ORIGINAL

UNITED STATES
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF: **DOCKET NO:** LRP

INQUIRY INTO THREE MILE ISLAND
UNIT 2 - LEAK RATE DATA
FALSIFICATION

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	
INQUIRY INTO THREE MILE ISLAND UNIT 2 - LEAK RATE DATA FALSIFICATION	Docket No. LRP

Nuclear Regulatory Commission
Fifth Floor Hearing Room
East West Towers
4350 East-West Highway
Bethesda, Maryland

Tuesday, October 28, 1986

The hearing in the above-entitled matter convened at 8:30 a.m.

BEFORE:

JUDGE JAMES L. KELLEY, Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C.

JUDGE JAMES H. CARPENTER, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C.

JUDGE GLENN O. BRIGHT, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C.

APPEARANCES:

On behalf of GPU Nuclear Corporation:

ERNEST L. BLAKE, JR., ESQ.
JOHN N. NASSIKAS III, ESQ.
Shaw, Pittman, Potts & Trowbridge
1800 M Street, N.W.
Washington, D. C. 20036

On behalf of the Employees:

HARRY H. VOIGT, ESQ.
MICHAEL McBRIDE, ESQ.
LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D. C. 20036
MOLLY BOAST, ESQ.
LeBoeuf, Lamb, Leiby & MacRae
520 Madison Avenue
New York, New York 10022

On behalf of Jack Herbein:

JAMES B. BURNS, ESQ.
Isham, Lincoln & Beale
Three First National Plaza
Chicago, Illinois 60602
CHRISTOPHER W. FLYNN, ESQ.
RICHARD O. WOLF, ESQ.
Isham, Lincoln & Beale
1150 Connecticut Avenue, N.W.
Washington, D. C. 20036

On behalf of Gary P. Miller:

MICHAEL W. MAUPIN, ESQ.
M. CHRISTINA HENSLEY, ESQ.
Hunton & Williams
707 East Main Street
Richmond, Virginia 23221

On behalf of Former Metropolitan Edison Employees:

SMTIH B. GEPHART, ESQ.
Killian & Gephart
217-218 Pine Street, Box 886
Harrisburg, Pennsylvania 17108

On behalf of the NRC Staff:

JACK R. GOLDBERG, ESQ.
MARY E. WAGNER, ESQ.
U.S. Nuclear Regulatory Commission

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P R O C E E D I N G S

JUDGE KELLEY: We are on the record this Tuesday morning. We have been having an off-the-record discussion on the schedule. I just began to refer to witnesses and their status. In that regard, there are several rulings and statements concerning the status of witnesses that I can now make.

Of the various people who have been put forward as potential witnesses in the case, we have already indicated, I believe, that we do not wish to -- not a matter of wishing -- we don't intend to call Dr. Chung, subject only to this outstanding discussion that is still taking place between the Staff and counsel for the employees regarding a particular position that Dr. Chung took at one time. We would like to hear from counsel on that; not immediately but in the next day or so, so we can, hopefully, nail that down.

We have already the discussion from the parties with regard to several other witnesses and we have reviewed the pertinent sections of the record, most notably prior statements by various people concerning their participation in leak rate and we decided that we will not call Mr. Stair, we will not call Mr. Weaver, we will not call Mr. Germer, and we will not call Mr. Brummer.

Very briefly in those regards, Mr. Stair by his statement and by all other indications we have got, was

merely serving essentially a clerical function in connection with the LER. We don't see that his input was significant other than to write down some words. It may well be that his statement in the record will be useful and is in the record, but the issue is whether we ought to call him in addition to having the statement. We don't think so.

Mr. Weaver is the gentleman involved in various efforts by engineers to work with the loop seal. Again, his statement is in the record and it shows what it shows. We don't see any real need to call him to testify in addition.

Mr. Germer is, I believe, in Maine these days. His involvement in leak rate testing was minimal. The same is true of Mr. Brummer; he's not in Maine but his role was very minimal and it appears that at most he may have had some role in writing procedures, but it's not the procedure writing we are concerned with, it's the procedure administration. So we believe that Mr. Brummer's appearance is also not warranted.

There is an outstanding question with regard to Mr. Bettenhausen, the author of an affidavit having to do with Units 1 and 2 and the significance of evaporative factors. I won't try to characterize it beyond that, but in any event, we began to call Mr. Bettenhausen and then it was decided we should all read his affidavit. The affidavit has been provided, the Board has read it, and sometime in the

next day or so we would like to hear a little further discussion as to whether Mr. Bettenhausen or his affidavit or -- whatever ought to be done about this. But, maybe first thing tomorrow morning; is that all right?

MR. MAUPIN: That will be fine.

JUDGE KELLEY: Okay.

MR. MAUPIN: May I just raise a point of inquiry, Judge Kelley? That is that we very much appreciate the Board's attention to Mr. Germer and Mr. Brummer, because I had requested the Board decide whether it was necessary to call them. But we will then have a procedural matter that we'll have to attend to, which is that each of those gentlemen has prefiled testimony.

JUDGE KELLEY: Right.

MR. MAUPIN: I would propose in the absence of an objection from a party, that the statements be incorporated in the record at some point as a stipulation that if they were here that's what they would say and let it go at that.

JUDGE KELLEY: In the absence of an objection, that would seem to be a pretty reasonable approach. Perhaps counsel could consider whether they have any objection and we can get a reading from you a little later.

MR. MAUPIN: In that connection, I wonder if I might raise one other subject. On a review of the record over the break that we've had in the last week and a half or

so, I discovered that when we had Mr. Haverkamp as a witness, at least my copy of the transcript does not include his prepared statement. It was not bound into the record as if read.

I think what may have happened is we had the prior panel of technical witnesses, most of whom were authors of voluminous reports and of course we weren't binding those into the transcript and I'm not sure we fell into the pattern of binding these statements into record as if read until we got to our clients.

I'm not certain about Mr. Kirkpatrick and Wermiel -- that just occurs to me now; I can go back and check on that -- but if those statements were not bound into the record as if read, it would seem to me appropriate that it be done so they would be incorporated into the physical transcript of these proceedings for convenience later.

JUDGE KELLEY: Well, certainly let's check on what happened in that regard. Your suggestion would seem to be eminently sensible -- except for one item you forgot, wouldn't know about. I got a memorandum from Judge Cotter and the subject was how much it costs to bind things into the transcript. I would say very high. It's a buck and a half a page per copy.

We have been asked to use a little discretion here, and if we are now going to be asked to put 30 or 40

pages in, at that rate, we may pause a bit and just use them as exhibits.

You are going to let us know, right, what happened to the other?

MR. MAUPIN: I just thought for consistency we ought to do the same thing for those as we did with the others, but we can discuss it. We'll talk to you later about it.

JUDGE KELLEY: There are two witnesses, Mr. Bezilla and Mr. Morck that the Board would like to continue to keep in a holding pattern, so to speak. They are concerned or involved one way or another with the LER, and it may be that our -- that the presentations from Seelinger may obviate the need to call them; however, it may make it a stronger need to call them. We realize we are not ruling on that yet but we would like to have that matter to stay with the understanding that we are deferring them now -- have you had a chance to get in touch with these gentlemen?

MR. MAUPIN: Where we left that, Judge Kelley, was that I certainly indicated to the Board that we would be willing to contact those gentlemen if the Board so desired. Since the Board had them in a holding pattern when we were last together and still does, I haven't felt the need to do it.

I don't anticipate there will be any problem in

getting ahold of them; certainly in the case of Mr. Bezilla, and I believe that's also the case of Mr. Morck. Whenever the Board indicates, if it does, that they would like to hear from them we'll give them a call, but I would like to hold off making those calls until it is necessary to do so.

JUDGE KELLEY: My only concern is with delay. My only concern is with somebody like Mr. Morck saying, gee whiz, you should have called me last week. I'm off to Hawaii.

MR. MAUPIN: If you are concerned about something like that we will certainly call them --

JUDGE KELLEY: You might call and alert them. I would think if we go over with -- well, it could be the end of next week, certainly, hopefully during the following week, we would be done.

Okay. That leaves, I believe, just two people in a deferred status, in a sense. I'm referring to two nominees that Mrs. Aamodt made some time ago, Mr. Tim Martin and Mr. Queen.

With regard at least to Queen, arguably we haven't reached that yet because we haven't gotten to the management phase so it's not really timely to consider them, but I had thought Mr. Aamodt was going to be here this morning. She had said she was going to be here this morning and I thought maybe we would talk about these people. She is not here.

Time goes by and I can only say that the passage of time and the interests of wrapping this case up some day suggest that the continued delay in addressing these issues, due to the absence of their sponsor, may work against their being called.

Did you have something else, Mr. Voigt?

MR. VOIGT: Yes, sir. This has to do with Mr. Kunder, who is going to be testifying a week from today.

The Board may recall that there's a rather extensive discussion in Mr. Stier's report about a steam leak that was being experienced in the plant during the first couple of weeks of January 1979. And there is a discussion about whether or not the plant should have been shut down because of the steam leak and who was responsible for decisions and so forth and so on.

In his prepared statement, Mr. Kunder has indicated that he believes those matters are outside the scope of a hearing on leak rates and therefore he hasn't said anything about it. But I wanted to point that out to the Board because, if you tell me either now or sometime between now and next Tuesday, that you are interested in that subject, Mr. Kunder will certainly be prepared to address it.

JUDGE KELLEY: Thank you. That's helpful. We'll try to give you an indication as soon as possible.

Mr. Booher? Good morning, sir.

Whereupon,

RAYMOND R. BOOHER

was called as a witness and, having first been duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. GEPHART:

Q Mr. Booher, do you have before you a six-page document entitled "Prepared Statement of Raymond R. Booher"?

A Yes, I do.

Q Did you have an opportunity to again review this document last night?

A Yes, sir.

Q Do you have any additions or corrections that you desire to make at this time?

A No, I don't.

Q Do you wish this to be bound into the record as your statement?

A Yes, sir.

JUDGE KELLEY: So ordered.

(The document follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING BOARD

In the Matter of	)	
INQUIRY INTO THREE MILE ISLAND UNIT 2 LEAK RATE DATA FALSIFICATION	)	Docket No. LRP

PREPARED STATEMENT OF RAYMOND R. BOOHER

My name is Raymond R. Booher. I currently reside in South Haven, Michigan. I am not licensed to operate a nuclear power plant.

Prior to joining Metropolitan Edison in 1971, I was with the United States Navy for six years. From 1971 to 1981, I was employed by Met Ed, first as an auxiliary operator in TMI Unit 1, then as a control room operator in TMI Unit 2. I obtained my TMI-2 license in 1977 and retained it until I terminated my employment with Met Ed in 1981. I then became employed by Louisiana Power & Light (LP&L) as a control room supervisor, licensed as a Senior Reactor Operator. In 1985, I terminated my employment with LP&L. I am now employed as Training Consultant at Palisades Nuclear Power Plant in Michigan.

While I was a control room operator at TMI 2, John Blessing was a trainee and Harold Hartman was an operator on my shift.

Kenneth Hoyt was the foreman and Bernard Smith the shift supervisor. According to technical specifications, we had to perform one successful leak rate test at least once every 72 hours. My employer required us to perform the tests more frequently, but I no longer recall how often we actually did run the test. I have no reason to doubt that we ran the tests on a shiftly basis. Tests that did not come out within the specified limit for unidentified leakage were discarded. I discarded them because I believed that I only needed one acceptable test with less than 1 gpm unidentified leakage during the 72-hour period. I do not know who taught me this interpretation of the technical specification; all I can remember is that that was how I operated.

I recall that generally my shift performed either one or two leak rate tests in order to obtain a successful one. There were times when we had to run the test more frequently, and times when we did not get one for an entire shift. I recall that satisfactory leak rate test results became more difficult to obtain as 1979 progressed.

I tended to show tests with over 1 gpm unidentified leakage to the shift foreman. While he initially might have told me to run another one, it did become a habit for me to run another one without his directive. The foreman also sent the control room operators or the auxiliary operators to search for leaks if plant instruments showed that there might be leakage.

Although I cannot remember specific values, I do recall submitting negative leak rates to the shift foreman for filing. At some point, however, I was told that negative test results would no longer be accepted. I do not know who told me this or why.

I attributed problems I had in obtaining a good leak rate test to variations in instrument accuracy and then to increasing leakage from either the pressure operated relief valve or the code safety valves. This increase in leakage did cause me to experience some concern as to whether I would be able to obtain a satisfactory leak rate test; however, I never felt that my job would be in jeopardy if I did not produce a successful test result. All that I can recall hearing from my superiors on the subject was that I should keep trying to get a good test.

I remember logging only the completion time of the surveillances that my shift performed. I do not believe that I ever logged the start time of a surveillance, and I do not recall anyone bringing the matter to my attention. I have learned, of course, that my practice was not in compliance with the NRC's interpretation of the administrative procedure governing logging practices.

I no longer recall the November 1, 1978 Licensee Event Report other than from investigators showing it to me. I know that my interpretation of the technical specifications for leak

rates did not change, so I can only conclude that the LER had no effect on me.

I recall that I added hydrogen to the makeup tank on my own initiative to maintain a specified pressure band. I do not think that I would have considered adding hydrogen during a leak rate test to have been prohibited by the leak rate test procedures. I no longer recall whether I thought hydrogen had an actual effect on leak rate tests. I do recall some discussion on this subject, although I can no longer pinpoint the time. I am certain that I never deliberately added hydrogen to affect the makeup tank level.

I am aware that there is one "definite" leak rate test that I filed where hydrogen was added during the test. This test, dated October 20, 1978, was signed by me, but Leonard Germer was on the panel. He logged the addition of hydrogen. I am not sure that if I had seen the hydrogen entry in the log, I would have invalidated the test because I do not remember being aware that a hydrogen addition could affect a test result. Edwin Stier claims that another test dated, March 15, 1979, shows a possible hydrogen addition. Although I performed this test I was not assigned to the panel and I did not collaborate in manipulating this test, or any other, by adding hydrogen.

We were required to log water additions made during the performance of a leak rate test. The operator performing the test was supposed to check the log for water additions. Although the NRC has accused me of deliberately adding water

during the leak rate tests to affect the results, I never did this, and I believe that I have been unfairly accused. For three of the tests where I was allegedly involved in manipulation, specifically, January 13, 1979, February 2, 1979, and February 23, 1979, I logged the water entry as I was supposed to. The operators who performed those tests did not enter the water additions on the computer printout. I did not "jog" water, as the NRC claims, for tests dated March 10, 12, 13, and 15, 1979 (two of which I signed). I really cannot understand how the NRC experts distinguished supposed jogged additions on strip charts showing similar effects for the entire day, but I do know that I did not engage in the practices they attributed to me by their analysis of these documents.

I do not know why Harold Hartman stated I added water to falsify leak rate tests. According to the NRC investigators, he believed that I was not a good operator; perhaps that is why he feels that I was involved in the conduct similar to his. All I can ask of the Presiding Board is that it fairly scrutinize the evidence compiled against me, and conclude that I did not participate in leak rate falsification. While the evidence shows that my shift discarded tests and made mistakes in recording information on the computer printout or the log, it does not show that I willfully falsified leak rate tests. What that evidence really proves is that the NRC investigators gave a highly subjective and questionable interpretation to my

four signed leak rate tests, and the strip charts from my shift's tests, to fit this data into the Hartman allegations.

In conclusion, I would like the Presiding Board to know that I sincerely regret the mistakes I made as a control room operator at TMI-2. My experience as a shift supervisor at LP&L's Waterford 3 has taught me that I was far too casual about the interpretation of the technical specifications at TMI-2. At Waterford, I learned the absolute necessity for strict compliance with the technical specifications and plant administrative procedures. Because of what I have been through, I am confident that I could do an excellent job if I can preserve my option to apply at a future date for an NRC license.

JUDGE KELLEY: Mr. Booher, I have a short statement that I'll read for the sake of context, largely, and then we'll get into our questions.

This Board has been charged by the Commission to determine the extent of involvement of employees at TMI-2 in 1978 and '79 in leak rate test falsification and other improper practices in leak rate testing. This is your opportunity to state on the record your recollections and your perceptions about your involvement in leak rate testing at that time and to rebut any adverse statement about you by other employees or investigators with which you might disagree.

We have reviewed your prefiled testimony. We considered it in the light of the record that has already been made in this proceeding, and we are in the process now of hearing people from your shift. We heard from Mr. Hartman some time back, Mr. Boyd is coming later today. I mentioned Mr. Blessing, I don't know whether he's coming or not; and Mr. Smith will be here tomorrow. And I guess yours is the last complete shift that we are hearing from.

Typically that's what we've done, we've heard from the CROs, and the foremen and also the shift supervisors.

We'll have some questions based on your prefiled testimony and we'll also have some questions, possibly based

on statements you have made in the past or statements that other people have made.

As you may know, there are in the record of this case already, two extensive studies on leak rate testing. I think you were interviewed by the NRR/NRC people in that connection, perhaps by Mr. Stier as well.

Their studies are in the record and they include rather detailed analyses of every test -- in the case of Stier, every test that was conducted, leak rate test that was conducted at TMI-2 that wasn't thrown away; and in the case of NRR, all the tests that were retained during the last six months of operation.

In those circumstances it has not been our approach with witnesses, and it won't be our approach with you, to go through each test you ever had anything to do with; but rather -- those analyses are in the record -- we may focus on a few tests so as to get a better look at exactly what you did at a particular time, but we are not going to go through an exhaustive, point-by-point discussion. Those tests, and the studies that concern them, are in the record and they are entitled to whatever weight they are entitled to in light of the entire record, including your testimony here this morning.

EXAMINATION BY THE BOARD

BY JUDGE KELLEY:

Q I would like to begin by asking you to describe how leak rate tests were performed on your shift, in terms of who did what.

A A little bit of background on how I remember the shift being organized at that time was, there were essentially three people on a shift, RO-wise: One person had the panel with the control room logbook; one person had surveillances; and one person had tagging. Something of that nature.

The person that had surveillances would actually do the leak rate. That was done on a shiftly basis. Physically, how you did a leak rate, you would put some kind of a code into the computer and the computer would ask you questions.

Q At the beginning of the test, as I understand it, you'd type in the code, RCSL -- wasn't that what it was?

A It could be.

Q That's what I've heard, anyway -- and tell the computer how long the test was supposed to be; is that right?

A Yes, sir.

Q Then you are referring to questions, would those questions then come at the end of the test? At the end of the hour?

A At the end of the hour -- or whatever; I think it was a variable time period could you put in there.

Q You could change it, yes. I'm just assuming --

A There were questions. If you added, I think if you added water, yes, sir, that was one of the questions at the end.

Q Right. Okay. So the person who was starting the test would punch the codes into the computer?

A Yes, sir.

Q And at the end of the test he would answer the questions put to him by the computer, including, let's say, water additions, and you'd get a result. Right?

A Yes.

Q The computer would --

A When you put the required answers in for the questions, then the computer would calculate some value.

Q Okay. Now, if in the course of a leak rate test you had some need to add water, let's say -- would that happen, from time to time?

A Yes, sir.

Q Typically who would do that?

A The person that had the panel. The panel operator would do that.

Q I put the question in terms of "typically who would do it?" Put a little differently, would the panel

operator always do that, if water were to be added?

A I don't think the panel operator was the sole person to ever perform action on a board so someone other -- some other operator in the control room may manipulate some actions on the board, including add water.

Q But, in the typical case would -- let's take the leak rate situation. If there were some need, whatever the need may be, to add some water to the makeup tank -- well, let's take a specific case.

The makeup tank, as I understand it, was maintained at a certain level, certain minimum and maximum levels; correct?

A Yes, sir.

Q And I went up to TMI last week and at least as of last week the indicator said 55 inches and 85 inches; does that sound about right?

A It sounds good to me; sure.

Q Okay. Now let's suppose that the level is heading down below 55 and -- would the surveillance guy, then, be the guy who would put water in to bring it up above -- to prevent it from going below 55 or would the CRO guy, or who would do that?

A It would be the panel person, or the operator that had the duty of the panel.

Q So the panel guy would do that? And, again, we'll

say this is typically the case.

A Sure.

Q Now, in order for the leak rate test to come out accurately, the fact that water was added during the test has to be communicated to the surveillance man; right?

A Yes, sir.

Q Again, typically, would the CRO on the panel tell the surveillance guy? Or how did this work? How was that communication maintained?

A The way I remember it, sir, it was the person performing the surveillance would check the logbook for any addition of water.

Q Just as a matter of routine?

A Yes, sir.

Q So, if you were running the test and you were at the end of the test and you were answering the question, you'd look in the logbook for an addition?

A Yes, sir.

Q Would you also ask him orally: Did you add any water? Or would you just look in the book and assume --

A I would think in lieu of looking in the logbook, I would ask the operator if he had added water in the last time period for the leak rate.

Q Would you also tell the panel operator, particularly if you were running a leak rate test, tell him

in advance: I'm starting a leak rate test?

A I don't remember if I did that or not but that's good practice.

Q How would you -- let me ask you first. You say there were typically three CROs. That's yourself and Hartman and Blessing; is that correct?

A Yes, sir.

Q Was Blessing a trainee during part of the time? Let me be more specific. Were you and Hartman on the same shift throughout the time of commercial operation? Or what was your time of service as a CRO?

A If I remember correctly, Hal Hartman was my peer throughout the operation of TMI-2.

Q Do you recall whether you were a CRO throughout the time of, let's say, commercial operation at TMI-2?

A Yes, sir. I went for the initial license of Unit 2.

Q You did say in your prefiled that John Blessing was a trainee. Did he become a CRO during that time, do you recall?

A I don't remember, sir.

Q Okay. We can check that in the record, I think. I just thought I would ask you.

But, if he had been a trainee during a portion of that time, then with regard to leak rates, could he have run

leak rate tests himself?

A Yes, sir.

Q If he had done so as a trainee, would he have done it just like a CRO? Or would he supposedly have been under some kind of supervision while he was doing it?

A Typically, a trainee could perform surveillances and tagging without direct supervision. But if the person was on the panel he would have direct supervision.

So, yes, sir, he could run a surveillance.

Q How would you describe -- and we have as context how these leak rate tests were run and who does what. Just to fill that out, if you were the operator on leak rate tests, you would run the test and the computer would then print out a final result and give -- then you would, what, review the test? Review the number that came out of the computer?

A I would look at the final result; yes, sir.

Q And if it was under 1 gallon a minute you would sign it; right?

A Yes, sir.

Q And then would you take it to the foreman or leave it on his desk or how was that step carried out?

A I think the routine was for the person performing the test after receiving the final result, would be to take it to the foreman for authorization and then it would be

entered into the logbook, I think.

Q Okay. With that context of who does what, how would you describe your working relationship, first with Hartman and then with Blessing?

A Working relationship was professional.

Q I think I understand what the word connotes. Is that a little bit different from saying it was a close working relationship?

A Pardon?

Q Is that a little bit different from saying it was a close working relationship?

A As in saying best of friends?

Q Okay. Yes.

A Hal Hartman was not my best friend, so therefore, we were not extremely close, then.

Q But you managed to get along okay on shift?

A Yes, sir.

Q How about with Blessing? How would you characterize your relationship with him?

A The same. Professional but not the best of friends.

Q Are you aware -- I take it you are aware of the various statements that Mr. Hartman and Mr. Blessing made, statements about leak rate tests generally and, in the case of Hartman, Hartman has made at least one statement about

you, I'm certain you know about. How would you respond to Hartman's claim that -- excuse me, let me get a page reference. Well, I'm looking at page 73 of the NRC interview with you. That's dated November 15, 1984.

Looking at page 73, if you could just show him that?

A Where are we?

Q I think on page 73 there's a solid cap "EXAMINATION" called "Examination by Mr. Christopher."

A Yes, sir.

Q Starting below that Christopher says: "Okay, particularly here I'm talking about water additions."

And you say: "I don't know of anybody right now that tried to manipulate a leak rate by adding water."

And Christopher says: "I asked Hartman this question on July 26, 1983 'what specific operators did you witness add water to a makeup tank in order to manipulate leak rate tests?'

"And the answer was 'Ray Booher, because he was on my shift.'"

You had seen this statement before? Of course it was put to you in the context of the interview.

A Yes, sir.

Q From reading your prepared testimony and your other testimony, I understand that you deny that you did add

water for the purpose of manipulating the leak rate test and here is Hartman saying that you did. What comment would you have about Mr. Hartman's statement?

A Mr. Hartman's statement is not true.

Q Can you suggest any reason why he would make such a statement?

A No, sir.

Q The particular statement we have just been looking at strikes me as a little bit ambiguous. He says: "Ray Booher, because he was on my shift." Would you read that to mean anybody who was on my shift would have added water? Or would you read it some other way? I'm not sure how to read it myself.

A I can't justify anything that Mr. Hartman has commented on in the past. But I did not manipulate any leak rates.

Q You indicated that your relationship with Hartman was professional, meaning, I think, that you got the job done working in the same room but you weren't close. Can you think of any reason why, if, as you characterize Hartman's statement, it's just a false statement, why he would have some vindictive feeling towards you?

A No, I don't. Socially we got along okay also. I do not know why he made the statement.

Q I take it you are familiar with both the Hartman

and Booher statements about what they did. Now, I'm not talking specifically about you, necessarily, but about what they did in terms of manipulating leak rate tests.

MR. MAUPIN: Excuse me, Judge Kelley, you said Hartman and Booher's statements?

JUDGE KELLEY: Forgive me. Blessing. I'm sorry.

BY JUDGE KELLEY:

Q You are familiar with their statements that are in the record?

A I believe so.

Q And here is Hartman describing various different techniques that he had for manipulating leak rate tests, involving both hydrogen and water additions.

Here is Booher saying --

MR. GEPHART: Blessing.

JUDGE KELLEY: I'm very sorry. The names -- forgive me.

BY JUDGE KELLEY:

Q Here is Blessing saying somewhat more briefly, in a couple of interviews with the NRC, and speaking somewhat more generally, that he would add hydrogen in an effort to change leak rate results. He wasn't successful very often, he says, but he did it. And he said he thought everybody knew it, that it was common knowledge throughout, at least on

his shift and more broadly among operators at the plant.

So, if two out of the three CROs, Hartman and Blessing, are saying, yes, sure, we were manipulating tests, why is it that you wouldn't at least know what they were doing? Wouldn't they have to have actively concealed what they were doing from you, in order for your testimony to be consistent with theirs?

A I would think they could manipulate leak rates, if in fact they did, without my knowing it.

Q Based on what I've heard here, I would agree with you it's possible. Maybe not a lot of the times, maybe not all the times, but sometimes, at least, if I wanted to manipulate a leak rate test with water or hydrogen I might be able to do it without the other guy in the room knowing about it. But why would they conceal it from you, if that's what they were doing?

A I don't know, sir.

Q I would like to go over with you two or three of the tests that you were involved in, either as CRO or operator on the panel. Can we look at NRR-94, first of all?

MR. MAUPIN: I'll get it for him.

THE WITNESS: Okay.

BY JUDGE KELLEY:

Q Looking at 94, just to establish two or three things about it -- have you got 94?

A Yes, I do.

Q The arrangement here begins with the computer printout page followed by a Xerox copy of the CRO log, followed by -- sometimes several pages -- and then followed by the strip chart, makeup tank strip chart.

Looking at the first page, the computer printout, NRR test 94 was run on the 13th of January, '79, between 9:37 and 10:37 in the morning. The operator, surveillance operator is Hartman; correct? Judging by his signature there?

A Yes, sir.

Q And Ken Hoyt approved it as foreman?

A Yes, sir.

Q And this showed a leak rate of .269 unidentified leak rate.

A Okay. Yes, sir.

Q If the turn the page, the first Xerox copy of the logbook shows you signing in at 0700, I gather; is that right?

A Yes, sir.

Q And the leak rate test we are talking about was run between 9:37 and 10:37, as indicated there in the left margin. The heavy ink markings there, the arrows and all of that, that's NRR write-in there.

Then, if you skip over to the makeup tank strip

chart you'll see that test number 94 is bracketed with the heavy ink lines a little bit left of center with the time marked up at the top.

I'll just note for the record that once again there's no complete agreement between the strip chart and clock time. Typically it's off.

Do you recall that very often the makeup tank strip chart time would be off from clock time to some degree?

A Not only the makeup tank but most of the charts.

Q Off clock time?

A Yes, sir.

Q Okay. Sure. And what has been done here, the NRR analysts have attempted to historically establish when things happened by cross referencing, let's say log entries which show clock time and then finding that on the strip chart to the extent that that is possible. That, sometimes, I think is pretty accurate. Sometimes it's more debatable.

But the main thing I wanted to look at here, if you look at the strip chart at about, what, 9:45 clock time, you see a rather sharp rise in the trace; correct?

A It looks like more -- like 10:00 a.m.

Q Okay.

A But, yes, there is a sharp increase.

Q Right. Then at the bottom there's two typed lines. That, again, is the NRR analysis of what happened

here. They say that this reflects a water addition of 117 gallons at 9:50 and they note that it was logged in the log but not included in the calculation.

Just looking back at the log, there is an entry at 10:00, "batched 117 gallons of water to makeup tank."

A Yes, sir.

Q So the log time in the time indicated at the bottom of the strip chart is 10 minutes off, 10:00 versus 9:50. But, in any case, the 9:37-10:37 time, it would clearly fall within the leak rate test; correct? The water addition?

A Yes, sir.

Q When you say that this was a batched water addition, you were on the panel. I would assume that you as panel operator would have been the person who would have added the water; correct?

A Yes, sir.

Q And by "batched," that means that you did it by means of the batch controller; is that the right term?

A Yes, sir.

Q And by that I mean there was on the panel there a -- what will I call it, a knob? A valve?

A A box.

Q A box. Okay.

A Okay.

Q I can't describe it very well because it's not there anymore. But it used to be and that was -- I was shown this black hole in the panel where there used to be a batch controller, last week. But you can dial the amount you want, correct, on the box?

A That's why I'm taking such a long time. I don't remember exactly what the box looked like nor how you performed water addition. But I do remember there was a box and its purpose was to add amounts of water.

Q I guess what I'm trying to get at is, I have understood that the batch controller is something where you can tell this machine: Put a certain amount of water in the makeup tank. You dial it, you set it to that setting; correct?

A Whatever you do; yes, sir.

Q And then it proceeds to do that and then it shows you some kind of result. Here it shows you a result of 117 gallons.

A Yes, sir.

Q As opposed to -- there are other ways you can put water in the makeup tank other than the batch controller, are there not? It's not the only way that one can get it in?

A There has to be because I can remember the batch controller being out of service frequently --

Q And --

A -- but I don't remember how you performed that.

Q Maybe we'll get to that later. But in any case, the log indicates this was batched in. This particular entry -- not entry -- this particular injection of 117 gallons was put in through a batch controller; correct? At least the log so indicates?

A I would think so; yes, sir.

Q And what you get on the strip chart, as I see it, is a sharp, almost vertical rise, which would indicate to me that that 117 gallons went into the makeup tank in a matter of -- how much time would you say?

A Well, let's see here. 10:00, 11:00 -- each one of those lines is 15 minutes, I think. You are talking about 7 minutes, approximately. I think each division of the chart is 15 minutes.

Q Well, if that's so, though, I'm looking from the bottom up to the top of that water addition.

A Yes, sir.

Q And I see an almost vertical line which -- if it were going to take 15 minutes, it would be lying across like that at a 45-degree angle, would it not, slicing that box?

A Yes, sir.

Q Since it isn't doing that, I would guess it would take two or three minutes for the water to go on.

A Well, the way I read this particular chart is you

take the 10:00 a.m. dark line, vertical line, take the next vertical line, which is a 15-minute increment, and it's approximately one half of that 15-minute increment for the vertical line to go from the bottom to the top.

Q Let's do this slow. I guess I'm not with you. Can I show you a comparison? Take a look to the right where they put in 1200 gallons, apparently with a batch controller.

MR. MC BRIDE: I'm sorry, at 1200 hours it's 400 -- 900? The 9 looks like a 4.

BY JUDGE KELLEY:

Q 900 gallons at noon?

A Yes, sir.

Q Now, that whole 900 gallons went in in what?

A I'd say 20 minutes, thereabouts.

Q Give or take. Okay, 20 minutes.

A Okay.

Q So if it could go in at a rate of 2 minutes per 100 gallons, very roughly -- when you turn the batch controller on a pump starts to activate and it pushes water into the makeup tank; right?

A I don't remember that.

Q I'm just assuming it. How else would it get there? Wouldn't you turn on a pump?

A The demin water tank may have been pressurized. I

don't know. Pressurized water went into the tank; yes, sir.

Q Well, at any case, what I'm looking at is the rate. I don't want to be obscure here. It seems to me when you use the batch controller you get water into the tank pretty fast. You get an almost vertical line showing water going in and that's a rather distinctive, I think, signature of batch control water additions. At least on this indicator --

A Sure.

JUDGE KELLEY: Why don't we take -- I think that's really it on this test. Why don't we take a coffee break, 10 minutes or so and we'll pick up again.

(Recess.)

JUDGE KELLEY: Let's go back on the record. Mr. Gephart indicated interest in making a clarification. Go ahead.

MR. GEPHART: Yes, Judge Kelley. We were more interested in substance than anything else with Mr. Booher's prepared statement. I would like to have a correction made

EXAMINATION

BY MR. GEPHART:

Q Mr. Booher, you have the statement in front of you?

A Yes, sir.

Q And you want to make a correction, I believe, on

page 1 as to address and current employment?

A Yes, sir. Since this statement was made I have recently moved to Sacramento, California, and I'm working at a nuclear power plant there as a lead office planner during an outage at that facility.

JUDGE KELLEY: Is that what we know as SMUD?

THE WITNESS: That is SMUD.

JUDGE KELLEY: All right. Thank you.

EXAMINATION BY THE BOARD

BY JUDGE KELLEY:

Q Just a couple of more points. We are back on the record now; right?

About test 94 we were looking at. Again, that indicates that Hartman was the operator, was the surveillance CRO and you were on the panel and you did log that addition during the test.

Do you have any thought as to why Mr. Hartman did not include that amount in the calculation of the leak rate? I'm just looking at the questions on the computer printout and it says "0." No indication of water addition.

A No, I don't. I have no idea why he didn't add that to the computer leak rate program. It may have -- he may have forgot to look in the logbook or he may have forgot to even, ask me if there were any water additions during that particular time period.

Q Well, it appears to me that the noninclusion of this 117 gallons -- correct me if I'm wrong, but 630 gallons in a test run over 1 hour has an effect of 1 gallon, right, per minute?

A Yes, sir.

Q 117 gallons is almost 120, which is pretty close to 2 gallons a minute.

A Yes, sir.

Q So, if you didn't include that amount here, the result indicated by the computer is .2639 -- say .3 gallons per minute. That would indicate to me that the inclusion of the 117 in the calculation would have produced a leak rate of something like 2.2; right?

A Yes, sir.

Q So the failure to include it has a rather dramatic effect on the bottom line, does it not?

A Yes, sir.

Q Since you did log it, you indicated it should have been Hartman's responsibility as a surveillance operator to check the log?

A Yes, sir.

Q There it is in the log -- this strikes me as very sloppy, frankly, and I'm not sure it has anything to do with you -- I assume it's Hartman's problem -- but not to include something that's right in the log and it throws you off by

such a huge amount strikes me as pretty sloppy. Would you agree?

A Yes, sir. A little bit of background on that.

Compared to how I've performed on the shift at different facilities and different positions in different facilities since those days at TMI, looking back on those operations we performed, they were very sloppy. Lack of communications is one item I can recognize right now.

Q Then Hoyt proceeds to approve it.

What do you recall about his process of approval? What do you recall him doing, when you presented him with a computer printout that stated a leak rate of under a gallon a minute, whatever it might have been, what did he do?

A I would assume he went over the leak rate calculation.

Q Well, in what sense, though?

A Probably to verify the plant was in a stable condition and look at the bottom line leak rate result. I don't know what specifics he reviewed during his review period.

Q What is your recollection, though, about his review? Was it perfunctory? Or did he actually study the numbers, check the log, do other things to satisfy himself that the leak rate test was correct?

A I don't remember.

Q This would suggest, though, would it not, that he didn't check the log?

A I don't think he'd have to check the log --

Q For a water addition, I mean.

A Yes, sir.

Q Do you recall this time frame? This is January 13, 1979; mid-January '79, about three months before the accident, a little bit more. If, in fact, you needed to add almost 120 gallons of water to get this -- well, let me rephrase that.

Here is a case where you got a leak rate of .26, round off to .3, which is fine, but you know by looking at the log that it wasn't anywhere near that. You added all this water to come up with this. Was that at a time when it was difficult, do you recall, to obtain a leak rate under 1 gallon per minute?

A I can remember as time elapsed closer to the accident, getting a leak rate within limits was harder.

Q What is striking me -- and we heard a lot of testimony to that effect and I think typically it comes a little later than January but your statement has a lot of agreement from other people. But, still, looking at the record now and realizing that this leak rate, this "good" leak rate, in quotes, of .3 gallons per minute, was actually off by at least a factor of 2 gallons a minute -- it wasn't

even close, in other words -- was that a period of time when getting such a nice, low leak rate would have been rather surprising? Do you have any recollection about that?

A Yes, sir. I agree.

Q Well then, if you were on the panel and you are working in some degree of coordination with Hartman and along comes Hartman with this marvelous leak rate, .3, and if that's sort of a surprising result, wouldn't that have caught your attention? I realize you are not primarily responsible for that test, but wouldn't that have seemed to you to be a rather surprising result, even leading you to say: Hey, Hartman, did you include that water in the calculation? He would say: What water? And then you could tell him about the 117 gallons.

A That would be called good communications and communications is something we didn't have back then, as I realize now.

Q Let's turn over to test 148. If you want to just take a minute to look at the computer -- it's a computer printout, couple of pages of log followed by copies of the makeup tank strip chart. Okay?

A Yes, sir.

Q Now, just to identify it a bit and identify the players, number 148 was run on the 15th of March of '79, between 4:50 and 5:50 in the morning. In this case you were

the surveillance operator. It was approved by Bernard Smith who, I understand, is shift supervisor; correct?

A Yes, sir.

Q Would that have been a case when Hoyt was just off doing something else or would you have a particular recollection?

A In those days, the shift supervisor and shift foreman would go for tours in the plant to check plant status. Evidently Mr. Hoyt was taking a plant tour at this time.

Q I don't mean to suggest it's particularly significant. I just wanted to clear that up, if we could.

Now, we indicated you are the surveillance CRO and Mr. Blessing is on the panel. So I gather he is licensed, at least at that time.

A That's not necessarily true. He may have been a trainee under Hartman, perhaps.

Q Looking over his shoulder, do you mean?

A Exactly.

Q If we look at the strip chart for test 148, again you can see that the time is bracketed in the heavy line drawn in by the NRR analyst. They show the location of 4:50 to 5:50 on the strip chart. In this instance the times seem to be pretty much in agreement.

Again, their analysis is towards the bottom of the

page. They read this strip chart as indicating a water addition of 100 gallons starting at 5:25, a little more than halfway through the test and they note that there is no log entry corresponding to that and also that there is no inclusion of water in the calculation. The other thing of interest is that they refer to this as a jogged, j-o-g-g-e-d, water addition.

Are you familiar with the term "jogged water addition"?

A I have heard of it.

Q What does it mean to you?

A "Jogged" means adding amounts in a slow rate.

Q That's my understanding, too. I don't know as we've ever had a definition on the record but that seems to be the context in which it is used.

Now, if you can recall our discussion of that last test, 94, where there was this sharp jump when there was the batched addition, how would one make a jogged water addition to the makeup tank as a matter of mechanics? How do you do it?

A I don't know.

Q Well, first of all, the batch controller, we talked about that some earlier. Is it possible to operate the batch controller in such a way that water goes in relatively gradually, as opposed to a fairly quick injection?

A I don't remember if boric acid went through the batch controller or not. But boric acid went in at slow rates.

Q Do you remember -- and believe me, I'm in the dark here, too; I don't know how to run a batch controller -- but -- that's what I would like to get from you.

I can imagine setting a batch controller, in effect telling the batch controller, put 300 gallons in the makeup tank, and hitting a button and it would do so.

A Right.

Q And I assume in a high speed way it would produce almost a vertical line on that strip chart; right?

A Yes, sir.

Q Is there any other way that those batch controllers could be operated?

A I think there's a bypass around the batch controller when the batch controller is out of service. There would have to be.

Q It would give you a slow injection of water relative to the quick injection?

A I wouldn't know how to do that.

Q Apart from the batch controller, are there other ways to feed water into the makeup tank?

A Boric acid, I think, has a different source of liquid.

Q No. Just water. Just plain old water. Well, I guess we don't use plain old water. Demineralized water, whatever kind of water one puts in?

A I can't think of any other way.

Q Only through the batch controller?

A Or associated bypass.

Q Can you elaborate a little bit on what this bypass involves?

A If I remember correctly, just open a valve and water goes in.

Q So if you opened the valve halfway water goes in more slowly?

A If that was possible. But I think it was an air-or motor-operated valve. If that was the case it would, I think, go all the way to the open position. But I don't remember exactly how that batch controller and its bypass worked.

Q Well, obviously all I am trying to understand is Staff analysts say this looks like a jogged water addition and I see the difference on the strip chart. It is not a sharp vertical rise. It's a leveling out of the trace. And if they are right -- that's a very simple question: How did you do that? You don't know; right? Neither do I.

A Yes, sir.

Q So the two of us are sort of stuck. But looking

at that makeup tank trace, do you agree that what appears on the trace at about -- they say 5:25, about a little more than halfway through the test, there's a leveling out of the trace?

A Yes, sir. That's obvious.

Q Okay. And that, it seems to me, appears to continue for a time interval of, from the beginning of that leveling out through the end of the test of, what, 25 minutes?

A It appears to be 25 minutes.

Q And then it starts to drop off again at the previous rate of decline; is that fair?

A Yes, sir.

Q What would you make of that particular part of the trace? What would you attribute it to?

A It looks to me like it could be a plant parameter change. If primary coolant system temperature would increase there would be less of a makeup situation required and the makeup tank would hold at a more stable level.

Q Temperature change in the reactor could have this effect?

A Yes, sir.

Q Where it appears, just at a glance, to be a change in water level, that's not a real change in water level?

A I don't know.

Q Or would the temperature change actually change the mass of the water, thereby changing the level?

A Well, if a temperature should increase in the primary coolant system, the volume, as you said, would increase. The pressurizer level would increase and, therefore, reduce the need for makeup to the primary coolant system. With a decrease in makeup, the makeup tank level would appear to be more stable or level off. And exactly the opposite on a temperature decrease. It would make the makeup tank level look like a straight line down, so to speak.

BY JUDGE CARPENTER:

Q Mr. Booher, to follow up on your comment that there might have been changes in plant, would you turn to the log for test 1478.

A Yes, sir.

Q On my copy of the NRR report there is a "58" in the upper left-hand corner. Do you see that?

A 58?

Q Upper left-hand corner. I just want to be sure we are looking at the same page.

A Yes, sir. A log page number. Yes, sir.

Q Right. Now, at 0527 it reads: "Pressurized GEN. to 76 pounds of hydrogen pressure." I guess it says. What does that mean?

A That entry refers to hydrogen being added to the

main electrical generator in the turbine building and, evidently, Mr. Blessing had the generator pressure increased to 76 pounds.

Q Does that represent a change in plant conditions or is it just a routine adjustment on hydrogen pressure?

A That would have no effect on the primary coolant system.

Q The next entry is 0530. Can you translate the hieroglyphics for me, please?

A "DF -- 1-A" refers to emergency diesel generator alpha. And it started in 7 seconds from a dead status.

Q Does that have any relationship to the reactor coolant system? Any effect on the reactor coolant system?

A No, sir.

Q The next entry is 0535. Once again, hieroglyphics that I don't understand?

A Well "breaker." Evidently BKR refers to electrical breaker 2-A-1 E2, and "pull to lock." I fail to remember what 2-A-1 E2 refers to. It is some breaker. And with an E in it, I think it's a safeguards breaker. But I don't remember what that breaker -- what it supplied power to or from.

Q Can you remember whether or not that breaker would have an effect on "plant conditions" in terms of --

A I would guess not.

Q Is that a common action, pulling a breaker?

A PTL?

Q Yes.

A Yes, sir.

Q So it doesn't indicate to you anything unusual is going on?

A Just by that terminology; no, sir.

Q What does "pull to lock" mean?

A Okay. "Pull to lock" means grabbing a pistol-grip handle, twisting it in a certain direction -- if I remember correctly, in a counterclockwise direction -- and then pulling it in a direction away from the console. The handle would stay in that position and that would interlock the breaker from changing its current position.

Q Where were these breakers located? There's a picture of the control room up there, if that can refresh your memory.

A Most of the breakers were located on a panel, the console which is closest to you in the picture. It is the one with the telephone in the center of the picture.

One thing about Three Mile Island, they had a good electrical panel as a MEMIC, and in that MEMIC system they had breakers that controlled power. And those breakers had a pull-to-lock position, PTL. When you want the breaker not to change position you would select that option on the handle.

I would assume that that particular breaker is on that panel.

Q Then at 0545 the log says he started "CWP-1-A." What is CWP-1-A?

A That would indicate circ water. P would indicate pump. 1-A would mean the alpha pump.

So, John Blessing started circ water pump alpha.

Q What does that do in terms of plant conditions with respect to this surveillance test?

A It would have a potential effect. Starting a circ water pump would essentially increase cooling to the main condenser, which should increase condenser vacuum, which should increase plant efficiency, so to speak, and that may have an effect on the primary coolant system.

Q Where are the controls that he would have gone to to start this circulating water pump?

A Geez -- if I remember correctly, all support systems are on the back upright panels. If I could have some time I could go over and look at the picture and try to locate them but I don't remember where they are located in the control room. It wasn't a normal occurrence to be starting and stopping those pumps.

Q This is somewhat of a surprise at 5:00, almost 6:00 in the morning, all of a sudden he starts the circulating water pump?

A That is surprising to me too, sir.

Q There are a number of these circulating water pumps, are there? Were there?

A There were 4 or 6 of them. I forget how many. But typically you keep them all running for increased plant efficiency.

Q Well, in March would that necessarily be so?

A Pennsylvania may have been cold in March. You may not need all of the circ water pumps.

Q Well, to summarize this, you don't see during the time period of this test, any entry in the log which would reflect change of plant conditions with respect to the leak rate surveillance test requirement of steady state?

A Leak rate test started at 0450 and was completed at 0550. And if he, indeed, did start that circ water pump at 5:45, which is five minutes away from the end of the leak rate surveillance, I can't see how that would have an effect on that chart.

Q What about the condition that led him to decide to turn it on?

A I would have no idea why he turned that particular pump on at that time.

Q Well, this involved the supply of water to the condenser, which is somewhat removed from the primary reactor coolant system?

A Yes, sir. A circ water pump would take a suction from those famous towers and pump it through the condenser and return it to those towers as a cooling method for quenching the steam going through the main turbine.

Q With an effect, primarily, on the secondary system?

A Yes, sir.

JUDGE CARPENTER: Thank you very much. I just wanted to see what was going on during that hour.

BY JUDGE KELLEY:

Q We were talking about possible reasons why the makeup tank strip chart would level out as we discussed. You indicated that it might be a result of temperature changes in the primary system; right?

A Yes, sir.

Q Is that something we can determine? I have been just looking at the computer printout, test 142. There are a number of data points included on the sheet. I was looking particularly at the T av, if that's how it's pronounced, entry. And it shows that piece of data at the beginning and end of the test with a change of .172.

By the way, I think those numbers written in are NRR calculations. But that calculation shows as a bottom line 13.7 gallons. Would that mean 13.7 gallon difference in mass? Or what would that mean to you?

A It looks to me, from viewing some of the other parameters, that pressurizer level increased over the leak rate period. That would cause the makeup tank level to become more horizontal. Like it's shown on the graph.

Why pressurizer level went up 1.411 inches, I don't know. That may be because T av went up 1.72 degrees.

Q You indicated the temperature rise might account for the level. Was that consistent with what we see on the computer printout here, a change of .172 change in temperature?

A That may be the effect; yes, sir.

Q I'm looking for help here. I frankly don't know what 13.7 gallons means. I thought it might mean that it would account for a difference of, in the level, of 13.7 gallons, which isn't very much. Certainly a lot less than the 100 that's referred to as jogged water, but I may be misreading this.

A And I don't remember. There's a thumb rule for, let's see, gallons per inch in the pressurizer versus --

Q Yes. It's 30 gallons per inch?

A Some thumb rule like that, but I don't remember what the actual thumb rule was.

Q Well, I just told you. 30 gallons per inch, so 100 gallons is a little bit more than 3 inches, which is about what that offset is, roughly. Wouldn't you agree?

A Yes, sir.

Q So, again, I'm groping a bit, but looking at the computer printout page under T av, there's a reference to 13.7. If that means that the difference that could make in the makeup tank wouldn't be very significant, it wouldn't be anywhere near the amount shown on the trace, would it?

A No, sir. So I can't -- I don't know why the makeup tank level was straightened out at that particular point.

MR. MAUPIN: Judge Kelley, a point of clarification, in the Newtonian world, temperature changes don't change mass, they change density.

JUDGE KELLEY: Fine.

BY JUDGE KELLEY:

Q In connection with running this test, Mr. Booher, would you as a matter of routine have looked at the strip chart?

A Yes, sir. When I had the panel; sure.

Q Okay. But in this particular test you didn't have the panel, you were the surveillance operator; correct?

A Yes, sir.

Q So, in that situation, would you look at the strip chart?

A No.

Q If you had looked at the strip chart in this

particular case, would you have regarded this as a valid test?

A I don't know but I would inquire why the makeup tank level decrease -- decreased.

Q So you would have looked into it, in any case?

A Yes, sir.

Q But you would have considered it to be the job of the panel operator to look at the strip chart?

A Yes, sir.

Q Did you do that routinely when you were panel operator?

A Yes, sir.

Q But did you do it just as a matter of part of your job to keep an eye on the trace? Or did you do it in relationship to leak rate tests?

A I did it because it is a good operating practice to keep conscious of plant parameters. Not only would I look at makeup tank level but also T av, THTC, rod position, pressurizer level, various parameters that would indicate a potential change.

Q My question is, did you look at strip charts in specific relationship to leak rate tests?

A No, sir.

Q Okay. Let me ask you to assume that this may reflect a, what we are calling a jogged water addition; that

is to say, gradual addition of water as opposed to a fast one. Can you suggest any valid plant-related reason to add water in that fashion?

A Waterwise; no, sir.

Q Anywise?

A Like I said before, boric acid goes in at a slow rate.

Q But water addition? Is there any reason you can think of to add water very gradually as opposed to pumping it in the way the batch controller apparently pumps it in most of the time?

MR. MAUPIN: Excuse me, Judge Kelley, but there seems to be perhaps a disconnect between you and the witness. Boric acid, I think you could put to the witness the question whether boric acid is added in solution, in water solution, and so it actually does constitute a water addition of a different sort.

BY JUDGE KELLEY:

Q Okay. You were indicating -- would you agree with counsel that you don't put pure boric acid in, you put in a solution of water and boric acid; is that correct?

A I think there's a mixing T in there somewhere in the system. I don't remember where that mixing T is located in relationship to the makeup tank.

Q You mean before the makeup tank?

A It would have to be before the makeup tank somewhere. I don't know how the batch controller was related to the mixing T in the boric acid system. I don't remember.

Q Well, you can see what I'm after here.

A Yes.

Q Let's assume that the Staff is right and that whatever this is, whether it's boric acid or water, got jogged in at some gradual rate. Since it has been suggested that jogging water is one way to manipulate a leak rate test, I would like to know whether there's any reason to jog water in other than that? That's what I'm preparing for. Do you know of any such reason?

A I don't know of any reasons to put water into the makeup tank at a slow rate.

Q Okay. Assume for the moment, again, that that's what happened in test 148. But Blessing is on the panel; right? And you are the surveillance man in that particular test.

A Yes, sir.

Q If Blessing were doing the water addition here and he were jogging water -- and I should add I don't believe that he has said that he did do that; I believe he simply said that he added hydrogen. But, in any case, it's a CRO operator, other than you. Assuming that another person other than you were jogging water in to affect a leak rate test,

would they -- do you think they would tell you that or not?

A I don't think anybody would tell me if they were manipulating a leak rate.

Q But you are the guy who is going to sign for it; right?

A I guess, especially in that case.

Q In my hypothetical -- let's take one. You are the operator who has got surveillance duties and you are the one who is going to sign for it.

A I wouldn't expect them to tell me if they were trying to manipulate something if I'm going to sign for it. In this particular case I did sign for this test.

Q Pardon?

A In this particular test I did sign.

Q 148. Yes.

A 148. Yes, sir.

Q Right. But if they do that to manipulate a test -- and by "do that," I mean jog water in, and they are jogging it -- in my mind anyway, if it's their intent to manipulate the test the reason they are jogging is so it won't show up on the strip chart, at least not as obviously as it would if it were batched in. It's a way of sneaking water in, so to speak.

They are doing that and you are the operator on surveillance. Then the situation, as I see it, is that they

are causing you to make a false certification; isn't that fair? If you don't know?

A Since I don't normally look at the makeup tank charts and only a visual looking at the logbook, that is a fair statement.

Q Do you think that either Hartman or Blessing would have done that to you?

A Obviously one of them has, if Hal has alleged that he has done it. Obviously he has performed that action.

Q We have been talking about 148 and the record shows what it shows about 148. I'm using it -- here it really is an example. I'm asking you to assume that somebody jogged water in, whether it was Blessing or Hartman or anybody else than you.

When your -- you are running the test as the surveillance operator you are going to sign for it and I'm just trying to get your opinion as to whether your fellow operators would have pulled the wool over your eyes in that fashion?

A It is possible.

Q Will you take a look at 143. This test is similar in certain respects and different in others, in terms of what you were doing. You were on the panel in this particular case as contrasted with being a surveillance operator at 148. And here the surveillance operator was Hartman and it

is approved by Mr. Boyd. The test was run on the 10th of March between 3:51 and 4:51 p.m., producing a leak rate of .80, .81.

Let's turn over to the Xeroxed copy of the makeup tank strip chart. The Staff has analyzed this test. Again you can see the times bracketed to the right of center. They analyzed this to be a jogged water addition of 80 gallons starting at 4:40 in the morning. Again, like 148 there's no log entry. It is not included in the calculation. And note it started 11 minutes prior to the end of the test.

Mr. Booher, do you see the portion of the strip chart where the Staff believes that this jogged water addition occurred?

A There does appear to be a leveling-off at around 5:00 a.m.

Q Okay. I think we are looking at the same place. In comparing 143 and 148, if you just look at the two strip charts, would you say that one is more the phenomenon -- the level-off phenomenon is more pronounced in one than in the other?

A They look similar to me. But, also looking at that time period, looking back earlier in the day, there seems to be a leveling-off at around 2130 also, as well as, it looks like, around 0200 or 0215.

Q Let me stick with you here. I think I see what

you are referring to. Well, is there one at 12:30?

A 12:30?

Q You tell me again. Which one --

A I was looking at around 2130.

Q 2130.

A 9:30. Just a minute --

JUDGE CARPENTER: This is chart time?

THE WITNESS: Chart time; yes, sir.

BY JUDGE KELLEY:

Q You are looking at chart time and 9:30 seems to reflect a level-off. Let's see if there's a water entry at that point. Is chart time and log time about the same? They are pretty close.

MR. MAUPIN: Judge Kelley, just for clarification, according to the Stier analysis in the green volume there is no difference between chart time and clock time in this particular case.

JUDGE KELLEY: Fine. That's helpful. Thank you.

BY JUDGE KELLEY:

Q Your shift is 11:00 to 7:00, the night shift here?

A Yes, sir.

Q So do we even have the logged tech spec 11:30 --

A I don't see it here.

Q We could take that up if we had to.

A If you want a justification of that leveling-off,

I can't give you one.

Q Well, would you agree with the Staff's analysis that it is -- that so-called jogged water addition?

A It appears there could be one.

Q Could be. Well, I think you have testified before -- am I clear that it's your testimony that you did not add jogged water to affect the leak rate test?

A Yes, sir.

Q But you can't suggest another specific explanation for that phenomenon there?

A No, sir.

MR. MAUPIN: Judge Kelley, I think I've got this right. If you turn back to test 142, I believe you'll find the previous page of the log, in case you were looking for it.

JUDGE KELLEY: Good.

MS. WAGNER: That's correct. It would be page 47.

JUDGE KELLEY: What page?

MR. MAUPIN: It has a chart -- or a log numbered 47 in the upper right-hand corner. In my version it has got an NRR reference of number 142, just below that.

JUDGE KELLEY: Does this show Hemmila?

MR. MAUPIN: Yes, sir.

JUDGE KELLEY: 3:00 to 11:00 shift. So there

ought to be an entry -- we were looking at 9:00 something -- 9:15 in the evening.

THE WITNESS: It looks likes it would be 9:15 to about 9:45.

JUDGE KELLEY: Well, 9:00 is 1900; right?

MR. MAUPIN: No, sir.

THE WITNESS: 2100.

JUDGE KELLEY: I'm sorry. 2100. 300 gallons of demineralized water to the makeup tank, 2135.

THE WITNESS: 2135. That's indicated by a straight line upward. Right prior to the water addition it seems to be a leveling-off.

JUDGE KELLEY: Yes. The 300 is the vertical line.

THE WITNESS: Yes, sir.

JUDGE KELLEY: So, according to the log, we don't know why it flattened out just before that. At least the log doesn't tell you, apparently.

THE WITNESS: Yes, sir.

BY JUDGE KELLEY:

Q If you had made a water addition in the course of 143, normally I guess you would have logged it; is that right?

A Yes, sir.

Q And if Hartman were running a test and you would

have known that, you would have told him, or he would have found it in the log?

A If Hal was on the panel and made an addition he would have logged it.

Q If you are on the panel -- I'm not hypothesizing; on 143, you were on the panel.

A Okay.

Q So you would have logged the water addition if there would have been one and, in any case, you may have told him -- or he may have asked you -- about water additions; is that right?

A Yes, sir.

Q Okay. So it should have shown up in the calculation. Okay.

BY JUDGE CARPENTER:

Q Mr. Booher, I'm still looking at this test 143. This is the time period where there was substantial identified leakage; is that correct?

A Repeat the question again.

Q This was a time period, this March 10th, is a time period where there was substantial identified leakage at TMI-2?

A I don't remember, sir.

Q You don't recall some valves over a good many days in March had a substantial leakage?

A One of the pressurizer codes or pour valves had some leak; yes, sir.

Q That's what I meant by identified leak.

A Yes, sir. We did experience leakage through one of those valves.

Q What I'm trying to get your help with, if we look at this strip chart for 143, there are a series of water additions necessary to keep the makeup tank level up, going all the way back to the 2100 time period you were talking about with Judge Kelley.

If I look at those several additions, five, and the time period right after them, they all show a pretty consistent slope. Then my eye is caught by the fact that right after the leak rate test there's an extended period where water wasn't added, running from roughly 0500 to 730, where the slope is significantly less. Do you have any idea how this happened? We are still trying to learn, even after six weeks, we are still trying to learn.

A I'm sorry, sir. The slope looks the same to me. It looks longer but the same.

Q Well, I have the advantage of having a ruler and pencil.

A Oh.

Q Let's assume hypothetically that if you did draw a straight line through that extended period there you would

see obviously a slope more like the other line that is drawn through the leak rate surveillance test time interval. Do you see that, that NRR has drawn two lines there, one with a lesser slope and one with a greater slope?

A Yes, sir.

Q See, in that following period it corresponds more to the line with the lesser slope. And if you use that lesser slope line you don't see any jogged water additions.

What I'm trying to do is look for times after the leak rate test and before the leak rate test to see, on the average, what is the slope? What was the rate of decline? And there seems to be this big change in slope at about the time of the leak rate test. I'm just curious as to whether that valve leakage was very constant with time or whether it went up and down, up and down, if you recall?

A I don't remember any change in valve leakage. I wouldn't know how to tell that.

JUDGE BRIGHT: Mr. Booher, I have a few more questions for you. We won't pull any more charts on you for a little while, anyway.

BY JUDGE BRIGHT:

Q On page 3 and 4, bottom of page 3, very top of page 4 of your prefiled testimony, you mention this LER, so I presume you know what that was. Is that true?

A Yes, sir.

Q Are you familiar with the circumstances that led up to it? That the NRC inspector came around --

A Yes, sir.

Q There were two things about that period of time that I'm interested in. We have some testimony about shortly after this occurrence happened that the word came out to not leave bad leak rates, leak rates in excess of 1 gallon per minute, laying around on tables somewhere. Or to be very careful in your handling. But the main thing was, don't leave them out where the casual passerby can see them.

This appears to be the sense of it.

Do you remember any instructions to that effect?

A Yes, sir. But I don't know when exactly I heard or read that instruction.

Q You remember getting an instruction like that, do you?

A I do remember a conversation on it.

Q Do you recall who told you?

A Yes, sir.

Q There are two possible -- well, I guess three ways that I have been able to figure out how you all exchanged information. One would be information coming from your supervisors. Was it ordinarily Mr. Hoyt's -- he was your shift supervisor -- I mean, he was your shift foreman, was he not?

A Yes, sir.

Q Do you recall talking with him about this particular thing?

A No, sir.

Q Another way, someone comes around with a piece of paper and puts it in a book somewhere. And if you ever get the time and inclination to look into that book, then you might have noticed it there. Would you --

A No, sir. I don't remember seeing it in the required reading book, but I do remember seeing and reading the required reading book.

Q As nearly as I can tell, it was with some difficulty -- you apparently signed off on the sign-off sheet. You initialed it for this particular item, which would generally indicate that you had read it. Now, would you say that was a fair statement?

A Are you referring to the LER?

Q Yes, sir.

A I do remember seeing that I did sign the LER. But what time I signed it I don't remember. I don't remember reading it, either.

Q Well, I'm not concerned about that. It's fairly well established that whatever this instruction was, it came out not too long after the occurrence of October 17th, 18th or 19th, if we could ever get those numbers straight.

The other way that information seemed to percolate around the system was at shift change. Could you possibly have received the word there from someone that you just happened to talk to when the shift was changing sometime?

A It's possible; yes, sir.

Q But you don't remember how you did get the information?

A No, sir.

Q Mr. Booher, this is a standard question that I ask. During your training or your experience or talking with your colleagues, whatever, did anyone ever really give you a good explanation of what the safety implications of this particular leak rate test were?

A During those days, no, sir. The basis was there in the tech specs. But we all realized the safety concept of leak rates. But --

Q Could you explain what you mean by "you all realized the safety context." What was the safety context?

A I'm hoping that I'm not confusing what I have learned from other plants, tech specs, and referencing it to a TMI tech spec basis. But, basically a leak rate surveillance is performed to indicate primary coolant system leakage. A primary coolant system leakage, a minute amount, can generate itself into a larger amount, and that's the basis for a tech spec surveillance and a tech spec LCO and

the associated tech spec action statement.

The training in those days wasn't as good as it is today. So I don't think I had the education or the training then as I should have.

Q Would it be a fair statement to say that you do not recollect knowing that in your present state of knowledge at the particular time that you were CRO-ing on TMI-2?

A It wasn't as big an issue as it should have been in those days.

JUDGE BRIGHT: Well, thank you, Mr. Booher.

BY JUDGE CARPENTER:

Q Mr. Booher, to follow up on what you were saying to Judge Bright, page 6 of your prefiled, your concluding paragraph. We don't want to explore Waterford. You say at Waterford you learned the absolute necessity for strict compliance with the technical specifications and plant administrative procedures.

Can you tell us -- there's been a lot of changes in the whole industry since 1969, but, in particular, how was that experience at Waterford different than your experience at TMI-2, 1978 and 1979?

A For my being licensed a CRO, at TMI, the policy there was to know a tech spec, to know that there's a general subject on a particular item. To know the action statement or to know the basis in detail, being an RO, was not as great

an issue as it is today.

Today in training programs at various plants the ROs must know the tech specs almost in as much detail as SROs, now. In the TMI days, like I said, the ROs only had to know a general subject. Say, for example, leak rates, primary chemistry, plant radiation levels -- just know that there are items associated, LCOs.

In respect, today, the training is much better than it was then. And at Waterford I did get the training relating to tech specs in much more detail.

JUDGE CARPENTER: Thank you.

JUDGE KELLEY: Follow-up questions?

MR. MAUPIN: Yes, sir.

MS. WAGNER: None from the Staff.

BY JUDGE KELLEY:

Q Mr. Booher, we have just a few follow-up questions from your counsel.

When did you first hear the term "jogged water addition"?

A During the investigations and interviews post-accident.

Q Okay. I think that answers this. I'll give you the next question, though.

Did you ever hear the term when you were a CRO at TMI-2 prior to the accident?

A No, sir.

Q Can you tell, just from the CRO log, what was going on in the plant in the period of a leak rate test? Or were your log-keeping practices such that one could not necessarily tell what was going on in the plant?

A The logs were somewhat sloppy then. I can remember a statement that came out, that during the accident, on March 28, that there was, like two or three lines of entries made during the accident itself.

Now, I would have thought that there would be more entries made of the different various parameters. So, in that respect, yes, the log-keeping was very lax back then.

Q Well, to put it a little differently, I think what the question is driving at: Let's assume that you did make all the log entries that the procedures told you to make and that they were put in at the right time. Could one then just sit down and by reading the log tell what was going on in the plant? Would it give you a full picture?

A I don't know about a full picture, but it should give you an indication of any major parameters' changes.

JUDGE KELLEY: Did that get at what you were after?

MR. MAUPIN: Yes, sir. Thank you.

JUDGE KELLEY: Okay, Mr. Booher. That takes us through the questioning process with you. We appreciate your

coming. I know you are joining us from California; is that right?

THE WITNESS: Yes, sir.

JUDGE KELLEY: Well, it's a long trip. We appreciate your coming very much and your attention to the questions. Thank you very much.

THE WITNESS: Thank you, sir.

(Witness stood down.)

JUDGE KELLEY: Our sense is just to break and come back at 1:30 for the afternoon witness. Is that all right?

MR. MAUPIN: That should be fine.

JUDGE KELLEY: Let's do that. Back at 1:30.

(Whereupon, at 11:30 a.m., the hearing was recessed, to be reconvened at 1:30 p.m., this same day.)

AFTERNOON SESSION (1:30 p.m.)

JUDGE KELLEY: Mr. Hoyt, good afternoon.

Whereupon,

KENNETH R. HOYT

was called as a witness and, having first been duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. MAUPIN:

Q Would you please state your full name for the record?

A Kenneth Richard Hoyt.

Q Mr. Hoyt, do you have before you a four-page document entitled "Prepared Statement of Kenneth R. Hoyt" and bearing the caption of this proceeding?

A Yes, I do.

Q Do you have any additions or corrections you wish to make to that testimony at this time?

A No, sir.

Q Do you adopt that statement as your sworn testimony in this proceeding?

A Yes, sir.

MR. MAUPIN: At this time, Judge Kelley, I'd ask to have the statement bound in the record as if read.

JUDGE KELLEY: So ordered.

(The document follows.)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE PRESIDING BOARD

In the Matter of	)	
INQUIRY INTO THREE MILE ISLAND UNIT 2 LEAK RATE DATA FALSIFICATION	)	Docket No. LRP

PREPARED STATEMENT OF KENNETH R. HOYT

My name is Kenneth R. Hoyt. I reside in Elizabethtown, Pennsylvania. I am currently employed by GPU Nuclear Corporation as a Decontamination Supervisor in Recovery Operations.

I spent nine and one-half years in the United States Navy. I began employment with Metropolitan Edison Company in 1971 as an auxiliary operator at Unit 1. I became a control room operator at Unit 2 in 1976 and served in that position until 1977, when I became a shift foreman. I was a shift foreman at Unit 2 until 1981, when I attained my current position.

My essential duties as a shift foreman were to operate the plant safely, to monitor daily evolutions, to carry out the required routines for a shift and to supervise the personnel assigned to my shift. During a typical shift, I would spend approximately one-half of my time in the control room, and the balance of my time touring and inspecting the plant.

I never personally performed a leak rate test, although it was my responsibility to review leak rate tests run by operators on my shift. In light of that information and the information I learned from my routine plant tours, I determined whether or not the plant was being operated in a safe manner.

As a shift foreman, I was aware that unidentified reactor coolant system leakage was not to exceed one gpm. I was also aware that part of my responsibility as a shift foreman was to ensure that this limit was not exceeded.

During 1978 and 1979, I was aware that the method by which we measured reactor coolant system leakage was not always accurate. The principal reason for this problem was that the computer program that ran the leak rate test was inaccurate. At that time, however, I believed that I could ensure that unidentified leakage did not present a safety problem by checking other monitoring methods, which I used routinely. These methods included observing makeup tank level, pressurizer level, system temperature and the sump pump. I believed that despite inaccuracies in the leak rate test, I could nevertheless obtain a "ballpark estimate" as to whether we were operating within the one-gpm limit by observing the parameters described above, and by tours through the plant looking at system leaks or other problems. I realize now that my review of these parameters did not enable me to determine precisely whether unidentified leakage exceeded one gpm. However, my primary concern was to operate the plant safely.

My understanding of the action statement was that unidentified leakage had to be brought to below one gpm within several hours after a bad leak rate test or the process of plant shutdown had to commence. Due to inaccuracies in the leak rate test, I was not always able to determine precisely whether unidentified leakage was below one gpm. Thus, I now recognize that there may have been instances when I should have entered the action statement but failed to do so.

I was aware that TMI-2 operating procedures required that exceptions and deficiencies be filed with invalid leak rate tests. However, I never filed an exception or a deficiency with any leak rate test that I deemed invalid.

I estimate that I approved about one-half of the leak rate tests that were brought to my attention. The remaining tests were discarded. I discarded all leak rate tests showing unidentified leakage in excess of one gpm because in my judgement those tests were invalid. If my shift ran a leak rate test showing unidentified leakage in excess of one gpm, we would run other leak rate tests until a good result was obtained.

I did not attend Plan of the Day meetings, and was not informed of the results of such meetings unless that information was relevant to my shift. I did attend meetings among the shift foremen, although I do not recall discussing problems with system leakage at any of these meetings.

I maintained a log which contained entries concerning leak rate test results and other indications of system leakage. I also maintained a list of active leaks, which I would hand over to the next shift foreman. I logged only satisfactory leak rate test results, because it was common practice at TMI-2 to do so.

I was not aware that during December 1978 one level transmitter was very unreliable, although I am now aware of that fact. To my knowledge, no one under my supervision deliberately used a faulty level transmitter so as to affect a leak rate test result.

I was aware that adding hydrogen to the makeup tank during a period when the makeup tank level instrumentation was faulty could produce a false reading. However, I was unaware during that time that the addition of hydrogen to the makeup tank during a leak rate test could affect the result. To my knowledge, none of the operators under my supervision attempted to manipulate leak rate tests in that way.

I was aware that it became increasingly difficult to obtain a satisfactory leak rate test result before the accident. None of my superiors ever pressured me to violate TMI-2 technical specifications or operating procedures concerning system leakage.

I realize today that I made some mistakes in my actions but I never tried to falsify any information. If I had it all to do over again today I definetely would be be doing things differently. I would log all results of tests and not make any assumptions on my own.

JUDGE KELLEY: I have an opening statement just for the sake of context, and then Judge Bright -- Judge Bright is on my right, by the way, and Judge Carpenter on my left. My name is Kelley.

The Board has been charged by the Commission to determine the extent of involvement of employees at TMI-2 in 1978 and '79 in leak rate test falsification and other improper practices in leak rate testing. This is your opportunity to state on the record your recollections and perceptions about your involvement in leak rate testing at that time and to rebut any adverse statement about you by any employee or investigator group with which you may disagree. We have reviewed your prefiled testimony and we have considered it in light of the testimony that has already been developed in this proceeding.

As I expect you are aware, we have been talking with -- we will talk with just about all of the CROs and shift foremen and shift supervisors in that time period, and talk with them on roughly a shift basis with respect to the shift that you were with at that time. We heard from Mr. Hartman some time back. Mr. Booher, as you probably know, was here this morning. Mr. Smith is going to be here tomorrow. We are not sure about Mr. Blessing, whether he's going to come or not.

But, in any case, we have pretty well talked to

everybody in those positions at that time, including your shift.

We'll have some questions based on your prefiled testimony, possibly on statements you made in the past. We may have a few questions based on statements of others, such as others on your shift may have made.

As you are probably aware, in addition there are in the record of this proceeding two rather extensive studies of leak rate practices at that time -- in that time frame: One by the NRC Staff; and the second one by Mr. Stier, which was commissioned by GPU Nuclear. Those studies cover the whole subject pretty comprehensively, including analyses of particular tests that were run during the period of TMI-2's operation. The Stier study, for example, has an analysis of every test run during that period that wasn't thrown away, and the NRC Staff study analyzes every retained test coming out of the last six months of operation.

We won't have detailed, test-by-test questions for you. These studies are in the record for whatever light they shed on the subject. We may have a few questions about particular tests, but by and large the tests themselves, the analyses of them, will be in the record for whatever evidentiary weight they are entitled to, but we'll certainly consider them in light of the entire record including your testimony here this afternoon.

So, with those contextual remarks, let me turn the microphone over to Judge Bright.

EXAMINATION BY THE BOARD

BY JUDGE BRIGHT:

Q Good afternoon, Mr. Hoyt.

I think I have been through essentially all of your prefiled testimony and your previous statements, et cetera, and I have compiled a number of statements here from those documents that, in the interest of time, I'll just ask you -- make a statement and see if you agree with it.

You have testified that you have discarded out-of-specification tests; by that I mean what are ordinarily called bad leak rates.

A Yes, sir.

Q That you personally have not run any leak rate tests?

A No, sir.

Q You did not ensure that out-of-spec LRTs were documented; that is, entered in the log?

A I didn't hear your first part, sir.

Q I guess the first part was: You have not made sure that the out-of-spec LRTs, the bad ones, were documented in the log?

A No, sir, I did not.

Q You have no knowledge of hydrogen additions?

A No, sir.

Q No knowledge of water additions?

A No, sir.

Q And no knowledge of manipulation?

A No, sir.

Q Or the use of those two to manipulate tests?

A No, sir.

JUDGE KELLEY: Excuse me, the mikes are off.

THE WITNESS: I am having a hard time understanding.

JUDGE KELLEY: Hearing Judge Bright?

THE WITNESS: Hearing all of you.

JUDGE KELLEY: Is this better now?

THE WITNESS: I can hear you real good now.

JUDGE KELLEY: When you say you have no knowledge of hydrogen additions, did you mean no knowledge of hydrogen additions for the purpose of affecting leak rate tests?

THE WITNESS: Yes, sir, that's what I meant.

JUDGE KELLEY: And the same with respect to adding water?

THE WITNESS: Yes, sir.

BY JUDGE BRIGHT:

Q That you personally nor anyone on your shift, as far as you know, ever made out an E&D on the leak rate mechanism?

A No, sir.

Q And you have never put the plant into the action statement as a result of a leak rate test?

A No, sir, I never did.

Q Okay. I would like to just go over some of the points that have been made previously and kind of flesh out what goes on when we have a little trouble because we weren't there, seeing how things went.

Could you just briefly give me your general opinion of the computer leak rate test procedure, what its value was, how it worked?

A Well, what am I going to say? The procedure really was for the CRO to go to the computer and put in a code asking for a leak rate of the reactor coolant system. The computer then would start monitoring certain parameters throughout the system that it needed to look at. It would do this for whatever interval of time the operator had programmed the computer for, which normally was for one hour. At the end of the hour the computer would print out certain questions for the CRO to answer, and when he answered those questions, it would print out what it seen as the leak rate for the time interval.

Q What was your personal opinion as to the value of this test?

A My personal opinion?

Q Personal opinion.

A It had a lot of inaccuracies into it. The computer was not given accurate enough information, really, to be judging whether the plant had 1 gpm leak rate or not.

Q In what way was it not given information?

A The accuracy of the instruments feeding it were not accurate enough to give a computer program that would be accurate enough to look for a 1 gallon per minute leak rate when you are talking -- you know, you have 88,000 gallons in the reactor coolant system and you are looking over an hour period for the thing to lose 60 gallons. The instruments that they had this computer -- they had maybe plus or minus, say 1 percent accuracy on them and you are asking the computer to give you plus or minus 1/15000 accuracy.

There was other problems in the program that certain things were not compensated for, temperature variations and things like that for the reactor coolant leak tank, drain tank. Those things were not properly compensated. The computer had been reprogrammed at least once, as I now remember, to compensate for this but still there were these little inaccuracies that fed into it. The computer was too, too variable. That was my opinion of the computer leak rate.

Q This point has come up before, people saying that you are trying to determine a gallon or so in a 60,000-gallon

system or something like that, whatever the gallonage of the system is. Isn't it true that you are not really doing that? Basically, for unidentified leakage anyway, you are depending upon measuring in the makeup tank, which is a much smaller system?

A No. If that was all the system was looking at, that would be the only thing it would monitor, in my opinion, just the makeup tank level and see if anything was put in or if anything was taken out. But it looked at plant pressures, tank levels, drain tank levels -- these all are independent of the makeup tank per se. Sort of independent systems. Why would the computer look at them if the only thing it was worried about was the makeup tank level change?

Q But that was the only thing you could measure, in terms of the water? You can measure temperature and all that but you had to manipulate that only for the amount of water that actually went out of the makeup tank; wouldn't that be true?

A Yes, sir.

Q Well, all of that being said, did you really regard this particular surveillance as really being necessary, except for the fact that it was in the tech spec?

A I believe it was a useful tool. All right? I don't believe that the 1 gpm, as I said, was really a good, accurate number. But I did use it as a tool to see what the

plant trend was. In that respect, yes, I did rely on it.

JUDGE BRIGHT: Does Mr. Hoyt have the Stier compilation of previous statements?

MR. MAUPIN: Do you mean the Stier assessment, Judge Bright?

JUDGE BRIGHT: Well, his interviews.

MR. MAUPIN: Yes. I believe we've got them all here. Which one would you like him to look at?

JUDGE BRIGHT: Stier investigation 2/14/85.

MR. MAUPIN: All right, sir.

JUDGE BRIGHT: Page 43.

BY JUDGE BRIGHT:

Q Have you looked at it?

A Yes. I read it.

Q I just want to refresh your memory here on this particular thing. You make a statement that you never remember seeing a leak rate test in excess of 1 gpm which agreed with other plant conditions.

A Yes, sir, I did make that statement. The answer was no.

Q I guess it would be handy if you would turn to the Stier interview of 2/26/85.

MR. MAUPIN: Mr. Hoyt, it's to your right.

BY JUDGE BRIGHT:

Q Page 11 -- no. Pardon me. Yes, that is page 11.

What I would like to do is go through these other indicators and get you to give me some idea of just how accurate they were, and what kind of information you could get from watching these other things. This is what you said they were back at that time. Would you take them one at a time? You look at makeup tank level --

A Yes, sir. Well, makeup tank level, as you are all aware, you get a readout on a strip chart and I roughly had 30 gallons per inch on the chart. So you could look at the trend in the chart and see which way leakage was going, see what water was being put into it and what water was going out, and mathematically, you know, calculating ahead, what the plant is doing.

Q How accurate would you say that was? That looks like a little bitty chart to me.

A Yes.

Q Those lines are awfully close together. You have a pen width to concern yourself with. Plus the fact there is an oscillation. It doesn't draw a straight line.

A Well, you never really looked at it as small increments. You would look at it over a time frame, and as the NRC people have done, you sort of put an imaginary straight line across it and averaged the thing out. Never really picked out a five- or 10-minute interval or something like that; no, sir, you couldn't, because of the

oscillations.

Q Well, with the method you described, how accurate do you think you could actually be?

A I think that instrument had something like about 1 percent accuracy.

Q That close?

A Yes.

MR. MAUPIN: Excuse me, Judge Bright, could you clarify whether you and the witness may have been talking about the same thing? Were you asking him how accurate was the methodology or how accurate was the instrument?

JUDGE BRIGHT: I'm asking him how accurate, considering the instrument was correct, how accurate was his eyeball guess on it.

THE WITNESS: I misunderstood you, then. I'm referring to the instrument, was approximately 1 percent accurate.

BY JUDGE BRIGHT:

Q Yes.

A To say my accuracy of eyeballing it, I probably was -- could have been anywheres from, I don't know, 2.5 percent, I would say. Somewhere in that neighborhood.

Q Could you characterize this in gallons? I believe that was the scale that was used.

A Yes, sir. By eyeballing it and drawing your

imaginary line you pick a reference of say 60 inches and it drops down to 55; you have got a difference of 5 inches, you multiply that by your 5 gallons per inch, and that is the methodology you would use to determine what the level change had been, how many gallons.

Q And you think that you could defend that to yourself at least?

A Yes, sir.

Q Within 5 percent?

A Yes, sir.

Q Now you say you look at the pressurizer level.

A Yes, sir.

Q How did that go?

A Well, pressurizer level, depending on plant conditions, if you were running stable, pressurizer level should be staying stable, makeup tank levels should be maintaining stable. Ideal conditions.

If the makeup tank level was going down and pressurizer was not changing and temperatures and pressures were not changing, that is an indication that water is going someplace and not showing up as an addition to the reactor coolant system, which would indicate you have a leak someplace.

If you see makeup tank level going down and a corresponding increase for the same amount of gallons into

the pressurizer, once again without temperature changes or pressure changes, it is safe to assume that the water leaving the makeup tank is being added to the pressurizer and vice versa.

Q Could you have quantify the amount of water being added to the system by looking at the pressurizer level?

A Yes, sir. There was a -- I don't remember the exact number now -- but there was a correlation of inches in the pressurizer versus gallons added.

Q Was that a recorded intelligence?

A Yes, sir, I believe it was.

Q The pressurizer level?

A Yes, sir.

Q It had a record made of it, much as the makeup tank had?

A What I remember right now, yes, sir, it did.

Q And you say you looked at reactor coolant system temperature changes?

A Yes, sir. And that's just the, you know, change in temperature is going to change the volume of the system. So, if you see something increasing and you have a significant change in temperature to increase, you can pretty much relate that the increase in level came from the increase in temperature. And we had a rule of thumb on that, that would say so many degrees should show so many inches of level

rise in the pressurizer, so we could relate that.

Q Okay. This was a correspondence between pressurizer level and temperature?

A Yes.

Q It was not a correlation between 1 degree equals 50 gallons or something like that?

A I don't remember what we used for the rule of thumb right now, sir; no.

Q Did you ever consider the reactor drain tank in that list of parameters that you gave to me?

A Yes, sir. They were looked at.

Q Exactly what went into the reactor's drain tank?

A Well, pressurizer release went in there; valve leak-offs drained into that tank; reactor coolant pump seal leakage went into that tank. I think there might have been a couple of other things I can't remember right now.

Q That would be, or would it be automatic valving? Or overpressure valving? Manual valving? Let's say, on the --

A Well, outside of the pressurizer release, it would have been manual valving prior to plant start-up. If there had been any valves in the line that would have been open they would have stayed that way while you were operating.

Q Now, with all of these things, without the use of the computer method, do you think you could determine the

difference between, say, .9 gallons per minute and 1.1 gallons per minute?

A No, sir.

Q So, it would be a fair statement to say that the only prayer you had was that the computer could detect this --

A Yes, sir.

Q -- that small of change?

A Yes, sir.

Q Something that I was curious about. If you had a leak in the, oh, say one of the main pipes in this system, the primary system -- maybe a weld or just -- you had a bad radiography job and there was a flaw in the pipe that nobody detected or whatever -- generally, where would the leakage from such a flaw, hole, whatever you want to call it, crack -- where would that leakage go?

A That would end up in the reactor building sump.

Q In the sump.

Now, I don't think we need to take worst case, but just someplace that is, oh, relatively not very close to the sump tank. How long do you think it would take for that to get to the sump?

A I can't think of any place in the plant where it should take more than one to two minutes before you start seeing the inflow of water into the sump and seeing your

level increase.

Q Now, we are not talking about a lot of water here.

A No, but the plant was fairly new. The piping was fairly clean. There was very little, let's call it dust and crud in there to create traps. Water should have flowed through pretty readily, I would think.

Q Was this something that was really considered very carefully in the construction of that plant, do you know? That is, how well all leaks lead to the sump? We have a garage downstairs that I park in and it's fantastic. It looks flat, but it is fantastic how often you have to wade through that sucker. I'm just curious --

A But other places in the plant -- I can recall right now that we did have puddles prior to getting to the drain. What I can remember today, these were outside of the D ring, which would be in areas away from the reactor coolant system piping.

Inside of the D ring itself, no, sir. Today I really can't recall any places where we formed any puddles from any leaks.

You know, wet spots, we'll call it that way, but not depth accumulation of water.

Q When you say the "D ring," what precisely is that? Is that a protecting shield inside containment?

A Yes, it's a concrete protecting shield built

around the reactor loop and that is inside the reactor building.

Q Is this the sort of thing -- I have seen it in a plant or two -- where you actually have a polar crane or something like that that uses it as a trap?

A No. You don't use the D rings. You use the outer walls of the reactor building.

Q Now, you, of course, were familiar with the tech spec on leakage out of the reactor.

A Yes, sir.

Q And if you couldn't determine whether the unidentified leakage was less than 1 gallon per minute, in light of the requirements of the tech spec, how could you not go into the action statement? This is something that is puzzling me.

A That's really hard to answer. I don't know what I was thinking back prior to the accident. I guess I felt safe with the computer printout that said we were less than 1 and that was sort of the direction that was given to the operators and the foremen. You get your computer printout and if you feel the plant is safe, you file that and go on.

Today I realize that was all wrong thinking, it was wrong training to even assume that.

So, it has just been too many years and too many people showing me where I made my mistakes that I really

can't go back to that point and tell you what I was thinking.

Q That is difficult.

Were you familiar with the safety significance of that leak rate test?

A Yes, sir.

Q The reasoning behind the requirement for the 1 gallon per minute?

A My understanding of that reason was to detect a leak prior to it really becoming a problem, where you could lead into, well, basically like the accident that we did have. Yes, I am aware of that fact.

Q Were you aware back in those days?

A Yes, sir.

Q Did you ever talk to people in the control room about it?

A I don't understand what you mean by "talk to" them.

Q Well, did you ever point out to them that this was why we needed the leak rate; it wasn't just a nuisance that some bureaucrat had put in to devil the poor operator?

A Not that I recall, sir. This pretty much was brought out in the training and I can't recall ever stressing that on my own to the operators.

Q Let's see. On page 4 -- first let me ask you, did you -- the operator would come to you and give you a leak

rate test for your approval and it would be below 1 gallon per minute unidentified leakage. Would you try to validate that before you approved it?

A In which way do you mean "invalidate"?

Q "Validate," not "invalidate."

A Excuse me. Validate? I would look at the information on the printout and I -- usually this was something that was made after I made my plant tour and if things liked right there and it was less than 1, that's, to the best of my recollection, about all I looked at to see whether I felt it was a good leak rate or not.

Q Well, now, you state here on page 4 that all of the discarded tests were greater than 1 gallon per minute?

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

Q Let me ask you this: Does that mean that there were no tests less than 1 gallon per minute that were discarded?

A Not that I can recall; no, sir.

I would like to clarify one thing, though. There was some times when the computer would come out with some large negative numbers, okay? Now, those are definitely negative numbers less than 1 but they were discarded because they were definitely an invalid thing. You can't have a -- I can remember as high as a negative 5 gallons a minute leak rate with nothing happening to the plant to indicate and no

way for the plant to make its own water.

I do recall at least one of them. So, in that respect, there was something else less than 1 that was thrown away. I'm sure there might have been others.

Q Well, with the exception of those negative leak rate tests, did you ever throw away a less than 1 gallon per minute?

A No, sir. Not that I recall.

Q On page 10 you make a statement. In your answer at the bottom of the page, the last sentence --

A Yes, sir?

Q Just for the record the sentence reads: "We were told to look at these parameters, to do our own evaluation of them, and to make our best judgment call on the condition of the plant."

You say "we were told." Who told you?

A By "we" what I'm saying is the training department had basically trained us, the crew, okay? Myself, shift supervisor, CROs, we all attended training normally at the same time, same class. That is what I'm referring to as "we." As the whole crew.

Q Yes. But who told you, the training people?

A Yes, sir. That's what I'm referring to there.

Q So it wasn't a matter of somebody wrote you a letter or memo, as a condition of your -- well, no, strike

that. That's going nowhere.

What I was curious about, I presume you applied this to this leak rate.

A Yes, sir.

Q And then the question is: Did you think that this was what gave you the authority, ability, carte blanche, you describe it how ever you wish -- to use your own judgment rather than what the leak rate test told you?

A Yes, sir, I did.

Q A little thing happened. Do you remember "the" LER on leak rate tests?

A Yes, sir.

Q I wonder if you would turn to page 58; 58, 59, 60. Why don't you read that. At least the bottom of 58.

I think, rather than go through some line of questioning here, let me make a statement and see if you think it's a fair statement of what is on these three pages.

That you didn't recall seek this LER, 78-62 --

A No, sir.

Q -- until people told you about it; and yet your initials appear on the check-off sheet?

A Yes, sir.

Q And you would not ordinarily sign off on something unless you had read it?

A That's correct.

Q But, regardless of that, that the practices used previous to the incident that led to the LER were not changed as a result of the LER being issued?

A No, sir.

Q In connection with that, let's go back to page 22. Let's see, this goes quickly up to page 30. If you could just refresh your memory.

The only thing I'm interested in here, they are talking about pressuring people on shift to do one thing or other, particularly to get good leak rate results. And you stated that there was no pressure. The only thing you could think of was shortly after this problem with the NRC and the leak rates came up, that you did receive the intelligence that bad leak rate tests were not to be laid out on somebody's desk, or whatever, but were to be thrown away?

A Yes, sir.

Q And you also state that your recollection was that it was communication from your supervisor, the shift supervisor?

A Yes, sir.

Q And it was your deduction, informed guess or whatever, that this did come from upper management through your shift supervisor to you?

A Yes, sir.

Q And your shift supervisor at the time was Bernie

Smith?

A As I said in here --

Q Yes.

Q -- normally; yes, sir.

Q But. It would have been a shift supervisor?

A Yes, sir.

Q You make a statement in here that they were curious as to why this was the first time you had ever revealed this information to anyone and your statement was "it is probably the first time I had been asked about it." Is that a true --

A Yes, sir.

Q Then, farther on down you state that you weren't present when the inspection was made, the NRC inspection.

A That's true.

Q And then you think that it was a pass-on, the information that you got, telling you that this had happened --

A Yes, sir.

Q -- came from a pass on of information from one crew to another.

A Yes, sir.

Q Could you elaborate on that just a little bit? We are trying to get the lines of communication here.

A I don't know whether it was a matter of, you know,

one day's shift or whether I might have been off and come back after a weekend or something, but it was normal practice for me when I come to relieve the foreman, to ask what had happened, essentially, since last time I was on shift. Lot of times you get a rundown. It could have been anything such as this NRC inspector has been here, or it could have been something as simple as somebody dropping something and hurting their toe, type of thing. That is what I mean, gossip type things, things that's happening that's really not the plant itself but it's happening to people. That kind of information got passed on right along with the technical information on the plant.

Q So, generally do you feel you had a pretty good idea of what was going on in the plant, people-wise?

A Yes, sir.

Q I see.

Q Something else: Different companies, different outfits, different parts of outfits, companies, all have slightly different ways of doing business. I'm just curious about lines of authority in your particular situation there at TMI-2.

What was the company attitude about adhering to line of authority word? I mean, on your shift, you had a shift supervisor and there was a line of progression that went through you down to the CROs.

Now, I guess, if, for example -- just a hypothetical situation -- if someone other than your shift supervisor had told you to quit leaving bad leak rate tests out on desks, would you really have considered that to be the definitive word? Or would you have gone to your shift supervisor to find out whether this was -- which was the proper thing to do?

A I believe I would have talked to my supervisor about it and asked him if that's the same word that he had received. Because that's normally where I took all of my directions from, was from my supervisor.

Q Well, for example, if Mr. Floyd had done this, would you have cleared it with your shift supervisor before you would have complied?

A Yes, sir. I would have made sure that he at least was told the same thing that I was.

Q Or that he had been told something?

A Yes, sir.

Q Just one other thing. Mr. Hoyt, did you feel it was your responsibility or was it your practice to make sure that your CROs were aware of such things as this LER? Let me put a little finer part on there.

I realize that supposedly the LER, or whatever the intelligence was, was taken and put in a book and it was supposed to be read by everybody. And you had a book, shift

supervisor had a book, and the CROs had a book. But did you feel that it was your responsibility to make sure that in one way or another the CROs had this intelligence, this information? That they knew about it? That they were aware of it?

A Yes, sir. I'll say yes from the fact that this book you are talking about, and the sign-off sheet, had the CROs right along with the foremen. Normally my practice, if I had read it and initialed it and seen that my CROs had not done so yet, that I would leave the book out and tell them when they have the time, please read it and initial it.

Q That was something else I wanted to ask you about. I noticed that all of the initials are on one sheet of paper. You have six shifts with, let's see, two CROs, perhaps three shift foremen, shift supervisor -- that's a minimum of five. That's 30 people and they are scattered out in time so they don't get to reading their little book every so often. It must take a tremendous amount of time for that single sheet of people to get around to everybody?

A Yes, sir.

Q This appears to me to be a rather inefficient way of getting the word passed and to make sure that everyone has seen it. Who is going to check on this, when it will take a month to get everybody to sign off on it?

A I guess I don't really have an answer to that,

other than agree with you. Today I can see how it really was a very poor method of doing it. But I guess sort of the philosophy was there would be people on vacation, people off for a week in the training; with rotating shifts you have four-day weekends, so to speak. So, theoretically, at least, people could be out of the control room for -- it's not hard to imagine two weeks, without getting into the control room.

So, basically within a two-week time frame, anyhow, somebody, or all the shifts should see it.

For something like this LER, that definitely was too long a time frame. I don't believe that would be done that way today but I don't have any other theory for it then.

Q That's the part that I have not been able to understand in this case at all. Everybody says they read the LER. Everybody initialed the check-off sheet. Nobody can recall what it said at the time. And there was absolutely no change in the way anybody did business. This seems extremely strange.

Are you sure those were your initials on there?

A I don't remember the piece of paper. All I'm saying is it looks like my initials. I can't argue that I --

Q At one time you thought that was probably your initials?

A I do today, sir. I can't say they are not.

Q I'm not arguing the point. I'm just asking you.

JUDGE BRIGHT: I think that's it.

THE WITNESS: Thank you.

JUDGE KELLEY: Let's take a 10-minute break.

(Recess.)

JUDGE KELLEY: Back on the record, Judge Carpenter has some questions.

BY JUDGE CARPENTER:

Q Mr. Hoyt, I would like to turn to your prepared statement. On page 2, the third full paragraph you state, "During 1978 and 1979 I was aware that the method by which we measured reactor coolant system leakage was not always accurate." I'm still trying to understand, did you think sometimes it was accurate? Most of the time it was accurate? I don't understand what "not always" means.

A What I'm saying is the inputs to the computer I did not feel as being totally accurate but I cannot say that the computer printout was accurate or not accurate. I guess I have no way of giving you that answer. So that's why I made my statement that way.

Q I take it what you just said you mean to imply --

A The computer could have been correct.

Q -- there was a doubt in your mind?

A I'm not saying it wasn't, all right? But I'm saying I felt there were enough inaccuracies, that I could

not believe it 100 percent.

Q That's what I'm trying to get at. Why you would believe it at all, if you had a doubt about it?

A It was the best tool that I had to be looking at something that small. I had to have some faith into it but I didn't have 100 percent faith into it.

Q We are trying to understand the root causes of this situation where a surveillance test wasn't considered to be really reliable and yet it was used, day after day, month after month, without any remedial action taken to make the test do what it was capable of. And that's what I'm trying to understand.

A The only answer I can give you on that, that was, you know, for the accuracy that we were looking at that was the best tool that we did have to use. To my knowledge, the program was looked at prior to the accident at one time and was changed and even up at the time of the accident I thought that the computer people were still trying to come up with a way of programming it to make it more accurate.

Q I recognize we are forcing you to strain your memory back to eight years ago and we are talking about feelings, impressions, not things written down someplace that you make reference to. If you thought there was an inaccuracy in the computer program, wouldn't that make every result that the computer produced inaccurate? I'm having a

hard time understanding the sort of whimsical -- and you are not the only person that expressed this view, I want you to understand that.

A I know I'm not. I find it hard to put into words. I have a feeling what you are looking for but I guess I don't know how to put it into words.

Q If I have a calculator and I put 2 times 2 in it and it tells me 5, I expect the next time I do that it will also tell me 5. It will do whatever result --

A But you are always putting in the same value, you are putting in 2 times 2 all the time. The computer was not getting the same values all the time. It was getting different numbers; all right? And what's to say that these numbers that it was getting was accurate; all right?

Q That's very different from the computer having an error.

A That's what I'm referring to. The computer compiled all the information; all right? It had to take the information that it got and that may not have been receiving accurate information. I'm sorry, maybe I didn't state it clearly enough.

The computer itself, I'm sure calculated what it seen. But did it see the accuracies? That I am not sure of. That's where I had my doubts. The instruments that were feeding the computer was not accurate enough so that the

computer could be accurate.

Q We certainly have evidence that, in particular the level sensors, malfunctioned over extended periods of time. What I'm trying to understand is how somebody trying to change the computer program would have helped the malfunctioning level sensor problem.

A I can't answer that. I'm not a computer man. I'm only telling you what I know the computer people were doing. They were doing something with the program. I can't tell you anything outside of that, sir. I'm sorry.

Q But you just explained that in your mind there was the computer program, which took whatever signals the sensors provided it, and manipulated them.

A Well, the one thing that I do know, that the program prior to the accident was not getting proper compensation for temperature in the reactor coolant drain tank. All right?

Now, that was -- I don't know how they did it but it was fixed so that supposedly the computer was getting a proper compensation for temperature. And my definition of that is part of the computer program. Maybe I'm using the wrong terminology, I don't know.

Q There was in, towards the middle of March, a temporary change order that called for the individual running of the leak rate surveillance tests to carry out a manual

calculation. The essence of that manual calculation was to correct the volumes measured in the reactor drain tank back to reactor temperature. So far as I have seen so far, this was never done by a change in the computer program, it's a manual calculation. Is that what you are referring to?

A I believe we are talking the same thing. That, somehow, did get into the computer. To the best of my recollection, this change had got put into the computer somehow. If not we would have been running hand calculations up until the time of the accident. We never would have went back to the computer.

Q That's what I believe the record shows, at least the records that I have looked at after the temporary change order, attached to each test is this hand calculation.

A I don't recall, sir.

Q Do you recall that temporary change order?

A No, sir, not right now.

Q What were you doing during the month of March? Were you on shift? Or were you at Lynchburg in training? Or were you on vacation, do you recall?

A Well, the week of the accident I was in Lynchburg, on training. Prior to that I was on shift.

Q So there might have been a week or so where this temporary change order was in effect. From my quick review of the tests, I didn't see any for your shift where the

manual calculation was made?

A No. Normally the week before our training week was a relief week and we were -- you know -- not really involved directly with the operations in the controlling room. We were picking up the odds and ends that needed to be done so the week before, if my recollection is correct; no, we would not have been involved with it.

Q In the next sentence of your statement you say "the principal reason for this problem," referring to the inaccuracy referred to in the previous sentence, "was that the computer program that ran the leak rate test was inaccurate."

Did you ever report that to anybody?

A Yes, sir, I talked about that with my shift supervisor. That's where I got my information that the computer people were trying to look into this situation and get it corrected.

Q What I couldn't begin to try to understand, this sort of a casual hopefulness that the computer people some day will get the problem solved. And yet the whole time TMI-2 was operating, the problem went on day after day. That's what I don't understand. I don't understand the management strategy here which allows a surveillance test that is required by the technical specification to go essentially unfulfilled, not for a few shifts or a few days,

but month after month.

A I can't explain for management, sir. The computer people was an entirely different department from mine. I did not have a direct interface. I did not have the authority to tell them: Hey, get in here and fix it. This was something that had to go up my chain, over and down another chain in another department.

Q But as you said, this was the tool that you had to see whether the plant was being operated in accordance with the technical specifications?

A Yes, sir.

Q And you recognized that the tool was deficient?

A Yes, sir.

Q And yet you were patient. That's what I don't understand.

A I'm a very patient person.

Q If you had tried to energize this system, going up the chain of command and down some other chain of command, to get somebody to really come and do something about this, would there have been resistance to your doing that?

A I can't answer that today. I don't know.

Q Well, did you have the feeling that it was wiser not to make waves?

A No, sir. I had a feeling that I should take that to my supervisor and it was his responsibility to come back

to me with an answer for my question. And his answer, to the best of my recollection, always was: Well, they are looking into it.

Q Well, I can think of a lot of things, looking into it might be the appropriate action, but where there's uncertainty about compliance with the technical specification, that seems too limp to me.

A I can't offer you anything else. I'm sorry.

Q Well, the information in the order concerning these proceedings asks the Board to make findings concerning who participated in, who had knowledge of or condoned or by their dereliction or culpable neglect allowed the leak rate falsifications. And clearly these falsifications would have never appeared if somebody had paid attention to this leak rate test and gotten it straightened out. The situation would not have existed in January, February and March of '79, if it had been fixed in October, November or December of '78; isn't that true?

A Yes, sir.

Q So you see what I'm trying to understand is where this neglect occurred. Is it at the initiating end or at the end where the response should have been?

A The way you are stating it, my answer to that would be it looks likes everybody fell short of what they should have done, the top end all the way to the bottom.

Q That's certainly the impression we have gotten over the five weeks we have been sitting here. That it was -- nobody feels that what was done was proper. On the other hand, you can't really say: Well, this individual should have been the prime mover. That's what I call a management deficiency in the structure that we see.

You, as the foreman, you would think -- not only you but the other foremen, recognize that this is the tool that you had to use to do this surveillance, and every foreman I talked to had reservations about it. But he couldn't get it fixed. That seems strange to me.

A Well, I guess I sort of have to say you would have had to have been there at the time, '78 and '79 time frame to realize that this wasn't our only concern. We had concerns with other things in the plant and even those things took time to get anything done with.

So, maybe -- just stick on the foreman level, maybe we got in a rut of just assuming everything takes time, paperwork takes time. So, therefore, got to be patient and wait for the whole wave of paperwork to make its round before we'll see the results.

Q We haven't seen any evidence that any paperwork was ever started. It sure takes a long time if it never gets by go.

A I'll agree with you.

Q Apparently, in your conversation with Judge Bright, apparently you never felt that it was appropriate to identify any of these surveillance tests as representing either a deficiency or exception as required by administrative procedure 1010?

A That's true.

Q Can you tell us why, looking at these surveillance test results, they didn't look like a deficiency?

A No, sir. I really can't tell you what my thinking was other than I felt the plant was safe and I had good results, good computer results. That's the only answer I can give you today.

Q Well, you had "good" computer results which you didn't believe. The computer might have said the leak rate was a half a gallon a minute. Did you believe it?

A I believe it gave me a good ballpark number and that it was telling me the best information it had. Through my own observations, tours through the plant and other things, I didn't really have any reason to doubt that the computer was giving me its best information. I may not have believed .5; I may have believed it was anywheres from 0 to 1 gpm, but --

Q In your tours of the plant, what fraction of the primary piping system could you inspect?

A I could inspect it all.

Q You could see all of the primary piping?

A Anything that was outside of a concrete wall.

Q What about inside concrete walls?

A I couldn't see in there other than seeing leakage coming from -- running down the walls.

Q You didn't feel that there were places that you couldn't inspect visually --

A No, sir.

Q -- in the primary reactor coolant loop?

A No, sir.

Q That's a little bit of a surprise because others expressed the view that there was a substantial fraction of it that they couldn't see, couldn't visually inspect?

A With the reactor under power you were not allowed without good reason to go into the D rings. But I think you all know that -- it is on record -- that I did enter the D rings under power to observe a leak on a pressurizer valve. So that proves that you can go into the D rings for observation.

Outside of that, you could walk over to the sump and see what is running in the sump, which will tell you that there's leak inside. You can stand on top of the D rings and look for steam, which is what you would see coming up in the atmosphere, which would tell you there's a leak someplace inside.

You may not physically see every inch of the pipe but you could definitely see the indications if there was a leak in that area or not.

Q Well, I accept that. That's the basis, in your mind, you felt you didn't know exactly what the leak was -- leak rate was, but you didn't think it was large or you would have seen these visual indications.

MR. MAUPIN: If I might just make a suggestion that the Board have this witness -- if you'll recall Mr. Voigt's suggestion to you this morning about Mr. Kunder's testimony in the Stier assessment of Mr. Kunder with respect to leakage in January of 1979, that whole controversy, I believe you'll find, if you inquire, that Mr. Hoyt is referring to the same testimony.

JUDGE CARPENTER: Would you state the beginning of it again? I got most of it.

MR. MAUPIN: I'm trying to be helpful but not be too suggestive to the Board. There was a period in January 1979 in which there was a steam leak inspected, of which Mr. Stier has made an assessment. Mr. Hoyt is a knowledgeable witness on that subject.

JUDGE KELLEY: Is this the reference to the time when you went inside the D ring to observe the leak?

THE WITNESS: Yes, sir.

BY JUDGE KELLEY:

Q Just a follow-up question. You have been exploring with Judge Carpenter the notion that by walking around the plant and looking for leaks you could derive some level of confidence that some large amount of leaking wasn't taking place. I haven't heard you place a number on it. But I assume that you are not saying that a walk-around of that kind is not a complete substitute for an accurate leak rate test, which is supposed to quantify it right down to the tenth of a gallon; correct?

A Correct.

Q Okay. But just how much confidence do you get by that kind of an inspection, in terms of gallons per minute? Could you give us an estimate? Could you be fairly sure that you weren't experiencing unidentified leakage of 2 gallons per minute?

A Yes, sir. I think I could.

Q Because effectively, if you don't really believe the computer in the leak rate test and you are really going on other indications of leakage, you are really, in effect, setting aside the leak rate test and looking at something else; right?

A Yes, sir.

JUDGE KELLEY: Okay.

BY JUDGE CARPENTER:

Q And isn't it true, Mr. Hoyt, that in this whole area of leak detection you were encouraged to use all these other ways of qualitatively detecting leaks?

A Yes, sir.

Q So that fits in with what you are saying: You are saying, quantitative, 2 gallons a minute is roughly 3000 gallons a day. That's an appreciable amount of liquid that one might look for.

A Yes, sir.

Q Well, I think the perception you have been providing us is useful. Turn over to page 3 of your statement. In the middle of the third paragraph you say "I discarded all leak rate tests showing unidentified leakage in excess of 1 gallon per minute because in my judgment those tests were invalid."

That's based on what you felt was your knowledge from other indications of what the leak rate might be?

A Yes, sir.

Q Not that you thought high numbers were invalid and low numbers were valid --

A No, sir.

Q -- in terms of the computer output? It hasn't been so clear to us that other foremen had quite that perception. They simply felt that the high ones were suspect

so they discarded them without emphasizing the fact that they needed some backup, namely, visible observation, to be sure that numbers like 2 weren't real.

A I can't speak for the other foremen. I can only speak for myself. And it was a very religious thing for me to make my tours of the plant. And in those tours I did inspect everything that I could as far as systems, whether it be RCS connected system or whether it be just a secondary system. I tried very hard to look at all of this and see where any problems were that needed repair work. So I sort of feel, myself, that I had a pretty good estimate of what was going on in the plant as far as any kind of leakage.

Q Well, I see your posture, that you didn't feel that this leak rate test was -- the absence of the leak rate test, in the sense of producing a result that you could have confidence in, was a serious safety problem in your mind because of your visual inspection. And apparently it just made you tolerant of the fact that this thing went on week after week after week; somebody looking into it.

A Yes, sir.

Q Well, the upshot of all this, of course, is that some people, as it begins to get more difficult to get computer printouts with numbers smaller than 1, which some people termed good, a lot of people got into manipulating the test as it became more difficult to get those kind of

results. In your mind, where does the fault lie for this? For this situation? It isn't something that was short term at all. The plant had been operating almost a year; almost October to March. It was reasonably up to speed. It was commercial.

You mentioned there were a lot of other problems. Was it that the work load was so high that this thing just never got a chance to be given the proper attention?

A I really can't answer that. I don't know what the work load of the other departments were, you know, that really should have been -- let's say the computer people. I don't know what their work load was. I don't know what the work load of the upper management people that should have been involved in this, I don't know what their work load was.

Q Was your shift generating items that they had to give attention to?

A I would say no more than any other shift. Every shift we generated paperwork that had to go up through the chain for different people to review and to look at. Some of them may be such things as work requests for something to be repaired. It may be some other surveillance that a surveillance engineer had to look at and prove. There were just volumes of paperwork created every shift that went off in different directions for different people to review.

Q You didn't have the feeling that it was excessive?

A That I can't answer. Only the people receiving the paperwork would know whether it was excessive or not.

JUDGE CARPENTER: Thank you very much.

THE WITNESS: Thank you.

BY JUDGE KELLEY:

Q Mr. Hoyt, I have three or four areas I would like to talk to you about. Could I ask you, first, to turn to test number 94 in the NRC study. I mentioned this to your counsel before we resumed.

MR. MAUPIN: Yes, Judge Kelley. He's had a chance to look at those two.

JUDGE KELLEY: That's fine.

BY JUDGE KELLEY:

Q Okay. This is the test that occurred on the 13th of January, 1979. We don't need to go into every detail of it. There is a specific point that I wanted to ask you about but it does reflect on the computer printout page that you approved it, that Hartman was the surveillance operator. I think the log indicates that Mr. Booher was on the panel for that test.

And if you look at the Xerox copy of the makeup tank strip chart about three or four pages past the computer printout, the test itself, you will note, is bracketed by heavy lines just to the left of center of the chart. And the analysis line at the bottom of the page, those two typed-in

lines, those are typed in by the NRR analyst. They read this as reflecting a water addition of 117 gallons at 9:50. That's an addition that was logged in the CRO log and I think we can find an entry for it. It was not included in the calculation.

Do you see on the strip chart where the increase of water, where the insertion of water is reflected?

A Yes, sir.

Q Okay. And then over on the log you have an entry right about in the middle of the page at 10:00, an entry that reads, "batched 117 gallons of water makeup tank." Entered apparently by Booher; correct?

A Yes, sir.

Q Then going back to the computer printout sheet, if you look at the questions just above the top half of the page, the second question asks for operator-caused changes, which I understand to include, where applicable, water additions; correct?

A Yes, sir.

Q And it says zero. So, apparently when Mr. Hartman answered the questions at the end of the test for the computer and he entered the zero in response to that question, he didn't, for some reason, reflect the fact that 117 gallons of water had been added. Is that right?

A That's right.

Q Okay. Now, 60 gallons of water in a one-hour test would mean 1 gallon per minute leakage; correct?

A Yes, sir.

Q So 117 is close enough to 120 to say it's about a 2-gallon difference; right?

A Yes, sir.

Q So, if that water had been included in this calculation instead of a leak rate of .26 -- forget about the 39 and say .26, or even .3, the leak rate would have been something like 2.3 gallons per minute; right?

A Yes, sir.

Q Okay. So, would you think -- we talked a couple of minutes ago about just walking through the plant looking for leak, that you would have seen a leak of 2.3 gallons per minute?

A Yes, sir.

Q But apparently in this case you hadn't. If there was a walk-through associated with this test -- I don't know whether there was or there wasn't -- but that would have flagged the fact that there was a high leakage rate if that thesis is correct?

A Yes, sir.

Q So what does this indicate? That the whole test is just completely out of whack? Or what do you conclude from looking at this test and looking at the fact that a

substantial water addition was not included in the test?

A Well, what I conclude there was a lack of communications between the two CROs.

Q Okay.

A And there was a lack of identifying it to myself when I signed this.

Q In a case like this, whose would be, in your opinion, the primary responsibility for making sure that this water addition got included in the leak rate calculation? I'm assuming that -- if my assumption is wrong tell me -- but I'm assuming that normally the person on the panel, in this case, Booher, would have actually batched the water in; correct?

A Yes, sir.

Q Where would the responsibility properly be in seeing to it that it got reflected in the leak rate test?

A I'd say it is the man running the surveillance. He's the man that didn't ask the question.

Q So the computer says to him: Did you add any water? In effect, he, then, could look in the log and he would have found this if he had done this, I take it?

A He could have looked in the log or just verbally add.

Q One way or the other he should have found out; correct?

A Yes, sir.

Q Would this indicate -- back up a bit.

When asked a while ago about the nature of your review -- I think Judge Bright asked you about that -- and you said words to the effect that you would look at the computer printout and look at the bottom line, in this case, .3. If the numbers on there made sense and the amount were under a gallon, you would approve it; is that correct?

A Yes, sir.

Q So I gather, then, that your review process would not encompass normally your own -- for example, your own reading of the waters, see if water got added?

A No, sir, logs, normally I reviewed them at the end of the shift, not in the beginning or middle. I waited until all entries were made. When I was referring the CRO log, that's when I did it.

Q But would you do it with a particular eye toward a leak rate test or just to see whether the log looked okay?

A Just to see whether the log was correct.

Q So, in a case like the one we just looked at where there was, in fact, a log entry of that water, you wouldn't, I take it, have necessarily matched up the two in the leak rate, to see if the two got put together?

A No, sir.

Q As I'm sure you are aware, Mr. Hoyt, two of the

three CROs on your shift, Mr. Blessing and Mr. Hartman, in interviews, have acknowledged manipulation of leak rate tests. Turning first to Mr. Blessing, who has not testified and we are not sure whether he will be here, but in any case, we have earlier statements from him. Let me just, rather than paraphrasing, I'll just quote from the statement of his given to NRC investigators on April 10, 1980. And this is an excerpt that I'll read:

"He" -- meaning Blessing -- "He acknowledged that it was common practice, by a large portion of the control room operators, to add hydrogen to the makeup tank while running a leak rate surveillance test in order to assist in getting good leaks rate results; i.e., results that met technical specification requirements.

"At this time Blessing did not specifically identify individuals who had actually added hydrogen to the makeup tank but reiterated that it was common practice and well known to personnel, at least up to the shift foreman level of management."

So, here's Blessing saying, as I understand him, it's perfectly common practice to add hydrogen in the hope that the leak rate would turn out better and that was generally known, including by the foreman, and at a later point, I believe he refers to you specifically.

Yes, let me go on and read the next section from

the next page in the same vein. Again, this is Blessing talking to NRC investigators in 1980. "He emphasized that it was not secret that hydrogen was being added to the makeup tank during the running of the reactor coolant safety test and it was a total common practice. He said it was his opinion that supervisors and foremen were well aware of this practice. He again reiterated that nine out of 10 times the hydrogen addition did not work and therefore was not pertinent to this issue. When specifically asked what foremen were aware of the hydrogen additions, he stated that he was confident that Dick Hoyt, his shift foreman, was well aware of the hydrogen additions during the leak rate tests."

I'll stop there.

So, comment on Mr. Blessing's statement?

A As far as adding hydrogen affecting leak rate; no, sir. I was not aware that it would and I do not believe that it would.

Today, I have been, by some of the experts -- they showed me their opinion but I'm still of a different opinion.

As far as adding hydrogen during a leak rate, by procedure there was nothing that said you couldn't do it. It is not up to -- it's a gas, it increases pressure, which is no different than if I add water and increase the level, I'm still increasing pressure. So, even if they did do it, I

wouldn't tell them not to.

Q Well, more specifically let me ask you this: In light of what I read to you, Mr. Blessing, at least, says that he in fact was adding hydrogen, hoping that it would improve the leak rate result.

One, do you believe that that's a true statement by Blessing or do you know one way or the other?

A I don't know. I'm saying my opinion is that it wouldn't affect it and you didn't know that it affected it if it did. All right?

Q Okay. That's two points. I've got a third point. Regardless of what you might have thought about the technical efficacy of adding hydrogen or not, were you aware of the fact that one of your operators, namely, Blessing, thought that it was helpful in that regard and was using it for that purpose?

A No, sir.

Q Let me shift over, then, to Mr. Hartman. Mr. Hartman gave a number of interviews. I won't try to quote from them but Mr. Hartman, as you are probably aware, described a variety of ways in which leak rate tests could be manipulated, hydrogen addition being one. He also spoke of water additions that would not be included in the calculation and therefore would affect the leak rate test. Whether number 94 that we just looked at is an example of that or not

I don't know. That could have been, as you suggested, a miscommunication.

I suppose alternatively it could have been Mr. Hartman deliberately manipulating leak rate tests. But, be that as it may, he spoke of a general practice on his part to use both water and hydrogen to manipulate leak rate tests. And so, I have really the same question: Were you aware of the fact that Mr. Hartman was engaged in those kinds of activities?

A No, sir.

Q Did you ever -- I gather if you weren't aware of it you had no discussions with him along those lines?

A No, sir.

Q What we have to grapple with here is, to understand what was taking place and satisfy ourselves that what you tell us and they tell us took place can both be made to fit together and, if not, who is telling the truth and who is not.

We have these descriptions of activities by Blessing and Hartman. We don't have, to my knowledge, any very explicit statement involving you as far as they were concerned, with the exception of the statement I just read a few minutes ago where Blessing said he thought that you knew about these hydrogen additions. He didn't flat say that he told you or refer to any specific incident. But, if they

were engaged in those kinds of activities, how are we to understand that those activities could have taken place and you wouldn't have known about it? What was going on between you and them, if you were supervising their work very closely. What are we to make of this?

A You say "supervising them very closely." I wouldn't say that I supervised them very closely. In fact, looking over their shoulder --

Q Fine. I don't want to build in an assumption that's not true. By all means, clarify that.

A I had full confidence in May operators that they knew how to do their work. I did not stand to look over their shoulders to see what they were doing. As I stated previously, you know, I had tours of the plant to do. I had other paperwork to do. I had lots of things that I had to do on the shift also.

I would have to make a special effort if I wanted to look over somebody's shoulder to take the time to watch and see what they were doing and I never felt that I had to do that with my operators.

Q So are we to conclude -- I think I understand what you are saying -- are we to conclude from that, then, that Blessing and Hartman were using various tricks and devices to give you a computer printout under a gallon a minute without telling you what they were doing?

A If in fact they did that; yes, sir.

Q So, in a sense, they are producing a desired result in the sense that a computer printout under a gallon a minute is what the system wants. And yet in another sense, if we believe their statements, they are doing it in a deceptive manner and then walking up to you with a piece of paper and saying: Hey, sign here. And you proceed to do that without knowing, I take it, that the result has been manipulated.

Knowing what you know -- again, using hindsight, knowing what you know about the situation at the time, your relationship with the two gentlemen I have referred to, Hartman and Mr. Blessing -- I am not referring to Mr. Booher simply because he testified this morning and I'll ask you about him in a moment. But he is not like Hartman and Blessing, admitted that "I manipulated results." Hartman and Blessing did. So that's why, I think, I'm emphasizing them.

But, taking into account your recollection of the situation and your relationship with them and your own estimate of them as people, do you think it plausible for us to conclude that they were pulling the wool over your eyes on these tests?

A Yes, sir.

Q Mr. Booher testified this morning, and the situation is different with Mr. Booher. We have the evidence

before us and we'll have to assess that, consider his testimony. We haven't reached any conclusions about whether Mr. Booher was engaged in manipulation or not. But would your view be any different with regard to Booher than it would be with regard to Hartman and Blessing, so far as manipulation is concerned?

A Are you asking me do I feel that Ray may have manipulated things along with them?

Q Yes. I'm asking you that. Maybe not as neatly and directly as I should, but that's a fair statement of it.

A I find it hard to believe that any of them manipulated any of it. I really had not given any thoughts along the line. I really felt that I could trust all three of them, to having everybody admit that they were doing it and to say whether Ray was doing it or not, I couldn't say.

Q Can you draw any distinction but I'm -- and I'm not trying to put words in your mouth but, in your own mind: Do you think it more or less likely that Mr. Booher would be engaging in manipulation than would Blessing or Hartman?

A I think it would be less likely for Ray because of the three, Ray was the more professional CRO on the shift. He was the man really that carried the shift, so to speak. My right-hand man when I wasn't in the control room.

Q Was he the senior of the three or just the one you relied on more or both?

A No, I think Hartman was really the senior but Ray was the one I could rely on because I knew I could trust him when I wasn't there.

JUDGE KELLEY: Excuse me a moment.

(Discussion off the record.)

BY JUDGE KELLEY:

Q Mr. Hoyt, I wanted to ask you a couple of questions about a certain type of water addition. The typical batched water addition will show a sharp, almost vertical line on the makeup tank strip chart; correct?

A Yes, sir.

Q We have had the term introduced in this hearing that speaks of a jogged, j-o-g-g-e-d, water addition, which I take it means a water addition put in the makeup tank gradually, at least compared to the rather quick way in which a normal batch addition occurs. Is that your understanding of it also?

A Yes, sir.

Q Can you tell us how, at TMI-2, as a matter of which controls one manipulates, how one makes a jogged water addition? How is that physically done?

A Well, you say "how was it physically done?" That I can't answer for you because I never seen anybody do it. I can only theorize, knowing the plant and if I wanted to do that, all right, I can tell you how I would do it.

Q All right. Please do.

A Well, most of the time we took water out of what we called a reactor coolant bleed tank with a pump, and on the discharge side of that pump there was an air-operated valve which had a variable position to it depending on the air pressure applied. That fed into the batch controller and into the makeup tank.

If you wanted to jog water into the system, I'd have to have a man on the pump to start the pump to regulate my little air-operated valve here. I would have to have a man over on the batch controller. He would either have to manipulate batch controller or have an operator out in the plant by passing the batch controller. The batch controller -- I don't know if Nick brought this thing up -- had a very loud distinct click to it every time a gallon went through it. You could hear it throughout the control room, sit there and go click, click, click, click. If they wanted to hide this they wouldn't want to have that this clicking. I would see an operator out in the plant to bypass that and get water into the makeup tank. Under that type of arrangement I'm sure I could jog water into that makeup tank that would not show up on a strip chart.

Q That's the reason for doing it, I assume? If you want to manipulate a test you don't want any telltale blip on the strip chart?

A I assume that's what this is all about. People trying to get water in without anybody noticing it.

Q Right.

A It could have been -- could be done.

Q Under the procedure that you described, though, you have three different operators cooperating in this venture?

A You would have to to have three because you have the discharge and volume of the pump, which was air-operated, tends to fluctuate a little bit, up and down a little bit; you have somebody watching the makeup tank chart and he has to stay up there continually watching this thing, is it continuing my slope normally as it goes, I'm not going flat, I'm not going uphill.

So you would have to have a collaboration of several people in order to do it. I don't think it was done that way.

Q Can you think of any other way to jog water into the makeup tank rather than just the way you just described?

A I'm sure -- there were probably some other ways, but off the top of my head; no, sir.

JUDGE KELLEY: Okay. Thank you.

BY JUDGE CARPENTER:

Q Are both the demineralized water and this --

A Reactor coolant bleed tank.

Q -- reactor coolant bleed tank water, both came through the back controller?

A Yes, sir.

JUDGE KELLEY: Anybody have any other questions?

MS. WAGNER: Yes, sir.

(Discussion off the record.)

JUDGE KELLEY: Questions from counsel? Mr. McBride?

MR. MC BRIDE: No, sir.

MR. MAUPIN: No, sir.

JUDGE KELLEY: Anybody else?

JUDGE BRIGHT: Bear with my reading, Mr. Hoyt.

BY JUDGE BRIGHT:

Q If you were obtaining only "ballpark estimates" of leakage, as stated on page 2 of your prefiled testimony, and were unable to determine precisely whether unidentified leakage was below 1 gallon per minute, what was the basis for your belief, as stated on page 2 of that testimony, that you "could ensure net unidentified leakage did not present a safety problem"?

A Well, throughout my tours of the plant to look at all these different parameters, piping and valves, et cetera, just from that if I never found anything that told me, hey, I had a hazard here that could develop into something dangerous, then I assumed I was safe. And my tours normally

included enough of the systems that that was my deduction at the end of it.

Q In light of your testimony that you were not always able to determine precisely that unidentified leakage was below 1 gallon per minute, on page 3 of your prefiled testimony, was it your view that leakage in excess of 1 gallon per minute did not present a safety problem?

A I guess my answer to that would have to be if I found something that was leaking, it would have to be determined where it was leaking from. I've never given much thought as to where I had a cutoff, what was safe or unsafe. It would be determined by where it came from.

JUDGE BRIGHT: Thank you.

MS. WAGNER: Could we get some expansion on that answer? He is saying, then, that unidentified leakage in excess of 1 gpm might not be a safety problem? It depends where it comes from?

THE WITNESS: If I went to a valve and the valve packing is leaking, all right? Now, one thing, I identified where the leak is, all right? The valve may be one of these type of valves that I can open up onto the back seat and seal the packing from the leak. All right? There, I'm not endangering the plant, I'm not endangering anything, I can just completely open the valve and put it on the back seat and seal the leak.

If I go up to a pipe at a weld and I have a weld that's bad, it's leaking, I cannot isolate that. It may be just a trickle. But I call that unsafe because it's on a weld; I cannot isolate it, because it's going to grow. It may be anything from a valve that's leaking to a weld that's only a trickle, not greater than 1 gpm. Therefore I'm going to say it's unsafe, no matter how much it is leaking.

BY JUDGE CARPENTER:

Q Mr. Hoyt, I would like to have you turn to NRR test 120, please. All you are going to need to do is look at the strip chart. This is a surveillance test that doesn't involve your shift at all.

In this test, apparently, Mr. Adams ran a test of the so-called hydrogen effect, as best we can understand.

You notice in the center of the strip chart it's labeled "leak rate test 120." About in the middle of that there's an arrow showing a time point where hydrogen was added, and what I wanted to find out was: We look at this as a pretty clear demonstration that at least on this occasion when you add hydrogen to the makeup tank it changes the signal that is fed to the strip chart recorder, apparently because this differential pressure sensor didn't sense that additional hydrogen on both legs equally.

I wanted to get your opinion. Is there an alternate interpretation here? When you said earlier you

didn't believe the hydrogen had an effect. This is one of the bases for a tentative view, at least on my part, that perhaps hydrogen did have an effect.

A I can't answer that for you, sir. The transmitters I'm referring to had a leg that went into the top of the makeup tank in the gas space, and you had a leg into the water side. If I put pressure in there, both legs should see it.

You don't put pressure in that stays at the top of the tank and sometime later drifts down to the bottom. It is felt equally at all places.

I can't see where -- I don't know if this is an effect from the hydrogen or not. I can't explain it.

Q As far as we can tell is that's the only thing that happened. The hydrogen was added and the makeup tank level recorder went up.

A Well, that may have been. But also looking at this same strip I see -- not quite as elaborate, but I can go over a couple of hours, I see another rise in there where nothing is indicated of anything done. I can go all the way back right straight to the beginning of this strip, I see a little bit of a levelization there. I don't know what that came from.

You know, so, because hydrogen was added at this time frame, maybe it had effect. I don't know. But I won't

say that it did. I don't believe it did.

Q Are you saying you think the amount of deflection here is not large enough to be unusual? That you periodically would see upward movement equivalent to, perhaps, three chart divisions?

A Well, that's roughly two or three and -- yes, I can go along this strip chart and find two to three in other places. Maybe not over the same duration, but definitely two or three increments.

Q If the reference leg, the leg that went to the gas phase at the top of the tank, had a low spot in it and liquid accumulated in that low spot, wouldn't that influence the transmission of pressure from the tank gas phase to the sensor; in the sense that the gas you are sensing would have to push that slug of water up the hill?

A I can't answer that for you without taking, really, some time to think about it.

Q Well, we are trying to get your help.

A The tank would normally run around 30 pounds of pressure. That would take quite a bit of water to -- for me right offhand to say that the water wouldn't affect it.

Q We are talking about pressure changes here that correspond, as I understand it it, to inches of water. We are looking at a change here that's two to three inches of water as expressed by pressure. So these are really small

changes in pressure that are being reflected in the strip chart recorder, aren't they?

A Well, I don't know. Does the log say what they changed pressure to? May I go back and review it? It says "added hydrogen." It doesn't say what they changed the pressure by, so I don't know. I don't know where the pressure was when they added it or what they ended up with. That may have had some effect. I just -- I'm sorry, I just can't really help you with this.

Myself, I don't believe it was the hydrogen that caused this.

Q Well, I say, I just wanted to get your view. Others expressed the view that this is unequivocally a demonstration of how hydrogen can affect a leak rate test. You add the hydrogen and the sensor temporarily shows bias, in this case, in a positive direction.

A What I see here, it looks to me it's showing over pretty near a half-hour range. That doesn't make sense to me. Even in light of you saying it has to push the water uphill, why would it have to take a half hour to push a couple of inches of water uphill?

No, sir. To me -- I can't agree that there's hydrogen additions shown there that affects that leak rate.

Q Well, certainly it's difficult to reach a firm conclusion based on a sample of 1. As opposed to --

A Yes, sir. If it would have been a blip, maybe I could agree with you. But this time duration and my feelings and understanding of the way the instrument worked, et cetera, I can't help you. I don't believe that that hydrogen addition is what caused that trace.

Q You don't feel that a slug of water in the so-called dry sensing line would produce a bias and pressure on that side so that it wouldn't equalize?

A Not anything that would look like that.

Q What would you think it would look like?

A I said, maybe a blip when you added the hydrogen. As soon as you stop adding and changing pressure you should be right back to a normal-type reading. At least what you had before. You would have had to have the water in there before you added the hydrogen.

Q Yes.

A And why should it take a half hour for this to stablize after you add the hydrogen? It should only have been the fluctuation at the time you were changing the pressure on that sensing line.

Q Well, if the increased pressure doesn't cause the gas to bubble through that slug, which simply displaces the slug as if it were a piston and then for some time later for some reason it begins to bubble through, then it would come back, then the pressure would equalize.

A I cannot argue that with you because right off the top of my head I don't remember the directions of the sensing lines. I don't remember any place in those lines, though, that this effect would occur. You may be right. I wouldn't argue that point.

Q Thank you very much. Since others have pointed this test out to us I just wanted to get your reaction. Thank you.

MR. MAUPIN: Judge Carpenter, I wanted to point out to you but I didn't want to interrupt the colloquy, you began by saying this was an experiment performed by Mr. Adams. The NRR may have typed his name on the sheet, but if you will recall his testimony he did not recall participating in this and he denied that the handwriting to the best of his recollection was his.

I also wanted to point out to you that you may recall the testimony of Mr. Chwastyk, which was to the same effect about the same test. The same effect as what Mr. Hoyt just stated.

JUDGE CARPENTER: Mr. Maupin, I accept your products. I recall Mr. Adams' views about whether or not this is his writing, whether or not this was the test, since his memory was he did a series of them which we cannot find any evidence for. That's not the point here. I just was trying to get Mr. Hoyt's evaluation to almost a hypothetical,

if you will. If you saw a strip chart record like this and saw this excursion, upward excursion in the makeup tank level strip chart record that correlated with adding hydrogen, how would you feel about that?

THE WITNESS: I would feel there was something besides the hydrogen that caused this trace.

JUDGE CARPENTER: Thank you very much.

JUDGE KELLEY: Mr. Hoyt, that completes our questioning process. Thank you very much for coming down here today and your responses and attention to questions. Thank you very much, you are excused.

THE WITNESS: Thank you.

(The witness stood down.)

JUDGE KELLEY: Off the record.

(Discussion off the record.)

JUDGE KELLEY: If there's nothing further, we will stand adjourned until tomorrow morning at 8:30.

(Whereupon, at 4:00 p.m., the hearing was adjourned, to reconvene at 8:30 a.m., on Wednesday, October 29, 1986.)

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the UNITED STATES NUCLEAR REGULATORY COMMISSION in the matter of:

NAME OF PROCEEDING: INQUIRY INTO THREE MILE ISALND UNIT 2 - LEAK RATE DATA FALSIFICATION

DOCKET NO.: LRP

PLACE: BETHESDA, MARYLAND

DATE: TUESDAY, OCTOBER 28, 1986

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission.

(sigt) Joel Breitner

(TYPED)
JOEL BREITNER

Official Reporter
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