of the things we did was look at  
21 pressurizer level but what I am saying is that that is  
22 not the point of termination of high pressure injection.

23 Q The question was wasn't it one of the  
24 things that the operators looked at?  
25

1 A To try to maintain level.

2 Q Right. Didn't you testify yesterday that  
3 you believed that the pressurizer level would be an  
4 indication of the inventory in the system?

5 A That's correct.

6 Q In the training that you did in the  
7 Training Department at Met Ed, did you tell the  
8 operators that they could assume that pressurizer  
9 level was, in fact, an accurate indication of system  
10 inventory?

11 MR. MacDONALD: You are talking prior to  
12 the accident?

13 MR. FISKE: Yes.

14 A Prior to the accident our training program  
15 reflected the fact that to maintain pressurizer level  
16 insured inventory in the RC, proper inventory in the  
17 right RC, yes.

18 Q And that looking at pressurizer level would  
19 tell the operators accurately what the system inventory  
20 was?

21 A That is what our training at both B&W and  
22 our Met Ed program indicated.

23 Q Did you feel that as head of the Training  
24 Department that it would have been important for the  
25



1  
2 operators to know in the training that you gave them  
3 at Met Ed if there were circumstances under which in  
4 the course of the transient pressurizer level was not  
5 an accurate indication of system inventory?

6 A That did not occur to me based on our  
7 training.

8 Q I think you have testified several times  
9 yesterday that you were not aware prior to the accident  
10 of any circumstances under which pressurizer level  
11 would not be an accurate indication of system inventory.

12 MR. MacDONALD: I object. I have no problem--  
13 if you think you have to clarify something but  
14 going back and having him trying to remember what  
15 he testified yesterday is very difficult.

16 MR. FISKE: I will rephrase it.

17 Q Is it correct that in the training you gave  
18 at Met Ed, you told the operators that pressurizer  
19 level was an important indication of system inventory?

20 A In the training of our operators both at  
21 Met Ed and at the simulator, level in the pressurizer  
22 was focused on as long as we maintained -- we told them  
23 as long as we maintained level that was an indication  
24 of satisfactory inventory.

25 Q I think you said yesterday that you were not

1  
2 aware prior to the accident of any situation in which  
3 pressurizer level had increased while pressure was  
4 decreasing.

5 MR. MacDONALD: Are you asking that again?

6 MR. FISKE: I am stating that as a  
7 preliminary statement and I will ask you today  
8 as a fresh question, doesn't that, in fact, reflect  
9 your testimony?

10 A Prior to the accident?

11 Q Yes.

12 A I said I could not recollect at this time  
13 any time in our training that I observed pressurizer  
14 level increasing or pressure decreasing during normal  
15 operations.

16 Q Is it your testimony that prior to the  
17 accident that you didn't understand that there could be  
18 circumstances under which pressure dropped creating  
19 saturation or boiling and in that situation pressurizer  
20 level would increase?

21 A Never occurred to me prior to the accident.

22 Q To your knowledge, did anyone in the  
23 Training Department know that before the accident?

24 A To the best of my recollection, not that I  
25 was aware of.

1 Q Let me read you from the testimony given  
2 in this case by Ronald J. Toole, an employee of GPU,  
3 and let me ask you preliminarily, did you know Ronald J.  
4 Toole before the accident?

5 A Yes.

6 Q What was his position at Med Ed?

7 A Prior to the accident?

8 MR. MacDONALD: You are talking about  
9 immediately prior?

10 MR. FISKE: Let's say a year or two before  
11 the accident, 1978, '79.

12 A I don't recall what his exact position is  
13 before he became superintendent, I just don't recall at  
14 this time. I recall that he worked in Engineering.  
15 I don't recall what his position was.

16 Q At some point he became superintendent?

17 A Yes.

18 Q On which unit?

19 A Unit 1.

20 Q What are the responsibilities as you  
21 understand them of the superintendent of either Unit 1  
22 or Unit 2?

23 A They have the total responsibility for the  
24 conduct, operation and administration of their unit.  
25

8  
1  
2 Q Would that include any supervision or  
3 supervisory responsibility for the training that was  
4 given to the operators?

5 A He had overall responsibility for everything  
6 for that unit, including the training.

7 Q Mr. Toole was examined in this case back  
8 in July of 1981 and I would like to read just several  
9 questions and answers from his deposition. If you want  
10 to look at them, you are welcome. I am reading from  
11 page 803 and 804.

12 "Question: Was it your belief in  
13 September of 1977 that a rise in pressurizer level  
14 accompanied by a simultaneous drop in reactor coolant  
15 pressure could not occur when reactor coolant pumps  
16 were in operation and there was fuel in the core of  
17 the plant?

18 "Mr. Glassman: If you recall.

19 "Answer: I don't remember.

20 "Question: Was it your understanding in  
21 September of 1977 that the formation of voids in the  
22 system in the reactor coolant system would displace  
23 inventory which would then migrate to the pressurizer?

24 "Answer: I believe I testified yesterday  
25 that if voids were to occur in one place in the vessel

Zechman

1  
2 other than the pressurizer you would force liquid into  
3 the pre-surizer level.

4 "Question: This was an understanding that  
5 you had in September of 1977?

6 "Answer: I don't remember if I did or didn't.

7 "Question: Is this an understanding you  
8 had before the accident at Three Mile Island in March  
9 1979?

10 "Answer: I don't know that I ever addressed  
11 it that way, but I assume that I knew if I put a steam  
12 bubble in one place and raised the pressure, that it  
13 would go on someplace else because that is, in fact,  
14 what you did with the pressurizer.

15 Q Did Mr. Toole ever communicate to you, or  
16 to your knowledge anyone in the Training Department, his  
17 understanding of the effect of voids in the system on  
18 level in the pressurizer as he described it in the  
19 testimony that I just read to you?

20 A I personally do not recall ever discussing  
21 that subject with Mr. Toole.

22 Q You have testified previously, Mr. Zechman,  
23 and this is a preliminary question, that you understood  
24 that if pressure dropped in the course of a transient  
25 that that could produce boiling in the reactor coolant

1 system.

2 A I testified that I understood theoretically  
3 that if pressure dropped, that could happen.

4 Q You are familiar with the concept -- the  
5 term "saturation," are you not, as it is used with  
6 respect to nuclear reactors?

7 A I understand the term "saturation" in terms  
8 of what we were trained, whether it was the pressurizer  
9 or the steam generator.

10 Q In layman's terms, isn't saturation what  
11 occurs when the water in the reactor coolant system  
12 or in the pressurizer turns to steam?

13 A Saturation -- the term "saturation" refers  
14 to the point -- at a given temperature at which water  
15 will turn to steam.

16 Q That is the same concept, is it not, to  
17 have the water boil?

18 A That is the same concept as the water  
19 changes phases and boils.

20 Q You testified yesterday that Mr. Floyd was  
21 the superintendent of -- he was in charge of operations  
22 at Unit 2.

23 A To the best of my recollection was that he  
24 was supervisor of operations.  
25



1

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Q What were his responsibilities as supervisor of operations?

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A He had the responsibility for supervising and directing the operations of -- and directing the operators and shift foremen and shift supervisors of Unit 2.

8

9

10

Q It is a fact, is it not, during the period '77, '78 and '79 some training of operators was being done by the operations people themselves?

11

12

13

A It certainly is true that they also had a responsibility for some training. It is true even on shift they were provided training among their own shifts.

14

15

16

Q As supervisor of operations of Unit 2, Mr. Floyd would have had an overall responsibility for whatever amount of that kind of training went on?

17

18

19

20

21

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MR. MacDONALD: Are you asking if he did, what Mr. Zechman's recollection is?

MR. FISKE: Yes.

Q As you understood what his position involved?

A Could you repeat that?

(Question read)

A He would have responsibility for training that he directed. That's not to say while the shift foreman, while on shift may have conducted training on

1  
2 his own that Jim wouldn't have been aware of.

3 Q I am not saying that Mr. Floyd did personally  
4 all the training. I am asking isn't it a fact his  
5 position as supervisor of operations included among  
6 other things overall supervisory responsibility for  
7 whatever training was going on at Unit 2 by the operations  
8 people?

9 A Each of the supervision personnel had a  
10 responsibility as a supervisor -- had the responsibility  
11 and shared in the responsibility of training their  
12 personnel. That's part of their responsibility.

13 Q Mr. Floyd has also given deposition testimony  
14 in this case within the last month and I would like to  
15 read you from pages 166 and 167 of Mr. Floyd's testimony.

16 Do you have that in front of you?

17 A I have page 166 in front of me.

18 Q Starting at the top of the page, line 4,  
19 "Question: Was it your understanding that a pressurized  
20 water reactor was not intended to operate at saturation  
21 temperature in a primary system outside of the  
22 pressurizer? All my questions relate to your  
23 understanding prior to the answer.

24 "Answer: Do you mean all temperatures of  
25 the water in the reactor coolant system should be below

1 saturation temperature?

2 "Question: I mean that water should not be  
3 in a bulk boiling mode.

4 "Answer: Yes, I knew that before the  
5 accident.

6 "Question: Do you know where you learned  
7 that?

8 "Answer: No.

9 "Question: Do you have any understanding  
10 of what would happen in the primary system of a  
11 pressurized water reactor if the water had reached a  
12 bulk boiling stage in the primary system outside of  
13 the pressurizer?

14 "Answer: Yes.

15 "Question: What was your understanding would  
16 be the results?

17 "Answer: Net steam formation.

18 "Question: Did you have any understanding  
19 as to what effect that net steam formation would have  
20 on the reactor coolant system, if any?

21 "Answer: Yes.

22 "Question: What was that understanding?

23 "Answer: As the size of the new steam  
24 bubble grew, the pressurizer level would increase.  
25

1  
2 "Question: Did Mr. Floyd ever communicate  
3 to you or to your knowledge anyone else in the Training  
4 Department his knowledge of the fact that in a case  
5 where you had saturation in the primary system that  
6 that would cause the pressurizer level to increase?

7 MR. MacDONALD: I am going to object to  
8 the form. You can ask him if he ever communicated  
9 what was set out in the pages. Your interpretation  
10 of what it means --

11 A Would you repeat the question?

12 Q To avoid any technical objection, did Mr.  
13 Floyd ever communicate to you or to anyone else in  
14 the Training Department that in a case where a drop  
15 in pressure had caused saturation in the primary  
16 system that that would cause the pressurizer level  
17 to increase?

18 A Not to the best of my recollection.

19 Q Can you tell us today, Mr. Zechman, whether  
20 there is any explanation that you know of as to why  
21 neither the superintendent of Unit 1 nor the supervisor  
22 of operations of Unit 2, each of whom had responsibility  
23 for training of operators, communicated -- did not  
24 communicate to the Training Department their knowledge  
25 of the fact that a drop in pressure causing saturation

1                   could itself cause an increase in pressurizer level.

2                   MR. MacDONALD: I object to the form.

3                   He can answer the question based on his  
4                   recollection.

5                   A        I have no way of knowing -- repeat your  
6                   question -- well, I can't speak for them. I have no  
7                   idea what -- they never relayed that to me, to the  
8                   best of my recollection, or anyone in my department.  
9                   Why they didn't, only they can speak for that.

10                  Q        Based on your understanding of the function  
11                   that the Training Department was supposed to perform  
12                   during the period of time you were in charge of it in  
13                   training the operators on how to deal with transient  
14                   conditions, is this the kind of information you would  
15                   like to have had?

16                  MR. MacDONALD: Objection. Purely  
17                   speculation.

18                  MR. FISKE: It is something he has no  
19                   recollection of ever receiving and you are  
20                   asking questions based on that.

21                  A        If it hadn't occurred to me prior to the  
22                   accident, it would be pure speculation at this point.

23                  Q        Was it important to you at the time that  
24                   you conducted training of the operators that they  
25

1  
2 be given accurate information as to whether or not  
3 the pressurizer level could be relied upon as an  
4 accurate indication of system inventory?

5 A Certainly it was important to me that we  
6 were, and we were assured that it was. That was our  
7 understanding.

8 Q Neither Mr. Floyd nor Mr. Toole ever told  
9 you anything that changed that understanding?

10 A Not to the best of my recollection.

11 Q Earlier in this deposition, Mr. Zechman,  
12 we showed you a document which has been marked as  
13 B&W 558, which is a chapter called "Core Performance"  
14 from the publication "Nuclear Power Preparatory Training,"  
15 which was purchased by Metropolitan Edison from the  
16 NUS Corporation.

17 Let me just show you that again. Do you  
18 have that in front of you?

19 A Yes, I do.

20 Q I would like you to turn to page 4-20.  
21 Do you have that in front of you?

22 A I have that page in front of me.

23 Q I would like to read you a paragraph about  
24 two-thirds of the way down the page from this document.  
25 "The reactor coolant in a PWR system is kept under



Zechman

1  
2 pressure to prevent bulk boiling in the core. In the  
3 case of an abnormal transient where this pressure is  
4 lost and some steam is generated in the core, how  
5 will we know it? We will see a large increase in level  
6 in the pressurizer until pressure is built back up  
7 above the saturation value corresponding to the  
8 temperature in the core."

9 Do you see those three sentences from that  
10 portion of the Met Ed training materials?

11 A I see that sentence.

12 Q Is it still your testimony that you were  
13 not aware of this concept prior to the Three Mile  
14 Island accident?

15 A It is still my contention that I was not  
16 aware of that phenomena prior to the accident.

17 Q Is it still your testimony that nobody  
18 in the Training Department at Met Ed was familiar with  
19 this concept prior to the accident?

20 A I don't recall seeing this paragraph prior  
21 to the accident.

22 Q Is it your testimony that, to your knowledge,  
23 nobody else that was responsible for training in the  
24 Met Ed Training Department ever saw that paragraph from  
25 this course book which Met Ed had purchased for use in

1 the training program?

2 A I can't speak for other people in my  
3 department. I can say that I don't personally recall  
4 ever seeing that paragraph in the manual or being used.

5 Q Are you familiar with something called  
6 hot functional testing at a nuclear power plant?

7 A Yes, I am.

8 Q Could you explain in as few words as you  
9 can, doing it accurately, what hot functional testing  
10 is?

11 A Hot functional testing is simply heating  
12 up the system and running the system and doing testing  
13 under those conditions.

14 Q Were you aware in September of 1977 that  
15 hot functional testing was going on with respect to  
16 Unit 2?

17 A I recall we went through a period of hot  
18 functional testing. I don't recall the exact timing.

19 Q Did it come to your attention that in the  
20 course of that hot functional testing a situation had  
21 been experienced where steam had been generated in the  
22 hot legs and pressurizer level increased?

23 A I have no recollection of that.

24 Q To make it more complete, did it come to  
25

1  
2 your attention that during the course of hot functional  
3 testing a situation had developed where pressure  
4 decreased, saturation was caused in the hot legs, and  
5 pressurizer level increased resulting in a situation  
6 where pressurizer level rose while pressure was down  
7 as a result of saturation?

8 A I have no personal recollection of that.

9 Q Let me show you a document which has  
10 previously been marked as B&W 175 which are pages from  
11 the GPU start-up test log book.

12 Do you have that in front of you?

13 A Yes.

14 Q Is it correct that the GPU start-up test  
15 log book was designed to record in a log events that  
16 occurred during hot functional testing?

17 A I never personally used the log book or  
18 was any part of those tests. So looking at this is new  
19 to me.

20 Q Let me just show you -- ask you to turn  
21 to what is the fourth page of this document which has  
22 at the top of the page, "John C. Ulrich 9/8/77."

23 Do you have that in front of you?

24 A Yes, I do.

25 Q I direct your attention to two-thirds down

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the page, "Pressurizer level unexpectedly increased when venting the pressurizer and decreased pressure from 500 psig to 460 psig. Pressurizer level increased approximately 150 inches during this evolution."

Do you see those two sentences?

A Yes, I do.

Q Is it your testimony that no one brought this information to your attention prior to the Three Mile Island accident?

A Not to the best of my recollection.

Q Is it also your testimony that to your knowledge nobody brought this information to the attention of anyone else in the Training Department prior to the Three Mile Island accident?

A Not to the best of my recollection.

Q Am I correct that your testimony is that you never saw the pages from this log book?

A To the best of my recollection, I have not seen the pages from that log book.

Q Was it part of the procedure at Met Ed at the time that information developed during the course of hot functional testing which might be important to the Training Department would be communicated to the Training Department?

1 A Repeat the question.

2 (Question read)

3 A There were, as I mentioned earlier, channels  
4 where information was sent to the Training Department.  
5 I don't recall during this period of time what  
6 information was transmitted to us.

7 Q I would like to show you a document which  
8 has been marked as GPU 153 which is a covering letter  
9 together with copies of the license -- inventory for  
10 a transient at David-Besse on September 24, 1977.

11 Do you have that in front of you?

12 A I do.

13 Q I would like to direct your attention to  
14 page 3, caption "Event Description."

15 A I see it.

16 Q I would like to have you look at a paragraph  
17 on the second -- on page 4, which is part of the event  
18 description. I am referring to the second paragraph  
19 on page 4. The sentence reads starting about halfway  
20 down, "Reactor coolant system pressure continued to  
21 decrease until saturation pressure was reached and  
22 steam began to form in the reactor coolant system.  
23 Approximately T=8 minutes. This caused an insurge  
24 of water in the pressurizer and the pressurizer level  
25

1  
2 went off scale at 320 inches."

3 Is it your testimony that at no time before  
4 the Three Mile Island accident did you personally know  
5 that in the course of the Davis-Besse transient a  
6 situation had occurred where because of a drop in  
7 pressurization had occurred in the reactor coolant  
8 system and that that caused an insurge -- and that that  
9 caused a significant increase in the pressurizer level?

10 A I believe I already testified that I was  
11 not aware of the Davis-Besse incident until post  
12 accident.

13 Q Is it your testimony that you never read  
14 this sentence in the Davis-Besse LER before the accident?

15 A I did not see this Davis-Besse LER prior  
16 to the accident.

17 Q We asked you some questions near the start  
18 of the deposition about various publications that were  
19 received by the Training Department.

20 A Yes.

21 Q Referring back to that general subject for  
22 a moment. I would like to show you an excerpt from  
23 a publication called "Nuclear Power Experience" which  
24 is part of a document which has already been marked  
25 as B&W Exhibit 208.



1

Do you have that in front of you, Mr.

2

Zechman?

3

4

A I have a document. I don't know how you  
associate that with 208.

5

6

Q You don't have to worry about that. Do you  
have the document in front of you that I just handed  
you?

7

8

A I have a document in front of me.

9

10

Q It consists of three pages, does it not?

11

A It consists of three pages.

12

13

Q I would like to read you a portion of  
a paragraph from this exhibit which is referring to  
the same Davis-Besse transient which was described  
in the LER that I just showed you a minute ago. The  
sentence that I am showing you says -- which I am  
going to read to you is in the second paragraph on  
page 4. It says, "RCS pressure continued to decrease" --

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A Wait a minute.

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Q Page 2 of the exhibit reads, "RCS pressure  
continued to decrease until saturation pressure was  
reached and steam began to form in the RCS." Skipping  
what is in the parentheses, "This caused an insurge  
of water into the pressurizer and the pressurizer level  
went off scale at 320 inches."

26

1

2

3

read?

4

A Yes.

5

Q

6

Is it your testimony that you did not see this publication with this information in it prior to the Three Mile Island accident?

7

8

A To the best of my recollection, I did not

9

see this document prior to the accident at Three Mile Island.

10

11

Q

No one in the Training Department, to your knowledge, obtained this information from this document?

12

13

A

I cannot speak for everyone in my Training Department because I wasn't at this -- I can't speak for the rest of the people in the Training Department.

14

15

Q

Do you have any knowledge as you sit here today that anyone else responsible for training at Met Ed read this document?

16

17

A

I have no knowledge of anybody that I know of that would have read that.

18

19

Q

There was also some testimony earlier about a publication called "The Atomic Energy" put out by the Atomic Energy Clearing House. I would like to show you some more pages from that same Exhibit 208 which have a caption on the first page, "Atomic Energy

20

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1  
2 Clearing House Volume 24, January 9, 1978." I would  
3 like to direct your attention to the second page of this  
4 excerpt where there starts a description of the  
5 September 24, 1977 Davis-Besse transient which is  
6 described under a heading "Valve Malfunctions Primary  
7 System Depressurization." I would ask you to look at  
8 the next page and the fourth paragraph on that page  
9 which reads, "The RCS continued to blow down through  
10 the open pressurizer power relief valve and the quench  
11 tank rupture disk opening until primary coolant  
12 saturation pressure was reached about six minutes into  
13 the transient. The formation of steam in the RCS  
14 caused an insurge of water into the pressurizer. This  
15 insurge and the high pressure injection then  
16 restored pressurizer level to about 310 inches after"  
17 something "minutes into the transient.

18 Is it your testimony that you didn't read  
19 this portion of the Davis-Besse transient prior to the  
20 Three Mile Island accident?

21 A To my recollection I did not see this prior  
22 to the accident.

23 Q Is it also your testimony that, to your  
24 knowledge, that no one else responsible for training at  
25 Met Ed read this paragraph or this description of the

1 Davis-Besse transient before March 18, 1979?

2 A Since I have not talked to each person  
3 relative to that, I cannot speak for everyone in my  
4 Training Department.

5 Q Nothing has come to your attention at any  
6 time up until today, has it, to indicate to you that  
7 any person in your Training Department did, in fact,  
8 read this?

9 A This particular document?

10 Q Yes.

11 A No.

12 Can we take a break?

13 (Recess taken)

14 BY MR. FISKE:

15 Q In another publication that you testified  
16 about earlier in this deposition, something called a  
17 current events power reactor. I would like to show  
18 you a document which has been marked previously as  
19 B&W Exhibit 161, which is a four-page document entitled  
20 "Current Events Power Reactors," and the date is  
21 1 September-31 October, 1977 published December 1977.  
22 Directing your attention to page 2, there is a  
23 description under the caption "Valve Malfunctions  
24 Primary System Depressurization of the Davis-Besse  
25

1 transient on September 24, 1977."

2 I would direct your attention to the third  
3 page of this exhibit, the middle of the page where  
4 there is a paragraph that reads, "The RCS continued to  
5 blow down through the open pressurizer power relief  
6 valve and the quench tank rupture disk opening until  
7 primary coolant saturation was reached about six minutes  
8 into the transient. The formation of steam in the  
9 RCS caused an insurge of water into the pressurizer.  
10 This insurge and the high pressure water injection then  
11 restored pressurizer level to about 310 inches after  
12 nine minutes in the transient."

13 Is it your testimony that you never read  
14 that description of the Davis-Besse transient prior  
15 to the Three Mile Island accident?

16 A To the best of my recollection, I haven't.

17 Q Is it also your testimony that no one, to  
18 your knowledge, responsible for training at Met Ed  
19 read that description of the accident of the Davis-Besse  
20 transient?

21 A To the best of my recollection.

22 Q You are saying, to the best of your  
23 recollection, you have no knowledge that anybody read  
24 it?  
25

1  
2 A To the best of my recollection at this time,  
3 I have no knowledge of anybody else reading it.

4 Q I think you testified previously that you  
5 were familiar with Users Group and Owners Group  
6 meetings held by B&W.

7 A I was aware that there were those groups,  
8 yes.

9 Q I believe you testified that you understood  
10 that those meetings were held under the auspices of  
11 B&W for the benefit of representatives of the various  
12 utilities that were operating reactors built by B&W.

13 A That's correct.

14 Q In November 1977, did you know an employee  
15 of Met Ed by the name of Gary Miller?

16 A Yes, I did.

17 Q What was his title?

18 A 1977.

19 I don't recall what his title was. I don't  
20 recall what his title was at that time.

21 Q Can you tell us what his title was as of  
22 the date of the Three Mile Island accident?

23 A I am drawing a blank on his specific title.

24 Q Can you tell us any position that you remember  
25 him holding at Met Ed or GPU during the period from



1 September 1977 through the date of the Three Mile Island  
2 accident?

3 A At one time he was Unit 2 superintendent.

4 Q Did you know an employee of Met Ed or  
5 GPU by the name of James O'Hanlon in November 1977?

6 A I knew a James O'Hanlon. I don't recall  
7 when he came with the company.

8 Q Can you tell us any positions that Mr.  
9 O'Hanlon held with Met Ed or GPU during the period  
10 September of 1977 to the date of the accident?

11 A Yes, he was superintendent.

12 Q Of which unit?

13 A I am just drawing blanks.

14 Q Is it correct that both Mr. Miller and Mr.  
15 O'Hanlon at some point in time between November '77  
16 and the date of the Three Mile Island accident held  
17 the position of superintendent of either Unit 1 or  
18 Unit 2?

19 A To the best of my recollection, they did.

20 Q Have you ever met a person by the name of  
21 Terry D. Murray employed by Toledo Edison?

22 A No, I don't recognize that name.

23 Q I would like to read you, Mr. Zechman,  
24 portions of testimony given by Mr. Murray in a deposition  
25

1  
2 in this case. Reading from page 49, I would like, Mr.  
3 Zechman, in the interest of saving time, to read you  
4 particular paragraphs from pages 49 and those that  
5 follow, and you are perfectly entitled to read the  
6 entire pages to see if there is anything there that I  
7 haven't read that you think is important. It starts  
8 on page 49.

9 "Question: Mr. Murray, can you tell us,  
10 if you can recognize the phrase Users Group"

11 "Answer: Yes.

12 "Question: Can you tell us what the Users  
13 Group is?

14 "Answer: That is a term that usually refers  
15 to an organization, an informal organization that  
16 meets twice a year made up of the plant managers  
17 of the various B&W-designed nuclear power plants.

18 "Question: You say plant managers. Are  
19 those the station superintendents?

20 "Answer: Yes.

21 "Question: When you became station  
22 superintendent as you described earlier, did you begin  
23 attending these meetings?

24 "Answer: Yes.

25 "Question: Can you tell us what the purpose

1  
2 is of having station superintendents meet?

3 "Answer: The purpose is to exchange  
4 information about the operation, particularly the  
5 unusual or out of ordinary occurrences that each of us  
6 have seen to exchange that information."

7 Skip to page 51.

8 "Question: Do you remember where the first  
9 Users Group meeting was that you attended as station  
10 superintendent?

11 "Answer: Twin Bridge Marriott in Washington  
12 D.C.

13 "Question: Are you able to tell us about  
14 when that meeting took place?

15 "Answer: I think it was the 15 and 16, or  
16 14 and 15 of November, 1977.

17 "Question: Let me show you a document which  
18 has been marked B&W 1001 in this litigation.

19 "Answer: Yes.

20 "Question: Are you able to recognize that  
21 document generally?

22 "Answer: It was a document that is  
23 distributed as the minutes of the meeting that was held  
24 on the 15 and 16 of November 1977."

25 Skipping to page 52, "Question: Are you

1  
2 able to find in those minutes a list of  
3 attendees?

4 "Answer: Yes.

5 "Question: Are you one of the persons  
6 listed?

7 "Answer: Yes, I am.

8 "Question: Are you able to find on the  
9 list of attendees any personnel of Met Ed?

10 "Answer: Yes.

11 "Question: Could you tell us who they are?

12 "Answer: Garry Miller, Mr. Jim O'Hanlon.

13 "Question: Do you remember whether Mr.  
14 Miller and Mr. O'Hanlon were, in fact, in attendance  
15 at that meeting?

16 "Answer: I do remember them being in  
17 attendance."

18 Going to page 54, "Now you reported on a  
19 number of events. Is one of the events you report on  
20 that of September 24, 1977 that we have discussed about  
21 during this deposition?

22 "Answer: Yes, it is.

23 "Question: Would it be fair to say that it  
24 is the spirit of the meetings of the station  
25 superintendents that information is exchanged fully and

1  
2 freely?

3 "Answer: Most definitely.

4 "Question: I take it in your report on  
5 the September 24, 1977 incident as well as your report  
6 on the other events listed in the minutes was consistent  
7 with that concept?

8 "Answer: Yes.

9 "Question: Are you able to recall that you  
10 made the report on that event?

11 "Answer: Yes."

12 On page 58, skipping a lot of colloquy,

13 "Question: Mr. Murray, can you tell me what your best  
14 recollection is that during that report on the  
15 September 24, 1977 incident you reported on the failure  
16 of the steam and feed rupture control system?

17 "Answer: I believe that I did.

18 "Question: Do you recall whether during  
19 that report you indicated that there had also been a  
20 problem with the auxiliary feedwater system?

21 "Answer: I am positive that I reported  
22 on that auxiliary feedwater governor problem.

23 "Question: What is your best recollection  
24 as to whether you reported on the fact that the PORV  
25 stuck open?

1 "Answer: I am positive I reported on that.

2 "Question: What is your best recollection  
3 of whether you reported that during the event that the  
4 pressure level went to saturated conditions?  
5

6 "Answer: That I am fairly sure was reported  
7 also.

8 "Question: What is your best recollection  
9 as to whether you reported that during the event the  
10 pressurizer indicator read full?

11 "Answer: I believe I stated that also.

12 "Question: What is your best recollection  
13 as to whether you reported that the quench tank rupture  
14 disk had broken?

15 "Answer: I am sure I mentioned that.

16 "Question: Is it your best recollection  
17 that in reporting the event you summarized those things  
18 which you thought were most important?

19 "Answer; Yes."

20 I would like to ask you at any time before  
21 the Three Mile Island accident in March of '79, did  
22 either Mr. Miller or Mr. O'Hanlon advise the Training  
23 Department that they had learned that at the Davis-Besse--  
24 in the Davis-Besse transient pressure decreased while  
25 pressurizer level was increasing?



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MR. MacDONALD: I will let him answer. I just want to object to the form of the question.

A I have no recollection of that kind of a discussion at this time.

Q You have no recollection of either Mr. Miller or Mr. O'Hanlon telling you that; is that correct?

A That's correct.

Q Have you learned at any time up until today that Mr. Miller or Mr. O'Hanlon reported that information to anybody else in the Training Department?

A No, I do not.

Q Have you learned at any time up until today that Mr. Miller or Mr. O'Hanlon gave the Training Department any of the information that they had received from Mr. Murray at that Users Group meeting?

A I have no recollection of that information at this time.

Q Did it ever come to your attention, Mr. Zechman, prior to the Three Mile Island accident that there had been a transient at Unit 2 in March 1978 involving a failed open PORV in which during the course of the transient pressure decreased and pressurizer level increased?

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A You are asking my personal recollection?

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Q Yes.

4

A Not that I recall.

5

Q Is it correct that you have no knowledge that information concerning an increase in pressurizer level and a decrease in pressure during the course of the March 29, 1978 transient was brought to the attention of anyone in the Training Department?

10

A Not to my knowledge.

11

Q Let me show you a document which has previously been marked as B&W 176, which are on from the shift test engineers' log for Unit 2 and these relate to March 29, 1978, and I would direct your attention to the second page. The third line says, "The pressurizer level was increased to approximately 200 inches. RCS pressure decreased to approximately 1200 psig before recovery started."

18

I take it your testimony is that nobody, to your knowledge, in the Training Department was made aware of that fact?

21

22

A I am saying that I am not aware of anybody in the Training Department being aware of that.

23

24

Q Is it your testimony that you did not review this particular document, that is, the shift

25

1 test engineers' log, before the Three Mile Island  
2 accident?

3 A I did not review that prior to the Three  
4 Mile Island accident.

5 Q Do you know, to your knowledge, if anyone  
6 else, anyone in the Training Department ever saw those  
7 pages from the test engineers' logs?

8 A I cannot speak for those in my department,  
9 but I am not aware of anyone in my department ever  
10 reading that.

11 Q Were you aware before the Three Mile Island  
12 accident that there was another transient at Unit 2  
13 in April 1978 with respect to an analysis of Met Ed  
14 after the transient concluded that because of steam  
15 bubble formation in the reactor coolant system,  
16 pressurizer level had been held up?

17 A I have no recollection of that.

18 Q Is it your testimony also with respect to  
19 this transient at Unit 2 that --

20 A When you say "this," this one here?

21 Q The April 23. Just so we understand each  
22 other, my questions a few moments ago were directed at  
23 a transient at Unit 2 in March of 1978 in which,  
24 according to the shift test engineers' log, pressurizer  
25

1 level went up and pressure went down, and I think we  
2 have covered that transient.

3 Now I am asking you about another transient  
4 less than a month later at Unit 2 with respect to which  
5 there was an analysis after the event by Met Ed which  
6 concluded that as a result of steam bubble formation  
7 in the reactor coolant system resulting from a drop in  
8 pressure, pressurizer level was held up. And I think  
9 you have testified that you were not personally aware  
10 of that transient.

11 I am now asking you whether you have any  
12 knowledge that anyone else in the Training Department  
13 at Met Ed was made aware by anyone at Met Ed of this  
14 second transient at Unit 2 in which because of the  
15 formation of steam in the reactor coolant system  
16 resulting from a drop in pressure, pressurizer level  
17 was held up?

18 A I can only say that I cannot speak for  
19 everybody else in the Training Department. I can say  
20 that I wasn't aware of anybody else being aware of that.

21 Q Were you aware of a transient which occurred  
22 at TMI-2 on November 7 of 1978 in which there had been  
23 an actuation of high pressure injection because of the  
24 drop in pressure?  
25

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2 A Do you want to tell me a little bit more?

3 MR. MacDONALD: Based on that.

4 MR. FISKE: Listen to the question again.

5 (Question read)

6 A I have no recollection at this time.

7 Q I take it it would also be your testimony  
8 that you have no recollection of learning any  
9 information from that transient about the effect of  
10 saturation on pressurizer level?

11 A Since I cannot recollect that one, certainly  
12 I can't associate it with level.

13 Q Is it your testimony, Mr. Zechman, that  
14 notwithstanding all of the information which has been  
15 brought to your attention in the last hour of this  
16 deposition concerning information available or known  
17 to various people within the Met Ed organization  
18 concerning the fact that a decrease in pressure can  
19 cause saturation which in turn can cause an increase  
20 in pressurizer level resulting in a situation where  
21 pressurizer level is increasing while pressure is  
22 decreasing, that at no time did that concept get  
23 communicated or known to the Training Department?

24 MR. MacDONALD: I object to the form of  
25 the question. I think there are assumptions

1  
2 built into the question and lacks foundation,  
3 but he can answer to the best of his understanding.

4 A Again, I will speak for myself. I have no  
5 recollection of that being relayed to us. I cannot  
6 speak for everyone in my Training Department.

7 Q Am I correct in understanding that  
8 notwithstanding the existence of the information in  
9 the various forms that it has been presented in the  
10 last hour of this deposition, the Training Department  
11 continued right up to the day of the Three Mile Island  
12 accident to train operators that pressurizer level was  
13 under all circumstances an accurate indication of  
14 inventory level in the system?

15 MR. MacDONALD: I object to the form, but  
16 he can answer.

17 A Would you repeat it?

18 (Question read)

19 A To the best of my recollection, the Training  
20 Department at Met Ed and at the simulator informed  
21 the operators that maintaining level in the pressurizer  
22 assured inventory in the RCS system.

23 Q Was there a procedure at Met Ed under  
24 which Mr. Floyd or Mr. Toole or Mr. Miller or Mr.  
25 O'Hanlon would communicate to B&W to understand that



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2 they had information with respect to the fact that  
3 pressurizer level was not an accurate indication of  
4 system inventory in a situation where a drop in  
5 pressure had caused saturation?

6 A Anything I would say about what their  
7 communications were would be speculation on my part.

8 Q You don't know of any regular procedure  
9 at Met Ed that would have led them to communicate that  
10 kind of information to B&W and not communicate it to  
11 their Training Department in their own organization?

12 A Let me see if I understand that question  
13 correctly.

14 What you are saying is was there a procedure  
15 such that they would relay any information they knew  
16 about that to someone else but not the Training  
17 Department?

18 Q Yes.

19 A I am not aware of any such procedure.

20 Q Was there a procedure at Met Ed whereby  
21 information from the log books relating to hot functional  
22 testing would be related to B&W but not to the Training  
23 Department at Met Ed?

24 A Again, you are asking me what somebody else  
25 would do and I don't know -- it is hard for me to speak

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for what they would do.

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Q Your understanding, I take it, at the time you were head of the Training Department was that if anyone in the Met Ed organization received information which would be useful to the operators in preventing a major transient, that that information would be communicated to the Training Department at Met Ed; is that right?

A I am saying that it was normal policy that things the plant superintendent, licensing or vice president wanted us to know, it was normal policy to send us that information.

Q There certainly was not a policy that you were aware of as head of the Training Department where that information would be communicated to B&W but not to your own Training Department?

A Not that I am personally aware of.

Q Was there any procedure at Met Ed where information concerning either the transient on March 28, 1979 involving the open PORV, the transient in April of 1978 involving a cooldown resulting from failed open steam relief valves, or the transient in November of 1978 would be communicated to B&W but not to Met Ed's own Training Department?

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2           A       I am not aware of them supplying B&W  
3 information that they felt that we should know and  
4 not supply us with. I am not implying by that,  
5 I saw it.

6           Q       Just one last question. Is it fair to  
7 say, Mr. Zechman, that you have no basis as you sit  
8 here today for telling us that B&W was aware of what  
9 Mr. Floyd knew, what Mr. O'Hanlon knew what Mr. Miller  
10 knew and what Mr. Toole knew concerning the impact of --  
11 concerning a divergence between pressurizer level and  
12 pressure? By that question, I mean you have no basis  
13 for testifying, do you, that any of those four  
14 individuals communicated that fact to B&W?

15           MR. MacDONALD: Are you asking whether he  
16 knew if any of those four individuals communicated  
17 any facts relating to saturation and its effect  
18 on level to B&W?

19           MR. FISKE: Yes.

20           Q       I take it, Mr. Zechman, you do not have  
21 any basis for testifying that either of those four  
22 individuals communicated to B&W that they knew in a  
23 transient where pressure decreases you can have  
24 pressurizer level increasing when saturation is reached?

25           MR. MacDONALD: I am going to object to the

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form of the question. No proper foundation.

3

You can answer.

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A I am not aware of the communication in those areas that they transferred, if any, to B&W.

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Q You have no knowledge that they did transfer such information; is that correct?

8

A I personally have no knowledge, yes.

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Q Is it correct that you also have no basis for telling us that the information concerning the hot functional testing incident in September of 1977 was communicated to B&W?

13

A I have no personal knowledge of that.

14

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Q Is it correct that you have no basis for telling us that the information concerning a divergence between pressure and pressurizer level in March 1978 open PORV transient was communicated to B&W?

18

A By that group, you mean?

19

Q By anybody at Met Ed.

20

21

A I have no recollection at this time of that being transmitted.

22

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Q We were discussing at the end of the day yesterday questions relating to high pressure injection.

24

A Yes, sir.

25

Q You did understand, did you not, before

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the Three Mile Island accident, that the actuation of high pressure injection was itself a symptom of a loss of coolant accident?

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A I understood was one symptom provided that the pressure got down to 1600 before it was activated.

7

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Q I think we have established yesterday that HPI would come on automatically when pressure dropped to around 1600.

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A What I am implying is that the leak may be small enough that pressure may not drop -- if it is a small break it may not drop to activate high pressure.

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Q You may have a loss of coolant accident in which it was not low enough to actuate HPI in the first place?

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Q If in the course of a transient pressure dropped below 1600 and HPI at that point did come on automatically, that that fact itself, that is the very fact that HPI had come on would be a symptom of a loss of coolant accident?

22

23

A Could be a symptom of a loss of coolant accident.

24

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Q Did you understand before the Three Mile Island accident that there was any other event or

1  
2 type of transient that could actuate HPI based upon a  
3 drop in pressure other than the loss of coolant accident?

4 A Yes. I understand that there were other  
5 circumstances that could have activated the high pressure  
6 system.

7 Q Which in those circumstances --

8 A Was not considered a LOCA.

9 Q -- would cause a drop in pressure, right.

10 A Yes.

11 Q You were familiar, I assume, with the phrase  
12 "overcooling"?

13 A Yes, sir.

14 Q Is an overcooling transient one which could  
15 cause a drop in pressure and the actuation of HPI?

16 A Drop of pressure and level.

17 Q And actuation of HPI?

18 A Yes.

19 Q You understood before the Three Mile Island  
20 accident that if you had an overcooling transient --

21 A Assuming, by the way, we have reached that  
22 activation point.

23 Q Yes.

24 MR. FISKE: Would you read what I started?

25 (Record read)



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Q If you had an overcooling transient, you would expect to see a drop in pressure and a drop in pressurizer level; is that correct?

A Yes.

Q You were not aware of any opposite trending phenomenon associated with an overcooling transient; is that correct?

I was trying to shortcut by using a phrase used in other depositions.

MR. MacDONALD: Just add the parameters you are talking about.

Q You were not aware prior to the Three Mile Island accident of any circumstances under which an overcooling transient as opposed to a loss of coolant accident -- let me -- pressure would decrease while pressurizer level was increasing?

A During an overcooling situation?

Q Yes.

A Not to my recollection at this point.

Q I think you told us before that H comes on automatically as part of the safety system whenever pressure reaches or goes below approximately the 1800 pound set point; is that correct?

A That's correct.

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Q In a loss of coolant accident, what is it that causes pressure to go down?

A The fact that we are losing inventory. If we have a breach of the RC system and therefore losing pressure.

Q What is it in an overcooling transient that causes pressure to go down?

A The fact that -- pressure to go down?

Q Yes.

A The fact that temperature is going down, you are dragging heat away and temperature is dropping and pressure is dropping.

Q Was it important to you in running the Training Department at Met Ed that you be advised in the Training Department of situations during the operation of either unit in which a transient had occurred which activated HPI? In other words, to put it simply, was it important to you in the Training Department that you learn about any transient that occurred at either plant where HPI had come on?

A During operations of the plant?

Q Yes.

A Not testing or anything of this sort?

Q Well, let's talk about during operations.

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2           A       Realizing that's a broad, generic question,  
3 I think based on the circumstances and I am sitting  
4 here trying to think of all the kinds of circumstances  
5 which could occur and whether there be any that were  
6 not significant that would not be important to the  
7 Training Department.

8           Q       Could there be a transient --

9           MR. MacDONALD: Was he finished with his  
10 answer?

11          MR. FISKE: I was trying to explain.

12          A       I wasn't finished yet. I was trying to get  
13 my thoughts together.

14          Q       Maybe I can make it clearer. Based on your  
15 understanding before the accident, would there be a  
16 transient during normal operations in which there was  
17 such a decrease in pressure that HPI came on requiring  
18 the use of emergency procedures to restore the plant to  
19 normal condition that you would consider insignificant?

20          MR. MacDONALD: Are you asking if anything  
21 that occurred he considered insignificant? You  
22 have to deal with his recollection.

23          MR. FISKE: I will ask if he remembers any  
24 such actuation of HPI which he then analyzed and  
25 decided was insignificant. I will ask him that. We

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will start with that.

A Can you repeat the question?

(Question read)

A I don't recall analyzing an HPI actuation in which I deemed insignificant.

Q Let me ask the next question. Making it clear, I am asking for your understanding before the Three Mile Island accident.

Did you have an understanding then that there could be transients during operations in which there was a drop in pressure large enough to actuate automatically a safety system requiring the application of emergency procedures to bring the plant back to a normal condition which could be termed insignificant?

A Not that I could think of in the phraseology that you used.

Can we break?

(Recess taken)

BY MR. FISKE:

Q Prior to the Three Mile Island accident, were you aware of any transient at Unit 1 or Unit 2 where in the course of operations the high pressure injection system had been automatically actuated?

A I cannot recall any at this time.

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Q Speaking of Unit 2, I take it that it is correct that you were not aware before the accident of the ECCS actuation in the open PORV transient in March '78?

A Not to the best of my recollection.

Q You were not aware of the ECCS high pressure injection actuation in the course of the April 23, 1978 cooldown transient?

A Not to the best of my recollection.

Q You were not aware of high pressure injection having come on automatically in a transient in November '78?

A To my recollection at this time, no.

Q You were not aware of high pressure injection having come on in the course of another transient near the end of 1978?

A Not to my recollection at this time.

Q Could you, for our benefit, go through the mechanics or dynamics of how it is that a drop in temperature produced a drop in pressure in the primary system?

MR. MacDONALD: His recollection prior to the accident?

MR. FISKE: Yes. I assume he understood

1  
2 before the accident how that worked or why that  
3 happened.

4 A A drop in temperature?

5 Q Yes. We are talking about a cool down  
6 transient. We are backing up a little bit. Before  
7 the break we were talking about two different types of  
8 situations which could cause a drop in pressure  
9 sufficient to actuate high pressure injection  
10 automatically. One was a loss of coolant accident  
11 and one was an overcooling transient. I think you  
12 described how it was that a loss of coolant accident  
13 could cause a drop in pressure simply because there was  
14 a loss of coolant through a break in the system, and I  
15 think that is clear. You also said that in the case  
16 of an overcooling transient, what would cause the drop  
17 in pressure was a drop in temperature.

18 I think it would be useful in this deposition,  
19 how in an overcooling transient that a drop in temperature  
20 produced a drop in pressure.

21 A A decrease in temperature, the RCS liquid  
22 results in the shrinkage of the system resulting in a  
23 decreasing level and pressure.

24 Q Is there during normal operations a  
25 relationship between the temperature in the primary



2 system and the temperature in the secondary system?

3 A Is there a relationship, did you say?

4 Q Yes.

5 A You are dragging from a hot to a colder  
6 system.

7 Q It is correct, is it not, that in the so-  
8 called primary system there is a hot leg and a cold  
9 leg?

10 A Yes.

11 Q And the hot leg describes that part of the  
12 system through which the water flows after it has gone  
13 through the core on its way to the steam generator;  
14 is that correct?

15 A That's correct.

16 Q As the water passes through the steam  
17 generator in the primary system pipes, it transfers  
18 heat from those pipes to the water in the steam  
19 generator; is that correct?

20 A Correct.

21 Q Which then heats the water in the steam  
22 generator up to a certain temperature?

23 A Secondary side, yes.

24 Q Isn't it correct that under normal conditions  
25 the temperature in the hot leg is around 605 degrees

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2 Fahrenheit?

3 A That's correct. Somewhere around 605 degrees.

4 Q After it passes through the steam generator

5 and becomes part of the so-called cold leg, it has

6 dropped in temperature to approximately 550 degrees?

7 A Somewhere in there.

8 Q And it stays at that temperature until it

9 goes back through the core again and re-enters the

10 hot leg, correct?

11 A Are we back on the primary side or secondary

12 side?

13 Q We are in the primary side. Just going

14 through it one more time. We have talked about the hot leg

15 which is the part of the system between the core and the

16 steam generator.

17 A I understand that.

18 Q And that part of the circle was about 600

19 degrees.

20 A O.K.

21 Q It then passes through the steam generator

22 and transfers some of its heat to the water in the

23 steam generator and the result when it comes out of

24 the steam generator and enters the cold leg it is down

25 to about 550 degrees.

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A Yes.

Q And it stays at that temperature until it reaches the core and goes back through the core and gets heated up again to approximately 605 degrees; is that correct?

A That's correct.

Q To what temperature is the water in the steam generator heated by the water that goes through it from the primary system?

A Using what the temperature of the steam is that comes out of the secondary side?

Q Yes.

A I don't recall the exact values.

Q There is water in the steam generator, is there not?

A Sure. On the secondary side?

Q Yes.

A On the secondary side goes in the bottom and goes up through the steam generator and heat is transferred and goes through different boiling regions and transferred to steam, super-heated steam and goes out the secondary side to the turbine.

Q You are familiar with the abbreviation "TH"?

A T Hot.

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Q TC?

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A T Cold.

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Q That is the temperature of the cold leg?

5

A Yes.

6

Q T Av

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A Yes.

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Q What is that?

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A That's the average temperature of the

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RC system.

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Q Is there any relationship between T Av

12

or TC in the temperature in the secondary system?

13

A Yes, there is.

14

Q What is that relationship?

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A Relationship between T Av and Tsat

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Q Are they the same?

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A No.

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Q If the T Av is halfway between 550 and

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605, approximately 575, and TC is 550, what is the

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temperature in the secondary side?

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A I need to know what Tsat is on the

22

secondary side.

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Q Isn't there a regular temperature for

24

Tsat in the secondary system during normal operations;

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isn't it supposed to be at a certain temperature?

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A It is and I cannot recall that number.

3

I am drawing blanks.

4

Q I guess what I am also asking you is what

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is the relationship between that number and whatever

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it is and either T Av or TC or TH.

7

A  $Q = UA \Delta T$ .

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Q Would you mind putting that in English?

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A Yes. The heat on the secondary side is

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equal to the U, which is the coefficient of heat

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transfer times the area times the quantity Delta T,

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change in temperature.

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Q What I am asking you is in the course of

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normal operations where you have TC 550, TH approximately

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600, what would you expect in normal operations the

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temperature on the secondary side to be?

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A I told you I just can't recall that number.

18

Q Is it correct the way the system works

19

that a decrease in temperature on the secondary side

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would produce a decrease in temperature on the primary

21

side?

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A It means we are dragging heat away, yes.

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Q Other than a loss of coolant accident and

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an overcooling as you have described it in your testimony,

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was there any other circumstance that you were aware of

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before the Three Mile Island accident that could cause a drop in pressure sufficient to actuate high pressure injection?

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A Please repeat the question.

6

(Question read)

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A Yes, there was.

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Q What?

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A Stuck open PORV would reduce pressure to that point.

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Q I guess by my question I had been including a stuck open PORV within the definition of a loss of coolant accident based on some testimony you gave earlier in a deposition that you considered a loss of coolant through an open PORV to be a "loss of coolant accident"?

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A No, sir, I did not. Not to the best of my recollection. I indicated that a stuck open PORV would allow pressure to drop but I didn't consider that -- we never considered a loss of coolant accident via a PORV.

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Q Let's pause on that for a minute. You understood that when the PORV, if the PORV failed open that mass in the form of steam or whatever would flow out of the PORV through the pipe into the drain tank;



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is that correct?

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A Small amount of mass, yes.

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Q Isn't it correct to consider that a loss of coolant?

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A But not in the phraseology as a loss of coolant accident.

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Q Without pausing a great deal longer at this moment, is it correct then that prior to the Three Mile Island accident you were not aware of any event which could cause a drop in pressure to actuate high pressure injection other than a loss of coolant accident, an open PORV or an overcooling?

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A There may be others, I just can't think of any other at this moment.

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Q Did you give your operators any training at Met Ed as to how they could tell once HPI had come on whether it had come on because of a loss of coolant accident as opposed to an overcooling transient?

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21

A In our training we tried to explain to them the distinguishing features.

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23

24

Q Did you explain to them that one of the distinguishing features of an overcooling transient was a drop in temperature?

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A We explained that one of them was a drop in

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pressure, also a corresponding drop in level. We are talking about overcooling?

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Q Yes.

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A Repeat the question.

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(Question read)

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A And level?

Q Right.

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Did you understand prior to the accident that you could have an overcooling transient when there was an increase in temperature?

A Never considered that prior to the accident. No. The answer is no, I never considered that.

Q Having just told us that what produced an overcooling transient is a drop in temperature, are you saying that you never considered that an increase in temperature would produce an overcooling transient?

A No. I am saying an overcooling is characteristic of temperature and level decrease.

Q So you would not expect to have an overcooling transient if there was an increase in temperature; is that correct?

A To the best of my recollection.

Q In training the operators on how they could tell the difference between a loss of coolant accident, open PORV transient and an overcooling, wasn't it part of the training process to tell the operators that what causes an overcooling transient is a drop in temperature?

A You can't put it just in those terms. You have got to know the situation at the time, what all the other parameters are and make that evaluation.

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Certainly one of the things they are looking for in overcooling is a decrease in temperature and pressure together. That is one of the symptoms but that is not the only thing we are looking for in making those -- between those situations you have hypothesized that we looked for.

Q I am not saying this is the only thing they should look to. Indeed, we went through a procedure yesterday which listed a number of separate specific things that should be looked to which might be uniquely characteristic of a LOCA as opposed to a steamline break and as opposed to a tube rupture. We have already covered all that. I am simply focusing on the moment for this additional consideration. I think you have told us that it was your understanding before the accident that you could not have an overcooling transient where there was an increase in temperature as opposed to a decrease, and I am asking wasn't that part of the training program? I am not saying the only thing. I am saying was that part of the training given to the operators that trying to determine in the course of a transient whether or not there was an overcooling involved, that one of the things they should look at was the temperature?

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A That's only one of the things they should look at. They should also look at level.

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Q I am only asking you at the moment about temperature as one of the things they should look at in the process of trying to diagnose what is causing this drop in pressure that they are looking at.

Am I correct that that was one of the things that they were told to look at?

A But not all. One of the things but not all.

MR. FISKE: Let's stop for lunch.

(Luncheon recess taken at 12:30 p.m.)

## AFTERNOON SESSION

2:12 o'clock p.m.

R I C H A R D W. Z E C H M A N, resumed:

BY MR. FISKE:

Q Mr. Zechman, before lunch we were talking about the training that was given to the operators at Met Ed on how to differentiate between a LOCA and an overcooling transient when they saw a decrease in pressure which was sufficient to actuate high pressure injection.

What I would like to ask you now is what was your understanding at the time of the Three Mile Island accident as to what would happen if in the course of an overcooling transient the operators left HPI on longer than they should have.

A Assuming now that the HPI is on and that there is an overcooling and temperatures are continuing to decrease because of that overcooling?

Q Correct.

A Levels are increasing. Pressure and temperature are decreasing and levels decreasing. One of the concerns the operators were told about was to maintain level in the pressurizer. Don't let it go out



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the bottom. Don't let the level go out the top of the pressurizer. They were trained to operate high pressure injection in such a way to control the overcooling event.

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Q Let's put it in a slightly different way in light of the answer you just gave. You said it was your understanding and your Training Department's position, right up to the time of the accident, that pressurizer level was an accurate measure of inventory of the system, correct?

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A That's correct.

Q What was your understanding of a situation in which the system was full and the pressurizer level was full, what would happen if under those conditions the operators continued to leave HPI on?

A I don't recall.

Q I think you testified yesterday that you did understand that if the operators terminated HPI during a loss of coolant accident when the pressure had not come back up to the actuation point that there was a risk that the pressure could continue to decrease to the point where saturation would occur. I think we spent about a half hour on that at the end of the day.

MR. MacDONALD: I am going to object. What

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2 he said was said. If you want to go back over the  
3 ground, fine. I don't think necessarily your  
4 characterization is right. That's all, Mr. Fiske.

5 Q Let me read you the last two questions and  
6 answers from yesterday's deposition.

7 "Question: My question is did it occur  
8 to you before the accident that if the operators had  
9 been given training and instruction on when it is  
10 proper to terminate HPI either didn't understand those  
11 instructions or failed to follow them or made a mistake  
12 or for whatever reason terminated HPI when, in fact, the  
13 HPI should have stayed on, that one consequence of their  
14 doing that, that is improperly terminating HPI would  
15 be to allow a continuing drop in pressure?

16 "Mr. MacDonald: Did that ever occur to you?

17 "Answer: Yes.

18 "Question: And that a continuing drop in  
19 pressure if it went far enough to cause boiling?

20 "Answer: And this is where I think we have  
21 our differences. As a theoretical point, I understand  
22 that that will occur."

23 That is from the end of yesterday's session.  
24 I would like to proceed from those answers. Did you  
25 understand that if a transient had been diagnosed as a

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loss of coolant accident and that a loss of coolant accident was in progress, that the operators should not terminate HPI until at least pressure had returned to the actuation point?

A The focus on HPI has always been to maintain level and their focus was on level. Everything we observed in the past maintaining HPI for a LOCA, pressure and level stay together.

Q And as you said, that was also true for an overcooling; is that correct?

A Would you like to state that question again? I said what for overcooling?

MR. FISKE: Read Mr. Zechman's last answer back.

(Answer read)

Q First of all, let me put a preliminary question. When you use the word "we" in that last answer, you weren't referring to Met Ed as a whole, you were referring to you personally, were you not?

A Met Ed and at the simulator training.

MR. FISKE: Read the last sentence back.

(Answer read)

Q Who were you referring to when you used the word "we" in that sentence?

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A I repeat what I said. When I said "we," I referred to our operators at the simulator and our own in-house training.

Q The "we" is confined to your operators?

A To the training of the operators.

Q It is not intended to speak more broadly and include anyone else in the Met Ed organization, other than just the operators; is that correct?

A Well, it depends whether the others attended the operator training program.

Q Were you intending to include Mr. Floyd, Mr. Toole, Mr. Miller and Mr. O'Hanlon in the use of "we" in that sentence?

A What I was referring to in that -- what I was referring to was that in the training, whether it was Mr. Floyd or Mr. O'Hanlon who went through the training, I am referring to them who went through the training at the simulator and in-house. That's what I was referring to.

Q I would like to go back to the question that I started with and I think it is probably easier to put it again.

Did you understand that if it was diagnosed during the course of a transient that the loss of

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coolant accident was in progress, that -- and the HPI had come on, that the HPI should not be terminated until at least the pressure had been restored back to the set point at which it had been automatically activated for safety reasons? So you understand, I am not asking you to get into the question of how that diagnosis would take place. I am asking you whether after the diagnosis had been made, on whatever basis, it was determined that you, in fact, had a loss of coolant accident in progress resulting in a drop of pressure sufficient to automatically activate HPI, did you understand that it would be wrong to terminate the HPI until the pressure had been restored at least back to the actuation point?

A In the operation of the HPI it was always focused on maintaining level in the pressurizer and pressure would follow that. It was the level that was the major concern in past training.

Q Are you saying that if there was a loss -- knew a loss of coolant accident was going on and as you were looking at the instrumentation you were seeing on whatever basis symptoms that told you that there was a LOCA in progress, that you would turn off the HPI, if the pressurizer level was high?

A We were taught that as maintaining level and



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2 pressure by operation of the HPI, we were always taught  
3 if we maintained level that we had a sufficient RCS  
4 coolant and the focus was on the level.

5 Q We have been all through that this morning  
6 and you have testified that you personally and apparently  
7 nobody else in the Training Department was aware of  
8 the fact that there could be circumstances when  
9 pressurizer level was not an accurate indication of  
10 system inventory. I am not particularly anxious to  
11 go through that all over again. I would like to finish  
12 this deposition. I am simply asking you once again  
13 that if it were diagnosed that there was a loss of  
14 coolant accident in progress because of a lot of other  
15 symptoms besides pressurizer level or including  
16 pressurizer level, that there was a diagnosis that you  
17 had a loss of coolant accident in progress, didn't  
18 you understand that the HPI should not be terminated  
19 until pressure had come back to the actuation point?

20 A You are talking prior to the accident?

21 Q Yes.

22 A Prior to the accident our training was to  
23 maintain level. The other situation didn't occur. We  
24 never saw in our past training level going up and  
25 pressure going down. It was always together.



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Q Didn't your own training at Met Ed, even without knowledge, as you have testified of the fact that there could be a difference between level and pressure when saturation was occurring in the system, even without that knowledge for the moment, wasn't your training to the operators that they should look at level and pressure before determining to terminate HPI?

A I think I answered that question by saying that the training we had focused on level and in the past the pressure always.

Q In other words, it didn't make any difference what the pressure was, you just looked at the pressurizer level?

A It never occurred -- in the past it was never separated. They were together.

Q Isn't it a fact, Mr. Zechman, that your training taught them that they should look at level and pressure, both, before terminating HPI?

A The training we received from the simulator and in-house focused on maintaining level to insure adequate RCS coolant. By virtue of that in the past and everything we observed, pressure stayed with it.

Q In other words, you were told that both pressure and level were important, were you not? Didn't

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you tell that to your operators?

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MR. MacDONALD: In normal operation of

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the plant?

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MR. FISKE: In deciding whether to terminate

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HPI after it had come on in the phase of a drop

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in pressure.

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A Maintaining level that pressure would also

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be controlled, we told them.

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Q So that pressure was important? In other

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words, what you are saying, is it not, that you told

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the operators that they could look at level as an

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indication of what the pressure was?

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A We trained them that by maintaining level

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sufficient core inventory would be maintained and

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pressure would follow it because that is the way we were

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taught at the simulator and in-house.

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Q If pressure followed it, then they could

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terminate HPI when they got back up above the actuation

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point?

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A Termination of HPI is when we get down --

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when we can go on to low pressure injection.

23

Q So you were supposed to leave it until

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you got down to low pressure injection?

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A We were always taught to maintain level with

1  
2 HPI in the pressurizer, and that's what the focus was on.

3 Q When you say "we were," that is what you  
4 were taught at Met Ed?

5 A We were taught at the simulator too.

6 Q How many hours were involved in the two-year  
7 requalification program that was taught by Met Ed?

8 MR. MacDONALD: What time?

9 MR. FISKE: While he was head of the  
10 Training Department.

11 A A minimum of 60 hours scheduled training a  
12 year and sometimes it went up as high as 200-some hours.

13 Q Wasn't it as high as 500?

14 A You may be right. I don't recall the exact  
15 facts on numbers that we had. I know there were times  
16 there was a significant number of hours.

17 Q And the training on the B&W simulator  
18 during the period of time that you were head of the  
19 Training Department was one week every two years, is  
20 that correct, about 40 hours?

21 A At times I was either acting or in charge  
22 of. There was a period of which was 40 hours every two  
23 years and 40 hours ever year. That's my recollection.

24 Q Beginning in '78 it was 40 hours every two  
25 years, correct?

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A I think I told you before I didn't remember the exact dates. I know there was a period of time that it was 40 hours and that was consistent with our requalification program.

Q Forty hours every two years on the B&W simulator as compared with hundreds of hours of training at Met Ed; is that correct?

A If you want to do a time comparison, that's correct, sure. By the way, not counting, of course, the initial training program that operators spent at the simulator.

Q These also had an initial training program at Met Ed that was many hours multiple of the 40 hours they would get --

A It was more than 40 hours --

Q -- on the simulator?

A Eight weeks at the simulator. Combination classroom and simulator.

Q In any event, would you debate any further the quantitative differences between the training at Met Ed and that at B&W?

It sounds to me that an extraordinarily high reliance was put by the Training Department at Met Ed on the situation of level in the pressurizer.

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MR. MacDONALD: Object to the form. What

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do you mean by "extraordinarily high reliance?

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Q Do you think that is an unfair characteri-

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zation, Mr. Zechman?

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A If you are referring to the number of hours

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spent on that issue, yes, I think that's unfair.

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Q I am not talking now about the number of

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hours that that subject was covered. I am talking

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quantitatively, or rather substantively, qualitatively

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about the situation that was given in your training

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program to pressurizer level as being an accurate

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reflection of inventory in the system and just from

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the numbers of times that you referred to it in the

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response to questions that I asked, whether they are

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related to that or something else, I will draw the

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conclusion, which I invite you to correct if you think

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it is wrong, that the Met Ed Training Department put

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heavy reliance on that in the training of its operators.

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A You have got to put it in the framework

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in which our discussions took place. We were talking

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about transient conditions and we went -- where we

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learned to operate under transient conditions was at

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the simulator. That was the main focus of the simulator

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to look at transients and do different things on the



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simulator. That's where we learned that concept.

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Q You didn't confine your information about how to deal with transients to the B&W simulator program, did you? Putting it another way, wasn't it important for you to get what information you could about transients from whatever source?

A I am not saying the only source of transient information came from B&W.

Q Accepting that and taking whatever you know about transients or didn't know about transients in the Met Ed Training Department, from whatever source, isn't it a fair characterization of your training program that you placed heavy reliance on the pressurizer level as being an accurate indicator of system inventory during the training that you gave your operators?

A I guess I take issue with "heavy emphasis." It was characteristic of what we learned in operating RCS system and how we performed at the simulator and what we have learned in the operation of that system over the years.

Q Again, when you use "we" in that sentence, who are you referring to?

A People going through the training who learned how to operate the plant.



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Q And you did not mean to include in "we" Mr. O'Hanlon, Mr. Miller, Mr. Floyd and Mr. Toole?

A I certainly did imply to include anyone who went through our program and got licensed. Went through the same training, went to the same kind of simulator training, went through our training program.

MR. FISKE: Could you read the last answer back?

(Answer read)

Q Was Mr. Floyd licensed?

A He was.

Q Presumably Mr. Floyd was taught during your training program that pressurizer level was an accurate measure of inventory in the system?

A To the best of my recollection, he went through that same training, both at Met Ed and at the simulator and had that reliance.

Q He knew then, did he not, that your training program at Met Ed was teaching the operators that they could rely on pressurizer level as being an accurate reflection of system inventory?

A I can't speak for what Mr. Floyd thought. I can only say what training he went through.

Q The training that he went through told him,

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as you have just said, that he could, he and anyone else -- any operator could rely on pressurizer level as being an accurate measure of system inventory?

A That is what we were taught in the simulator and carried through on our training.

Q Do you know if Mr. Floyd knew this was being taught in the training program and he knew that was incorrect, that he wouldn't tell you in the Training Department that you were giving out misleading information?

MR. MacDONALD: Objection to the form,

A I can't speculate what was in Mr. Floyd's mind.

Q Would you give the same answer with respect to Toole?

MR. MacDONALD: To clarify, go through the training program.

Q Did Mr. Toole, to your knowledge, go through the Met Ed training program?

A To the best of my recollection, Mr. Toole did not go through all of our training program. He went through some of it.

Q Did he go through the part where operators were taught that they should look to pressurizer level

1  
2 during the course of a transient as an accurate measure  
3 of inventory in the system?

4 A I have no way of recalling that. I don't  
5 recall that at this time.

6 Q Did Mr. Miller go through the Met Ed training  
7 program?

8 A Yes, he did.

9 Q Did Mr. O'Hanlon go through the Met Ed  
10 training program?

11 A Yes, he did.

12 Q Let me ask you the same question with respect  
13 to those two gentlemen, Mr. Miller and Mr. O'Hanlon.  
14 Do you have any reason why they would not have told the  
15 Training Department that you were giving misleading  
16 information to the operators when you were telling them  
17 that they could rely on pressurizer level as an accurate  
18 level of system inventory?

19 MR. MacDONALD: Objection to form.

20 A You keep saying "giving us" -- why they didn't  
21 tell us about misleading information. I can't speculate  
22 on what their thoughts were. I can only tell you what  
23 our training was and what training they went through.

24 Q I understand. They went through your training  
25 which told them and others that you should look during

1  
2 the course of a transient to pressurizer level as an  
3 accurate measure of inventory in the system, correct?

4 A That's correct.

5 Q I am asking you, do you know of any reason  
6 why having gone through that training program and then  
7 learning at the Users Group meeting about which Mr.  
8 Murray testified that there had been a transient in  
9 which pressurizer level was clearly not an accurate  
10 measure of system inventory, that they didn't tell  
11 that to the Training Department?

12 MR. MacDONALD: I object again.

13 A Sir, I am not going to speculate on their  
14 thoughts or their communications that I know nothing  
15 about.

16 Q We were discussing at one point earlier  
17 today the question of whether an open PORV was considered  
18 by you to be a loss of coolant accident; do you remember  
19 that?

20 A Yes.

21 Q I think you said, and correct me if I am  
22 wrong, that you considered an open PORV to involve  
23 some loss of coolant but that you didn't consider it  
24 to fall within the phrase "loss of coolant accident."  
25 Is that correct?

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A Yes. I never considered as it was the day of the accident the loss of coolant through the PORV. Never considered it in that mode.

Q In training --

A That is prior to the accident, I never considered it.

Q In the training that was given at Met Ed with respect to dealing with an open PORV, we went through earlier in the deposition procedures that were designed to diagnose an open PORV and prescribe the treatment for an open PORV once it has been diagnosed. I think we went through that a day or so ago; do you recall that?

A Yes.

Q You recognized, did you not, that it was important not to allow a condition to continue where a PORV opened and remained open?

A If it was recognized that that was the case.

Q I will accept that for the moment. In considering what the consequences --

A By the way, this is assuming we are in operating -- the plant is operating and we had an open PORV?

Q Sure. That's what the procedures were

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designed to deal with; is that correct? The pressurizer system failure procedure that we went through was designed to deal with that very situation and the failed open or stuck open PORV during the course of operations; is that correct?

A The procedure dealt with, if it was recognized through some symptoms that it was open, they told you some of the things to do.

Q In order to close it?

A In order to close it.

Q Or to block off the opening?

A If it was recognized that it was open, yes.

Q What understanding did you have as to what would happen to the system if the PORV remained open for a sustained period of time?

A My understanding was that the pressure would drop until a point where HPI would come on.

Q So we understand each other, an open PORV creates, in effect, a hole at the top of the system, does it not, above the pressurizer?

A It's a relief valve.

Q It's an opening in the system?

A Yes, it's an opening.

Q Beneath that opening is the pressurizer,



1

2 correct?

3

A Yes.

4

5 Which has at least at the time the PORV  
6 first opens steam on the top and water underneath; is  
7 that correct?

8

A Correct.

9

10 Q That water and that steam is under very  
11 high pressure, is it not?

12

A Yes.

13

14 Q And did it occur to you at any time right  
15 up to the accident that if there was a hole in the top  
16 of the system that remained open for any period of time  
17 and you had right beneath the hole water under high  
18 pressure, that a normal consequence of that would be  
19 for the water to go out the hole?

20

21 A It never occurred to me. We never  
22 experienced that in our training. It never occurred to  
23 me before the accident that that would happen.

24

25 Q What did you think the reactor coolant drain  
26 tank was for?

27

28 A I told you there are several uses. Vent  
29 headers going into that, the PORV empties into that.

30

31 Q What empties into that from the PORV as  
32 you understood?

33

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A The tailpipe.

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Q I know the pipe connects the PORV and the drain tank. I am saying what goes into the drain tank through that pipe through an open PORV.

6

7

A Just steam and it condenses and forms water during normal operations.

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Q Did it occur to you that if the PORV remains open for an extended period of time, something more than the steam that is at the top of the pressurizer will go through that hole?

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A Never occurred to me prior to the accident.

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Q In other words, it never occurred to you before the accident that one consequence of having a PORV that remained open for a period of time is that water under high pressure would tend to go towards that hole, thereby, among other things, filling up the pressurizer?

A Our training always in the operation of the pressurizer say don't go solid and don't go out the bottom. Try to maintain level in the pressurizer. With that in mind, it never occurred that that would happen.

Q In other words, you never tried to sit down and figure out as a matter of basic dynamics of the

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plant what would happen to the water in the system or what would happen to the water in the pressurizer if there was a hole at the top of the system that remained open for a period of time?

MR. MacDONALD: I am going to object to the form. He may answer.

A Certainly I think that would be something on the simulator. We never observed it on the simulator. It was never called to our attention. I don't recall having -- thinking about that prior to the accident.

Q Mr. Zechman, did you ever do any thinking during the entire time you were head of the Training Department to form some independent opinion of your own as to what you thought the operators should be taught?

A Sure I did. I am saying that that particular situation never occurred to me prior to the accident.

Q You didn't think that you were limited in what you taught the operators by what you had learned at B&W, did you?

A Certainly not.

Q Didn't you understand that Metropolitan Edison had the legal responsibility with the NRC as a particular condition of keeping their license for running

1  
2 a training that was satisfactory to the Nuclear  
3 Regulatory Commission?

4 MR. MacDONALD: I object to the form of  
5 that. You may ask him what his understanding is.  
6 When you couch it in legal responsibility, I think  
7 it is out of bounds for this witness.

8 MR. FISKE: They maybe told him that when  
9 he was hired as head of the Training Department  
10 that Met Ed had a legal responsibility. If he  
11 doesn't know, he may say so.

12 A I know we had a training program consistent  
13 with the requirements of 10CFR55 and the appendices.

14 Q And the responsibility for that training  
15 program ultimately was with Met Ed although you could  
16 subcontract certain parts of it out to other  
17 organizations; is that correct?

18 A Please repeat.

19 (Question read)

20 A We are getting into legal questions that I  
21 don't feel I am in a position to totally answer.

22 Q What did you understand would happen to  
23 Met Ed's operating license if the NRC determined that  
24 any part -- if the NRC determined that the training  
25 program was insufficient?

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A I certainly understood that I have a commitment to provide a training program consistent with 10CFR55 and appendices.

Q Did you understand that if you did not do that, that Met Ed could lose its license?

A I suppose depending on the circumstances that would be the case.

Q We are talking about a license from the Nuclear Regulatory Commission that Met Ed is required to have in order to run its reactor; is that correct?

A I don't pretend to know all the legal ramifications of the operating license. I know I can state categorically that we had to have a training program consistent with 10CFR55.

Q Let me put the question again. You understood, did you not, that in order for Met Ed to be able to operate TMI-2, they had to have an operating license from the Nuclear Regulatory Commission?

A I understood that.

Q You understood, did you not, that Babcock & Wilcox did not have to have a license from the Nuclear Regulatory Commission?

MR. MacDONALD: To operate plants?

MR. FISKE: To engage in the business that

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they were engaging in.

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A I don't know all the business that B&W engages in. How can I say that? They have a fuel facility. I don't know what the --

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Q Did they have to have a license from the NRC to conduct a simulator training program?

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MR. MacDONALD: I am not quite understanding.

A license in what sense, the same sense as operating a nuclear plant?

MR. FISKE: Any kind of a license. In other words, did B&W have to have approval in the form of any kind of a license from the Nuclear Regulatory Commission in order to conduct a training program in Lynchburg?

A They have an approved program for the start-up a certification program.

Q Was that part of the training you sent your operators to?

A Yes, it was.

Q Did they have to have a license in order to operate the simulator training, conduct the simulator training that you have been referring to so frequently throughout your deposition?

A When you say license, are you referring to an



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operator license, RO or SRO license?

3

Q Any kind of a license?

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MR. MacDONALD: I object. I don't know what

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you mean.

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MR. FISKE: I couldn't make it any more

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simple.

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Q You understood, Mr. Zechman, that when Met

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Ed operated Unit 2 they were doing that under a license

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from the Nuclear Regulatory Commission and that they

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couldn't operate the plant without that license; is

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that correct?

13

A I understand that.

14

Q Now I am asking you with respect to the

15

B&W simulator program that we have been discussing

16

here, did you understand that B&W was running that

17

simulator program under any form of license from the

18

NRC and that they couldn't conduct it without approval

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from the NRC?

20

A To the best of my recollection, they did not

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have-- the simulator did not have an operating license

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similar to an operating license at a commercial plant.

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The simulator did have to have an approved start-up

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certification program.

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Q Did you understand that if the NRC found

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that inadequate training was being given to operators at Met Ed with respect to dealing with emergency transient situations, that that would be a basis upon which they could find the training program insufficient and take away the license?

A I recognize that they provided audits of our training program to insure we were in compliance with the program. And that if there were problems in the training program they were identified at that time and evaluation of the situation of those was made by the INE.

Q So you understood they were doing audits?

A Yes, sir.

Q Did you understand that if the NRC concluded that the training given to Met Ed operators with respect to handling emergency conditions in a transient were inadequate, that that could put Met Ed's operating license in jeopardy?

A You are asking me this prior to the accident?

Q Yes.

A Prior to the accident I guess I never considered it in that vein because our programs and our audits always had that program and never thought our program being insufficient enough to warrant anything

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2 like that.

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A No.

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Q That was my question.

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Q You mean the thought never crossed your mind at any time when you were head of the Training Department as to what might happen if the NRC concluded that your training was inadequate?

A Certainly I knew we had commitments for our training programs. I knew we were audited against those.

Q And you knew if the NRC concluded that the training being given to your operators handling emergency conditions in the course of a transient were inadequate that that could put your license in jeopardy?

A I certainly understood that if our -- if they determined our training was inadequate for whatever reason, that some resolution would have to be made and some determination of what the penalty for that would be. Whether it is a follow-up, whether it is a fine, whatever.

Q You understood that part of the training that was given to Met Ed operators on dealing with emergency conditions in the course of a transient

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was done under contract with Met Ed by B&W; is that correct?

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A I understand that we had a contract with B&W for B&W to provide training for us.

5

6

Q That training was part of the training that you relied upon to be sure that your overall training program met the requirements of the code of federal regulations that you just referred to; is that correct?

10

11

A The B&W program supplemented our ongoing training program. We relied on B&W to provide that training and the start-up certification programs.

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Q In the last analysis if training on emergency procedures was not sufficient, then Met Ed could lose its license whether that deficiency occurred in the Met Ed training or in the training that was contracted to B&W; is that correct?

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A You are getting into a legal question and I don't feel that I am in a position to answer legal questions like that.

Q Mr. Zechman, I didn't refer to a legal question. I am simply asking you. You are head of the Training Department. You are responsible for this program that has been described to the NRC and the FSAR,

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and did it ever occur to you while you were running the Training Department that you better be sure in your own mind that you are satisfied that the training that is being given to the operators on dealing with emergency conditions in a transient is sufficient?

A Please read that question back.

(Question read)

A As head of the Training Department, I relied on the procedures that were given us in the operation of our plant, in the training and guidance that we received and the training we received at the simulator. What is adequate and sufficient is everybody's responsibility, not just the head of the Training Department. That includes the training we got from the simulator as well. It is everybody's responsibility to insure that we have procedures and that we receive training accordingly.

Q If the training was adequate, including the training at B&W, Met Ed was the one who was going to lose the license; is that correct?

A If the NRC made that determination?

Q Right. So it was important to you, was it not, as head of the Training Department to make your own judgment as to whether including the information

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that was being taught at B&W and all the other information that you had at Met Ed, the training program met the requirements of the code of federal regulations?

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A As I said, it was a cooperative effort on what was adequate. Certainly we relied a great deal on the vendor of the plant to be able to tell us how to operate that plant.

Q I think you have said that on numerous occasions, and I think we understand that.

A O.K. Therefore we relied on them giving the correct information on the operation on that plant. You can't separate that.

Q What I am getting at, Mr. Zechman, you didn't put a blindfold over your eyes insofar as emergency training procedures are concerned. "I wouldn't worry about that, that's being done at B&W. I don't have to look what they are doing or whether I think that's sufficient. I will let them do that and I won't pay any attention to it"?

A I didn't imply that at all.

Q You made your own independent review to satisfy yourself that sufficient training was being done on emergency procedures, correct, including a review, in fact, of what was being taught in your



1  
2 Training Department and including what was being taught  
3 at B&W?

4 A If that is to imply that I thought of every  
5 possible situation that could happen in the plant and  
6 the operation of that plant, I don't believe I am a  
7 superman of that type.

8 Q Do you think there are supermen of that  
9 type at B&W?

10 A I think the people who manufactured the unit  
11 certainly should be expert on that unit.

12 Q And shouldn't the people that are operating  
13 it also be expert on the operation of that unit?

14 A They should be expert on the operation based  
15 on what they were told how to operate that.

16 Q By you in your Training Department as well  
17 as by B&W; is that correct?

18 A Input to the training program came from both  
19 directions.

20 MR. MacDONALD: Let's take a break.

21 (Recess taken)

22 BY MR. FISKE:

23 Q Are you familiar with a publication put out  
24 by the Nuclear Reactor Facility of Pennsylvania State  
25 University entitled "A Lecture Series in Nuclear Power

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Plant Operations Training"?

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A Yes, I am.

4

Q Were you a contributor to that publication?

5

A Yes, I was.

6

Q Was that publication provided to the Met

7

Ed Training Department for use in the training of your

8

operators?

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A Yes, it was. Not in all training programs.

10

It was provided to Met Ed to be used where they felt

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necessary to use it.

12

Q In other words, to the extent that there

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was material in here that you or whoever else was

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making decisions felt would be useful in your training

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program, you would use it; is that correct?

16

A That's generally the way it was, yes.

17

MR. FISKE: I would like to mark as the

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next exhibit, a collection of pages which we

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will formally bind together at some appropriate

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point. Mark this as B&W 570.

21

(Collection of pages with numbers at bottom

22

running from 0565 to 0956 were marked B&W Exhibit

23

570 for identification, as of this date.)

24

MR. FISKE: For the record, I would like

25

to indicate that the collection of pages that are

1  
2 being marked as B&W Exhibit 570 have numbers at  
3 the bottom running from 0565 to 0956.

4 Q Let me show you this exhibit, Mr. Zechman,  
5 and ask you whether you recognize from the cover the  
6 pamphlet or brochure you have just referred to.

7 A I recognize the cover but there were  
8 several different editions of this. I don't know  
9 which edition this is.

10 Q All right.

11 Let me direct you to the page which has  
12 the number 0576 through numbers 0584 and ask you if  
13 you recognize those as the table of contents for  
14 this publication?

15 MR. MacDONALD: Would you give him a minute  
16 to leaf through this?

17 Q Have you had an opportunity, Mr. Zechman,  
18 to look through that exhibit?

19 A I have scanned through the exhibit.

20 Q Let me show you a page from this exhibit  
21 marked No. 0574 entitled "A Lecture Series in Nuclear  
22 Power Plant Operators Training," and it list  
23 contributors and a list of individuals. Do you see  
24 that?

25 A Yes, I do.

1

2

Q Are you listed as a contributor?

3

A Yes.

4

Q For what subject matters?

5

6

A Basic physics, atomic physics, basic nuclear physics and fission shielding.

7

8

9

Q Back to the table of contents that we looked at a moment ago, can you tell which chapters deal with those topics?

10

A Chapter 2, Chapter 3, Chapter 4, Chapter 10.

11

Q How many chapters are there altogether?

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14

A In this issue there are -- assuming I have the full set of table of contents here, there are ten chapters.

15

16

Q This also lists as contributors a man named John L. -- maybe you can read that for me.

17

A Penkala.

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19

20

Q Did you know Mr. Penkala during the period of time that you were writing your section of this publication?

21

A I did.

22

Q Who is Mr. Penkala?

23

24

A Mr. Penkala was in charge of the training section of the Penn State Nuclear Reactor Facility.

25

Q The next individual listed is Donald A. Ross.

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2

Did you know Donald A. Ross during this period of time?

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A Yes.

4

Q Who is he?

5

A In that period of time -- I forget his

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exact title.

7

Q Was he also located at Penn State?

8

A Yes, and physically located at the nuclear

9

reactor facility.

10

Q To save a little time, page 0575 contains a

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notice which says "original notes compiled March 1969

12

and revised April 1969."

13

Do you see that?

14

A I see that.

15

Q During that period of time, were all the

16

individuals that are listed as contributors to this

17

publication affiliated with Penn State?

18

A To the best of my recollection they were.

19

Q What was George Geissler's position at that

20

time?

21

A Geissler had -- if my recollection is

22

correct, had the same faculty title as Don Ross. I

23

can't recall what that was.

24

Q What was your position at that time?

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A At that time I was a training supervisor.

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Q If there was such a thing, where did Mr. Geissler range in the hierarchy as compared to you?

A Above me.

Q Would it be fair to say that this publication was a joint effort by several individuals on the -- affiliated with Penn State University?

A That's correct.

Q Did you ask any of the other individuals that were contributing to the publication to review the sections that you wrote?

A To the best of my recollection, John Penkala reviewed those.

Q Did you review sections that the other authors wrote?

A I did not.

Q I would like to refer to page 9-71 which is part of the chapter on instrumentation and control written by Mr. Geissler and this bears the number 0899 at the bottom. I will read a section of this 9.14.2.5. "Importance of pressure measurement. Accurate assessment of pressure and the resulting control actions are of paramount importance in a PWR if the pressure increases beyond a certain point, certain irreversible relief devices are provided such as safety valves and rupture



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2 disks, which while protecting the primary piping, produce  
3 an inevitable shutdown of the reactor. If pressure  
4 decreases the possibility exists that boiling will  
5 begin, which may produce a sufficient change in the  
6 heat transfer from the core to cause damage to fuel."

7 Did you review that paragraph at any time  
8 in connection with your training responsibilities at  
9 Met Ed?

10 A You pick one paragraph out of there that  
11 I simply don't recall at this time. It's been too  
12 long a period of time.

13 A I think you testified that this book was  
14 made available to Met Ed for use in your training  
15 program.

16 A That's correct.

17 Q At any time while you had any responsibilities  
18 in the Training Department, including the period of time  
19 that you were in charge of it, did you review this  
20 publication to determine which portions of it you felt  
21 would be useful in training operators at Met Ed?

22 A I guess I have to give you some historical  
23 background on use of those books. The books initially  
24 were used for the initial cadre of operations personnel  
25 for Unit 1. The books then were used on the Island for

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the training of operators most of which was -- I can't say -- some of which was already completed by the time I joined Metropolitan Edison. After that period of time, they were used, different sections were used and not entirely the entire book. I can't recollect right now at this point in time which sections we used when and which sections I reviewed at that time.

Q I guess my question was, did you make an effort to review the entire publication apart from the part that you obviously had written yourself to determine whether there was anything in any of those sections which would be useful in the Met Ed training program?

A I recall reviewing the book. I don't recall any longer what sections or if I reviewed the entire book. I do recall making a review at times.

Q I would like to read again one sentence from the paragraph I read a moment ago where it says, "If pressure decreases the possibility exists that boiling will begin which may produce a sufficient change in the heat transfer from the core to cause damage to fuel."

I would like to ask you, based on your knowledge and understanding of the system prior to the Three Mile Island accident, did you have any understanding

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that that statement is inaccurate in any way?

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A I believe I already testified relative to the question of if pressure decreases, did I have an understanding from a theoretical point that if pressure decreased that the boiling could have occurred. I already stated from a theoretical standpoint I understood that.

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Q You referred several times during this deposition to the fact that you knew that from a theoretical standpoint. I take it that once, in fact, the pressure reaches that point and boiling starts, it is not theoretical anymore?

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A I am talking about an understanding, a theoretical understanding as opposed to a practical situation, as applied to our plant.

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Q You mean you knew of no situation in which pressure had decreased to the point where saturation had occurred?

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MR. MacDONALD: Prior to the accident?

MR. FISKE: Yes.

A I told you from a theoretical point -- from practical application to our plant it never occurred to me.

Q In other words, it never occurred to you

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that at Unit 2 a drop in pressure would produce boiling?

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A We never observed it on the simulator. The focus wasn't on that in our training at the simulator or in the operation of the simulator.

6

MR. FISKE: I will move to strike that.

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Q That is not my question, and I believe you know that, Mr. Zechman. I am asking you --

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MR. FISKE: Read the question back again.

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(Question read)

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A It never occurred to me prior to the accident that decreasing pressuring as applied to our plant was going to cause boiling because our emphasis wasn't on that.

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Q Did you think there was something different about your plant from other pressurized water reactors so that a drop in pressure wouldn't cause boiling at your plant?

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A The focus was on maintaining level such that inventory -- I am trying to tell you that our training was such that our focus was not on that and therefore not considered.

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Q In other words, that was the focus, you say, of the training that you gave your operators in the Met Ed training program?

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A I am saying the focus of our training both from B&W and in-house was on maintaining level and as long as we did that, the core was sufficiently inventoried.

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Q I guess you are telling us that for whatever reason, nobody ever brought to your attention or anybody else's in the Training Department the fact that incidents had occurred at TMI-2 in which there had been saturation as a result of drop in pressure?

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A I think I already testified to that, sir.

Q So nobody told you that this theoretical concept that you described had, in fact, occurred in real life on more than one occasion, right there at Unit 2?

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MR. MacDONALD: Are you asking whether or not anyone ever told him saturation occurred at Unit 2 prior to the accident?

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MR. FISKE: Could you read the question back?

(Question read)

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A Prior to the accident?

Q Yes.

A I already testified to that.

Q O.K.

Going back to this sentence one more time, it

1  
2 reads, "If pressure decreases, the possibility exists  
3 that boiling will begin which may produce a sufficient  
4 change from the heat transfer from the core to cause  
5 damage to fuel."

6 How did you understand that boiling in  
7 the reactor system could cause damage to the fuel?

8 A As related to our training.

9 Q How did you understand it?

10 MR. MacDONALD: Prior to the accident?

11 Q I am not limiting it, Mr. Zechman, which I  
12 believe I made clear on numerous occasions on what you  
13 may have trained your operators on or what the operators  
14 may have learned from any other source. I am simply  
15 asking prior to the accident how did you understand as  
16 head of the Training Department boiling in the core  
17 could cause damage to the fuel?

18 A The training I had with respect to the core  
19 always had to do with --

20 Q Pressurizer level. We are not asking about  
21 that, Mr. Zechman. I am not asking what your training  
22 was, as I believe I just made clear in my last question.  
23 Maybe we could read it back one more time so there is  
24 no possible mistake about it.

25 (Question read)



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A My prior knowledge and own training relative to fuel damage had to do with transfer of heat from the elements relative to DNBR. It did not have anything to do, it did not -- well, that's what my prior experience has been.

Q You did understand, did you not, that boiling in the reactor coolant system could cause damage to the fuel?

A Again, I put it in the light that we are talking about damage to the fuel in relationship to the fuel being able to transfer heat to the coolant. Not as the RCS, as a collective body.

Q For whatever the mechanics of it were, you did understand that if boiling occurred in the core that could cause fuel damage?

MR. MacDONALD: You mean the core itself?

MR. FISKE: The core is part of the reactor coolant system, isn't it?

A Yes, but when we are limiting the effects of fuel and the transfer of heat from fuel, that is a surface effect.

Q I am talking, Mr. Zechman, about the type of boiling that results from a drop in pressure. The same type boiling that Mr. Geissler is talking about in the

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publication that was part of your materials in your training program. Do you understand that?

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A I can't speak for Mr. Geissler. I can only speak for myself.

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Q I just want to make it clear what I am asking you. I am asking it in reference to the sentence in Mr. Geissler's part of this publication which reads, "If pressure decreases, the possibility exists that boiling will begin." That is the type of boiling I am asking you, the type of boiling that results from a decrease in pressure and goes on to say, "which may produce a sufficient change in the heat transfer from the core to cause damage to the fuel."

I am simply asking you, didn't you understand before the accident that if boiling occurs as a result of drop in pressure that that boiling by whatever means can cause damage to the fuel?

A I am going to repeat my testimony that I already said, I theoretically understood that if pressure dropped that boiling could occur. I will repeat that my limitation -- my understanding relative to the core and DNBR had to do with surface effects on the fuel or in channels of the fuel.

Q Taking that answer as you gave it, am I

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correct in understanding that you did know before the accident that if boiling occurred in the reactor coolant system as a result of drop in pressure that boiling could cause damage to the fuel?

A It was referred to localized boiling in the core. Never in reference to bulk boiling in the RC system.

Q What produced this localized boiling that you are referring to?

A You have -- assuming the worst case where you are going to get localized effects on the field. Broad configuration could localize the heat in a particular part of the core. Localizing it to a particular fuel assembly.

Q So in other words, if there was localized boiling as you have just described, it that could cause damage to the fuel at the point where that boiling occurred, is that your testimony?

A Our training was such that we realized the difference of nuclear boiling to film boiling. If the heat transfer was through one of those modes that that is the surface effect you would get.

Q And that boiling could be produced by a drop in pressure?

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A No, that's where we differ.

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Q You are talking about some type of boiling that occurs without a change in the basic pressure temperature relationship?

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A Due to the localized flux distribution.

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Q That is one case, the localized flux distribution. Didn't you understand that if that same type of boiling was caused by a drop in pressure that the same would occur?

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A That never occurred to me prior to the accident.

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Q You certainly had no reason prior to the accident to exclude that type of boiling as a cause for a type of fuel damage?

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A I repeat that that never occurred to me prior to the accident.

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Q Let's get a couple of basic things here straight. Didn't you understand before the accident that what keeps the water in the reactor coolant system from boiling is maintaining the proper pressure temperature relationship?

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A I told you from a theoretical point I understand that a PWR operates at elevated pressures to prevent boiling.

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Q And if the pressure drops below what you referred to before as the  $T_{sat}$  temperature, then you will have boiling; is that correct?

A Repeat that question.

(Question read)

A From a theoretical standpoint, I understand that when the pressure drops from that point you would have boiling.

Q Let's look at the steam generator for a second. All right?

A O.K.

Q What types of fluid are in the steam generator?

A We have liquid, we have steam, and we have superheated steam.

Q What did you understand caused the change in the steam generator from water into steam?

A Transfer of heat from the primary to the secondary as the water passed through the tubes, passed by the tubes, the water would heat up as it traveled up to a point where it flashed to steam and then went by a section that was not wetted and picked up more heat and became superheated.

Q What turned the water in the steam generator

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into steam was a change in the pressure temperature relationship; is that correct?

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A I understand that. That's the way the training was.

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Q Nothing theoretical about that?

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A That's correct.

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Q You certainly understood if that same type of change occurred in the primary side you would have steam in the primary side?

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A That never occurred to me prior to the accident. We didn't discuss that.

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Q It never occurred to you at any time that one of the reasons for keeping pressure up was to prevent the water in the reactor coolant system from turning it into steam?

A I said from a theoretical standpoint I understood that.

Q Did you understand that damage to the fuel could increase the possibility of radiation being released into the atmosphere?

A I certainly understood if the fuel damage was significant enough, the fission products were released to the RC system, that there are sets of conditions in which that radioactivity under certain conditions could be released to the atmosphere. You have to have a whole set of conditions, different paths that would have to take for that to happen.

Q Is it correct that if the damage to the -- isn't it correct that you understood prior to the accident that if the damage to the fuel resulted in the release of radioactive material into the reactor building, that there was only one barrier left at that point between release of radiation into the atmosphere?

A First your assumption is that we have had fuel damage and fission products were released to the

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RC system and by some means the fission products got into the reactor building.

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Q Yes.

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A Somehow got there. That the reactor building was the last barrier for the containment of that radiation.

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Q I am asking you what was left as a barrier to release the radiation to the atmosphere after that point?

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A Assuming that it was not -- should that occur and should there be inventory that was not transferred somewhere else, suppose the activity got in the sump. Transferred from the sump to the waste facilities. Assuming that -- are you assuming that it is in there and not going anywhere else? I don't understand your boundary conditions.

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Q Let's put it this way: You had as part of the requalification program training on radiation, did you not?

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A Sure.

Q

Why did you tell your operators that it was important not to allow damage to occur to the fuel?

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Certainly there are a lot of reasons. One was the integrity of the core itself. One, release of

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fission products, the possibility of those being able to be released to the atmosphere. That you wanted to make sure -- well, so we talked about integrity of the core, we talked about fuel damage, assuming it is significant enough that fission products would be released, those are the two main ones that I recall at this time.

Q Is it your testimony that it never occurred to you before the accident that one of the reasons it was important to maintain pressure was to prevent certain circumstances from occurring under which, by reason of a drop in pressure, boiling could occur which could cause fuel damage which could increase the likelihood of radiation being released to the atmosphere?

A Pressure temperature relationships in that light were always focused on the operating reactor within the pressure temperature envelope which was associated with not exceeding the DNBR ratio.

Q I have understood what you said and I would like you to listen to the question one more time and see if you can answer it.

(Question read)

A I already testified to the fact that prior to the accident my knowledge relative to fuel damage

## I N D E X

Witness	Page
Richard W. Zechman	525

## E X H I B I T S

B&W	For Ident.
570	Collection of pages with numbers at bottom running from 0565 to 0956
	619

ooo

2 had to do with surface effects of fuel elements and  
3 related to the transfer of heat from those elements.  
4 It was not related to a decrease in pressure of the  
5 RC system.

6 Q So that it never occurred to you that  
7 boiling which resulted from a drop in pressure could  
8 cause fuel damage which could increase the dangers  
9 of releasing radiation; is that your last answer of the  
10 day?

11 A Repeat the question.

12 (Question read)

13 A I already testified to that in my previous  
14 answer.

15 Q Do I understand that the answer is no?

16 A The answer is prior to the accident it did  
17 not occur to me of that relationship.

18 MR. FISKE: This is a good time to stop.

19 (Time noted: 4:15 p.m.)

20 oOo

21 Richard W. Zechman

22 Subscribed and sworn to  
23 before me this  
24 day of 1982.

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CERTIFICATE

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

I, Catherine Cook, a Notary  
Public of the State of New York, do hereby  
certify that the continued deposition of  
Richard W. Zechman was taken before  
me on March 25, 1982 consisting  
of pages 524 through 641;

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 29th day of March, 1982

Catherine Cook

Catherine Cook