ORIGINAL

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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GENERAL PUBLIC UTILITIES CORPORATION, :
JERSEY CENTRAL POWER & LIGHT COMPANY,
METROPOLITAN EDISON COMPANY and :
PENNSYLVANIA ELECTRIC COMPANY,
:
Plaintiffs,
:
-against- 80 Civil 1683
: (R.O.)
THE BABCOCK & WILCOX COMPANY and
J. RAY McDERMOTT & CO., INC., :
:
Defendants. :

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Continued deposition of The Babcock & Wilcox Company, by BERT MERRIT DUNN, taken by plaintiffs pursuant to adjournment, at the offices of Kaye, Scholer, Fierman, Hays & Handler, Esqs., 425 Park Avenue, New York, New York, on Thursday, March 19, 1981, at 9:40 o'clock in the forenoon, before Charles Shapiro, a Certified Shorthand Reporter and Notary Public within and for the State of New York.

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B E R T M E R R I T D U N N, having been previously duly sworn, resumed and testified further as follows:

MR. SELTZER: Mr. Fiske, I think you and I reached an agreement over the telephone at the beginning of this week regarding certain instructions that you had given the witness during testimony last week. Do you want to state for the record what your position is now?

MR. FISKE: Yes. I told Mr. Seltzer on Monday that with respect to the questions that were asked at the very end of the day on Friday, March 13th, that we would allow Mr. Dunn to testify with respect to questions that we had instructed him not to answer relating to his conversation with Mr. MacMillan, and also certain questions relating to the document which has been marked as GPU Exhibit 12. And my suggestion would be, Mr. Seltzer, that you ask the questions and we will just go forward.

MR. SELTZER: All right.

Am I correct that we also reached a broader understanding that it is now your agreement that it is proper to ask witnesses questions about the meaning of what a witness has written and the meaning about what a witness has said?

MR. FISKE: Well, I certainly agree to that with respect to the questions that were pending at the end of the day Friday, and I think I also indicated that that agreement would have a broader connotation.

I am not prepared to state at this moment that there might not be a question asking for the witness's interpretation of something he said or something that he wrote that I might consider objectionable, but I would have to wait to see the circumstances. As a general proposition, I would not object.

MR. SELTZER: All right.

MR. FISKE: But I think a lot does depend on the context.

MR. SELTZER: We also had a disagreement

last week regarding whether the witness should be permitted to answer questions relating to his impressions of what someone had said when he has testified he cannot recall the exact words that someone has said, and you assured me that when we resumed, you would let me know which of the Federal Rules of Evidence you were relying on in directing a witness not to answer a question regarding impressions.

MR. FISKE: I would continue that objection for the time being, and I will give you the answer to that before the end of the deposition.

I assume we are not going to finish today.

MR. SELTZER: I would like to know so that if we can't resolve that dispute between ourselves, we will have an opportunity to consider going before the Court on it.

MR. FISKE: Sure.

EXAMINATION (continued)

BY MR. SELTZER:

Q Mr. Duun, do you understand your testimony today c tinues to be sworn testimony under oath to tell the truth?

A I do.

MR. SELTZER: I would like to mark for identification as GPU Exhibit 86 a memorandum from Mr. Brazill to Messrs. Ham and Fairburn, the subject: Supplementary Operating Instructions for High Pressure Injection, dated April 17, 1979.

(Two-page memorandum dated April 17, 1979, to R. E. Ham and G. T. Fairburn from G. J. Brazill, was marked GPU Exhibit 86 for identification, as of this date.)

MR. SELTZER: Mr. Dunn is indicated for receipt of a copy at the bottom of the first page of GPU Exhibit 86 marked for identification, and there is a dramatic leftward-pointing arrow adjacent to his name.

Q Is GPU Exhibit 86 a copy of a memorandum which you received in or about mid-April 1979 in the regular course of business?

A I believe so.

Q Under the heading "Engineering Department Review & Approval," do you see where somebody else has given his approval on your behalf?

A Yes.

Q Whose signature is that?

A John Biller.

Q Who is Biller?

A He was a supervisory engineer reporting to me at the time that this memo was issued.

Q Did you ask him to review and approve it on your behalf?

MR. SELTZER: Let me withdraw that.

Q What is the significance of John Biller's signature?

A The timing during when this memo was issued, B&W was operating under a 24-hour-a-day attention and at this time Mr. Biller was charged with the responsibilities of unit manager for ECCS, with the exception of certain administrative tasks charged with my full responsibility and for a certain period of time during the day.

Q In other words, because you could not physically make yourself available 24 hours a day, Biller was your deputy during part of the day?

A Yes.

Q Prior to B&W's issuing GPU Exhibit 86 to customers, did you review it or the substance of it?

A I was party to the discussions which led to the generation of the memo, although I am not sure today whether I reviewed the exact memo prior to its issuance.

Q Among whom were the discussions that led to the generation of the memo?

A There were approximately five to six people involved in the discussion. George Brazill is the only one I recall at this time.

Q What, as best you can recall, led B&W to issue this supplement to the HPI operating instructions that had been issued earlier in April 1979?

MR. SELTZER: Let me back up and make it a little bit clearer.

Q On the second page of GPU Exhibit

86 there are three criteria for termination of high pressure injuction; is that right?

A That's correct.

Q The first two are the same as the criteria that had been issued to customers on April 4, 1979; is that right?

I will show you GPU Exhibit 85 for comparison (handing), which is the April 4 instruction.

A Yes, the first two appear to be identical.

Q Is it correct that it is the addition of the third criterion which is the difference between the April 17 operating instructions for high pressure injuection and the April 4 instructions?

A That is my understanding.

Q As best you are familiar with it, what facts or circumstances led B&W to add the third criterion?

A There was a recognition that the specific necessity of the second instruction, particularly relative to the requirement for a 20-minute time lag between initiation and the allowance of termination of the high pressure injection

collapse cause unnecessary challenging of the code safeties of the PORV in terms of primarily water flow through those valves. By code safeties, I am referring to the safety valves on the pressurizer and that we wished to lessen the adamacy of requirement 2 for certain circumstances.

Q By adding criterion 3, was it intended that some challenges to the pilot operated relief valve or code safety valves could be avoided?

A By adding criterion 3, we could avoid or allow there to be avoided some circumstance in which water flow would be forced through the valves.

I don't think the word "challenge" is strictly correct.

Q I was just repeating your word.

A Well, O.K. I used "challenge" in terms of water flow.

"Challenge" would mean utilization of the valve and we did not have concerns over utilization of the valve for steam flow.

Q Why, if you did, did you have concern

over utilization of the valve for water flow?

A Hydraulically water will place a stronger force on the valves during operation than steam would and the opportunity for valve failure is enhanced to some extent if the valve sees liquid as opposed to steam.

Q What do you mean, it would place greater force on the valve?

A Well, any device through which any kind of fluid is flowing experiences a certain amount of mechanical force.

If the fluid that is flowing is steam, then in general the force is of a certain value. If the same volumetric flow occurs and it is all liquid, the force is generally higher. And that is about the state of my knowledge in this area on these valves.

Q Is that a force measured in pounds per square inch that would be greater?

A Not necessarily. I would, in terms of defining the force, think about it as the actual total pounds force, or to use perhaps a better defined term, newtons, which are actually on any given component of the valve.

Q In the context that you have just been explaining pressure and force, would steam under a thousand psi pressure exert a different force from water under a thousand psi of pressure?

MR. FISKE: I am going to object to the question unless Mr. Dunn considers himself qualified to answer.

MR. SELTZER: I am trying to make it just being in the same context that he has been answering so you can understand his past answers.

MR. FISKE: This is in the context of pressure in general or --

MR. SELTZER: No, pressure in a pressurizer of a B&W NSS.

MR. FISKE: In terms of pressure on the safety valves?

MR. SELTZER: Yes, or a pilot operated relief valve.

Q Do you understand the question?

MR. FISKE: Maybe you better read it back.

MR. SELTZER: I will restate it.

MR. FISKE: O.K.

Q Will steam under a thousand pounds psi exert the same force on a valve as water under a thousand pounds psi?

A It is my understanding from other people that the valve flowing steam with an inlet pressure of a thousand pounds would experience less force than a valve flowing water with an inlet pressure of a thousand pounds.

Q When you use the word "water," you mean water in its liquid phase?

A That's correct, yes.

Q I believe you said earlier that it was your view at the time that GPU Exhibit 86 was being prepared that a valve including either a pilot operated relief valve or a code safety valve had a greater probability of failure if it was passing water than if it was releasing steam; is that correct?

A That may be correct. It was our belief that that was correct.

Q What, if anything, was your understanding in April of 1979 regarding whether the specifications for the pilot operated relief valves for B&W plants had included

their ability to pass water in its liquid phase?

MR. FISKE: Could I hear that question again, please.

(The reporter read the question.)

A At that time I did not believe I had any knowledge relative to the specifications.

Q Did you have any belief regarding whether B&W specifications called for the pilot operated relief valve to be able to release water pressure in addition to steam pressure?

MR. FISKE: I think, Mr. Seltzer, the specifications will speak for themselves.

MR. SELTZER: I know. And then I want to find out whether the Manager of the ECCS Analysis Unit knew what those specifications were.

MR. FISKE: I think he said he didn't in April of 1979.

MR. SELTZER: I think his answer was not quite so clear and I want to find out whether he had any belief as to what those specifications were.

MR. FISKE: Well, you can answer.

A Well, you used the term relieve pressure

and my belief was that the valve would relieve pressure in either a steam or a water environment.

Q Did you have a belief in April of 1979 that B&W had specified to the valve manufacturers that the valve be designed and delivered with a capability of relieving liquid water pressure?

MR. FISKE: I am sorry, could you repeat the question again.

(The reporter read the question.)

A A valve, I don't believe, was specified in terms of relieving pressure, be it -- and I don't know what you mean by liquid water pressure and I think you are just being inaccurate.

Q Let me clarify the question if it is confusing you at all.

Did you have a belief in April of 1979 that B&W's specifications for the pilot operated relief valve called for the valve to be capable of relieving water?

MR. FISKE: I am not sure I understand the question, Mr. Seltzer. What do you mean by relieving water.

MR. SELTZER: Pass water, permit

water to go through it, as opposed to steam.

MR. FISKE: Do you understand the question?

THE WITNESS: Yes, I understand the question.

A Relative to that question, I don't believe I had a belief one way or the other.

Q Is it correct that you have since learned that B&W's specifications for the valve only specified steam as the service condition which the valve would have to be designed and delivered to meet?

A No, relative to the service condition I had a belief at all times that that was the service condition specified in our specification.

Q So in April 1979 you knew that steam was the service condition which B&W had specified for the pilot operated relief valve; is that right?

A I had a belief that that was the service condition specified.

Q Do you also know or do you have a belief that prior to the Three Mile Island accident the Dresser pilot operated relief valve had not been tested for its ability to

pass water?

MR. FISKE: Mr. Seltzer, I think these questions should be put to Mr. Dunn in terms of whether he has knowledge on the subject or an understanding on the subject, rather than a belief.

MR. SELTZER: Bob, that is, I think, not a fair objection because different people couch their recollection in different ways. This witness has consistently over days of depositions couched his recollection as beliefs and he says "I believe this happened, I believe that happened," that is the way he happens to phrase his recollections, and I think that you are just trying to block relevant testimony in trying to deter him from using the buzz phrase that he uses consistently to describe his recollection, and I resent it. I want you to know that I certainly resent it, and I think this is one of the most important depositions in the Three Mile Island litigation and I think you are doing your damnedest at

some times to interfere with the conduct of the deposition. I really don't think it is fair. I have an enormous amount of respect for you as one of the really fine litigators in the country and I just feel you are pushing a little bit too hard.

MR. FISKE: Mr. Seltzer, let's just make a couple of things clear. Nobody is trying to block any relevant inquiry, but it seems to me that the question of whether the valve has been tested for water or the question of what the specifications say are all facts -- I mean the specifications say what they say and either the valve has been tested or it hasn't been tested. It is not a matter of Mr. Dunn's opinion or Mr. Dunn's belief. Either it was or it wasn't, and as long as the question is directed to Mr. Dunn in a way that asks him, does he know whether this happened or not, I have no objection, but if you are talking about in terms of some speculation on his part as to whether he believes it was done or it wasn't done,

he could very well be wrong and --

MR. SELTZER: Bob, I don't mind explaining the relevance of my question to you because I think I can put you at ease very fast.

MR. FISKE: I understand the inquiry is highly relevant.

MR. SELTZER: I don't think you understand at all why I am asking this witness for his belief.

MR. FISKE: I would be glad to hear you.

MR. SELTZER: O.K.

I think that the condition of a car's tires may be a question of fact, I think the driver's perception of the condition of his tires is a completely independent fact and I think that it is relevant in an auto negligence case to ask a driver what his perception was of the condition of his tires before the accident, and I think that if he has a perception that is important, it is a separate relevant fact from the actual condition of the tires.

A It was my belief at the time that the valves had not been tested for their ability to pass water.

Q When you say "at the time," you mean at or about the time of the Three Mile Island accident?

A Yes.

Q That was your belief at that time?

A Yes.

Q To your knowledge or belief, have the valves or any of them been tested since the Three Mile Island accident for their ability to pass water?

A I don't know.

Q Do you know who in B&W's organization would be most likely to know the information?

A I could point that individual out. I can't give you his name right now.

Q You mean in an organization chart you could point it out?

A No.

MR. FISKE: Off the record.

(Discussion off the record.)

A I could find that individual on the floor.

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MR. FISKE: You have persuaded me.

MR. SELTZER: Thanks.

MR. FISKE: You can answer the question.

THE WITNESS: Where are we at?

MR. SELTZER: The left front tire.

THE WITNESS: O.K. Enough to get back to Lynchberg.

MR. FISKE: Maybe we ought to hear the question.

Q The question is: Do you have any knowledge or belief that prior to the Three Mile Island accident Dresser had tested the pilot operated relief valves which it was supplying for B&W plants for their ability to pass water?

A I am not familiar with the manufacturers used by B&W for the pilot operated relief valve and have not chosen to segregate my beliefs relative to manufacturers.

Q Do you have any knowledge or belief about whether any of the manufacturers of pilot operated relief valves being supplied to B&W were testing those valves for their ability to pass water?

Q What section is that individual in?

A He is in my section, the same section that I am a member of.

Q Do you know what unit he is in?

A If I were given an organization chart, I could -- a current organization chart, I could probably identify the unit.

(Document handed to witness.)

Q Does that show the unit in which the individual you are thinking of works?

A No.

Q At Crystal River, to the best of your knowledge, which of the three criterion for termination of high pressure injection was relied upon when the high pressure injection was ultimately terminated?

A I do not know. I would have to speculate.

Q It certainly wasn't criterion 3; is that right?

A No, I don't think I would make that statement.

Q Didn't the pressurizer go high off scale at Crystal River?

A The instruments indicated such.

Q At Crystal River they took the pressurizer solid, didn't they?

A Yes.

Q Have you spoken with any of the people who were in the control room at Crystal River on the day that they had their transient? By "on the day," I mean at the time the transient occurred.

A Have I spoken to people that were in the control room on that day?

Q Let me recast it.

Have you spoken with people who were in the control room at the time of the Crystal River transient in February 1980?

A I spoke with a person who was in the control room during the accident -- during the recovery from the accident. That is when I spoke to him.

Q Who was that?

A I can't recall his name. He was the B&W site representative.

Q How soon after the start of the transient did you speak to him?

A I am not sure. It was within a few hours.

Q Was the high pressure injection still on?

A I don't recall.

Q You don't remember the name of the B&W site rep?

A No.

Q Have you spoken to him since the day of the transient?

A I don't know.

Q Have you spoken to anybody else who was in the control room at Crystal River during the Crystal River February 1980 transient?

A Not with the knowledge that they were there.

Q Did you discuss with the B&W site representative the implementation of B&W's operating instructions for high pressure injection?

A No.

Q Have you ever spoken with anyone who was in the control room during the Crystal River transient about whether or how they used the B&W supplemental instructions for operating high pressure injection?

A No.

Q Have you ever had any conversation

with anyone about the use of the B&W HPI operating instructions during the Crystal River transient?

Let me make it very clear. The difference between this question and the prior questions is I am not limiting the conversation to people who were actually in the control room at Crystal River.

A I understand that.

Yes.

Q When and where did those conversations take place?

A I believe the conversation took place in Don Hallman's office. The time frame was sometime after the Crystal River accident.

Q Who, if anyone else, was present?

A I can't recall whether anybody else was present or not.

Q Did you have any other conversations with anyone regarding the application of the B&W instructions for high pressure injection system operation during the Crystal River accident?

A I can't be sure.

Q Do you believe that you did?

A Yes.

Q With whom else do you believe you had such conversations?

A Bob Jones, and I think the other individual I might name would be in a speculative nature.

Q Where did you have the conversation which you believe you had with Jones?

A Somewhere in the unit's physical boundaries.

Q When, to the best of your recollection, did you have the conversation with Jones?

A Very shortly following the accident.

Q Was anybody else present?

A I don't know.

Q About how long was your conversation with Hallman in his office?

A I don't recall.

Q Did you go in to talk to him about the Crystal River accident?

A I don't recall what started the conversation.

Q As best you can recall, what did you say to him and what did he say to you, in words or substance?

A The substance was that the operator had made a conscious decision to maintain high

pressure injection until instrumentation had been returned to the point where he could verify his loop conditions, and that was from Don, and my response was that I thought that was good.

Q When you say "verify his loop conditions," are you referring to conditions in the hot and cold legs?

A Yes.

Q Are the conditions that you are referring to temperature and pressure?

A That was my interpretation, what the key variables were of importance.

Q What, if anything, did you or Don Hallman say about the operators applying the new B&W instructions on high pressure injection operation, the supplemental operating instructions?

A Nothing more than what I have already said, that I recall at this time.

Q What was the substance of the conversation that you believe you had with Bob Jones about the use of the B&W supplemental instructions during the Crystal River accident?

A In substance, I reiterated the words that

the operator had made a conscious decision to maintain high pressure injection until instrumentation had been returned to the point in time where he could verify his system conditions, and that I felt very good that such a decision had been made by an operator.

Q Did you feel that the operator had made that consious decision in reliance on the supplemental operating instructions sent out by B&W?

A Not necessarily.

Q Have you ever had any communication which you understood or which led you to believe that the operators had acted at Crystal River in February of 1980 in reliance on the supplemental operating instructions received from B&W since the Three Mile Island accident?

THE WITNESS: Could I get that one back, the first clause, please.

(The reporter read the record.)

A Not that I recall.

Q Did you get any communication that led you to believe that they were acting on any instructions that they had received from

B&W on high pressure injection operation since the Three Mile Island accident?

A Not that I recall.

Q Have you ever made any efforts to determine whether the operators were specifically assisted by the B&W operating instructions or suggestions issued after the Three Mile Island accident?

A No.

Q In your resume, which is part of GPU Exhibit 75 marked for identification, you described the specification of operational procedures for handling loss-of-coolant accidents as being one of your major accomplishments, and you say, "These procedures may have prevented a second incident similar to TMI-2 on at least one occasion since March 26, 1979."

On what were you basing your statement that these additional oeprational procedures may have prevented a second incident similar to TMI-2?

A On my decision that the operator had responded correctly and set appropriate criteria for termination of high pressure injection in the

Crystal River event and that he had had several influences and items of training available to him, two of which relate to it or are the small break operating guidelines and the instructions for management of high pressure injection.

Q The instructions for management of high pressure injection that you are referring to are the April 4 and April 17 instructions; is that right?

A That is correct.

Q The training that you referred to is training that was implemented after the Three Mile Island accident and based upon the small break operating guidelines; is that right?

A There was training, to my understanding, on the small break operating guidelines. There was training shortly following Three Mile Island on the particular course of that accident. That training does not relate to the small break operating guidelines.

Q When were the small break operating guidelines circulated?

A I could not give you a date.

Q After the Three Mile Island accident?

A Yes.

MR. SELTZER: I would like to mark for identification as GPU Exhibit 87 a memorandum from Don Hallman to Mr. Ellison, subject: Reactor Coolant System Subcooling Limits Curve, May 10, 1979.

(Memorandum dated May 10, 1979, to K. R. Ellison from D. F. Hallman, was marked GPU Exhibit 87 for identification, as of this date.)

Q Is GPU Exhibit 87 a copy of a memorandum which you received in the regular course of business on or shortly after May 10, 1979?

A I believe I received a copy of the same memo. This one is addressed to Allen Womack.

Q Is that your signature on page 2 of the exhibit?

A Yes.

Q What is the curve that is attached as the last page of Exhibit 87 supposed to accomplish?

A As I recall the curve was to provide assistance to the operators in determining whether

their system conditions were in fact more or less than 50 degrees subcooled.

Q How would they use the curve to determine that?

A They would take the indicated reactor system coolant pressure and the indicated reactor coolant system hot and cold leg temperatures and either visualize or plot them on the curve; depending on which side of the curve they were on, they could determine whether they were 50 degrees subcooled.

Q To your knowledge, was this the first time that B&W had circulated such a curve to its customers?

A To my knowledge, yes.

Q You testified earlier that you had had no personal involvement in operator training at B&W from the time of the Davis-Besse incident in September of 1977 through the date of the Three Mile Island accident.

Could you describe generally what kind of involvement you have had in training since the Three Mile Island accident?

A Yes. I have seen the training film

produced for training on the accident at Three Mile Island itself. I have participated in a mock training session in which we were given a short course on small breaks by an instructor. I participated in the development of the small break operating guidelines which, it is my understanding, has since been utilized as a basis for training and has been trained on. And I have been in the habit of giving a short lecture to operators, when requested, on the modes of natural circulation which can occur in a B&W plant, and have assigned an engineer within my organization whose responsibilities are to give lectures in the large and small break arena, again as requested by the Training Department, and who is also charged with the responsibility to maintain contact with the general field of post-accident operations and operations during the early phases of the accident, to provide an ECCS overview to some extent of what information is being given to the customers in this area.

Q What area?

A The area of operations and management of

accidents with attention to the small break accidents of course -- well, with attention to loss-of-coolant accidents.

MR. FISKE: I am supposed to call somebody at 11. Is this a good time for a break?

MR. SELTZER: Yes.

MR. FISKE: I mean if you are in the middle of something --

MR. SELTZER: No.

(Whereupon, a recess was taken.)

BY MR. SELTZER:

Q Who was the engineer assigned from your unit to give lectures on large and small breaks?

A Mr. Ed Anderson, that is, presently assigned.

Q O.K.

Since the Three Mile Island accident, have others been assigned from your unit?

A Yes.

Q Who?

A The original designee in that function was Mr. Jim L[illegible]mon. He did not function in that

position for an extensive length of time though.

Q Have you ever given lectures since the Three Mile Island accident on operator response to loss-of-coolant accidents?

A I don't believe so.

Q Have you ever given any lecture on system performance during a loss-of-coolant accident?

A Again, I don't believe so.

Q Have you discussed with the people from your unit the contents of their lectures on large and small breaks?

A From time to time, yes.

Q Have you sat in on any of their lectures?

A No.

Q Have they ever presented their lectures to you, any of them?

A No.

Q Have you ever reviewed any written materials which they use in conjunction with any of their lectures?

A Yes.

Q What written materials have you seen?

A Mr. Anderson currently has a basic format for his lecture, part of which is a written -- his written information descriptive of the lecture, descriptive of large and small break accidents, and the scenarios played out within the primary system during those accidents.

Q Does he discuss breaks at the top of the pressurizer?

A I don't recall that specifically.

Q Does he discuss saturation occurring in the primary system?

A Yes.

Q What, as best you can recall, is the substance of his instruction with respect to saturation?

A You asked whether he discussed it. Saturation occurs within the primary system for all but the very smallest small breaks, and in explaining the scenario of the accident, explaining operator response, and in that form he is discussing it.

Q Does he discuss the three criteria for termination of high pressure injection as outlined in the April 1979 communication?

A Not exactly.

Q What do you mean by "not exactly"?

A The criteria are reiterated in the small break operating guidelines. I don't believe them to be exact reproductions of the April 17th criteria at this time. And he discusses the small break operating guidelines.

Q How frequently are engineers from your unit called upon to give lectures as part of the B&W training program?

A Frequency would depend upon the nature of the training and the desires of the customer.

Ed gives lectures, on the average, approximately once every other week.

Q Has he been giving lectures approximately once every other week for more than a year?

A Yes. Those lectures would be grouped into a significant number over a month, and then perhaps a month or two without lectures, and then another significant number of lectures.

Q Has Norman Elliott ever conferred with you about the content of the B&W training program since the Three Mile Island accident?

A Not that I recall.

Q Has anybody in training ever conferred with you about the content of the training program since the accident?

A Not other than the content of the natural circulation lectures I have been in the habit of giving.

Q Who has conferred with you from training about the content of that lecture?

A The instructors.

MR. SELTZER: I would like to have marked as GPU Exhibit 88 for identification a document entitled "ECCS Analysis of B&W's 177-FA Lowered-Loop SNN - Revision 3," Topical Report, BAW-10103A, Revision 3, July 1977, by Messrs. Dunn, Jones and Biller.

(Multipage document entitled "ECCS Analysis of B&W's 177-FA Lowered-Loop NSS - Revision 3," was marked GPU Exhibit 88 for identification, as of this date.)

Q Is GPU Exhibit 88 marked for identification a copy of a report which you

co-authored?

A Yes.

Q This analysis was intended for what purpose?

A It was a generic evaluation of the response of the B&W 177 lowered-loop design for the purpose of showing conformance to the criteria of 10 CFR 50.46, Code of Federal Regulations.

Q Included in the class of plants covered by this report is Three Mile Island Unit 2; is that right?

A That is correct.

Q When you say this is done to demonstrate conformance to the criteria of 10 CRF 50.46, does that mean that for all break sizes and locations in the 177-FA lowered-loop plants your analysis showed that there would be acequate core cooling?

THE WITNESS: May I have the question read back, please.

(The reporter read the question.)

A The analysis showed adherence to the criteria of 10 CFR 50.46.

Q The criteria of 50.46 are criteria

which specify -- I think you have already testified, five different measures of whether there is adequate core cooling; isn't that right?

A Yes.

Q So the analysis that is set forth in GPU Exhibit 88 is intended to show that there is adequate core cooling within the definition of 10 CFR 50.46 for all break sizes and locations; right?

A Correct.

Q Is there anything in GPU Exhibit 88 which analyzes specifically breaks at the top of the pressurizer?

A I don't believe so.

Q So that is a break location that wasn't covered by GPU Exhibit 88; is that right?

A In my opinion, your statement is wrong.

Q Where in GPU Exhibit 88 is that break location covered, namely, a break at the top of the pressurizer?

A A specific analysis of a break at the top of the pressurizer is not covered in BAW-10103. However, the intent of BAW-10103 is to show that for accidents which provide the most serious

challenge to the emergency core cooling system, the system is capable of adequately assuring core cooling as defined by 50.46. The accidents directly evaluated in 10103 are more severe relative to placing a requirement on the emergency core cooling system than the specific one you mentioned.

Q Is there any break described in BAW-10103 which would cause pressurizer water level to rise as reactor coolant system pressure fell, and if so, would you tell me on what page it is described?

A No, I don't believe for any of these events analyzed here the pressurizer water level would rise.

Q Would you turn to Appendix C, please, which is entitled "Small Break Analysis."

A Yes.

Q Let me ask you --

MR. FISKE: The pages are numbered C at the bottom.

THE WITNESS: Yes.

MR. BENEDICT: Yes.

Q You and two other individuals are

listed as the authors of 10103 which we have identified as GPU Exhibit 88.

What was your role in the preparation of this document?

A During the preparation of the original revision to the document, I was a supervisory engineer charged with the responsibility to see that the analysis was performed and to see that the document was produced.

During the work on Revision 3, I was in the unit manager capacity.

Q You supervised the preparation and issuance of this document?

A Well, as I mentioned before, the document grows over a period of time and I directly supervised the original version, and for Rev. 3, being in the position of unit manager at that time, had a great deal to do with the production of the document but I wouldn't say I directly supervised it.

Q Did you review it before it was issued?

A To the extent I deemed necessary.

Q Did you know at the time that

BAW-01003 was being prepared that it would be submitted to the NRC?

A Yes.

Q Is it your understanding that an analysis demonstrating conformance of NSS to the criteria of 10 CFR 50.46 is necessary to obtain an operating license for those plants?

A Yes. At this time.

Q On page C-2 of Appendix C, in the introduction, you refer to three different break areas that are studied.

Do you see that reference in the second paragraph?

A Yes.

Q The third break area is a 0.04 square foot break at the pump suction which you say "was shown to be the most limiting small break."

What do you mean by the phrase "the most limiting small break"?

A That accident, which places the most severe requirement for performance on the emergency core cooling system within the small break spectrum.

MR. FISKE: Could I just hear the answer, not the question, please.

(The reporter read the record.)

Q What is the small break spectrum?

A It is generally considered to be ruptures of the primary coolant system pressure boundary which will allow fluid discharge at a rate in excess of the makeup system capability and which are smaller in cross-sectional area than one-half of a square foot.

Q When you refer to the makeup capacity, are you referring to the amount of water that can be pumped into the system by the makeup pump?

A Yes.

Q And in the 177 plants there is generally one makeup pump?

A In the 177 plants the same pump is utilized for makeup and for high pressure injection, so there are three possibilities.

Q What I was --

A One pump is normally utilized for makeup.

Q O.K. You have put your finger right on the pulse of the ambiguity that I was

concerned with.

When you say it is a break in excess of the capacity of the makeup system, is it a break in excess of the capacity of one makeup pump or the combined capacity of all three makeup high pressure injection pumps?

I am sure this isn't the first time you have thought of that question.

A The definition of the small size, small side size of the break spectrum has not historically been strictly defined. There have been times when the definition has included the discharge of two makeup pumps through the single makeup train of piping; most frequently it is one makeup pump.

Q You say that the 0.04 square foot break at the pump suction was shown to be the most limiting small break in BAW-01152.

Is 01152 another topical report prepared by B&W?

A That is correct.

Q And you were also a co-author of that topical report; is that correct?

A I believe so.

Q I will hand you a copy of 10052, Revision 1, and ask you if you recognize this as a copy of that topical report which you co-authored.

A This appears to be a copy of that report.

Q Would you look at the chart that is on page 2 of what we will mark as GPU Exhibit 89.

MR. SELTZER: We will have copies made of this and we can mark it after lunch.

Q Do you see the third column labeled Peak temperature Fahrenheit?

A Yes.

Q Is that the peak clad temperature for each of the breaks described in the left-hand column?

A Yes.

Q What does that mean, that these are the peak clad temperatures? Is that the highest temperature which the zirconium alloy cladding is expected to reach during a break of the description in the left-hand column?

A It is the highest temperature the cladding has been calculated to reach using the assumptions imposed by the accident and by the method of analysis.

Q In the left-hand column you describe three different size breaks occurring at pump suction; is that right?

A Yes.

Q They are arrayed from top to bottom in descending size of the break; right?

A Yes.

Q As the break gets smaller, the peak cladding temperature anticipated increases; right?

A That is indicated in the narrow range of this table.

Q Specifically for a 0.3 square foot break, the peak clad temperature is 780 degrees Fahrenheit; right?

A Yes.

Q For a 0.4 square foot break, the peak clad temperature is 978 degrees Fahrenheit; right?

A Yes.

Q What is the significance of the peak clad temperature?

A Relative to what?

Q Relative to topical reports analyzing the ability of B&W nuclear plants to conform to

10 CFR 50.46?

A One of the criterion in 10 CFR 50.46. that the clad temperature shall not exceed 2200 degrees Fahrenheit.

Q With the peak clad temperature increasing as the break size gets smaller, how did you determine that the .04 square foot break was the most limiting small break?

A Through considerations of the mechanisms which lead to this result.

Q Didn't you have any concern that there might be a smaller break that would produce significantly higher peak clad temperatures?

A No.

Q Isn't it a fact that there are smaller size breaks at the pump suction which would produce higher peak clad temperatures?

A Not that I am aware of.

Q Have you ever analyzed breaks smaller than 0.04 square feet at the pump suction?

A For this particular plant type, I don't believe that we have analyzed it in the fashion that we have analyzed these (indicating), in that these have specific computer evaluations

behind them.

Q For a break that is incrementally smaller than 0.04 square feet at pump suction, is it your belief that the peak clad temperature would be greater than 978 degrees Fahrenheit?

A The term "incrementally," in my mind refers to a very small element typically used in the derivation of the mathematical procedure calculus.

Q That is exactly the sense in which I was using it.

A And I believe the trend would be that the temperature would be incrementally smaller than indicated here.

Q Why do you believe the temperature would decline?

A The basis for the break spectrum was to examine accidents which utilized different portions of the emergency core cooling system for mitigation of the accident. Considering the mechanisms of small break and the way in which the accidents evolve, it is my judgment that smaller breaks performed with this evaluation technique and at the pump suction would utilize

the initial inventory of the reactor coolant system to provide core cooling for a longer time, allowing the high pressure injection system more opportunity to build the coolant level within the reactor coolant system, thus achieving lower uncovery levels at a longer period of time at which lower decay heat levels would exist, and the calculated temperatures would therefore be slightly reduced.

Q What is the break size at pump suction which produced the highest peak cladding temperature?

A With these methods of analysis, it would be reasonably close, if not exactly, .04; perhaps slightly larger.

Q Under the analysis in BAW-10103 and 10052, am I correct that no operator intervention is needed to actuate emergency core cooling systems in order to achieve cooling in conformance with 10 CFR 50.46?

THE WITNESS: Could I have that read back, please.

MR. SELTZER: I will restate it.

Q At the time that BAW-10103A, Revision

3 was issued, was it your understanding that no operator intervention was necessary to actuate the emergency core cooling systems required to maintain core cooling in conformance with 10 CFR 50.46?

A Yes.

MR. SELTZER: I would like to mark as GPU Exhibit 90 a memorandum from Jim Taylor to distribution including Mr. Dunn, entitled "Preliminary Report of Safety Concern PSC 10-78," dated April 12, 1978.

(Memorandum dated April 12, 1978, from J. H. Taylor to Distribution, was marked GPU Exhibit 90 for identification, as of this date.)

Q Subsequent to the issuance of BAW-10103A, Revision 3, did B&W discover that operator intervention was necessary to achieve core cooling in conformance with 10 CFR 50.46 for some of the breaks covered in that topical report?

A In the fashion that the topical report was intended to bound breaks anywhere within the primary system, B&W did discover the possibility

of alternate break size -- excuse me, an alternate break location could produce more severe results than was indicated in BAW-10052 and that mitigation of these accidents under the assumptions -- assumptions posed by 10CFR 50.46, Appendix K, required the rearrangement of the ECCS discharge paths, which for a time was accomplished in the plants by operator intervention.

Q Am I correct that it was your section which discovered this fact after 10052 and 10103 had been issued?

A It was my unit.

Q How did your unit happen to discover it?

A As I recall, we had been performing some work on the Babcock 205 design, and part of the emergency core cooling system configuration on the Babcock 205 design is a cross coupling of the high pressure injection lines and it occurred to the engineer involved that the general sizing of the high pressure injection systems for the 205 design and the 177 design were reasonably equivalent when normalized

against power, and he could not explain why cross-coupling of the system was necessary for the 205 design and not necessary for the 177 design.

Q Is that your signature on the third page of GPU Exhibit 90 marked for identification?

A Yes.

Q What does your signature at the bottom signify?

A In this document my signature signifies that the words contained in the remainder of the document are a reasonable and accurate representation of the intent of the author.

Q Does it also mean that you had reviewed the analysis presented by Mr. Jones and that you felt that it was accurate?

A No.

Q Have you reviewed the material presented by Mr. Jones and believed that it was accurate?

A Yes, I had done that.

Q In item 2 at the top of this third page of GPU Exhibit 90, it says, "On April 7, a 0.04 square foot small break analysis at the

pump discharge on the SMUD plant was completed. Results show substantial core uncovery."

The SMUD plant is a 177-FA lowered-loop plant; is that correct?

A Yes.

Q And it is a plant that was covered by BAW-10103A; right?

A Yes.

Q And substantial core uncovery for the 0.04 suqare foot small break at pump discharge is a result that was not described in BAW-10103A; right?

MR. FISKE: I am sorry, could I hear the question, please.

(The reporter read the question.)

A Yes, I think that is a fair statement.

Q Under item 6, description of safety concern, it states, "For small breaks at the pump discharge of the 177-FA lowered loop plants (identified above), the high pressure injection pumps are inadequate to control the accident to the criteria of 10 CFR 50.46."

You believed that was an accurate statement at the time, did you not?

A Taken in the context of the design of the injection trains and the mode of operation of the injection trains at that time, I believe that to be an accurate statement.

Q And the reason that the high pressure injection pumps were inadequate to control the accident in conformance with 10 CFR 50.46 was that the use of those pumps and the way the trains were connected at that time was "inadequate to maintain cladding temperatures below 2200 degrees Fahrenheit"; is that right?

A A computation of the clad temperature which would result had not been performed, but out of our experience in correlating core uncovery to cladding temperature, we had expectations, strong expectations, that the resulting cladding temperature for this particular case would be in excess of 2200 degrees Fahrenheit.

Q And it is because of your belief from prior calculations and experience that the cladding temperature would exceed 2200 degrees Fahrenheit you believed that for this particular small break that the plant would not be in conformance with 10 CFR 50.46 as then hardwared

and operated; right?

A Yes, given the assumptions imposed by 50.46.

Q Based on that conclusion, you agreed, did you not, with the boxes checked at the top of the page, namely, that this problem presented a "significant deficiency" and a "substantial hazard"?

A At this time I cannot recall the reason for checking the particular boxes.

Q Does "significant deficiency," as those words are used on the preliminary report of safety concerns, refer to a deficiency from 10 CFR 50.46?

A I don't know. I would have to reread the definition given in our procedures at that time to pass a judgment.

Q It is a fact, is it not, that B&W subsequently reported this safety concern to the NRC pursuant to its reporting obligations under 10 CFR, Part 21; isn't that right?

MR. FISKE: I will object to the form of the question.

You can answer it.

A It is a fact that we subsequently reported

this concern to the NRC.

As to whether or not that was under our obligation from 10 CFR-- well, 20, part 21 or not, I don't recall.

Q Jim Taylor, on the front page of GPU Exhibit 90, says, in the second paragraph of the document, that you received, "A preliminary indication is that this concern will be reportable to the NRC under the requirements of 10 CFR 21."

Do you see that?

A Yes.

Q What was your understanding at the time of this reference to the requirements of 10 CFR 21? In other words, what do you think he is referring to?

MR. FISKE: You mean, what did Mr. Dunn think then when he got the memo?

MR. SELTZER: Yes.

Q What was your understanding at that time, Mr. Dunn, of the requirements of 10 CRF, part 21?

A I can't say that I recall what my understanding of the requirements of 10 CFR 21 were at that time.

Q Did you have an understanding then that there were certain safety matters which B&W management was under an obligation to report to the NRC when they came to the attention of B&W management?

A Yes.

Q Did you understand that that reporting requirement was described entirely or in part in 10 CFR part 21, or have you since come to learn that?

A I think it is fair to say that I understood that that reporting requirement was described in part in 10 CFR 21.

Q Did you believe that there were other sources of that reporting requirement?

A I don't know that I can properly distinguish between that particular time and later times.

MR. SELTZER: Is this a time when you think it would be appropriate to have lunch?

MR. FISKE: Sure.

(Whereupon, at 12:30 p.m. a lunch recess was taken.)

AFTERNOON SESSION

B E R T M E R R I T D U N N, resumed.

(Topical Report, October 1975, entitled "Multinode Analysis of Small Breaks for B&W's 2568-MWt Nuclear Plants - Revision 1" was marked GPU Exhibit 89 for identification, as of this date.)

EXAMINATION (continued)

BY MR. SELTZER:

Q Mr. Dunn, I am sure you know that your testimony this afternoon continues to be under oath.

A Yes.

MR. SELTZER: I would like to mark as GPU Exhibit 91 a letter from Jim Taylor, the Manager of Licensing at B&W, to Dr. Ernst Volgenau at the NRC, dated April 14, 1978.

(Letter from James H. Taylor to Dr. Ernst Volgenau at the NRC, dated April 14, 1978, was marked GPU Exhibit 91 for identification, as of this date.)

Q Have you had a chance to look at

GPU Exhibit 91?

A I have looked at the front of it. I have it in front of me.

Q Goes GPU Exhibit 91 and the attached report refer to the same item which was the subject of the preliminary safety concern which you put your name to in GPU Exhibit 90?

A It appears to.

Q Did your unit prepare the pages that are attached to Jim Taylor's transmittal letter in GPU Exhibit 91?

A I believe we created input for the pages but did not actually create the pages themselves. But I don't know positively.

Q Do you believe that your unit prepared the text which is contained in these backup pages?

A I don't believe so.

Q Did you review the material that is being transmitted by Jim Taylor to the NRC at or before the time that your company sent this to the NRC?

A I do not recall reviewing it or not reviewing it, so I would have to speculate.

Q From your familiarity with the business practices of Babcock & Wilcox, would it be the normal practice for the head of the ECCS analysis unit to review an evaluation of 177 fuel assembly lowered-loop ECCS concern before such a report was transmitted to the NRC?

A It wouldn't be necessary and the practice is sometimes done that way, sometimes not.

Q Would somebody in your unit, if not you, review it, as a general practice?

A More often than not, somebody in my unit would review it, but it is not, again, necessary to do that.

Q Would you turn to the second page of GPU Exhibit 91. It says on the second page of the document: "This report documents the evaluation of a concern wherein it was postulated that for B&W 177FA lowered loop plants, the analysis presented in BAW-10103A, 'ECCS Analysis of B&W's 177FA Lowered-Loop NSS,' may be nonconservative for a small break in the reactor coolant pump discharge."

Do you see the word "nonconservative"?

A Yes.

Q That is a euphemism that refers to the fact that there could be core uncovery for small breaks in the reactor coolant pump discharge?

A No.

Q Your analysis as of the time that you were communicating with the NRC on April 14, 1978 showed that there could be core uncovery for a small break at the pump discharge; isn't that right?

A I didn't catch your reference. If you meant the analysis which led to the production of the PSC on April 12th, I guess dated April 7th, that analysis indicated significant core uncovery.

Q And isn't it a fact that it is the significant core uncovery that made the prior topical report on the 177 plant nonconservative?

A No, it is the fact that the core uncovery that occurred as -- is to a far greater extent than the previous, the previous analysis had shown.

Q In what way was the prior analysis nonconservative?

A The prior analysis had portrayed the

accident -- excuse me -- had stated that the accident at the pump discharge in the approximate area of .04 square foot could be viewed as the worst small break accident for the purposes of evaluating the capability of the emergency core cooling system, emergency core cooling system's capability of assuring adequate core cooling in conjunction with 10 CFR 50.46.

At this time we are saying that that may be nonconservative because we had indications to believe that a different break or accident would produce higher peak cladding temperatures, and thus we had information that the spectrum, which we thought had bounded the results in the -- the results of accidents in the primary system did not in fact or was not indicated any longer to bound those results.

Q In other words, your previous assumption that the .04 square foot break bounded was wrong?

A I don't know that I would use the word "assumption."

Our previous representation of the .04 square foot break contained in the document

BAW-01152 was shown after this one; here we have the indication of it. It was shown after this to be wrong.

Q You said a moment ago that as of April 1978 you learned that there would be core uncovery for the .04 square foot break to a far greater extent than previously shown in the 10052 or 10103 topical reports.

Did you misspeak? I thought those topical reports showed no core uncovery for the .04 square foot break.

A The -- well, I guess I would like to be sure and check the documents relative to no core uncovery. I do not believe I misspoke myself before.

Q You have in front of you 10052 and 10103.

A The evaluation in 10052 shows core uncovery for the .04 square foot break.

Q On what page?

A 46.

Q At what time does core uncovery appear?

A Slightly after 1600 cycles. It would

appear to be about 1750.

Q Is the line that says "top of active region" the line that shows the volume of water necessary to keep the core covered?

A No.

Q What on that chart signifies the point of core uncovery to you?

A A point at which the solid line crosses the dashed line indicated top of active region, that the graph refers to mixture level and it refers to inter-vessel regions which have specific definitions and do not refer to the amount of water required to keep the core covered.

Q Even with the fuel core uncovery, to a limited extent shown on page 46 of BAW-10052, do I understand you to be saying that the peak clad temperature is still within the margins permitted by 10 CFR 50.46?

A Yes.

Q When you say "yes," you mean yes, at the time that the analysis was done and issued in 10052; right?

THE WITNESS: Please repeat the last few questions and answers.

(The reporter read the record.)

A Yes. Mr. Seltzer, the record shows me referring to liquid volume to keep the core uncovered. I believe it should show liquid volume, in the previous answer, to keep the core covered.

Q O.K. I think the reporter also read "inter-vessel mixture." I think you said "inner vessel," did you not?

A Yes.

Q It was only after BAW-10052 was issued that you realized that the core uncovery for the .04 square foot break at pump suction could lead to peak clad temperatures in excess of those permitted by the 50.46 criteria; right?

A No.

Q It was at the discharge that the criteria were violated; is that right?

A That is correct.

Q The uncovery of the core leading to violation of ECCS acceptance criteria contained in 10 CFR 50.46 occurred if there was no operator action; is that right? And I would call your attention to analysis of occurrence on the

fourth page of GPU Exhibit 91.

THE WITNESS: Could you repeat that question to me, please.

(The reporter read the question.)

A In conjunction with the assumptions for the evaluation of these types of accidents contained in 10 CFR 50.46 and Appendix K, the unacceptable results or the cladding temperatures felt to be in violation of 10 CFR 50.46 occurred with no operator action.

Q It is a fact, is it not, that B&W came up with a prescription for operator action in order to bring the 177-FA plants into conformance with 10 CFR 50.46; isn't that true?

A Yes, that is true.

Q What was the operator action which B&W prescribed in order to bring its 177-FA plants, including Three Mile Island Unit 2, into conformance with 10 CFR 50.46 and Appendix K?

A To rearrange the valving at the discharge of the high pressure injection pumps to allow for four points of penetration into the reactor coolant system in the event that only one high pressure injection pump was operating.

Q The cross-connection is something that would be performed manually by the operators is that right?

A The instruction was of an interim nature to allow time for automation, and during the interim it would be performed manually.

Q Do you know how long it took or was projected to take to make the cross-connection automatic? In other words, how long would it take to retrofit the plants?

A I do not know that answer definitively.

Q More than a year?

A It is my recollection that the time frames discussed were possibly in excess of a year.

MR. SELTZER: I would like to mark for identification as GPU Exhibit 92 another letter by Jim Taylor, this time to Robert Baer, Chief of Reactor Safety Branch at the NRC, dated May 1, 1978. A copy is indicated to Mr. Dunn.

(Letter dated May 1, 1978, to Mr. Robert L. Baer at the NRC, from James H. Taylor, with attachment, was marked GPU Exhibit 92 for identification, as of this

date.)

Q Is GPU Exhibit 92 a copy of a piece of correspondence which you received in or about May 1978 in the regular course of business?

A Yes.

Q Did you or your unit contribute to the preparation of the analysis which is attached to GPU Exhibit 92?

A Yes.

Q Did you review it before it was sent to the NRC?

A Yes.

Q Would you turn to the section that is headed "Introduction" and would you look at six lines down, the sentence beginning "These results show..."

Do you see that sentence?

A Yes.

Q It says there: "These results show that it is necessary to use operator action during the early stages of the postulated accident, to effectively mitigate the accident consequences and meet the criteria of 10 CFR 50.46."

I take it you believed that that

statement was accurate at the time it was written; is that right?

A Yes.

Q Would you look at the page numbered 2 at the bottom. Do you see item k. on that page?

A Yes.

Q That item states: "Operator action is taken to increase the high pressure injection flows to the intact cold legs at 10 minutes following the ECCS initiation signal."

Is that the operator action which is required to meet the criteria of 10 CFR 50.46?

A This is the assumption used in the analysis which is extracted from the required operator action.

Q The required operator action that you are referring to is item 3 on page 5 and continuing onto page 6; is that right?

A Yes. That being a generic description.

Q At the top of page 6 it states: "The above actions initiated at five minutes and completed within 15 minutes subsequent to the ESFAS actuation ensures adequate high pressure

injection flow for accident mitigation."

Does that mean that the operator was expected to begin taking the action necessary to bring the plant into conformance with 10 CFR 50.46 within five minutes after the start of the ESFAS actuation?

A That is my recollection.

Q In order for the operator to know what he was expected to do, what would the operator have to recognize in those first five minutes?

A The details of the operator action were in plant specifications and handled by the customers within their own procedures. Generically the operator would have to recognize the occurrence of an ESFAS.

Q What is ESFAS?

A I believe it stands for emergency safeguards features actuation signal.

Q I am sorry, I didn't mean to interrupt you.

You would have to recognize an actuation of emergency safety features; right?

A Yes. And that flow was occurring in only

one of the ECCS trains.

Q Now, according to GPU Exhibit 92 which you reviewed, the operator action was supposed to be commenced at fivue minutes.

How much margin for error was there, if the operator missed the five-minute mark?

A That would be an answer that I would have to specifically evaluate on a plant-by-plant basis in conjunction with the flows as they would actually occur.

There was margin for error.

Q If the operator hadn't acted within 20 minutes, it is a fact, isn't it, that at the 177-FA plants the core would be uncovered?

A Under the assumptions posed by 10 CFR 50.46, yes.

Q And it is also a fact, isn't it, that in the 15 minutes between when he should have initiated the operator action called for in GPU 92, and 20 minutes, without any operator action there would be fuel melting, wouldn't there?

A I could not answer that question without detailed evaluation.

Q In the 15 minutes of no operator

action, the peak cladding temperature would exceed 2200 degrees Fahrenheit, wouldn't it?

A I could not answer that question without detailed evaluation.

Q Is there anything in GPU Exhibit 92 which would indicate what the cladding temperatures become without operator action?

A I don't believe there is anything in here that would allow us to answer the question.

Q Has your section done, or your unit done analyses of at what point the peak cladding temperatures exceed 2200 degrees?

A To my recollection, not to the point at which we could determine a specific time delay.

Q Did you have any communication directly with the NRC or any employee of the NRC with regard to B&W's analysis or prescription for dealing with the pipe break described in GPU Exhibit 92?

THE WITNESS: Would you read the first clause of that back, please.

(The reporter read the record.)

A Yes.

Q What was the nature of that

communication?

A Description of the incident, disclosure of the primary causes for the accident, description of the analytical techniques utilized to show compliance, explanations of why compliance resulted, defense of the break spectrum utilized to demonstrate compliance.

Q Was that an oral communication?

A Both oral and written.

Q Whom did you meet with?

A I don't believe at this time I can recall the individuals' names.

Q Did the NRC accept B&W's prescription of operator action as a means for complying with 10 CFR 50.46?

A On the basis that it was an interim measure and would be automated at some time, it is my understanding that they accepted it.

Q Is proper operator handling of emergency safety features something that is incorporated in B&W's analysis of accidents for compliance with 50.46?

A During the interim period while we are awaiting automation of this action, active

operator response to the accident was a requirement and part of the analysis and part of the licensing basis for the plants.

Q What, if any, assumption is made in analyses done by your unit that operators will not interfere with the functioning of emergency safety features which are required for compliance with 50.46?

MR. FISKE: Is this just a generic question or are you referring to this specific evaluation (indicating)?

MR. SELTZER: I am not referring to the specific evaluation.

MR. FISKE: Could I hear the question again, please.

(The reporter read the question.)

A Subject to the possibility that someone might interpret the operator action required within GPU Exhibit 92 to be interference, the assumption is that the operators will not, during small break LOCA, interfere with the functioning of the emergency core cooling systems.

Q Is it correct that the assumption is made that the procedures and training under which

the operators are functioning are such that they will not interfere with the operation of emergency safety features which are required to operate for conformance with 50.46?

MR. FISKE: I will object to the form of the question, but you can answer it.

A I don't believe I would phrase it that way. I would rather phrase it that within the analysis it is our assumption that the emergency core cooling systems will continue to function during the course of the accident.

Q In making that assumption, are you assuming that operators will not prematurely terminate the function of the emergency core cooling system during the accident?

A Again we are assuming that at least one high pressure injection train continues to operate during the course of the small break loss-of-coolant accident.

Q It follows, from what you have just said, does it not, that you were assuming that operator intervention will not arrest the operation of that high pressure injection train which you are depending on for conformance with

10 CFR 50.46; isn't that right?

A I choose to repeat my previous answer as opposed to making any logical extension or any extension whatsoever.

Q Isn't it a fact that operator intervention is one way in which a plant could lose the functioning of its high pressure injection system?

A Operator intervention in the fashion of terminating or what is sometimes referred to as securing the high pressure injection system or low pressure injection system would have the possible effect of depriving the facility of high pressure or low pressure injection flow.

Q In making the assumption which you said your analyses have made that flow through at least one train will continue during the small break loss-of-coolant accident, aren't you assuming that there will not be operator termination of that high pressure injection flow?

A During the analysis in response to the requirements of 10 CFR 50.46 we made the assumption that for whatever reason, at least one high pressure injection system or low

pressure injection system, depending on the accident, continued to function throughout the course of the transient.

Q It is inconsistent with that assumption for operator action to terminate or secure all high pressure injection flow or all low pressure injection flow, depending on the accident; isn't that right?

A Yes.

Q You said you would have to see the procedures for processing a safety concern to tell me what "significant deficiency" meant as that term was used on the PSC form which was part of GPU Exhibit 90.

MR. SELTZER: Let me mark for identification as GPU Exhibit 93 the Babcock Administrative Manual, subject: Processing of Safety Concerns, Revision 6.

(Babcock & Wilcox Company Administrative Manual, Policies and Procedures, Revision 6, was marked GPU Exhibit 93 for identification, as of this date.)

Q Is this the procedure that you were

referring to for the definition of a significant deficiency?

MR. FISKE: Mr. Seltzer, I don't know whether you meant to give him this one or not. This says June 20, '78.

MR. SELTZER: Let me also mark Revision 5 then, which is November 21, 1977, and we will have both.

(Babcock & Wilcox Company Administrative Manual, Policies and Procedures, Revision 5, was marked GPU Exhibit 94 for identification, as of this date.)

Q Are these the procedures that you were referring to for the definition of what is a significant deficiency?

A These procedures contain the definition or the guidance that I would use.

MR. FISKE: Off the record.

(Discussion off the record.)

(Whereupon, a recess was taken.)

MR. SELTZER: I would like to mark as GPU Exhibit 95 a B&W Policy and Procedure regarding reporting of defects

and noncompliance concerning safety, 10 CFR 21, dated December 6th, 1977.

(Babcock & Wilcox Company Administrative Manual, Policies and Procedures, Number 1716-A1, was marked GPU Exhibit 95 for identification, as of this date.)

Q Can you identify GPU Exhibit 95 marked for identification?

A I suppose so.

Q Is it anything that you have seen before today?

A I don't recall seeing this specifically.

Q Do you think you have seen anything like it or any part of it?

A Yes, I think I have seen something like it.

Q Was GPU Exhibit 95 or something like it circulated to you prior to the Three Mile Island accident?

A To me personally?

Q Personally, impersonally, generally, specifically; anyhow.

A Yes.

Q How did it come to your attention?

A I don't think I would phrase it as coming to my attention.

I maintained a station in which all policies appropriate or applicable to our division are maintained.

Q What do you mean by "station"?

A A set of books that is actually maintained by my secretary.

Q Prior to the Three Mile Island accident, do you believe that you were aware of this particular policy which is in GPU Exhibit 95 or some policy substantially like it?

A In the fashion of "aware" meaning knowing specifically that it is there and recognizing its potential use, I don't think this is a procedure that I paid a great deal of attention to.

Q Would you look at the last page of GPU Exhibit 95.

Prior to the Three Mile Island accident, do you have any recollection of seeing that page posted at B&W?

A I am not sure.

Q Before the Three Mile Island accident,

do you know if B&W had an officer who was responsible for B&W's reporting requirements under 10 CFR 21?

A I do not know.

Q Putting aside your February 1978 memoranda, prior to the Three Mile Island accident did you ever report anything to anyone at B&W which you felt should be reported as a defect or noncompliance pursuant to 10 CFR part 21?

A My unit processed a preliminary significant deficiency report. I believe it was my understanding that that could be connected with 10 CFR 21 or 50, 55E.

Q Are you referring to a PSC in addition to the one contained in GPU Exhibit 90?

A No. That I recall today, that is the one I am referring to.

Q The day of the Three Mile Island accident you were at work in Lynchburg, Virginia; right?

A That is correct.

Q You attended a meeting at about 11 a.m. on March 28, 1979 at which you heard

Q Let me read to you from your Rogovin Commission testimony at page 93 -- page 73, rather. I think you can see on the bottom of page 72 there is a reference to 10:45 in the morning, and then continuing onto the next page in your first answer at line 8 you said, "And after that I was told to give a very short briefing to people on the floor so they wouldn't find out about it first on the national news."

Do you see that?

A Yes.

Q Does that refresh your recollection that you were told to give a short briefing to people on the floor?

A Well, I don't believe I misrepresented myself in the Rogovin Commission, but instilling any better recollection today, no.

Q Do you remember telling anybody on the floor what had happened at Three Mile Island?

A Today I can't say I remember it one way or the other.

Q At a meeting in the afternoon at Lynchburg, you and Cartin recognized that super heating of the steam in the primary system was

occurring; is that right?

A We recognized that the information we had been given via telephone indicated the super heat conditions existed within the reactor coolant system.

Q Was that the first time that you became concerned that something serious had happened at Three Mile Island and that the situation had not been brought under control in the morning?

A No.

Q When did you first realize that the situation had not been brought under control at Three Mile Island?

A I believe it to be a gradual process occurring that afternoon as a function of various inputs, and not really occurring at any one time relative to "brought under control," starting with the question asked me by Mr. Parks.

Q Parks?

A Yes.

Q P-a-r-k-s?

A P-a-r-k-s.

Q When did Parks ask you the seminal

question, if I can dignify it that way?

A I thought Seminole was an Indian tribe.

Q That is a good joke. That is seminal.

A The question was asked shortly after lunch.

Q What did he ask you?

A In substance, as to whether or not a plant at low temperature could be depressurized to pressures at which the decay heat system could be brought into a functioning state by opening of a leak area the size of the PORV, as I recall it.

Q What were the other events or pieces of information which you received successively which contributed to your increasing awareness that there was a problem at Three Mile Island?

A When I determined an answer to Mr. Parks' question and attempted to communicate it, I became aware that Mr. Parks had not directly asked the question, but had referred the question to me from Allen Womack and Allen was the person that needed the answer.

I then attempted to find Mr. Womack. I found him in a room in the project management

area of the building. I became aware that the telephone in that room was connected to somebody relaying site information and the situation within the room did not indicate that the plant was in a controlled state. Sometime after giving my answer to Mr. Womack, I became aware of the information to indicate super heat in the upper regions of the system was passed on, and at that point I did become most seriously concerned.

Q Who was in the room with Allen Womack, as best you can recall? Cartin?

A Well, Lou was there when we got the information on the super heat content and the apparent super heat content in the upper regions of the system.

Q That is Lou Cartin?

A Lou Cartin.

Bruce Karrasch was there.

Q Allen?

A I believe I communicated the information on the super heat -- on the capability of depressurizing the plant through the break to Allen in that room.

People were coming in and out. Kosiba was there part of the time.

Q Was Don Roy there?

A Part of the time.

Q Don Hallman?

A To respond definitively, I would rather trust my earlier testimony on the issue.

I would expect that Don was there, but I don't actually recall him being there right now.

Q Was Deddens there?

A I don't recall one way or the other on Jim Deddens at this time.

Q You have previously testified that you had difficulty convincing the other people in the room that the plant was in trouble. That is at page 79 of your Rogovin Commission testimony. Page 79, line 21, you were asked: "Did you have any difficulty convincing the other people in the room that the plant was in trouble?

"Answer: Yes."

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

A I have no reason to doubt that I did.

Q Do you still believe that that answer is correct?

A I might change "in trouble" to "could be in trouble" as being more correct.

Q So if the question is, did you have any difficulty convincing the other people in the room that the Three Mile Island plant could be in trouble at that time, your answer would be yes?

A In my perspective, yes.

Q You testified on page 80, you were asked after you explained it, did they share your concern.

Answer at line 5: "After I convinced them.

"Question: Approximately how long did that take?

"Answer: I have guessed at about 40 minutes in the past. I wasn't keeping track of the time."

Were you asked those questions and did you give those answers

A I believe so.

Q What were you telling the others in

the room during those approximately 40 minutes to convince them that the plant could be in trouble?

A We were illustrating how a plant can achieve temperatures in the hot leg which we had received via the phone and that this would mean, these temperatures would mean that we had no assurance that the water level within the plant was not critically close to the top of the core and that it was very important to be sure that we had sufficient high pressure injection to maintain that water level above the core.

Q Am I correct in inferring from your prior testimony that initially it was only you and Cartin who, to your knowledge, perceived the possible danger of core uncovery when you heard the hot leg temperatures?

A That remains my impression, yes.

Q Of those who were in the room with you that afternoon, whom did you have the greatest difficulty convincing, to use your word, that the plant could be in trouble?

A I am not sure.

Q Well, who were among the people that

you had difficulty convincing?

A Again, I am not sure.

Q Is there anybody other than Cartin who was a quick convert, in other words, perceived rather quickly that the plant could be in trouble?

A What I remember is the first person that I felt understood what I was saying -- he may not be the first person that understood what I was saying -- and that was Mr. Dick Kosiba.

Q After Dick Kosiba, whom do you believe or did you have a feeling was next to comprehend that the plant could be in danger?

MR. FISKE: Let me just say, Mr. Seltzer, I will object to this whole line of questioning on the same grounds that I have objected before, that you are really asking Mr. Dunn for his perception of someone else's reaction, and as he indicated himself in the last answer, it may well be that people appreciated the problem long before Mr. Dunn perceived that they did, which is one of the problems with this kind of questioning.

I will let him answer this last

question, but I do want to note on the record that I think this is not a proper line of questioning.

MR. SELTZER: Well, I strenuously disagree. I am 100 percent confident that this is questioning that is reasonably calculated to lead to the discovery of admissible evidence, and if he identifies some people who he believes comprehended quickly, we may want to take their deposition to find out why they were so smart, and if there were others who he says were relative dunderheads and it took them the full 40 minutes to catch on, we might want to depose them to find out what lapses in their education may have led to this difficulty in comprehending something so fundamental. But I think this is reasonably calculated to lead to the discovery of admissible evidence. I don't think I am off base on this at all.

MR. FISKE: Well --

Q Your counsel says he will let you answer the question.

After Dick Kosiba, who do you think understood what you were trying to say before you convinced everybody in the room?

A I do not recall.

Q Were there any people who even by the time the telephone call was being made to the Island to get the instruction through that they ought to have high pressure on if it is not already on, who still were not convinced that there was a danger that the plant was at super heat conditions or could be at super heat?

A I don't know.

Q Who was at the 11 o'clock meeting that you came into when you first learned some of the details as to what was happening at the Island?

A Allan Womack and the other unit managers within the plant design section, and Mr. Bob Jones, as I recall it.

MR. SELTZER: I would like to mark for identification as GPU Exhibit 96 your copy of Bob Jones's notes of the 11 a.m. meeting.

(Notes of Bob Jones of 11 a.m.

meeting were marked GPU Exhibit 96 for identification, as of this date.)

Q Is that your handwriting on the front of GPU Exhibit 96?

A It looks like it.

Q What does your handwriting say?

A It is very difficult to read.

I believe it says "Notes of R. C. Jones on 11 a.m. March 28th, '79 staff briefing for Plant Design," with my signature below it.

Q What does the notation "item 1" at the top mean?

A I am not sure I recall exactly, but I think this note was made in conjunction with the production of documents for this lawsuit.

Q What do the other notations at the top mean?

A I can't be sure.

Q When did you get a copy of Jones's notes?

A I don't recall. I would have to speculate.

Q Would you say it was the day of the accident or shortly after the accident?

A Again, I would have to speculate.

Q Do you recognize the next two pages as being a description of items of information which were reported, whether accurately or not accurately, at the Design Section meeting on March 28, 1979?

A I recognize these as being Bob Jones's notes from that meeting.

Q And do you recall that some or all of these items were items which were brought up at the meeting, the 11 a.m. Womack meeting, as you have called it in your note in the upper right-hand corner?

A I arrived at the meeting during the middle of it, and independently of these notes, I do not recall very much of the meeting.

Q You have previously testified that you believed you learned in the morning that the pilot operated relief valve had stuck upen.

Is that your recollection, that in fact you learned in the morning that the PORV had stuck open?

MR. FISKE: Can you refer us to the page?

MR. SELTZER: Page 73 there is one

reference to that, and page 84.

Q Page 84, line 21, you were asked: "Do you know when that fact was known to you?

"Answer: I believe that fact was known as early as the 11 o'clock meeting at Womack's office."

Do you see that question and answer?

A Yes.

Q Do you see that the prior question and answer is: "Did you know that the PROV had failed open?

"Answer: I think I did."

Then the question is: "Do you know when that fact was known to you?

"Answer: I believe that fact was known as early as the 11 o'clock meeting."

Were you asked those questions and did you give those answers during your deposition by the Rogovin Commission?

A I have no reason to doubt that I was asked those questions and gave those answers.

Q Did you believe those answers were truthful at the time you gave them?

A Yes.

Q Is it still your recollection that you first became aware that the pilot operated relief valve had failed open at the 11 o'clock meeting in Allen Womack's office?

A Well, I think I phrased it properly in response to the Rogovin Commission, and my recollection today, if anything, is worse than it was at that time of that meeting.

Q Do you have any recollection of asking at the 11 o'clock meeting what, if any, operator action was taken in response to the failed open pilot operated relief valve?

A I have no recollection of asking that question.

Q Was there any discussion at the meeting about the failed open pilot operated relief valve other than somebody conveying information that it had failed open?

A I have not attested to the fact that there was a disclosure of a failed open relief valve in the 11 o'clock meeting.

Q Well, I think your testimony previously was just what I read, that you believed that fact was known as early as the 11 o'clock meeting

at Womack's office.

A Yes.

Q That is all I am referring to.

A O.K.

Q Other than somebody announcing that fact at the meeting, was there any discussion of the fact that the pilot operated relief valve had failed open?

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

Q Did you have a sense of deja vu or a flashback to Davis-Besse when you heard at the 11 o'clock meeting that a pilot operated relief valve had failed open?

MR. FISKE: You mean did he have it at the 11 o'clock meeting?

MR. SELTZER: Right.

A Not that I recall.

Q During lunch did you talk to anybody about the fact that another plant had failed with a pilot operated relief valve open during a transient?

A Not that I recall.

Q Didn't it ring any kind of bell with you that this was another plant suffering a

failed open pilot operated relief valve, at any time before the afternoon meeting on March 28, 1979?

MR. FISKE: Well, I don't think that question is too clear.

Q Do you understand what I mean by "ring a bell with you"?

MR. FISKE: Well, I will object to it.

MR. SELTZER: O.K.

Q Do you understand what I mean, Mr. Dunn?

A I think you are saying, did it dawn on me that this was another plant suffering a stuck open PORV.

No, I don't believe that dawned on me in the dramatic sense that ringing a bell intones.

Q I take it you were aware as of March 28, 1979 that the Three Mile Island Unit 2 had been in operation for several months prior to the end of March 1979; is that right?

A I was not in the habit of keeping tabs of what plants were operating or not operating.

Q It is correct, isn't it, that you knew

that the plant had gone into commercial operation months before March 1979, didn't you?

Let me withdraw that.

You knew that the plant had been operating at full power prior to March 28th, 1979, didn't you?

MR. FISKE: Just so the question is clear, you are asking him, as of March 28th, did he know that the plant had been operating at full power?

MR. SELTZER: Yes.

MR. FISKE: All right.

MR. SELTZER: And by "full power," I mean over 90 percent.

MR. FISKE: I understand.

A In terms of know, k-n-o-w --

Q Let's spell it -- all right, go ahead.

A I would say I did not know that.

Q Did you have a belief that it had been operating at full power prior to March 28th, 1979?

A Yes. On March 18th, 1979 I had that belief.

Q And did you have a belief on March 28th, 1979 that there had been more than minimal

burnup of the fuel?

A Yes, I had that belief.

Q Did you also have a belief as a result of the meeting on the morning of March 28th that the plant had been operating at or about full power prior to the transient that morning?

A Yes.

Q Did you ask any questions at the morning meeting on March 28, 1979 regarding what, if any, action the operators had taken with regard to high pressure injection at the Three Mile Island plant?

A Today I do not recall that meeting very well. I do not recall asking such questions.

Q Even though you believe you heard that the pilot operated relief valve had failed in an open position, to the best of your recollection you didn't ask what, if any, operator action had been taken with regard to high pressure injection?

A I said I did not recall doing such.

Q Bob Jones's notes, which are part of GPU Exhibit 96, indicate "Secured all pumps."

Do you see that?

A Yes.

Q What pumps do you understand that refers to?

MR. FISKE: Well, just a minute. I am going to object to that, Mr. Seltzer, unless Mr. Dunn has a recollection of the conversation. I mean, looking at this document all by itself, he wouldn't have any more reason to know it than I would.

MR. SELTZER: Well, I think you are demeaning Mr. Dunn a little bit by saying that, since he works --

MR. FISKE: Maybe I am flattering myself.

MR. SELTZER: -- since he works all the time with ECCS analysis, and I think --

MR. FISKE: I am going to object.

MR. SELTZER: And you don't work all the time with it.

MR. FISKE: I will object unless it is couched in terms of his recollection.

MR. SELTZER: Jones is also his protege and he may have a great deal of

sense about when Jones says "secured all pumps," that means all men to stations or something, and he knows exactly the sense in which Jones uses that phrase.

Q Do you have any understanding what that phrase means as it is contained in this set of notes which you received from Jones?

MR. FISKE: Well, I really am going to object to that.

MR. SELTZER: Your objection is noted for the record. All right. I will not appreciate it if you think this is an appropriate time to instruct this important witness not to answer.

MR. FISKE: Well, I am not going to instruct him not to answer.

MR. SELTZER: All right.

MR. FISKE: Because I frankly don't think it is that big a deal.

MR. SELTZER: We will see.

MR. FISKE: But the question is clearly improper.

MR. SELTZER: You know, you are terrific. Maybe when you become Judge Fiske

you will satisfy this latent desire you have to make rulings at depositions. I have never seen a lawyer who arrogates to himself not only the right to make the objection, but also to rule on the objection and practically every time you make an objection, you also instruct the witness not to answer, even though the Federal Rules of Civil Procedure are very clear that the objection is preserved until the time of trial and the witness is supposed to be permitted to answer.

MR. FISKE: Please, just because it is 4:30 we don't have to end the day in a flurry of excitement.

I have not instructed him not to answer. I merely have stated my belief that the question is improper to give you an opportunity to ask a proper question.

Q What do you understand "secured all pumps" means?

A I think my answer would be interpretive, speculative.

Q What would you interpret it to mean

as you read it in this set of notes that you received from Mr. Jones?

A First, I do not recall what I interpreted it to mean if in fact I interpreted it at all that day.

Today it would be my interpretation, which is at best a guess, that he is referring to the reactor coolant pumps.

Q Not to the high pressure injection pumps?

A Correct.

MR. FISKE: Before you put another question, I do have to be at another meeting at a quarter of five.

MR. SELTZER: Is it uptown, I hope?

MR. FISKE: It is 44th Street and Sixth Avenue, so the answer is yes. You go ahead for a couple of more minutes.

MR. SELTZER: O.K., I don't have much more.

Q Do you see the phrase "activity went up in building"?

A Yes.

Q That doesn't refer to people running

around the building, does it, as you understand this set of notes that you received from Bob Jones?

A As I understand it, it refers to radioactivity.

Q And the measurable radioactivity in the containment building went up following the four a.m. incident at Three Mile Island; that is how you would understand this?

MR. FISKE: You mean as he reads it now?

MR. SELTZER: Yes.

A That would be my first interpretation.

Q At the bottom of the page where it says "1/2 hour 250F to 450F" -- do you see that?

A Yes.

Q Is it your understanding today that that means that in half an hour temperature somewhere went from 250 degrees to 450 degrees?

A I don't think the phrase is specific enough to create an understanding or interpretation.

Q Do you have any recollection of getting a report at the 11 a.m. meeting of temperatures at Three Mile Island?

A No, I do not have a recollection.

MR. SELTZER: O.K., why don't we call it a day and return --

MR. FISKE: On this high point.

MR. SELTZER: -- at 9:30 tomorrow morning.

MR. FISKE: Fine.

(Time noted: 4:33 p.m.)

Bert Merrit Dunn

Subscribed and sworn to before me this 29 day of October 1982.

Danita R. Kidd - Notary Commissioned Notary as Danita D. Robertson
Commission Expires: July 1, 1983

CERTIFICATE

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

I, CHARLES SHAPIRO, a Notary Public of the State of New York, do hereby certify that the continued deposition of BERT MERRIT DUNN was taken before me on March 19, 1981 consisting of pages 390 through 499;

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 7TH day of APRIL, 1981

Charles Shapiro

Charles Shapiro CSR

I N D E X

E X H I B I T S

INDEX TO EXHIBITS (continued)

* * *

Dunn - Vol. 4

395-427 - further post-accident instructions/valves/Cog Rel

398-99 - add'l criterion added; was felt 20 min. limit cd lead to too many challenges of PZR relief valves on terms of water flow - hoped to avoid this w/ 3d criterion

400 - water flow puts more strain on valves

402 - was believed that water flow cd lead to greater possibility of valve failing

404-05 Dunn had no belief as to whether valve specs and they cd be able to pass water - had belief steam was specified

410 - believed that valves hadn't been tested for ability to pass water -

415-16 - conversation w/ Hallman re: CR - op wanted wait to cd judge cond'n of loops before term'g HPI, wh Dunn thought was gd

417 - cdn't say he knows CR op relied on B&W op instruction

418 - based statement in response that he prevented another TMI-2 on his decision that CR op had responded correctly & used appropriate criteria re: HPI; several influences, two of both are SBOGs & HPI instructions

420-21 - GDC-87 - B&W, post-acc, circulated 50° subcooling curve to ops for 1st time

422 - Dunn's big involvement post-acc - big film, some lectures;

424 - no lectures on op response or system perf'ce during a LOCA -

425-26 - lectures from Dunn's group discusses sat'n, SBOGs.

427-440 B&W Topical Reports

427-28 - GDC-88 - B&W-101034: generic eval'n of response of 177-FA NSSS to show conformity w/ 50.46

429-30 yet is to show adequate core cooling w/in def'n of 50.46 for all break sizes & locations; LOCA stopper not analyzed, but this placing greater demand on ECCS than that all are analyzed

430 - for now 5 of the analyzed events w/ 4per rise

432 - most limiting small BE = the pertinent worst severe perf'ce req't on ECCS w/in SB spectrum - here, 0.04 ft² heat pump location

433 - SB spectrum: bkr causing flow loss in excess of HU capability, but $< 0.5 ft^2$

434 - most frequently, MU capability defined as 1 MUP, two sometimes 2 are included

435-36 - in table in BAW10052, as break gets smaller, peak clad temp gets higher

437 - no concern small bkr will yield higher temps; consideration of mechanisms lead to conclusion .04 is most limiting SB

438-39 - Dunn thinks incrementally smaller bkr will lead to incrementally smaller temps

439-40 - Dunn's o/s that no op intervention re: ECCS needed to assure core cooling in conformity w/ 50.46

440 - 471 Pump Discharge

440-41 - B&W did then discover a more severe bkr, requiring op intervention to change ECCS flow paths - discovered by ECCS unit

441-42 - found this during wk on 205-FA, didn't explain why not necessary for 177-FA

442-43 - SMUD analyses showed .04 ft^2 bkr at pump discharge led to subst'l core uncovery, a result not described in BAW-10103A

444 - expected PDSBLOCA wd lead to PCT > 2200°

445-46 - concern was rpt'd to NRC

447 - Dunn understood B&W mgt under obligation to rpt certain safety matters to NRC & that req't was imposed by Pt. 21 -

452-53 - ~~assumption~~ finding that .04 ft^2 pump suction was worst turned out to be wrong

456-57 B&W came up w/ prescription for op to rearrange valving at discharge of HPI pumps to allow 4 pts of entry into RCS even if only 1 HPI pump op'g; wd be done manually; wd take ~ 2 yrs to make it automatic -

458-59 - GPU-92: B&W ltr to NRC: ~~q~~ action needed to mitigate consequences of ~~BLOCA~~ PDSB LOCA -

459-60 - op action wd need to take the manual action within 5 min after ESFAS

460-61 - op crd have to recognize ECCS in & flow is only 1 hr w/in 5 min - Dunn says there is margin for error

461-62 - crd need detailed eval'n to tell if PCT wd > 2200° w/in 20 min w/o op action

463-64 - active op action became part of analysis & bec'g basis of plants -

464 - assumption in analyses is that op won't interfere w/ functioning of ECCS

465 - assume that at least 1 HPI train will continue to function

466 - op intervention cd deprive plant of HPI flow

467 - inconsistent w/ assumption of 1 HPI train that op wd secure or terminate all HPI flow

469 - pre-acc, Dunn had seen B&W policy re: pg. 21

471 - only pg. 21 ~~not~~ related ~~to~~ pgt Dunn recalls is that relating to PORV & BLOCA

471-496 Day of Accident

471-72 - heard details @ 11 AM only

472 - felt events at TMI under control after 11 AM only; not worried over safety of plant at lunchtime

473-74 - in afternoon only, Carter & Dunn recv'd info they had that there was superheat in the RCS

474-75 - started to realize plant not under control when Parks asked if plant at low temp'd & depress'd to pressure where decay heat system cd be brought on by opening of area of size of PORV -

475-76 - relayed answers to Womack in prog mgt room, where info coming in & situation in room was such as to indicate plant not in a controlled state; as Dunn became aware of info indicating superheat in upper regions of RCS & Dunn became seriously concerned

476 - in room: Carter, Kanavel, Womack, Roy, ~~Holler~~

477-78: had trouble convincing people in room that plant cd be in trouble.

479: Dunn was elected as how plant can achieve temp in hot

leg w/ no assurance that HPI level was high enough to cover core

479 - initially it was only Denn & Carter who perceived danger of core uncovery upon hearing hot leg temps

480 - Denn felt Kemba was the first person to understand what he was saying

482 - at 11 am mtg: Womack, other mgrs in Plant Design Section, Jones

485 at Rogovin depo, said he heard PORV open in TMI; no recollection of asking what operation had been taken

487 - doesn't recall thinking of DB when he heard about open PORV

489 - on 3/28/79, believed TMI-2 operating at full power and more than minimal burnup

490 - doesn't recall asking re: operation in TMI, even tho he heard PORV had stuck in ~~full~~ open position