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 Friday, March 26, 1982, at 9:45 a.m., before Catherine Cook, a Shorthand Reporter and Notary Public of the State of New York.

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ALSO PRESENT:

SUSAN HANSON

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RICHARD W. ZECHMAN, having been previously duly sworn, resumed and testified further as follows:

EXAMINATION (Continued)

BY MR. FISKE:

Q Mr. Zechman, you realize that you continue under oath?

A I do.

Q Near the end of your testimony yesterday, you mentioned something that you referred to as a pressure/temperature envelope.

A Yes, sir, I did.

Q Could you tell us what the pressure/temperature envelope is?

A A pressure/temperature envelope is an operating envelope which defines the boundaries of operations of the reactor during operations.

Q You say "defines the boundaries"?

A Pressure/temperature boundaries.

Q Was your understanding of that envelope that there is a fixed pressure and a fixed temperature or is it a floating, movable pressure/temperature relationship?

A It's a movable temperature relationship.

You have to stay within the boundaries of those different points of operations.

Q What did you understand would happen if you did not stay within the boundaries?

A To the best of my recollection, that pressure/temperature envelope was always based on a DNBR ratic. You maintain a DNBR ratio no greater than 1.3.

Q What is DNBR ratio?

A Heat flux which would cause departure from nuclear boiling divided by the actual heat flux.

Q What is a departure from nuclear boiling?

A Departure from nuclear boiling is a heat transfer transition from nuclear boiling into what could eventually lead to film boiling.

Q So is it correct that if one function of the pressure/temperature envelope was to prevent either temperature increasing or pressure decreasing to the point where boiling would occur?

A As I said, the DNBR ratio was again in relationship to a surface phenomenon. It was always related to the heat transfer characteristics or modes of heat transfer from fuel assemblies.

Q This is the type of surface boiling that

you described yesterday that could cause fuel damage?

A Yes, sir, I did.

Q So is it fair to say that one purpose of staying within the pressure/temperature envelope was to prevent fuel damage?

A Yes, I think that's fair. Yes, sir.

Q Also the phrase has been used in this deposition "bulk boiling."

A Yes, sir.

Q And what is bulk boiling?

A Bulk boiling, as I understand it --

Q I am asking your understanding before the accident.

A Before the accident?

Q Yes.

A To the best of my recollection, I don't recall the use of the term prior to the accident. I do recall the term after the accident. There was a lot of discussion about RCS bulk boiling.

Q What is bulk boiling as you understood the meaning of that term after the accident?

A Well, as I understand it after the accident, it was referred to a saturated RCS system which you had bulk boiling in the RCS system.

Q What is bulk boiling?

A I don't recall how the term was exactly defined after the accident.

Q As you have used it in the deposition, what did you mean by bulk boiling?

A As I believe I understand it post-accident in that terminology, it referred to -- my terminology or understanding was bulk boiling referred to a saturated RCS system, where you had a lot of boiling occurring -- rapid boiling occurring in the RCS system.

Q Just going back to basics for a moment, Mr. Zechman. You have described earlier in the deposition the temperatures of the water in the primary system as you understood them before the accident.

A Yes.

Q What were those temperatures again?

A Full power operation?

Q Yes.

A About 600 degrees TH, about 550, about 575 in there, average.

Q What atmospheric -- at what temperature does water boil at atmospheric pressure?

A 212 degrees.

Q What was your understanding of what kept

the water in the primary system that was either at 550 degrees or higher from boiling?

A What was it that kept that from boiling?

Q Yes.

A I understand we have a pressurized water reactor. That the reactor was at very high pressures to prevent that.

Q At what pressure was this water in the primary system kept during normal operations?

A About 2000 psig.

Q Going back to basics again, I think you testified that you understood that if that pressure dropped far enough, you could have boiling in the primary system?

A I said from a theoretical standpoing, I understood that.

Q Was that theoretical concept explained in your basic training that you gave the operators?

A To the best of my recollection, that theoretical understanding was known.

Q Were the operators trained that they should not operate the reactor in conditions that you have described as bulk boiling?

A As I testified earlier, that never occurred

to us and, to the best of my recollection, that subject wasn't approached.

Q You mean you never at any time in any of the training that you gave your operators explained to them that it was important not to let the water in the primary system start to boil?

A As I testified earlier, it just didn't occur -- that didn't occur. That didn't occur to me.

Q Going back to the description that you gave earlier of the way the whole reactor system operates, it is correct, is it not, that there is a hot leg and a cold leg in the primary system?

A Yes.

Q When the water is in pipes which go through the core, correct?

A Yes.

Q When they go through the core, they are heated up, the water is heated up to approximately 600 degrees Fahrenheit?

A That's right.

Q Now it's in the so-called hot leg?

A Yes.

Q The water goes in these same pipes through water in the steam generator, correct?

A Yes.

Q In that process, heat is transferred from the primary system water to the secondary system, correct?

A Yes, that's correct.

Q As a result of that, when the water comes out of the steam generator --

A On the secondary side.

Q -- on the secondary side, it has now been cooled to 550 degrees, correct?

A We are back to the primary now.

Q I am talking about the primary all along.

A We were jumping back and forth. You are talking about heat being transferred to the secondary?

Q Maybe I didn't make myself clear. The water comes out of the core at 600 degrees in the hot leg, correct?

A Yes, sir.

Q It stays in those same pipes and goes through the steam generator, is that correct?

A That's correct.

Q In that process, heat is transferred from the primary system water to the water in the steam generator, correct?

A To the secondary side, yes.

Q After the water in the primary system goes through the steam generator, as a result of the heat transfer process that you have just described the water in the primary system which is still in the same pipes is cooled down to about 550 degrees, correct?

A 500-something degrees, yes.

Q Now, it's in the so-called cold leg, correct?

A Yes, sir.

Q Then it goes through the cold leg and reenters the core?

A That's correct.

Q In that process the water is heated up again to 600 degrees, is that correct?

A That's correct.

Q In that same process, that is going through the core, the water performs a function of cooling the core, does it not?

A That's correct. It serves more than just that function.

Q One of the functions it serves is keeping the core cool?

A Yes.

Q Did you understand that it was important from a safety point of view to keep the core cool?

A I understood that as long as I maintained adequate RCS inventory, that the core stayed cool.

Q And that it was very important for safety reasons to keep the core cool, is that correct?

A It was one of the functions -- I understand it was one of the functions of the coolant -- yes, sir.

Q By "yes, sir," you mean you did understand that cooling the core was important for safety reasons?

A Yes, I understood that.

Q You understood that if the core was not adequately cooled, that could lead to fuel damage, correct?

A I understood there were conditions in which you could have localized flux such that you could have fuel damage.

Q For the moment I am not asking you by what particular mechanisms the core would be failed to be cooled. I am simply asking you didn't you understand as a basic concept of running a nuclear reactor that if the core was not cooled, that could lead to core damage?

A I already testified that it never occurred to me that conditions were such that the core wouldn't

be covered, because we were focusing on maintaining the pressure --

Q Why did you understand that it was important to keep the core covered?

A For several reasons. One, as you mentioned, the coolant kept the core cool.

Second of all, it was a moderator for the neutron reaction.

Q Why was it important to keep the core cool?

A Because if you didn't have the core cooled, you could have core damage, fuel damage.

Q And as you just said a minute ago that one function of having the water in the primary system circulate through the core was to perform a core cooling -- was to keep the core cooling, is that correct?

A That was one of its functions.

Q You also knew, did you not, before the Three Mile Island accident, that if the water in the reactor or coolant system boiled into steam, that it would not be able to effectively keep the core cooled?

A I told you that that never occurred to me prior to the accident.

Q You mean it never occurred to you that --

MR. FISKE: Withdrawn.

Q It never occurred to you that if pressure dropped far enough, that could cause boiling in the primary system?

A I told you from a theoretical point, I understood that.

Q Let's keep it on a theoretical point of view.

Did you also consider as a theoretical point of view that if the water in the primary system did boil as a result of a drop in pressure that that could impede its effectiveness to keep the core cooled?

A Repeat the question, please.

(Question read.)

A And you are talking about prior to the accident?

Q Yes.

A I don't recall that occurring to me at that time.

MR. FISKE: Let me show you a document which we will mark as B&W Exhibit 571. This is a collection of pages captioned "Nuclear Energy Training Instructor's Guide Plant Performance."

Q I will show you this document and ask you whether this was part of the training materials used at Met Ed?

A Yes, we got this somewhere around 1978 or so.

Q Let me show you two pages, Mr. Zechman, from this document. First is page Q-1 which has the number 1083-0123, question No. 4 reads, "Is boiling in the PWR core expected? If so, what are the limitations on the amount?"

And the next page is QS-1, 1083-0125, captioned "Quiz Solutions." No. 4 reads, "Yes. There is some boiling in the hot channels, but it must be limited so that there will be no steam in the upper plenum."

Do you see that?

A Yes.

Q What is the upper plenum?

MR. MacDONALD: His understanding before the accident?

Q Did you understand before the accident what the upper plenum was?

A Top of the reactor vessel above the core.

Q Part of the primary system outside the

pressurizer, right?

A No. What I am talking about is the top of the vessel, above that -- that part of it, above the core.

Q In other words, not part of the primary system through which the water circulates in the manner you have just described?

A For example, the steam generator or the pressurizer, you are referring to, sir.

Q Yes.

A No.

Q In other words, it is not?

A It is not.

Q Why did you understand it was important that there be no steam in the upper plenum?

A I don't recall seeing those questions or even using those.

Q Did you understanding that it was important that there not be steam in the upper plenum?

A I never considered that, sir.

Q Let me show you another set of questions and answers from the same exhibit. The question is on page E.2-6, 1083-0148, question 17.

"While reading an analysis of a

hypothetical accident you find this statement, 'Then there is a rapid drop in reactor pressure and the DNBR drops to less than 1,' what would you expect the consequences of this to be?"

And then on page ES2.B, 1083-0151, the answer is, "Expect film boiling to occur and probable fuel damage."

Do you see the question and the suggested solution?

A I do.

Q So it is correct, is it not, that you understood that a rapid drop in reactor pressure could produce film boiling which could cause fuel damage?

A That is not correct. I already told you that that never occurred to me.

Q Did you ever look at this material?

A We haven't scanned every bit of material because we had gotten in, to the best of my recollection, the early part of '78. We used part of it. I don't recall which parts were used and which weren't. I don't know that we used the whole thing.

Q Is it your testimony that you didn't train your operators on the concept that is reflected in that question and answer that I just read?

A Could you define the concept again?

Q Yes. If there is a rapid drop in reactor pressure and the DNBR drops to less than 1, you would expect film boiling to occur and probable fuel damage.

A I don't recall, to the best of my recollection, that it was put in those terms.

Q Whether it was put in those terms --

A Because it didn't occur to me, so I don't recall the time that it was taught.

Q So I understand your answer, whether or not it was put in the precise terms that were used in that question and answer, is it your testimony that that basic concept was not part of the training that you gave the operators?

A To the best of my recollection, that was not.

Q I think you have testified before that it was part of the training at Met Ed to train the operators on technical specifications, operating procedures and emergency procedures.

A Yes, sir.

Q Wasn't it a fundamental concept in the training on those procedures that pressure and temperature should be maintained within the so-called

pressure/temperature envelope?

A Yes, we were trained that we would try to operate the reactor within the pressure/temperature envelope.

Q And that this was true whether you were talking about a start-up or whether you are talking about normal operations or whether you are talking about cooldown or after a transient, is that correct?

A This is during normal operations, the operating envelope.

Q Did you understand that after a transient it was all right to depart from the pressure/temperature envelope?

A That's why we had a pressure/temperature envelop in the RCS system that would give us trips should we reach points of those envelopes.

Q You have already said earlier that one of the purposes of staying within the pressure/temperature envelope was to keep from creating a condition in which fuel damage would occur, do you remember that?

A I said it was related to not exceeding -- to maintaining a DNBR ratio greater than 1.3.

Q In order to avoid fuel damage?

A DNBR was always related to heat transfer

from fuel and if that heat -- yes. If that heat -- could you repeat the question.

Q I will repeat it so we can save time. I am repeating a question that I asked in the same way and it's a predicate to the question I want to next ask.

Isn't it a fact that you understood that it was important to stay within the pressure/temperature envelope in order to avoid creating a condition where fuel damage could occur?

A I believe I already testified to that.

Q Wasn't it your understanding that it was just as important to keep fuel damage from occurring after a transient had occurred, as it was during normal operations?

A Yes.

Q So isn't it a fact that the concept of maintaining pressure and temperature within the pressure/temperature envelope was reflected in procedures that applied after a transient had occurred as well as procedures that related to normal operations?

A Repeat the question, please.

(Question read.)

A I don't know that the procedures covered every possible circumstance that one could perceive.

Emergency procedures were based on expected response, expected symptoms and responses to certain plant transients.

Q I am not asking you now to tell us about every single procedure that applied after a transient had occurred. I am simply asking you on a broader basis, isn't that correct that the same concept, that is, staying within the pressure/temperature envelope in order to prevent possible fuel damage apply just as much during a situation in which a transient had occurred at it did during normal operations?

A I don't recall.

Q Mr. Zechman, I would like to read you from some testimony that Mr. Scheimann gave before the President's Commission.

You know who Mr. Scheimann is, I take it?

A Fred Scheimann.

Q Yes. One of the operators of Three Mile Island who was present in the control room on the day of the accident.

A I understand who he is, yes.

Q He was a shift foreman, was he not?

A I forget what his position was at that time.

Q I am reading from page 154, and I will come around so you can follow.

A I forget what his title was at that time.

Q Let me start at page 154.

"Question: On Frederick Deposition Exhibit 3 they indicate limiting conditions for operation. Do you know where those limiting conditions came from?

"Answer: It would probably come from B&W specifications for the plant operation.

"Question: In designing the plant they would set out limits to operate the plant?

"Answer: I would believe so, yes.

"Question: And pursuant to that tech specs were drafted?

"Answer: Yes.

"Question: In your B&W training course, was it explained to you why these limits were set?

"Answer: Some limits I would say yes, it was.

"Question: Do you remember which limits were explained?

"Answer: Not totally.

"Question: Do you remember generally?

"Answer: We had talked some pressure and

temperature limits and things of that nature.

"Question: Do you remember anything else?

"Answer: Not really.

"Question: Do you remember what they e explained to you as to pressure and temperature?

"Answer: They explained to us what our pressure bands were and what our temperature bands were and they did give us basic ideas of why they were trying to maintain in that area.

"Question: Do you remember what they said?

"Answer: You had a certain minimum pressurization temperature to keep from increasing pressure too high before your temperature was up to keep you from having cladding trouble and rupture trouble. And you had maximum temperature limitations to prevent boiling in the core and things of that nature. You had minimum temperature limits, minimum pressure limits to keep you from boiling in the reactor coolant system basically things of that nature."

Did you at Met Ed train the operators that you had a pressure/temperature relationship which was important to keep you from boiling in the reactor coolant system.

MR. MacDONALD: He can answer. I object to

the form.

A I already testified that I do not -- it did not occur to me the condition of having boiling in the core, that the pressure/temperature envelope was based on a DNBR ratio which had to do with fuel cladding and fuel damage considerations.

Q Did you ever learn during any of the time prior to the accident that you were receiving reports as to what was going on in the B&W training program that B&W was giving training of that nature?

A I don't recall B&W giving us training in which those areas were discussed.

Q You mean nobody ever brought to your attention that they were giving that training, is that correct?

A I am saying I don't recall seeing it in my training or recall it in their training, to the best of my recollection at this time.

Q So apparently Mr. Scheimann never told you that they were doing that?

A No, I don't recall discussing it with Mr. Scheimann.

MR. FISKE: Let me mark as the next exhibit, as B&W Exhibit 572, Section 2.0 of the Technical

Specification for the TMI Unit 2.

(Collection of pages captioned "Nuclear Energy Training Instructor's Guide Plant Performance"marked B&W Exhibit 571 for identification, as of this date.)

(Section 2.0 of the Technical Specifications for TMI Unit 2 marked B&W Exhibit 572 for identification, as of this date.)

BY MR. FISKE:

Q Is it correct, Mr. Zechman, that during the period of time before the Three Mile Island accident when you were in charge of the training department, you were familiar with the technical specifications for Unit 2?

A At the time I was either acting or was in charge, and the times that I went through the technical specifications. I don't know that I memorized all of them.

Q Let's look at page 2.1, the very first item, which says, "2.1 Safety Limits."

Do you see where it says "Reactor Core," it says "The combination of the reactor coolant core outlet pressure and outlet temperature shall not exceed the safety limit shown in Figure 2.1-1."

Do you see that?

A Yes, I do.

Q Turning to Figure 2.1-1, does that reflect a pressure/temperature envelope?

MR. MacDONALD: What he understood prior to the accident?

MR. FISKE: Yes.

A I realize prior to the accident we had a pressure/temperature envelope. I just don't recall if this was the -- I just don't recall this, at this time.

Q You do recall that there was a pressure/temperature envelope which had to be complied with as part of the safety limits relating to the core?

A Yes, I understood that.

Q I would like you to turn to page B2-1. If it helps, it is numbered 0922 at the bottom.

Do you have that in front of you?

A Yes.

Q Do you see at the top "Safety Limits?

A Yes.

Q And the next word is "Bases"?

A Yes, sir.

Q And the first paragraph reads, with respect

to 2.1.1 that we read just a moment ago, "The restrictions of this safety limit prevent overheating of the fuel cladding and possible cladding performation which would result in the release of fission products in the reactor coolant. Overheating of the fuel cladding is prevented by restricting fuel operation to within the nucleate boiling regime where the heat transfer coefficient is large and the cladding surface temperature is slightly above the coolant saturation temperature."

Do you see that?

A I see that.

Q Did you understand that the pressure/temperature envelope pictured in Figure 2.1.1 was designed to accomplish the result described in the section I just read?

A Yes, I did.

Q You understood that that technical specification applied during both normal operations and during the course of a transient?

A I said I didn't recall.

MR. FISKE: Let me mark as B&W Exhibit 573 at the risk of re-marking an exhibit that has already been introduced at a prior deposition.

(Document marked B&W Exhibit 573 for identification, as of this date.)

BY MR. FISKE:

Q This is Unit 2, Operating Procedure 2102-3.3, Decay Heat Removal Via OTSG."

Do you recognize this, Mr. Zechman, as an operating procedure for Unit 2?

A I recognize this as a procedure that has all the markings of a Unit 2 procedure, yes, sir.

Q Looking at the bottom of the front page, do you see two blocks reflecting the fact that Unit 2 PORC had recommended approval with the signature for the chairman of the PORC and that the Unit 2 superintendent had approved with a signature of the Unit 2 superintendent?

A I see that.

Q Both reflecting dates in April of 1977?

A Negative. It looks like '78 to me.

Q I think you read it better than I do. It's'78, right?

A I believe so.

Q What did you understand the purpose of this procedure was?

A I don't recall using this procedure

personally.

Q Were you aware that there was a procedure applicable to decay heat removal via the steam generator?

A I can only say that the title looks familiar, but I don't recall using it.

Q Let's go back a couple of steps.

Are you familiar with a concept in the operation of a nuclear reactor called decay heat removal?

A Yes, sir.

Q What is decay heat removal?

A Decay heat removal is removal of residual heat from reactor core after a period of shutdown.

Q Am I correct that in a situation where there has been a transient resulting in a reactor trip, there continues to be heat generated from the core even though the unit is not operating?

A Even through the rods have been inserted and the reactor is essentially shut down, there is a residual heat flux of the core of fission products.

Q That is colloquially called decay heat?

A That's correct.

Q It is important to accomplish a safe and

effective shutdown that that decay heat be removed?

A Cooldown.

Q It's important that it be done, that the decay heat be removed?

A It is important to remove the decay heat.

Q One way to do that is via the steam generator, is that correct?

A The decay heat removal system?

Q Yes. Is that correct? Put it another way, more simply.

Is there a process for removing the decay heat which involves the steam generator?

A There is one process -- there is a process that I am aware of, yes.

Q Can you tell us whether the document you have in front of you is the operating procedure for that process?

A As I said, I have not used and I am not familiar with this procedure and I would be speculating at this point.

Q Let me direct your attention to page 3.0 of this document, the top of the page under "Limits and Precautions."

A Yes, sir.

Q "2.1.1. Reactor coolant temperature/ pressure and cooldown rates shall be maintained within the limits specified in Figure 3.4.2 of TS 3.4.9.1 (refer to Figure 1.5.2 attached)."

Do you see that reference?

A I see that reference.

Q Turning to Figure 1.5.2, do you have that in front of you?

A Yes.

Q "Heat Up/Cooldown Curve."

A That's correct.

Q Have you ever seen that curve before?

A I have seen heat up and cooldown curves, but I don't know that I saw this specific curve. I don't recall that I specifically saw this specific curve.

Q What did you understand the purpose of a heat up/cooldown curve was?

A It's been a very long time since I worked with them. I only have a generic remembrance of the heat up and cooldown curves. Two areas, one had to do with the operation of the pumps and some of the limitations had to do with the metallurgical considerations of the piping.

Q Isn't the heat up -- doesn't the

heat up/cooldown curve appear in a large number of procedures for Unit 2, both emergency and operating procedures?

A I can't put a quantity on it. I know that it appears in several procedures.

Q Isn't it a fundamental concept that these curves have to be conformed with during all phases of the start-up operation and cooldown of the reactor?

A I don't recall all the limitations and use of those curves any more. It's been long time ago.

Q Mr. Zechman, we are talking about a pretty fundamental question relating to a period of time from whenever it was that you first started with the training department at Met Ed back in the early '70's right through the period of time ending in March of '79 when you were in charge of the training department. So I am asking you simply, thinking back over that entire period of time in which you were involved in or in charge of the training at Met Ed, didn't you understand that at all times during start-up operation or cooldown, shutdown, you had to comply with these curves?

A I had an understanding years ago when I was

working with these and in the training department, I had an understanding of the heat up and cooldown curves and the basis for them. I don't recall the basis for them today. It's been too long since I worked with them.

Q Did you know of any situation from start-up right through cooldown when it wasn't necessary to conform to these curves?

A As I said, I don't recall all the ramifications and uses of those curves at this time. I would be speculating at this point with my memory.

Q Let's see, Mr. Zechman. Why did you understand it was important to comply with these curves?

A Because they were limitations that were put in procedures to operate with.

Q Did you have an understanding beyond the fact that they were attached to a procedure as to the reason why it was important to do it?

A I certainly understand that they were important, that we follow those heat up and cooldown curves. That's why they were in our procedures and there were a good number of reasons for parts of those curves. I don't recall today all those ramifications.

Q I am simply asking you in the broadest

terms possible, why did you understand that it was important to fllow the curves? I assume you had some understanding beyond simply the fact that they appeared in the procedure?

A I told you a while ago, they had to do with the operation of our C pumps, they had limitations with the metallurgical considerations of the piping. I understood that.

Q What did you understand would happen if those curves were not followed?

A I don't recall those details any more, sir.

Q Can you give us any single thing that you recall now could have occurred that would be bad for the plant if those curves were not followed?

A With respect to the metallurgical considerations, you could exceed some of the stress limits of some of the piping.

Q Why would that be bad?

A For the integrity of the RCS system.

Q Why was it important to maintain the integrity of the RCS system?

A So you won't have ruptures or damage to the piping within the RCS system.

Q Was it important that you not have damage to the integrity of the RCS system during start-up?

A Certainly.

Q Was it important that you not have damage to the integrity of the RCS system during normal operations?

A Yes, sir.

Q Was it important that you did not have damage to the integrity of the RCS system during cooldown?

A Yes.

(Recess.)

BY MR. PIKE:

Q You have that heat up/cooldown curve in front of you, Mr. Zechman.

A 1.5.2?

Q Yes.

A Yes, sir.

Q There are some numbers down the left-hand side of the page, are there not?

A You mean B&W numbers or -- I am sorry. Starts with the J --

Q No, not the numbers that reflect the stamping of the documents.

A On the curve itself?

Q Yes, top number is 2300 and the bottom is 100.

Do you see that?

A Yes.

Q What do those numbers represent?

MR. MacDONALD: You are asking for his recollection now?

MR. FISKE: Yes, and he can look at the curve.

A The numbers represent temperature.

Q What do the numbers across the bottom --

A I thought you said -- which hundred are you talking about?

Q The top number is 2300 and the bottom number 100.

A That's RC pressure.

Q The numbers across the bottom are temperature?

A Correct.

Q What did you understand the curves, the various curves that are on this graph supposed to represent?

A Sir, it's been too long since I worked

with these curves. I would be speculating on the interpretation of these curves. I don't remember any more.

Q Just starting with the basics, isn't it correct that these curves reflect various pressure/temperature relationships as you move along the curve?

A Yes, they do.

Q And is it also correct that it was important to maintain those pressure/temperature relationships?

A In the utilization of this curve and the procedure that utilizes this curve.

Q So that at any time this heat up/cooldown curve appears in a procedure, the purpose of it is to be sure that in implementing that particular procedure, the operators are sure that the pressure/temperature relationships conform with what they are expected to do in light of these curves?

A Under the guidance of what the procedure states.

Q Right. But let's just take one curve, for example. Let's take the curve that's marked No. 2.

Do you see that curve on this chart?

A Yes, I do.

Q Then there is a description of that on the right-hand side, is there not?

A Yes, there is.

Q How is it described?

A "Minimum RC pressure to maintain compression force on clad (natural circulation)" -- and then a letter I can't read, and then -- "inst. error plus 50 psig minus 12 degrees Fahrenheit."

Q So did you understand before the accident that the purpose of this curve was to be sure that a certain minimum pressure was maintained in relation to the temperature that existed at that particular point in time?

A I already said I have not worked with these. I don't recall the basis for these or have a recall of the basis for these at this time. I would be speculating on -- I can read to you what it says, but I would be speculating on the interpretation of all of this.

Q Let's just look at the various curves. Let's take them one at a time.

The first one is No. 1. Do you see No. 1?

A Yes, sir.

Q Do you know whether the operators were

supposed to maintain a pressure/temperature relationship that stayed on the left side of the curve or the right side of the curve?

A I don't recall.

Q How about curve No. 2, can you tell us whether the operators were supposed to maintain a pressure/temperature relationship on the left side of the curve or on the right side of the curve?

A I don't recall.

Q Can you tell us looking at any one of the six curves on that chart whether the operators were supposed to maintain pressure on the left side or the -- pressure/temperature relationship on the left side of the curve or the right side?

A I don't recall.

Q And you are giving those answers after having an opportunity to look at the curves and look at the description of each one, is that correct?

A That's correct.

Q As you sit there today, Mr. Zechman, just by looking at the description of these curves, can you tell us which side of the curves the operators should be on?

MR. MacDONALD: I am going to object to

that. You are talking about his present recollection of the document and not prior to the accident. I object to that. His recollection is fine. I have no problem with that.

MR. FISKE: I will give Mr. Zechman an opportunity to answer if he wants to.

A Would you restate the question, please.

(Question read.)

Q Just so you understand, Mr. MacDonald stated an objection that had been stated in previous depositions on both sides and witnesses up to this point have not been required to answer his questions like the one --

MR. MacDONALD: Do you want to know if he wants to answer over my objection?

MR. FISKE: Yes.

A I do not.

Q Were you familiar with a procedure called the unit heat up operating procedure that was in effect before the accident 2202-1.1?

A I don't recall that procedure at this time.

Q Was there a heat up/cooldown curve that was part of that procedure?

A I don't recall.

Q Do you recall a procedure called unit startup operating procedure that was in effect before the accident?

A You are talking about Unit 2?

Q Yes.

A As I think I mentioned --

Q Or Unit 1?

A Okay, for Unit 1 there was a startup procedure, I recall that.

Q Was there a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q Was there a procedure in effect before the accident for Unit 2 or Unit 1 called pressurizer operating operating procedure?

A For Unit 1, to the best of my recollection, there was.

Q How about Unit 2?

A I don't recall.

Q Was there a heat up/cooldown curve that was part of that procedure?

A I don't recall. I don't remember.

Q Was there a procedure in effect prior to

the Three Mile Island accident called reactor coolant pump operating procedure?

A I don't recall either way.

Q For either unit?

A Either unit.

Q I take it you don't recall whether there was a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q Was there a procedure in effect before the Three Mile Island accident known as power operations?

A To the best of my recollection, there was for Unit 1.

Q How about for Unit 2?

A There was one that was similar to it. I don't recall the exact title.

Q Whatever the title of it was, the substance was comparable?

A I can't say because I don't recall what the substance of the Unit 2 one was.

Q Was there a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q Was there a procedure in effect prior to the Three Mile Island accident called unit shutdown?

A There was a shutdown procedure for Unit 1. I don't recall the exact title. I don't recall the title if there was one for Unit 2.

Q Was there a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q We looked at the decay heat removal via OTSG, and we have all seen that there is a heat up/cooldown curve for that one.

A Yes.

Q Was there a procedure in effect before the Three Mile Island accident called unit cooldown?

A I don't recall either way.

Q For either unit?

A For either unit.

Q So I take it you don't recall whether there was a heat up/cooldown curve for any such procedure?

A I don't recall.

Q Was there a procedure called decay heat removal system?

A There was a procedure called decay heat removal for Unit 1. I don't recall if there was a corresponding specific title for Unit 2 on procedure.

Q Was there any heat up/cooldown curve as

part of that procedure?

A I don't recall.

Q Was there a procedure called reactor trip emergency procedure?

A For Unit 1 there was a reactor trip procedure, to the best of my recollection. I don't recall if there was a corresponding title for Unit 2.

Q Was there a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q Was there a procedure in effect before the accident called station blackout?

A To the best of my recollection, there was a procedure with that title for Unit 1. I don't recall if there was a corresponding procedure for Unit 2 or its title.

Q Was there a heat up/cooldown curve as part of that procedure?

A I don't recall.

Q Regardless of the specific titles of the various procedures, having read you the titles that I just did, do you recall whether or not there were in fact procedures designed to deal with the types of conditions or circumstances reflected in the titles

that I just read?

A I have forgotten the titles you went through.

Q Unit heat up operating procedure, unit startup operating procedure, pressurizer operation, reactor coolant pump operation, power operations, unit shutdown, decay heat removal system, unit cooldown, reactor trip, station blackout.

A Repeat your initial question.

(Question read.)

A Can I ask for a clarification? You are saying, for example, if there is a procedure called reactor trip procedure, that it dealt with a reactor trip?

Q Yes. In other words --

A It could have dealt with some other things but would it have dealt with what the title said?

Q I wanted to be sure when you were answering my questions that you were not limiting your answer to a procedure with a specific wording of the one that I read to you. I wanted to be sure that your answers are given in the context that I was asking whether there were procedures not only with that specific title but also procedures that governed the

type of situation that was describe in the title, whether or not you remembered the exact title of the procedure.

A To the best of my recollection, the ones that you have named were procedures that dealt with at least what the title implied. Sometimes some of those titles were tied together into a single procedure, that's what is confusing the issue in my mind right now, whether they were separate procedures or titles or sometimes combined titles.

Q I want to make sure I understand your answers when you were saying you didn't recall one way or the other if there were certain procedures in effect at Unit 2, but you did remember such a procedure for Unit 1, you were giving that answer in the context not simply of a procedure with that specific title but a procedure dealing with the subject matter reflected in the title, do you follow me?

A I understand. To the best of my recollection I was.

Q I would like to show you, Mr. Zechman, a document previously marked as B&W Exhibit 540, which is Unit 2 operating procedure 2102-3.2 called Unit Cooldown.

Do you have that in front of you?

A I have that in front of me.

Q What is cooldown?

MR. MacDONALD: Apart from the procedure?

MR. FISKE: Yes.

Q Just generally, in the same sense I asked you before what is decay heat removal, I would like to know basically what is cooldown.

A When you are shutting down the plant, you are cooling down the system, the RC system.

Q Would this be a procedure that is a cooldown procedure that would be in effect at some point in time after there had been a reactor trip as a result of a transient?

A I have not used this procedure. I can only say that this says that it's a Unit 2 procedure, cooldown.

Q Without reference to this specific procedure, is it correct that the process of cooldown as you have described it a moment ago would follow a reactor trip as a result of a transient?

A To the best of my recollection, yes, sir.

Q In other words, after a transient occurs, one of the things you try to do is get the plant back

to normal conditions as part of a cooldown process, correct?

A Following a trip, if you are shutting the plant down, you are going to cool it down, it's a cooldown procedure.

Q It's a procedure on the way to shut down after a trip, correct?

A Yes, sir. I was referring to the general title cooldown, not this particular procedure.

Q I understand. Now, I would like you to look at the specific procedure. Particularly page 3.0 paragraph 2.1.1, which reads under the heading "Limits and Precautions," "Reactor coolant temperature/pressure and cooldown rates shall be maintained within the limits specified in Figures 3.4-2 and 3.4-3 of TS 3.4.9.1. Refer to Figures 1 and 2 attached."

Just a preliminary question. Does TS refer to technical specifications?

MR. MacDONALD: You are asking for his recollection?

MR. FISKE: His understanding of --

A To the best of my recollection, it is.

Q Would you look at Figures 1 and 2 that are part of this.

A 1 and 2?

Q Let's start with Figure 1.

Do you have Figure 1 in front of you?

A Yes.

Q That is a heat up/cooldown curve?

A That's its title.

Q Isn't that the same curve that we were just looking at a moment ago which was part of the decay heat removal procedure?

A I haven't compared them.

Q Do you want to take a minute and do that. Before you do that, Mr. Zechman, was it your understanding before the accident that there were different heat up/cooldown curves appliable to different procedures?

A Not to the best of my recollection.

Q I would like to turn to page 6.0 and paragraph 2.2.9, which reads, "If any safety equipment defined in technical specification 2.1 and 2.2 is exceeded, the shift supervisor shall notify the station unit superintendent. The reactor shall be placed in hot standby within one hour. The licensee shall notify the Commission, review the matter and record the results of the review including the cause

of the condition and the basis for corrective action taken to preclude reoccurrence. Operation shall not be resumed until authorized by the Commission."
The safety limit defined in technical specification 2.1 refers to the same technical specification that I read to you earlier, does it not, concerning safety limits for the reactor core?

A I don't recall the numbers -- I don't recall whether 2.1 --

Q Would you look at it so there is no question. It's B&W 572.

MR. MacDONALD: You are asking now his recollection of these things prior to the accident. Not just comparing these documents?

MR. FISKE: Sure. His understanding prior to the accident when this refers to technical specification 2.1, was he aware prior to the accident of any technical specification 2.1 other than the one that has been previously shown which he now has in front of him.

A Assuming that I have the current tech spec that was associated at the time this procedure was in effect, these two correspond.

Q It says in this paragraph, "The licensee

shall notify the Commission."

What Commission was that referring to?

A The NRC, Nuclear Regulatory Commission.

Q Were you familiar with this requirement of the unit cooldown procedure prior to the Three Mile Island accident?

A As I said, I don't recall this procedure.

Q Do you recall any part of any procedure which required you to notify the Commission if safety limits were exceeded?

A I certainly recognize and understand that when safety limits were exceeded we notified the commission.

Q Wasn't it your understanding, Mr. Zechman, that not following a heat up/cooldown curve could result in a violation of a safety limit which would require reporting to the NRC?

A I don't recall.

Q Going back, Mr. Zechman, to the decay heat removal procedure, do you have that in front of you?

A 2102-3.3?

Q Yes.

A Yes, sir, I do.

Q I would like to direct your attention

to page 4.0, paragraph at the top of the page, 2.1.7, which reads, "During decay heat removal by natural circulation maintain TH" -- that's temperature in the hot leg?

A Normally TH refers to temperature in the hot leg.

Q -- "30 degrees Fahrenheit below the saturation temperature corresponding to pressurizer pressure in order to prevent boiling in the hot legs."

Do you see that?

A I see that.

Q What was your understanding of the purpose of that requirement?

A I don't recall using this procedure, so I have no recollection of what that means.

Q Do you know what boiling in the hot legs refers to in that procedure?

A No, sir, I do not. I have no recollection what that means.

Q What do you understand the saturation temperature corresponding to the pressurizer pressure to mean?

A You are asking me to interpret that sentence, the saturation temperature --

MR. MacDONALD: Recollection again prior to the accident as to what those words meant.

THE WITNESS: In relationship to this procedure?

Q Generally.

MR. MacDONALD: Just a second. Can we have the question so we can have an understanding of what you are talking about. The witness is confused. He was asked questions about this paragraph relating to what he understood the words meant.

Q Before the accident, Mr. Zechman, did you understand what boiling in the hot legs was?

A No recollection of what the terminology referred to.

Q You mean if somebody had come to you in the course of a transient and said, "Mr. Zechman, I think we have got a problem," and said, "We have got boiling in the hot legs," you wouldn't know what he was talking about?

A I could interpret what he is saying. I am not going to interpret what the meaning of this was.

Q What was the concept, boiling in the hot legs, as you understood it?

A I didn't understand before the accident. I said I would -- I said the only thing I would do if you asked me was to speculate what that means, and that's pure speculation.

Q Go back to the question I just asked and if someone came up to you and said "We have got a problem, we have got boiling in the hot legs," would you have understood what he was talking about?

MR. MacDONALD: I object to the form.

You can answer.

A I am afraid I would have to ask him to define what he is talking about.

Q Were you familiar with the concept of saturation temperature corresponding to pressurizer pressure?

A As it refers to the pressurizer?

Q Yes.

A Whatever the saturation pressure is for that -- whatever the saturation temperature is for that pressure.

Q Did you have any understanding before the accident as to why during decay heat removal by natural circulation, it would have been important to have maintained temperature in the hot leg 30 degrees

Fahrenheit below the saturation temperature corresponding to pressurizer pressure?

A I don't recall seeing this procedure or that statement and, therefore, it would be speculation in interpreting what that means, sir.

Q I am not asking you to interpret a procedure. I am just asking you whether by reference to the procedure or not, did you understand that during decay heat removal by natural circulation, it was important to maintain temperature in the hot leg, 30 degrees Fahrenheit below the saturation temperature corresponding to pressurizer pressure?

A I have no recollection of that concept.

Q Did you understand it was important to maintain temperature in the hot leg at any degrees Fahrenheit below the saturation temperature corresponding to the pressurizer pressure?

A As it applies to this procedure?

Q No.

A I never used that terminology so -- the answer is I have no recollection.

Q Did you understand that during decay heat removal by natural circulation that it was important to maintain any pressure/temperature relationship?

A There were temperature and pressure relationships but I just don't recall what they were.

Q I am not asking you to give me the specific degrees or pounds per square inch, but do you recall that it was important to maintaining certain pressure/temperature relationship?

MR. MacDONALD: Specifically now with natural circulation?

MR. FISKE: During decay heat removal.

A I can only recall that there were temperature considerations that we looked at and pressure, but that is as far as I can answer, sir.

Q You did know, did you not, that the pressure/temperature envelope concept that you have described earlier applied to decay heat removal?

A I don't recall.

Q Do you understand that question? Maybe you would like to have it read again.

A Read it again.

(Question read.)

A I don't recall.

Q Earlier, Mr. Zechman, in this deposition we showed you Volume 5 of the final safety analysis report prepared by Metropolitan Edison Company and

submitted to the Nuclear Regulatory Commission in order to obtain an operating license for Unit 2.

I would like to show you a section from that 5.5.10, pressurizer. Right under that 5.5.10.1, design basis and it reads, "The pressurizer is designed to provide a capability of maintaining the reactor coolant system at saturation pressure to prevent boiling of the coolant."

Do you see that?

A I see that.

Q Were you familiar with that concept before the accident?

A I don't recall this one.

Q I am not -- for the moment I am not asking you whether you read this particular part of the FSAL. First I am simply asking you whether you were aware prior to the accident of the concept that is expressed in the sentence that I just read.

A I told you that from a theoretical standpoint I understood that pressure/temperature relationship, that it did not occur to me prior to the accident -- did not occur to me prior to the accident having a saturated or boiling condition in the coolant.

Q You didn't know before the accident that the pressurizer was designed to provide a capability of maintaining the pressure at a level sufficient to prevent boiling in the coolant?

MR. MacDONALD: Are you asking him now to interpret the concept supposed as stated in this FSAL or his recollection of it?

MR. FISKE: Read the question back.

(Question read.)

A I understand from a theoretical standpoint that it maintained pressure and elevated pressures in a PWR.

Q That that was done in order to prevent boiling in a coolant, is that correct?

A I told you I never considered boiling of the coolant in the RC system.

Q Did you train your operator in the training program that in accordance with this statement from the Met Ed FSAL to the Nuclear Regulatory Commission describing the design basis of the pressurizer that the pressurizer was designed to provide a capability of maintaining the reactor coolant system at a pressure high enough to prevent boiling in the coolant?

A Are you asking me if I trained on this paragraph?

Q On the concept of that paragraph.

A I don't recall.

Q Any of your training programs at Met Ed, did you ever try to describe to the operators what the purpose of the pressurizer was?

A Yes, we did.

Q Did you tell them that the purpose of the pressurizer was to keep pressure up above saturation temperature?

A We told them the purpose of pressurizer had several functions. One as a surge tank, one to maintain system pressure.

Q At a certain prescribed level, correct?

A What do you mean by "certain prescribed level"?

Q Didn't you explain to the operators at any point in the training that they received at Met Ed that a purpose of the pressurizer to be sure that pressure was kept up above the saturation point?

A We never discussed, to the best of my recollection, the saturation of the RC system.

Q So you never told the operators that it was

important that pressure be kept up above the saturation point?

A We taught them that the pressure -- the only recollection I have at this point that we taught them that the purpose of the pressurizer was to maintain system pressure and that it accommodated -- acted as a surge tank to accommodate incoming and outgoing surges and to maintain system pressure.

Q My question, which I don't believe you have answered yet, did you ever tell them at any point in the training program that by maintaining system pressure that meant that pressure should be maintained above the saturation point?

A I don't recall.

Q Does that meant that your testimony is as you sit here today that you don't have any recollection of ever teaching them that concept?

A I just don't recall.

Q Do you recall at any time at any part of the training program that you conducted or that you participated in at Met Ed when there was a discussion of maintaining system pressure, any one of the students asking a question, "Well, gee, what happens if pressure drops and we can't maintain system pressure?"

A The concept has always been on maintaining pressure and level. I don't recall considering that, sir.

Q So it's your testimony, and I think this is the last question I have on this, that at no time in the training program, to the best of your recollection, as you sit here today, where the operators taught what would happen if system pressure was not maintained?

A Other than the relationship of the pressure/temperature envelope relative to DNBR.

Q They were never told what would happen if the pressure dropped even lower than the pressure/temperature relationship that would affect the DNBR, is that correct?

A Read that back.

(Question read.)

A I don't recall it.

Q Was training given to the operators at Met Ed during any period of --

MR. FISKE: Withdrawn.

Q Did you believe during the period of time while you were in charge of the training program at Met Ed that it would be important for the operators

to be able to determine during the course of a transient whether or not saturation had occurred?

A I already testified that prior to the accident saturated RC system just didn't occur to me, sir.

Q So the answer to my question is no. If you would like to hear it again.

A Please.

(Question read.)

A It did not occur to me prior to the accident, I am sorry.

Q Let me show you a document which has already been marked as B&W Exhibit 419 and which is a copy of a letter from Mr. E. G. Ward, senior project manager at B&W to Mr. L. C. Lanese, GPU Service Corporation, Parsippany, New Jersey. Subject Three Mile Island Nuclear Station Unit No. 2, ECCS small break analysis.

Do you have that document in front of you?

A Yes, sir.

Q Did you ever see this document prior to the Three Mile Island accident?

A I don't recall seeing this document.

Q Did anyone within the training department

receive from Mr. Lanese or anyone else at GPU Service Corporation the ECCS small break analysis which was sent by B&W to Mr. Lanese, with this letter?

A I can't speak for other people in my department, whether they personally have seen this or not. I don't recall seeing it.

Q Look at the second paragraph of the letter from Mr. Taylor to Mr. Varga, do you see that?

A Yes, sir. On the cover page, July 16, 1978?

Q Yes, which is one of the pages in this exhibit. This is a letter by which Mr. Taylor, manager of licensing at B&W, forwarded to the Nuclear Regulatory Commission the same ECCS small break analysis that they sent to Mr. Lanese at CPU Service Corporation.

MR. MacDONALD: I object if you are asking him to --

MR. FISKE: I am just stating that. Trying to save a little time.

Q The second paragraph of this letter says, "Break sizes of .04, .055, .07, .085, .10 and .15 feet are examined. These attached analyses, along with the break analysis in 'ECCS analysis of B&W's 177FA lowered loop NSS,' constitute a complete

spectrum of small break analyses which we believe to be wholly in accordance with 10 CFR 50.46 and 10 CFR 50 Appendix 'K.'"

There is attached to the NSS analysis a Figure B-3 which is a graph reflecting pressure versus time for each of the break sizes referred to in the paragraph that I just read.

I would ask you whether or not, Mr. Zechman, you were ever made aware by anyone at GPU Service Corporation or anyone else within the Met Ed organization that analyses had been conducted of various break sizes and that a calculation will be made of the expected pressure versus time resulting from these of those break sizes?

A You are talking about what my recollection was prior to the accident?

Q Yes.

A My only recollection at this time prior to the accident that there was an analysis done. That's my only recollection.

Q And the understanding that you had back before the accident as acting supervisor or as supervisor of training, is this the kind of information you had expected that GPU was to send to your

training department if they received it?

MR. MacDONALD: You are talking about in the form itself here?

MR. FISKE: The substance. I don't know if it was the precise language.

A Sir, I would have to evaluate all of the information that's given here and make some rational determination. In speculation -- it would be speculation at this time.

Q Was it important to you during the period of time you were in charge of the training department that you have as much information as possible to communicate to your operators about the expected consequences which would flow from a variety of break sizes which could produce a loss of coolant accident?

A It was important for me to have information on small break operating philosophy that an operator need to know how to recognize it and the results of those different things.

Q As you understood it prior to the accident, would and which showed the changes in pressure over a time that would be reflected in small breaks of various sizes, be useful to the operators in diagnosing a transient?

MR. MacDONALD: You are asking if he thought of that prior to the accident?

MR. FISKE: Yes, with that kind of information.

A I didn't consider it at the time so --

Q You didn't? You said you don't remember seeing this report. I understand that. I am simply asking you whether in your function as supervisor of training or acting supervisor, did you understand that there could be different changes in pressure over time resulting from small breaks of different sizes?

A To the best of my recollection, I had that kind of an understanding.

Q And did you believe it would be useful for the operators to know in diagnosing a transient what the expected changes in pressure over time would be for different sizes of small breaks?

A Since I didn't have that information at hand at that time, I don't know that I considered that at that time.

Q You mean it never occurred to you as head of training that there might be different changes in pressure over time resulting from different sizes of breaks?

A I don't recall what my considerations were at that time.

Q Did you understand that every break in the primary system boundary, no matter what size, would produce exactly the same change in pressure over time?

A I don't know what I considered at that time. I don't recollect what my thinking was at that time.

Q Were the operators in the training department trained on the fact that there could be different changes in pressure over time resulting from different break sizes?

A I don't recall.

Q To your knowledge, today as you sit here, do you have any recollection that such training was in fact given?

A I recall there was small break training given, but I don't recall today all the details of that training.

Q Did you also receive -- you also received training, did you not, in the course of getting your license on Unit 1?

A Yes, sir.

Q In the training that you received as a

student at the same time you were head of the training department, did you get training on the fact that different break sizes would produce different changes in pressure over time?

A I just don't recall.

(Recess.)

BY MR. FISKE:

Q Mr. Zechman, prior to the Three Mile Island accident, were you aware of any provisions in any operating procedure or technical specifications regarding the pressurizer level?

A I was aware that they existed, that they existed in tech specs and limits and precautions.

Q What did you understand those ground rules were?

A I can only recall one of them today. That was limit and precautions, there was a statement that says one should not exceed a certain level in the pressurizer under any circumstances except under hydrostatic testing.

Q What was that level?

A I don't recall the exact number any more.

Q What was the capacity of the pressurizer?

A I don't recall those numbers, sir.

Q What was the level prescribed in the limits and precautions in relation to the capacity of the pressurizer?

A I don't understand your question.

Q You have said you don't remember the level and it was referred to in the technical specifications. You said you also don't remember the capacity of the pressurizer. I am not asking you for a specific number, I am asking what was, without reference to any specific numbers, the relationship between the level that was referred to in the tech specs and the capacity of the pressurizer?

A As I have just mentioned -- the statement I just mentioned relative to the pressurizer had to do with limits and precautions.

Q Not tech specs?

A I don't recall if it's also listed there. I just don't recall. So I was referring to limits and precautions and there was a limit and precaution not to exceed a certain level in that pressurizer, if I remember correctly, under no conditions except under hydrostatic testing.

Q What I am asking you in simple terms, was that level halfway up the pressurizer, was it three

quarters of the way up, was it full or was it a quarter? What was it?

A It was above the halfway point. I just don't remember the number.

Q Did you train your operators with respect to that particular section of the limits and precautions?

A Yes, to the best of my recollection.

Q What did you tell them was the purpose of that particular portion of the limits and precautions?

A What the statement said.

Q The statement simply said do not allow the pressurizer level to go above a certain level other than in hydrostatic testing?

A I believe it says under any conditions except for hydrostatic testing.

Q You remember that specific language?

A That's -- because it became an issue after the accident it is still in my mind.

Q None of these other things that we have been talking about that you don't remember were issues after the accident?

A Certainly they were.

Q Just before we took a break, I showed you a

number of specific procedures and you said you didn't recall whether there was such a procedure. After the break I started asking you about this one particular subject and without having any document in front of you, you are now quoting specific language of that limit and precaution.

A I can't account for why memory remembered that. I can't account for it.

Q Let me go back to my earlier question, that you now demonstrated that you remember the specific language of this one particular paragraph, and as you have described it -- I would say parenthetically, if you want to look at it now, I will be happy to show it to you. I don't mean to restrict you to oral memory word for word for that whole section. As you have described it, it prescribed -- you described it that pressurizer level should not exceed a certain level under any circumstances except hydrostatic testing.

A To the best of my recollection, that's what the limits and precautions say.

Q So we don't have any question about it, I would like to show you -- I believe this has already been marked. I am sure it's been marked already and instead of taking the time to look for the specific

exhibit number, why don't I just -- if this is agreeable to Mr. MacDonald -- to refer to the fact that this has been previously marked as a GPU exhibit and leave it blank until we find out what it is and fill it in later.

MR. MacDONALD: That's fine.

Let's refer to it as to its title.

MR. FISKE: A fairly large document entitled "Three Mile Island Nuclear Station Unit No. 2 Operating Procedure 2101-1.1 Nuclear Plant Limits and Precautions," and this is a document that contains 137 pages.

Q The page I would like to refer you to is number 17 which says --

A Are you on page 17?

Q Yes. At the bottom, this all refers to the pressurizer. Down at the bottom it says, "Limits and Precautions 1.2-01 Absolute Maximum pressurizer level at any time the reactor is critical is blank inches," and then on the right-hand side it is filled in 385. Then I will go on to the next page where item .04 says, "The pressurizer must not be filled with water to indicate its solid conditions blank inches any time except when required for systematic

hydrostatic test." Number on the side is 400 inches.

Is that what you were referring to, the limits and precautions?

A I believe so.

Q Rather than the one on the previous page which says "absolute maximum pressurizer level at any time the reactor is critical is 385 inches"?

A I recall both of those. The one I was referring to was item 4.

Q Did you understand in four separate paragraphs of this particular section two different maximum pressurizer levels were prescribed?

A The one I think has a note on page 17 that defined the reasoning behind the 385 inches. The other one -- the only recollection that I have that was 900 that was quoted when it was described when the answer to the question, "Why don't you want to maintain pressurizer level in the pressurizer and not go solid?" Because we had a maximum limit and precaution.

Q Maybe this will help you answer the question I asked before, what did you tell the operators was the reason for not allowing the press pressurizer level not to exceed either 385 inches or 400 inches?

A The reason for the 385, to the best of my recollection, we did quote the note that's here. The other one -- I don't believe a reason was given on the fact that it says do not exceed under any condition except hydrostatic testing.

Q What did you understand the reason for having that 400-inch limitation?

A I don't recall.

Q Did it have anything to do with the concern about going solid?

A As I said, in our training at the simulator when we were discussing that, that was a number which was usually quoted as a reason why you didn't want to go solid.

Q You understood, did you not, Mr. Zechman, before the accident that the system would not be considered solid if there was saturation in the reactor coolant system?

A Repeat that question.

(Record read.)

A I told you before that I never considered prior to the accident that saturated RC system.

Q Let me read you from the testimony of Mr. Toole, the same Mr. Toole whose testimony we read

to you yesterday. This is his testimony in this case.

"Question: What is your understanding of the term 'solid condition' with reference to a reactor coolant system?

"Answer: Solid system is what we used to have when we hydroed the system. We will open all vents and the coolant system would be solid. Sometime the condition of having the pressurizer instrument off scale above 400 inches to be off scale high would be referred to as being solid.

"Question: Does your definition of solid system include the possibility of voids in the reactor coolant system?

"Answer: No. None other than what would be in the top of the pressurizer."

That's from page 1060 of Mr. Toole's deposition and I would also like to read to you from page 287 of Mr. Floyd's deposition.

"Question: Was it your understanding prior to the accident that if the reactor coolant system had a bubble, not in the pressurizer, but someplace else, that it could be described as a solid system?"

Mr. Seltzer, attorney for Mr. Floyd, "In other words, the pressurizer is full to the roof and there is a bubble someplace else?

"Ms. Wagner: Right.

"Answer: Would I before the accident have described that as a solid system, is that the question?

"Question: Yes.

"Answer: No, I would not have described that as a solid system."

Having heard the testimony of both Mr. Floyd and Mr. Toole, does that in any way help you recall whether you had the same view before the accident that they did?

A I guess I can't speak for them, but I certainly did not have that understanding prior to the accident.

Q Did you believe before the accident that the system would be solid even though there was saturation in the reactor coolant system?

A I never considered saturation in the reactor coolant system.

Q Do you know where, from what source, Mr. Toole and Mr. Floyd would both have received

information or training which led them to the conclusion that the system would not be solid if there were voids in the reactor coolant system?

A I didn't discuss it with either of them. I am not knowledgeable of other than what you quoted to me or the reasoning for them saying that.

Q Did you understand that the 400-inch limitation or the 385-inch limitation would apply even if the operators knew that the system was not solid?

A I don't know that in our discussions prior to the accident that that ever became a point of consideration.

Q What did you understand going solid meant before the accident?

A As the terminology used in the training on simulator and our own, it meant continuing rising level in the pressurizer from going out the top.

Q You mean if the pressurizer was full of water, that meant --

A With a full RC system including up through the pressurizer.

Q What do you mean by a full RC system?

A A completely solid system.

Q I asked what a solid system was and you

said a system which is full. And then I asked you what a full system and you said solid.

MR. MacDONALD: Full of what?

A Full of water.

Q If the system in fact was not full of water but was full of part water and part steam, it would not be solid, is that correct?

A As long as we put it in the reference that not solid and not steam, we are talking about the pressurizer.

Q What I am talking about is the part of the system outside the pressurizer for the moment.

A Never considered that.

Q But your definition of solid was a condition in which the system was full of water, correct?

A Yes.

Q If it is not full of water, then it is not solid, right?

A Yes, but I am saying, I am putting boundary conditions on where it is not solid, I am saying not solid by virtue that there is a steam space in the pressurizer.

Q Just to go back to basics. If the reactor coolant system itself was full of water, but the

pressurizer is only partly full of water and part steam, that is not a solid system, correct?

A In the light that that term was used.

Q Yes. That's the way it's supposed to be during normal operations?

A Yes.

Q So your testimony, I believe, a moment ago that a solid system is a system where not only the reactor coolant system itself is full of water but also the pressurizer is full of water, correct?

A That's my recollection. Yes, that's correct.

Q If the reactor -- if the pressurizer is full of water but the reactor coolant system is not, the system is not solid, isn't that correct?

A I never considered that.

Q Whether you considered it or not, if your definition of solid is a situation where both the reactor coolant system and the pressurizer is full of water, if either one of them is not full of water then it is not solid?

A But in the definition of the terminology that we used it in our training, not being solid was always -- was in reference to then only and only to the pressurizer. It did not consider not being solid

below the pressurizer or in the RC system.

Q That is because you believed that pressurizer level was an accurate measure of system inventory?

A I think I already testified that our training focused and B&W's training focused on if you maintained pressurizer level you were assured satisfactory inventory.

Q What was the problem with being solid?

A I just don't recall. I know there was a real important reason but I just can't recall it right now.

MR. FISKE: I think what I suggest is we break for lunch. I will go back through my notes and maybe we can shorten this. I think we can finish.

(Whereupon, at 12:45 p.m., a luncheon recess was taken.)

AFTERNOON SESSION

2:40 p.m.

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R I C H A R D W . Z E C H M A N , having been previously duly sworn, resumed and testified as follows:

EXAMINATION (Continued)

BY MR. FISKE:

Q Mr. Zechman, are you aware of the fact that within the last year two operators at Met Ed were found to have cheated on certain examinations they took during the course of the Met Ed training program?

A I was aware of that.

Q Which particular examinations?

A Pardon?

Q Which particular examinations?

A To the best of my recollection, it was the relicensing examination.

Q During the period of time that you were head of the training department, did you have specific procedures in effect to prevent that kind of cheating?

MR. MacDONALD: What kind of cheating.

MR. FISKE: The kind of cheating that went on by those two operators.

A I haven't been in conversation with the investigating committee nor am I aware of all the facts surrounding that cheating other than the fact that it existed.

Q You were aware that cheating existed, correct?

A Yes.

Q The cheating related to examinations that were taken in the course of the Met Ed training program?

MR. MacDONALD: Before or after?

MR. FISKE: After.

A That was the NRC exam to the best of my recollection, after the accident.

Q Did you have procedures in effect at the training department when you were in charge of it to prevent cheating on NRC exams?

A During the administration of either exams for requalification or entry exams, there was a separation of students and a proctor.

Q Did it ever come to your attention at any time while you were running the training department that any operator was suspected of having cheated?

A On any exam?

Q Yes.

A In one case.

Q Was there an investigation made?

A Yes, there was.

Q What was the result of that?

A The result of that, I can only speak from the end I observed, I was not in again total conference with the individual and senior management. I know one of the results of that particular cheating incident, the individual was relieved from duty, sent to the training department for a concentrated training effort.

Q That is the only time that you now recall where anyone was suspected of having cheated on an examination?

A To the best of my recollection, sir.

MR. FISKE: That's all I have.

MR. MacDONALD: Due to the length of time he has testified, we are not going to get done cross this afternoon so let's knock off here until some mutually convenient time to reconvene here for this examination of Mr. Zechman.

MR. FISKE: If you choose not to start

this afternoon, I am not in a position to require you to do it. I want to make it clear that we don't consent to this.

MR. MacDONALD: Whether or not you consent, I am saying that Mr. Zechman has testified for many days and is tired and exhausted at the end of the day, on the basis of that it's not in the best interest of anybody and not fair to anyone if we start cross-examination at this time and to the extent that he is leaving today, I don't think it would be concluded anyway and since we have scheduled and rescheduled direct and cross-examinations during the case, I think that that's a practice we will continue.

MR. FISKE: I say there is no way we can require you to proceed this afternoon. I want to make it clear that we are not in agreement with what you have just said.

MR. MacDONALD: That's fine. I can't make you agree to anything, Mr. Fiske.

MR. FISKE: We also would like to finish this up as quickly as possible and we would be happy to do it any day next week.

MR. MacDONAL: As we have done in

scheduling and rescheduling direct examinations, as soon as we can with everybody's schedules, mine and the witness' get back together again to finish this as expeditiously as we can, and that's what we will try to do and we will try on every deposition. It doesn't serve the purpose this afternoon, not being able to complete it --

MR. FISKE: I want to make it clear. We are ready to go now, we are ready to go Monday, we are ready to go Tuesday, we are ready to go Wednesday, and if you want to defer it beyond that.

MR. MacDONALD: Let me say -- there are many different times in the scheduling of depositions and rescheduling direct testimony when we are ready to go ahead and you are not and you can't and we try to work this out to mutually convenient times, and I think we will continue to do that throughout the case.

That's one of the reasons that we talk on the telephone and try to get the dates convenient for everyone.

There have been various times when we are ready to go on with direct and you have not and vice versa. I appreciate your telling me

that you are available Monday, Tuesday and Wednesday and I will take that into consideration.

MR. FISKE: We are available on those dates and we are available at the earliest opportunity five minutes from now to what you think is an appropriate date if you don't agree to those.

MR. MacDONALD: Okay.

MR. FISKE: Thank you, Mr. Zechman.

(Time noted: 1:45 p.m.)

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 26, 1982 consisting of pages 642 through 726;

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 1st day of April, 1982.

Catherine Cook

CATHERINE COOK

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