

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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

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Continued deposition of GENERAL
PUBLIC UTILITIES CORPORATION, by QUINCY
BILLINGSLEY, III, taken by Defendant,
pursuant to adjournment, at the offices
of Davis, Polk & Wardwell, Esqs., One
Chase Manhattan Plaza, New York, New York,
on Thursday, February 25, 1982, at 10:30
o'clock in the forenoon, before Catherine
Cook, a Shorthand Reporter and Notary Public
within and for the State of New York.



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16 -ooo-

17 Q U I N C Y B I L L I N G S L E Y , I I I ,
18 having been previously duly sworn by a
19 Notary Public, was examined and continued
20 to testify as follows:

21 EXAMINATION (continued)

22 BY MR. WISE:

23 Q You recognize you are still under oath
24 from the previous portion of your deposition?

25 A Yes, I do.

 Q When we broke off at the end of the last

1
2 session, we were discussing B&W Exhibit 466 which
3 is a copy of what has been identified in another
4 deposition as a draft report prepared by Stafco
5 on the sequence of events during the TMI-2 accident.

6 In addition, we were discussing some
7 related documents. I believe we have marked B&W
8 Exhibits 510, 511, 512 and 513. Exhibit 510 is a
9 handwritten note of yours concerning a draft of the
10 Stafco report and requesting comments by November 30,
11 1979.

12 Exhibit 511 was a memorandum from
13 Mr. Ankrum to Mr. McEwen of Stafco dated December 6,
14 '79 with an attached 8-page list of questions
15 concerning the sequence of events.

16 Exhibit 512 is a handwritten note dated
17 November 9, 1979 signed by Mr. Ankrum addressed
18 to someone named Ed and bearing some handwriting
19 which I believe -- bearing some handwriting at
20 the upper portion of the first page which I believe
21 you identified was yours.

22 Exhibit 513 is a 13-page list of
23 comments on a sequence of events.

24 What I was trying to establish the last
25 time was some sequence of events of our own with

1
2 respect to your work on the Stafco report and these
3 various memoranda that I believe relate to it.

4 Let me just back track a little bit to
5 put it all into prospective.

6 You do recall, Mr. Billingsley, that in
7 November 1979, you did begin work on putting
8 together a sequence of events for the TMI-2 accident?

9 A No. I did not put together a sequence
10 of events. I reviewed existing sequence of events
11 that has been proposed by other people and consultants.

12 Q I believe last time you identified the
13 EPRI sequence of events as one that you had.

14 A Yes, I recall looking at that one.

15 Q I believe you also said one had been
16 prepared internally at Met Ed?

17 A That's correct.

18 Q That was project undertaken by Mr. Putnam
19 of Met Ed?

20 A That's correct.

21 Q And I believe you also recalled that a
22 sequence of events had been prepared by Stafco?

23 A Correct.

24 Q Stafco had been retained by Met Ed to
25 do that, Met Ed or GPU?

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A Yes.

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Q You are familiar, I believe you testified last time, with Mr. Ankrum and Mr. McEwen?

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A Yes.

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Q They are gentlemen who work for Stafco?

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A Correct.

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Q Did you have any involvement at all with respect to the Stafco report?

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A Yes, I did.

11

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Q Would you describe what your involvement was?

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Q When did you begin that work?

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A It's hard to say, based on the documents in front of me. I would have to say November is a good time frame.

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Q November of '79?

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A Correct.

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Q What were you supposed to do as a result

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of your review?

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A Any comments that I had I was to forward

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on to Stafco.

8

Q Was there any work to your knowledge

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going on within GPU or Met Ed to develop a final

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sequence of events for the TMI-2 accident?

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A The only work I knew that was going on

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internally was the work being performed by John Putnam.

13

Q What was your understanding as to what

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use was to be made of the Stafco work on developing

15

a sequence of events?

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A My memory is vague in this area but

17

the impression I was left with was that this report

18

was going to be GPU's report that would be published

19

for lack of a better word quote, unquote to the

20

world.

21

Q How did you gain that understanding?

22

A I don't know. I don't recall.

23

Q Do you recall who was responsible for

24

hiring Stafco?

25

A I know that Ed Wallace had put out a

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purchase order. I don't know if he was the initiator or the person who authorized Stafco.

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Q During your involvement in reviewing Stafco's work, did you have any understanding as to whom within the GPU system Stafco was reporting?

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A I got the impression that Stafco was reporting to Ed Wallace.

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Q The memorandum from Mr. Ankrum to Mr. McEwen which has been marked as B&W 511 and is dated November 26 refers to a letter written by you dated November 19, 1979 enclosing certain comments regarding the Stafco draft of sequence of events.

Do you now have a recollection of having written a letter sometime during November to Stafco stating your comments on their draft report?

A I believe I did but I can't recall when it was.

Q Do you recall how lengthy the letter was?

A If my memory serves me correctly, there was probably a cover letter and a response to certain questions, so I would guess the document might be a five or six pages in length.

Q Do you recall how you would put together

1
2 the responses to the comments, that is, from what
3 sources was that prepared?

4 A A combination of sources. I utilized
5 operator interviews, I utilized sequence of events
6 that have been published by other people. In some
7 cases, raw data, whatever knowledge was available,
8 technical data that I could get my hands on and my
9 co-worker could get his hands on to provide information
10 to Stafco.

11 Q Who was your co-worker?

12 A Jim Flaherty.

13 Q He was employed by Energy, Inc.?

14 A Yes.

15 Q This was a list of questions that you
16 and Mr. Flaherty developed as a result of the review
17 of materials you just described?

18 A The majority of questions that came
19 up were a result of reviews performed by other
20 people. Other people would have reviewed the Stafco
21 report and say I have problems in this area, I
22 don't think this is right. I believe this actually
23 happened and not that. So it was questions
24 developed by other people. There may have also been
25 questions developed by Stafco. Those are just some

1
2 of the sources that come to mind. There may have
3 been others. I think primarily we worked from a
4 list that -- I don't know, maybe Stafco sent a list
5 of questions.

6 Q Let's look at, for instance, B&W Exhibit
7 512 which is Mr. Ankrum's handwritten memo of
8 November 9 which contains in part some handwriting
9 by you as well. That mentions a three typewritten
10 page list of comments made by Ed and Mr. McEwen,
11 along with some Mr. Ankrum has added.

12 You obviously did see Exhibit 512, the handwritten
13 memo, because your handwriting is on it. I think
14 also at the end of last session we marked B&W Exhibit
15 513 which is a three-page list of typewritten
16 comments on sequence of events. I don't know how
17 far we had gotten with 513 when we broke off.

18 Let me ask you to take a look at it now
19 and tell us whether or not you did in fact receive
20 that three-page list of comments?

21 MR. GLASSMAN: Do you want the witness'
22 recollection on whether he received it or
23 based on the review of the document?

24 MR. WISE: He has to review the document
25 in order to see what we are talking about. He

1
2 can review it and see if he remembers it.

3 A I don't recall seeing this document, but
4 I know I saw it because I see my handwriting here,
5 but I don't recall this document.

6 MR. WISE: The witness is referring to
7 some handwriting on the lower right-hand side
8 of the page next to the typewritten comment
9 numbered 11.

10 Q Is that right?

11 A That's correct.

12 Q You are not able now to testify whether
13 B&W Exhibit 513, a three-page listing of comments
14 on the sequence of events, is the same as the list
15 referred to on the first page of B&W 512 as a
16 three-page typewritten list of comments on the
17 sequence of events?

18 A No. Because I don't recall seeing this
19 document.

20 Q Also mentioned in B&W Exhibit 512 is a
21 15-page list of questions and comments generated in
22 discussions with someone called Jim. I note that
23 looking at B&W Exhibit 511, Mr. Ankrum's memo to
24 Mr. McEwen of November 26, he does refer to
25 comments he received following discussions with Jim

1
2 Floyd on November 8 and 9.

3 Let me now show you what I would like
4 to have marked as B&W Exhibit 550. The reason for
5 skipping from B&W Exhibit 513 to B&W 550 is that
6 I understand there is a simultaneous deposition
7 going on of Mr. Shieman downstairs and in that
8 deposition they have begun marking with the number
9 B&W Exhibit 514. In order not to double mark
10 things, we'll skip to 550. I just want the record
11 to reflect the reason for the gap.

12 MR. WISE: B&W 550 is a 14-page set of
13 handwritten notes which bear the date November 8,
14 1979 in the upper right-hand corner on the
15 first page.

16 (14-page set of handwritten notes dated
17 November 8, 1979 marked B&W Exhibit 550 for
18 identification, as of this date.)

19 Q Mr. Billingsley, do you recognize B&W
20 Exhibit 550?

21 A Yes.

22 Q Does it contain in part your handwriting?

23 A Yes, it does.

24 Q What is your recollection of what 550 is?

25 A These are series of questions that Jim

1
2 Flaherty and myself worked on to resolve and provide
3 answers where possible.

4 Q Recognizing that there are various
5 handwritten comments that appear to be in your
6 handwriting, the underlined handwriting is not your
7 handwriting, is it?

8 A No.

9 Q Do you know whose it is?

10 A I can't recall.

11 Q Is it Mr. Ankrum's?

12 A I can't recall that.

13 Q Do you know where you received the
14 handwritten copy of comments that is B&W Exhibit 550?

15 A I can't say exactly. I may have been
16 given these by Ed Wallace but I can't recall.

17 Q There are various comments by you on
18 this copy of the handwritten notes. Do you recall
19 whether you made those comments before your letter
20 to Mr. Ankrum which he states was dated November 19,
21 1979?

22 A Are you asking me if these comments
23 from me -- would you repeat that question again?

24 Q Let me back up. I am only trying to
25 establish a sequence of events.

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A I understand.

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Q We have B&W Exhibit 512 which is a

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November 9 memo from Mr. Ankrum to someone named

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Ed. You obviously got a copy at some point because

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your handwriting is on it. It refers to two things

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that came with it. One was a three-page list of

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comments on the sequence of events, typewritten.

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And the other was a 15-page set of handwritten notes.

10

We have now identified B&W 513 which

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is a three-page list of comments which you must have

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received at some point --

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MR. GLASSMAN: There has been no

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connection drawn between that document and

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the three-page document referred to in B&W 512.

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MR. WISE: That's correct, whatever

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inference the founder of the fact may wish to

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draw of the similarity of description in

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512 to what 513 is.

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MR. GLASSMAN: I am not sure that's

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appropriate or not. I want to make sure that

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the record did not have an inappropriate

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conclusion here or reference to testimony.

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There is no testimony drawing such a connection.

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MR. WISE: I agree Mr. Billingsley has

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2 not been able to identify it. I think we are
3 entitled based on the similarity of 513 to
4 the description of 512 to at least present
5 evidence to the finder of fact from which he
6 can draw an inference.

7 If you have contrary testimony, of
8 course you may present that at some point.

9 MR. GLASSMAN: I am not sure I agree
10 with you, but the appropriate thing here is
11 to proceed rather than belabor the record.

12 Q We have now identified B&W Exhibit 550
13 which is a handwritten set of comments dated
14 November 8, 1979, again it looks to me that it
15 fits fairly closely the description contained in
16 B&W 512 of a rough form of questions generated by
17 Mr. Ankrum in his discussions with Jim.

18 MR. GLASSMAN: I should note that while
19 B&W 512 talks about a 15-page document, what
20 has now been marked as B&W 550 is 14 pages.
21 I draw no conclusions from that. I think the
22 facts should be clear.

23 MR. WISE: Again, if you have some
24 witness or some evidence that in fact B&W
25 550 is not the document referred to in Exhibit

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2 512, of course you may present that at some
3 time. At this point I want to find through
4 discovery whether Mr. Billingsley can testify
5 one way or the other on that. What I am
6 trying to establish here is whether in fact
7 the comments which appear on B&W 550 were
8 comments that were made by Mr. Billingsley
9 between the date of the document which is
10 November 8, 1979 and the letter which
11 Mr. Ankrum refers to as having been sent on
12 November 19, 1979 by Mr. Billingsley to him.

13 MR. GLASSMAN: You are entitled to proceed,
14 but in terms of connection between documents,
15 I suggest that if that connection is
16 significant to your presentation of B&W's
17 position that it might find better avenues of
18 proof.

19 A I can't say that this is the document
20 that came with this Exhibit 512.

21 Q You can't say it is not?

22 A No, I can't say it is not. I can't say
23 it is. At this point I don't know. You asked me
24 about the date November 19.

25 Q There is a reference in B&W 511 to a

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letter you wrote to Mr. Ankrum or Mr. McEwen dated November 19 enclosing certain comments on the draft sequence of events. B&W 512, 513 and 550 have been identified and what I am trying to establish with respect to 550 is whether you can recall if in fact the comments on 550 were part of what went into or was the source of whatever comments you transmitted to Stafco by letter on or about November 19.

A Based on the time frame here and the time frame I know that I worked on these questions, I doubt very much that the suggested memo of November 19 contained a response based on 550.

Q Do you recall whether there were any other lists of questions or comments concerning the draft of Stafco's sequence of events generated before November 19, 1979 other than possibly B&W's Exhibit 512, 513 and 550 which we have identified?

A I can't say if any others were written prior to the 19th or after the 19th. I can't say, but I believe there were more than one set of questions, to the best of my recollection.

Q Let's pick up with things in sequence. There are some questions I would like to ask you

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about the questions and answers that resulted from
the November 26 Ankrum memo which is B&W Exhibit 511.

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Let's go back and look at your comments
on B&W 550. Those are comments on the handwritten
list of questions dated November 8, 1979 by someone
who you cannot now identify; is that right? You
don't know who wrote the original document?

A 550?

Q Yes.

A I can't recall who wrote it.

Q You don't recall where you got it from?

A No.

Q Would you look at the first page of the
exhibit. You will notice that the comments are
generally preceded by a notation at the left-hand
side of the page which appears in the form of three
sets of digits separated by colons.

A Correct.

Q Was it your understanding that those
references were to the time of the accident?

A Yes.

Q That started from a time of when
the accident began rather than what you might refer to
as real time, time of day?

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A That statement is correct.

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Q Looking down the page at the bottom
comment. It refers to the time 13 seconds after
the accident began.

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Do you see that?

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A Yes.

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Q Are you able today to read the handwritten
comment for that time period?

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A My comment?

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Q Let's begin with the comment by the
original author of the questions and then we'll pick
up with your comment.

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MR. GLASSMAN: The witness appears to
have some difficulty reading the handwriting.
I don't know what we gain by having him
attempt to read that now. Perhaps counsel
could just as well try to read that.

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MR. WISE: I will be happy to. It's
simply a predicate for his handwritten
comments that I want to ask him about. I
think it would be meaningless to ask him
about his handwritten comments if we don't
know what he is commenting on.

MR. GLASSMAN: Subject to my objection --

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Q My reading, "In remarks, state that make-up pump B was running before the accident. Also state final that letdown flow was isolated."

Is that roughly your reading of that?

A Yes. You are pretty good.

Q You have written a comment next to that in a great deal clearer handwriting.

Would you read that for us?

A "Find out if it's a procedure requirement to isolate letdown before starting" --

Q MUP, is that your abbreviation for make-up pump?

A Yes.

-- "make-up pump. Sequence of events from Stafco does not say letdown isolated around this time period. EI does say this was done."

Q And that carries over?

A Yes.

"But doesn't specifically state before make-up pump was started."

Q The reference to EI was EPRI?

A Energy, Incorporated.

Q Do you recall what you meant by a procedural requirement to isolate letdown before

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starting the make-up pump?

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A Yes.

4

Q What were you referring to there?

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A I was referring to whether or not there was an approved procedure for performing this action.

7

Q By isolating letdown you meant shutting off the letdown flow?

8

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A Yes.

10

Q Letdown from the reactor coolant system takes inventory out of the system; is that right?

11

12

A Yes.

13

Q Did you ever get an answer to the question you posed in your comment?

14

15

A I don't recall. I am sure I did, but I can't recall what it was.

16

17

Q You today do not know whether there was or wasn't an approved procedural requirement for isolating letdown before starting a make-up pump?

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A I can't recall that, no.

21

Q Would you look at the next page, please. Look at the last comment on that page for the time indicated one minute and 13 seconds into the event.

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My reading of that comment by the original author is as follows: "Indicated level

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was screwed up whenever the bypass valves were passing steam. Make this a remark and where applicable say indicated level."

Can you make that out from your copy, Mr. Billingsley?

A Yes, I can.

Q Are you able to recall what that comment related to?

A No.

Q Would you take a look at B&W Exhibit 466 which was identified during the deposition of Mr. Floyd to be a copy of a Stafco draft sequence of events and turn if you will to page 23230 as marked for purposes of this litigation. You will note that the bottom comment on that page shows a time of one minute and 13 seconds into the accident, the same as indicated on the comment that we are looking at on B&W Exhibit 550.

The Stafco draft sequence of events identifies the action at that time as "The condensor hot well high level alarm was received. The level was 37.77 inches."

Do you see that?

A Yes.

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Q Does that help refresh your recollection in any way as to what the comment in B&W Exhibit 550 for the time one minute and 13 seconds referred to?

A Yes.

Q Was it referring to the level in the condensate hot well?

MR. GLASSMAN: You are asking the witness to speculate or whether this refreshes his recollection?

MR. WISE: I just asked precisely that question.

MR. GLASSMAN: Just wanted to be sure.

MR. WISE: I am sure you wanted the witness to be sure, too.

A It appears to be what 550 is addressing.

Q You will note that you wrote a comment on B&W 550 next to the original comment for that time. Your comment reads, if I am reading it properly, "See if a problem report was ever put in on this. Verify this statement with operations."

Did you ever find out whether a problem report had been put in on the item mentioned here?

A I don't recall.

Q Do you recall finding out that the

1
2 indicated level for the hot well was incorrect whenever
3 the bypass valves were passing steam? Did you ever
4 find out whether that was a true statement?

5 A I vaguely remember discussing this
6 question, but I don't recall what my final conclusion
7 was.

8 Q Do you know in what manner the hot well
9 level indicator would show an incorrect indication
10 when the bypass valves were passing steam?

11 A No.

12 Q You don't recall whether it would show
13 high or low?

14 A The most detail I can recollect concerning
15 this is I vaguely recall being told that the level
16 in the indicator was like a floater that floated in
17 the hot well.

18 Q What is floater?

19 A It would be a level indicator that floats
20 on water level and I don't know -- I don't recall
21 how that floater was arranged. I don't know if it
22 was like a lever like level that came up it might trip
23 a level.

24 Q Did you ever attempt to determine the
25 consequences of incorrect indication on the condensate

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2 hot well level?

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A No, it wasn't important to address this question.

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Q If I understand your testimony, you do not recall now whether you were able to determine if a problem report had been put in before the accident on this particular item?

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A No, I don't recall.

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Q Were you able to verify the statement made in the comments, in B&W 550 with the operating staff?

MR. GLASSMAN: Which statement are we now talking about?

MR. WISE: The statement that indicated level for the condensate hot well was screwed up whenever the bypass valves were passing steam.

MR. GLASSMAN: There has been no testimony that he did do that.

MR. WISE: I just asked him that question. I am asking him whether he was ever able to gain that verification.

A I don't recall whether I did or not.

Q Would you turn to the next page, please.

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Would you look at the comment for the time,
two minutes and two seconds after the beginning of
the accident. It reads, if I have it correctly,
"Emergency safeguard features equipment all went
to its proper position as indicated by the" --

A Board.

Q -- "board. It appears to be white -- good
human engineering." Your handwritten comment next
to that is "Don't understand the point that they
are trying to make here."

First, let me ask you, do you recall
learning that at approximately two minutes into
the accident the emergency safeguard features
equipment actuated, including high pressure
injection?

A No, I don't recall that.

Q You do recall learning that that
equipment actuated at some point during the early
moments of the accident, whether it was 2:02 or
some other point?

A You would have to ask me about specific
safeguard equipment. The only equipment I personally
did an investigation of was the make-up pumps.

Q Do you recall now why you wrote the

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comment that you did?

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A I can speculate based on what I see here, but I don't recall the comment -- I don't recall what I found. These are very preliminary comments, by the way.

Q Whose are preliminary, yours or the authors?

A My comments are very preliminary.

Q Would you look now at the comment immediately below that for two minutes and four seconds. Comment reads, "Add at 76" --

A At greater then.

Q -- "at greater than 600 pounds you don't get 250 gallons per minute per loop. You get something less but you get enough." Your handwritten comment on that, "Must check out, see pump curves, neither EI nor Stafco mentions this."

Is that a fair reading of what is there?

A Yes.

Q Do you recall what the original or the underlying comments for two minutes and four seconds referred to?

A No.

Q Would you look at the Stafco report

1
2 B&W 466 and turn to page 23232 as marked for
3 litigation purposes. You will note that the top
4 comment is listed for two minutes and four seconds
5 and reads, "Reactor coolant make-up pump C started
6 automatically leaving pumps 1A and 1C running.
7 Discharge valves were open to the 250 gallon per
8 minute per loop throttled position."

9 Do you see that?

10 A Yes.

11 Q You will note under the remarks there
12 is a discussion of an in -- an incomplete discussion
13 because there are some blanks in it, of the fact that
14 slightly less or somewhat less of 250 gallons per
15 minute would be expected at reactor coolant pressures
16 other than -- a blank has been left for some psig.

17 Does that help refresh your recollection
18 as to what the original comment and your notation
19 with respect to it on B&W Exhibit 550 related to?

20 A Yes, it does.

21 Q Isn't it a fact that that relates to the
22 amount of high pressure injection flow into the
23 system at approximately two minutes into the accident?

24 A That's correct.

25 Q Your comment said "Must check out C pump

1
2 curves."

3 What does that refer to?

4 A That refers to an output curve telling
5 you at what various output of pressure, what kind
6 of fuel you'll receive out of the pump.

7 Q Where did you find or get a hold of
8 curves like that?

9 A Curves like that you could get from
10 maintenance or operations.

11 Q Do you recall whether you ever obtained
12 those curves?

13 A I don't recall.

14 Q Would you turn to the next page, please,
15 of B&W Exhibit 550, the comment at the top of the
16 page is, for the time three minutes and 26 seconds
17 into the accident it reads, "Say the reactor coolant
18 drain tank was liquid full." Your comment next to
19 that is "Check if there is level indication for the
20 tank. How do you know it's liquid full?"

21 I take it that comment refers to the
22 reactor coolant drain tank which is connected through
23 the discharge piping to the relief valves at the
24 top of the pressurizer?

25 MR. GLASSMAN: May I have that read back?

(Question read by the reporter.)

MR. GLASSMAN: Is that a series of questions?

MR. WISE: I am trying to establish that we are talking about the reactor coolant drain tank that receives flow from the valves at the top of the pressurizer.

Q That is the one we are talking about, isn't it?

A That's correct.

Q Did you ever check to see if there was a level indication for the tank?

A I don't recall what I found out with respect to that tank. I don't know what conclusions I drew.

Q Did you ever find out how the operator would know if it was full of liquid, the second part of your question on your comment?

MR. GLASSMAN: Objection. First, there may be an inaccurate reading of the comment and, second, it's impossible for Mr. Billingsley to testify as to how the operators would know something.

If you would like to ask him about whether

1
2 there was some indication which Mr. Billingsley
3 looked at or whether he spoke to operators
4 and they told him something that they were
5 aware of, that would be appropriate.

6 MR. WISE: I don't understand your
7 objection.

8 MR. GLASSMAN: You are asking Mr. Billingsley
9 to speculate as to what operators would know.

10 MR. WISE: The question is as he wrote
11 it, "How do you know it's liquid full?"

12 Q Did you ever get an answer to that
13 question?

14 A I don't recall what the answer was to
15 that.

16 Q You look down a little bit further on
17 the page to the comment listed for the time five
18 minutes and 54 seconds after the beginning of the
19 accident. The original comment reads, "Remark,"
20 underscored, "drain tank pressure increase indicates
21 relief from pressurizer." You have written the
22 comment, "On the surface this may" -- "true." I
23 think you omitted the word "be." "But must look at
24 steam tables to make sure steam wasn't passed. A
25 safer statement would be: Pressurizer relieved

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2 system inventory through PORV, therefore, reactor
3 coolant drain tank pressure increased."

4 Do you recall your comment?

5 A Yes, I do.

6 Q What would be the relevance of looking
7 at steam tables in connection with this remark?

8 A Steam tables would be consulted to
9 determine for the given pressure at a point in time,
10 whether you be at a condition to create steam or
11 whether you would be in a liquid or whether you
12 would be in a two-phase flow environment.

13 Q How would that effect the conclusion
14 reached in the remark that the drain tank pressure
15 increase indicated an increase in the pressurizer?

16 MR. GLASSMAN: What the witness had in
17 mind when he wrote this comment, is that
18 your question?

19 MR. WISE: Yes.

20 A Depending on whether you had steam or
21 liquid, you could vary tank pressure. I wasn't
22 sure at that point in time whether anyone had drawn
23 any conclusions as to what passed through the PORV.
24 I know there were a number of discussions going on.
25 I am not sure whether or not there was an investigation

1
2 and I wasn't sure whether or not there was a
3 conclusion drawn.

4 As you may find, some of these
5 questions -- some conclusions weren't reached to a
6 year, two years later with respect to certain aspects
7 of the accident. For the purpose of a sequence of
8 events, until one had drawn that conclusion, I felt
9 that statements there were substantial
10 unknowns and you would be better off stating a fact and
11 refraining from conjecture until proper investigations
12 had been conducted and conclusions drawn.

13 Q Do you know whether any conclusions
14 were ever drawn with respect to what passed through
15 the PORV during the early minutes of the TMI-2
16 accident?

17 MR. GLASSMAN: Conclusions drawn by
18 whom?

19 MR. WISE: Anyone.

20 A Not to the best of my knowledge.

21 Q Did you ever come to any conclusion as
22 to what an increase in reactor coolant drain tank
23 pressure would indicate other than relief from the
24 pressurizer?

25 A With respect to this accident?

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Q Yes.

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A Repeat that question again.

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Q Let me back up.

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Does the remark here that the increase in drain tank pressure indicate a relief from the pressurizer? As I understand your comment and your testimony, you didn't agree with that conclusion. What I am asking now is whether during the course of your investigation and work you ever learned of any other reason for an increase in reactor coolant drain tank pressure of the type seen during the first five minutes and 54 seconds of the accident at TMI-2 besides relief from the valves at the top of the pressurizer?

A Not to the best of my knowledge, no.

Q Would you now go to the next page in B&W 550. There is a comment at the top of the page for the time 11 minutes and 30 seconds into the accident.

It reads, "When did drain tank temperature pass through 212 degrees? At this point reactor building pressure would have started to rise."

Unfortunately on the copy we have, your comment is partially obscured. However, the part we

1
2 can read begins, "Diaphragm ruptured, therefore I
3 don't see what importance this question has. Ask
4 J.F. when he saw rise in reactor building pressure."

5 First, let me ask you, do you recall now
6 to whom the reference "J.F." was?

7 A Yes.

8 Q Was that Mr. Floyd or Mr. Flaherty?

9 A Jim Flaherty.

10 Q Did you ever find out from anyone what
11 importance the comment on drain tank temperature
12 had?

13 A I don't recall.

14 Q Did you ever find out why someone was
15 interested in this question?

16 A I knew what they were -- what I felt
17 they were looking for.

18 Q What did you feel they were looking for?

19 A That tank is an enclosed tank so as
20 long as that tank remained enclosed, it had no
21 effect on outside conditions. I felt that they
22 were looking to determine when the rupture disc had
23 broken which would relieve pressure from the tank
24 to containment atmosphere.

25 Q Did you ever ask Mr. Flaherty when a

1
2 rise in reactor building pressure had been seen?

3 A Yes, we discussed that.

4 Q What did he tell you?

5 A He gave me an answer. We reviewed that
6 together. We got an answer for that, but I can't
7 recall what it was.

8 Q Where was Mr. Flaherty getting his
9 information by the way? Was he talking to operators
10 and operating staff?

11 A He went much the same route as I did. He
12 utilized prior sequence of events. He utilized
13 graphs of events which had occurred during the
14 accident, operators, knowledge he had gained working
15 on other investigations he had conducted. He had
16 various sources as well.

17 Q The following comment immediately beneath
18 that reads, "If the reactor coolant drain tank
19 relief passed enough water to see a pressure rise.
20 If not reactor building pressure would not start to
21 rise until 14 minutes and 50 seconds. See 3 minutes
22 and 20 seconds -- was there another leak (earlier)
23 not reactor building? From steam generator B?"

24 Your only comment on that reads, "Stripchart
25 on reactor coolant drain tank temperature."

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Do you recall whether anybody ever looked into the matters raised in the comment I just read?

A It looks like that comment is all in conjunction with the prior comment we just got through discussing. On that basis that question you just read would have been approached along with the prior question concerning when the drain tank passed 212 degrees. It's all part of the same question.

Q Do you recall why the reactor building pressure would not have been expected to start to rise until 14 minutes 50 seconds into the event if the relief was not passing enough water from the drain tank into the building to cause a pressure rise?

A I think what you are asking for -- would you repeat the question again, please?

Q Let me break it down.

A I had to read the question.

(Question read by the reporter.)

A This refreshes my memory, seeing this in context now.

Apparently there is a relief valve on that drain tank. The first part of your question is

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if you are passing through the relief and this is why I would want to take a look at steam tables, et cetera, take a look at what conditions you have coming out of the tank through the relief. Apparently that goes to containment atmosphere. I am not sure. This is long ago. These questions are 1979.

The only other possible cause would be rupture of the diaphragm. So it appears on the basis of reading this question in complete context that 14:50 maybe, I say maybe, I would have to look at a lot of data, maybe addressing when the diaphragm ruptured.

Q Do you recall whether an investigation had been made in connection with the sequence of events work to determine when the diaphragm ruptured?

A Yes, I believe so.

Q Do you recall that it was around 15 minutes into the accident?

A No, I don't.

Q At the end of the comment there is a discussion or a question regarding whether there had been another leak into the reactor building perhaps from steam generator B.

Do you recall whether there was any

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investigation that you were aware of in connection with the sequence of events, to find out whether that was the case?

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A No investigations that I can recall.

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Q You don't know what answer, if any, was ever arrived at concerning that question?

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A No.

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Q Would you turn to the next page, please. Look at the comment listed for time 38 minutes 11 seconds. It reads, "There is conflicting testimony on whether the operators knew the rupture disc had broken." Next to that in your handwriting is, "QB check out testimony here."

Did you in fact check out the testimony concerning whether the operators knew whether the rupture disc had broken by 38 minutes and 11 seconds into the accident?

A First of all, I had a question here under time. The time looks substantially out of sequence as to the other times. I will attempt to answer your question.

Yes, I did take a look at operator testimony on this issue.

Q What did you find out?

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A I don't recall.

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Q Would you take a look at B&W 466 which is the draft Stafco sequence of events and turn to page 23243 as marked for litigation purposes.

Would you look at the comment listed for the time for 38 minutes and 11 seconds, the same as in B&W Exhibit 550. That comment reads, "The auxilliary operator stopped reactor building sump pump B." The remarks under that comment are, "The two reactor building sump pumps had operated for 31 and 28 minutes respectively based on the measured capacity of each pump. Approximately 8,260 gallons of water was transferred to the auxilliary building. The automatic pumping of the reactor building sump was not considered abnormal since operators knew that the reactor coolant drain tank rupture disc had broken. Sources for that are data and TMI staff interviews."

Does seeing that refresh your recollection as to why the time 38 minutes and 11 seconds appears for the comment made in B&W Exhibit 550 concerning whether the operators knew that the rupture disc had broken?

A It refreshes my memory as to the question.

1
2 But it does not refresh my memory as to when the
3 operators had known when the disc had broken.

4 Q What was the answer as to why 38 minutes
5 and 11 seconds had been picked as a time to which
6 the comment concerning operator knowledge of the
7 rupture disc blowing was attached?

8 MR. GLASSMAN: Could I have that read
9 back?

10 (Question read by the reporter.)

11 A This comment don't really tell you when
12 the operators knew the disc had blown. This
13 only -- this really only addresses the fact that you
14 have some pumps -- a sump pump running rather and
15 why nobody considered it has no significance. It
16 doesn't tell you when they knew the disc had blown.

17 Q You had written on B&W Exhibit 550 next
18 to the time the question, "Where did this time come
19 from?" I guess a better way to put my question is:
20 What did you find was the answer to your question?

21 A I can't say. I believe we pinpointed
22 it down to a time, but I can't say what that time
23 was.

24 Q Would you look down at the bottom of the
25 page we were referring to of B&W 550 and note the

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comment listed for the time one hour 20 minutes 31 seconds which reads, "Isolate the time then make a sequence remark about the relief valve temperatures." Then there is some writing of various numbers, 402, 403, 404. Your comment underneath this item reads, "QB will do."

Do you see that?

A Yes.

Q First let me ask you, do the numbers 402, 403, 404 refer to the computer points or I think at some point they are called multiplex points on the indicators available in the control room from the plant computer which would show relief valve discharge pipe temperatures?

A I don't recall what the multiplex points are for tailpipe temperatures.

MR. WISE: Let me have marked as B&W Exhibit 551 a single handwritten page. It appears to be in Mr. Billingsley's handwriting entitled "(From Typed Stafco Questions)" and labeled "Question 19" and then it has some writing on that.

(Single handwritten page entitled "(From Typed Stafco Questions)" marked B&W

1
2 Exhibit 551 for identification, as of this
3 date.)

4 Q Mr. Billingsley, is Exhibit 551 in
5 your handwriting?

6 A Yes, it is.

7 Q I believe this relates to later Stafco
8 questions, but because it is on the same point, we
9 might as well take it up now.

10 This document refers to an attached
11 computer printout.

12 MR. WISE: I would like to have marked
13 as B&W Exhibit 552 a portion of a computer
14 printout which was produced to us from your
15 files.

16 (Portion of a computer printout marked
17 B&W Exhibit 552 for identification, as of this
18 date.)

19 Q Do you recognize B&W Exhibit 552?

20 A Yes, I do.

21 Q Is that a portion of the computer printout
22 during the TMI-2 accident?

23 MR. GLASSMAN: You are not asking the
24 witness to speculate?

25 MR. WISE: I am not asking him to speculate.

1
2 Why don't you give him an instruction not to
3 speculate. Rather than every time I ask him
4 a question instruct him not to speculate
5 every time. It's getting to be very repetitive
6 each time.

7 If you want to counsel your witness not
8 to speculate and prepare him for the deposition,
9 I prefer you, as a matter of fact I expect you
10 to. Occasionally it's all right but every
11 other question you tell him not to speculate,
12 it's getting out of hand.

13 MR. GLASSMAN: I don't think it's getting
14 out of hand when you show one sheet of a longer
15 computer printout maybe, it doesn't have any
16 identifications at the top of it exactly what
17 it is from and I don't want the witness to
18 guess.

19 A Yes, this is dated 3/28/79.

20 Q Would you look at B&W Exhibit 551. It
21 says, "Based on the attached computer printout the
22 following points were printed." You will note
23 you have a chart there at the left-hand column, a
24 column for the time and you have four entries for
25 the time approximately 5:21 A.M.

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2 The second column is headed "MPX" and
3 lists three digit identifying number and the fourth
4 column -- the third column to the right is headed
5 "Temperature" and it lists various temperatures
6 beginning with 283 and going through 211, 218 and
7 218 is the final entry.

8 Do you see those columns and entries?

9 A Yes.

10 Q Am I correct that the time column refers
11 to the real time or time of day as shown by the
12 computer printout for the morning of March 28, 1979?

13 A Yes, you are correct in that statement.

14 Q Second column MPX refers to the multiplex
15 point shown on the computer printout?

16 A Yes, you are correct in that statement.

17 Q The numbers 402, 403 and 404 refer to
18 the thermocouples for the discharge line piping
19 leading from the relief valves from the top of the
20 pressurizer?

21 A Yes.

22 Q The final column which is headed
23 temperature would refer to the temperature shown for
24 that particular thermocouple indicated?

25 A Yes.

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2 Q You made up this chart from the information
3 on B&W Exhibit 552 which is a portion of the computer
4 printout for the morning of the accident and I note
5 that it includes the indication or indications for
6 approximately 5:21 A.M.

7 A Yes.

8 Q Do you recall now what was the purpose
9 of your making up B&W Exhibit 551?

10 A I would have to go back and take a look
11 at the original question.

12 MR. WISE: We'll mark the Stafco
13 questions -- I believe we have already done
14 that.

15 Q If you would look at B&W Exhibit 511 which
16 is Mr. Ankrum's memo to Mr. McEwen of November 26,
17 1979 attaching an 8-page list of sequence of events
18 questions dated November 19, 1979 and turn to page
19 3 of the 8 pages. You will note the question
20 numbered 19 references the time one hour and 20
21 minutes into the event.

22 Do you see that?

23 A Yes.

24 Q One hour and 20 minutes would correspond
25 to approximately 5:20 A.M. by time of day?

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2 A Yes.

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3 Q On the morning of March 28?

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4 A Yes.

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5 Q The comment there or the question reads,

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6 "What was the exact time when the operator requested

6

7 data points 402 (followed by a paper roll-down), 403

7

8 (a keying error), 403 and 404, which resulted in his

8

9 reading 403, and 403 and 404 as 402, 403 and 404?

9

10 What temperatures were read to the Shift Supervisor?"

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11 That's the end of the question for

11

12 item 19.

12

13 A Yes.

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14 Q Does that help refresh your recollection

14

15 that B&W Exhibit 551, your handwritten comments were

15

16 an attempt to answer the question posed in item 19

16

17 in the sequence of events questions attached to

17

18 B&W Exhibit 511?

18

19 A Yes.

19

20 Q What is your recollection of what this

20

21 question and your answer are all about, if you can

21

22 explain it in layman's terms?

22

23 A The only thing I can recall is that

23

24 there were some questions as to what the shift

24

25 supervisor was providing for temperature readings on

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the relief valves.

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Q Who raised that question?

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A I don't recall. And I was asked to take a look at that statement and verify it or find out what in fact would have been read.

7

Q Your handwritten note on B&W Exhibit 551 discusses one possibility, does it not, as to how the operators may have misread the computer printout? I am speaking about the part where you have a chart at the bottom where you have two columns. One has actual MPX point and the other is possible reading error MPX 1.

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You are referring to one set of possible errors that could have been made?

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A That's correct.

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Q Were you ever able to determine in fact that was the error that was made?

18

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A No. There would be no way to -- for me in hard cold facts to substantiate what error was in fact made.

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Q You didn't interview operators or follow up their testimony to find out what they said about this particular point?

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A I may have. I went through an awful lot

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of interviews for some of these questions to try and find out facts. I may have in fact done that. As a matter of fact, I had some of the copies of the interviews.

Q You have no recollection today of whether you were able to confirm this scenario that you have charted at the bottom of B&W Exhibit 551 as what actually happened or whether it remained simply an hypothesis on your part?

A I never came up with a hypothesis on this. This is strictly somebody else's hypothesis that I was trying to check out and verify. In the absence of going to hard cold technical data, as far as I was concerned, in the absence of that, there still remained word of mouth.

Q What remained word of mouth?

A This statement concerning the error.

Q In other words, you were not convinced that an error had been made in reading the temperature of the computer printout?

A It's not that I wasn't convinced. A statement was made and I was asked to verify it and the only way to verify it was either through hard cold data or operator interviews which I had been

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taking. In the absence of one I would have to rely on the other to provide as much verification of the statement as possible.

If you are asking me what this is saying, I can probably tell you what this is saying, my statement on 551 is stating. That's all I could do for you.

Q What is your statement on 551 saying?

A Let me take a look and I will tell you.

My statement here is saying when the paper was rolled down you have three multiplexer points shown together, 403, 404 and 404. With the paper rolled down in this particular position, it's possible for someone to interpret those three multiplexer points put together as being 402, 403 and 404.

So what I am saying is that it's possible for the computer to printout 403 and with the paper rolled down it's possible for someone to read that as 402.

Q Assuming as you did here that they read neither the multiplexer point nor the title of the printout, either one of those would have told the reader that he was not getting point 402, the

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reactor coolant pressurizer relief valve out
temperature?

A That's correct.

Q Did you ever learn who it was at
approximately one hour and 20 minutes into the
accident who called up the relief valve temperatures
on the printer and read them out?

A No, I don't recall finding out who that
was.

Q If you would go back to B&W Exhibit 550
at this point. Would you turn to the next page in
B&W Exhibit 550 and look at the comment listed for
one hour 33 minutes into the accident. It reads,
"Remark, initial rise was due to quenching rapid
drops were due to cooling." Then there is a
parenthetical which I believe reads, "saturation."

Do you see that?

A Yes.

Q Your comment next to that is, or at
least next to the word quenching, "Isn't this the
same as cooling?" Beneath that and perhaps referring
to the entire comment, "No reason to put in report
(sequence of events)."

Do you recall what that comment referred

1
2 to, the one for one hour and 33 minutes?

3 MR. GLASSMAN: Mr. Billingsley's or

4 both?

5 A No, I know you are going to refresh my
6 memory.

7 Q If you would look at B&W 466, the
8 Stafco sequence of events, and turn to page 23248,
9 you will see a comment listed there for one hour
10 and 33 minutes which reads, "The control room
11 operators increased high pressure injection flow
12 to 150-200 gallons per minute per line to the A loop.
13 Reactor coolant system pressure peaked and dropped
14 rapidly and source intermediate range indications
15 sparked upward. Source left range, source is
16 Nuclear Regulatory Commission's interviews and
17 plan stripcharts."

18 Does that help refresh your recollection
19 as to what comments in B&W Exhibit 550 related to?

20 A Yes.

21 Q Did you ever find out that at one hour
22 and 33 minutes into the accident the operators had
23 HPI running?

24 A I would have to go back and take a look
25 at the make-up pump operation.

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Q Do you remember doing any work on this particular comment, the one for one hour and 33 minutes?

A Yes, I remember it because of the word quenching.

Q What do you recall about that?

A About the word quenching or the work that I had done?

Q The work you had done.

A I don't recall very much to be honest with you.

Q Why don't you tell us what you do recall?

A I remember the word quenching because I didn't know what it meant by it. Quenching from my understanding was the same as cooling and I didn't know what the situation they were trying to place in the difference in the two words.

Q Did you ever find out?

A I believe I did, but I can't tell you what I found out.

Q Do you know whether the comment concerning operator increase of high pressure injection flow was still in the draft sequence of events as of the time you left the project in May 1980?

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A I don't know.

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Q Do you recall any discussion about whether that comment should be left in, taken out or modified?

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A No, I don't.

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By the way, to the best of my knowledge, I don't recall Stafco ever getting back to me what responses to my answers to their questions, once I completed my work. I don't recall Stafco getting back to me on it.

Q Do you ever recall discussing with anyone the basis upon which Stafco had made the entry that appears for one hour and 33 minutes concerning high pressure injection flow?

A I don't recall other than to say the only basis that I can determine right now is as shown in the source is here.

Q I guess I am trying to go behind that to see if you have any recollection of having any discussion with the Stafco people concerning how they came to the conclusion that high pressure injection flow had been increased at one hour and 33 minutes to between 150 and 200 gallons per minute per line in the A loop.

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A That's making a couple of assumptions.

Assumption A is that this is Stafco. If you say it is, I will agree.

Q We'll be able to prove this is Stafco's report.

A The other problem is that Stafco did a cut and paste on a lot of their work. They saw stuff from other people so -- in some instances if another party who did a sequence of events made an error, it will be carried through by Stafco. So their comments may be exactly the same as comments from some other source.

The answer to your question is I don't know how this comment 1:33 came about.

Q You don't recall any discussion concerning it?

A No, I don't recall.

Q Did you participate in any review of the reactor coolant system pressure charts data for the period around one hour and 33 minutes to determine what pressure was doing and why at approximately that time?

A I don't recall.

Q Do you know whether anyone did?

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A No, not to the best of my knowledge,
today, no.

Q You will note that for the comment in
the Stafco report, B&W Exhibit 466 at one hour and
33 minutes there is a parenthetical in the right-hand
margin beneath the entry with the letter Q and
next to the section for remarks which is blank in
this particular draft of the sequence of events,
there is a parenthetical with the letter R.

A Yes.

Q Do you have any knowledge as to what
those parentheticals indicate?

A No, I don't remember.

Q Look at the next page of B&W Exhibit 550
and the handwritten comment for one hour and 42
minutes following the beginning of the accident. It
reads, "Counts increasing again due to boil off."
Your comment on that reads, "What time does this
refer to? Prefer to leave out but this is a true
statement."

You may wish to refresh your recollection
as to what the event at one hour and 42 minutes was.
You may do so by taking a look at page 23250 in
B&W Exhibit 466, the Stafco report. There is an

1

2

entry for one hour and 42 minutes which reads,

3

"The source range count level, followed by

4

intermediate range monitor input start upward

5

trend. The control room operator reports

6

'emergency borated'." Under remarks it reads,

7

"Over the next 15 minutes source range count rate

8

level increased two decades without exhibiting

9

previously observed oscillatory behavior."

10

Does that help refresh your recollection

11

as to the comment on B&W Exhibit 550 for one hour

12

and 42 minutes and your question with respect to

13

the comment?

14

A Yes, it refreshes my memory. However,

15

there is a comment I have here that makes me wonder

16

about the entire statement. I don't know what I

17

meant by that I questioned it for some reason. It

18

refreshes my memory.

19

Q Why did you prefer to leave out the

20

statement concerning the fact that the counts were

21

increasing due to boil off?

22

A I don't know.

23

Q The counts we are referring to are

24

indication of increasing radiation activity in

25

laymen' term in the core; is that right, or the

1

2 reactor coolant system?

3

4 A I believe we are talking neutron flux
there, yes.

5

6 Q The boil off that is referred to in
the comment in Exhibit 550 is the boil off of
7 reactor coolant system inventory?

8

9 MR. GLASSMAN: Is that a question or a
statement?

10

11 MR. WISE: That's the question I am
asking.

12

13 Q Wasn't that your understanding of this
comment?

14

15 A In light of the comments here on 1:42,
I can't necessarily make that statement today.

16

17 Q You don't recall what was meant by
boil off?

18

19 MR. GLASSMAN: Are you looking for what
who wrote this meant?

20

21 MR. WISE: We don't have that individual
here. We are looking for what Mr. Billingsley
22 remembers when he got this set of comments
and did some work on it. He obviously read
23 it. He wrote a comment on it and he must
24 have had some understanding of the time of
25

1
2 what boil off meant. I am simply asking
3 if he can now recall what his understanding
4 was.

5 A No, I don't. It could be a couple of
6 different things. Therefore, today, I don't know
7 what I meant or what was meant here although I
8 may have then.

9 MR. WISE: That concludes my questions
10 on B&W Exhibit 550 which I believe was
11 connected up with the material attached to
12 B&W Exhibit 512.

13 Q Going back to B&W 511 which was the
14 November 26 memorandum from Mr. Ankrum. We have
15 already established there is attached to that a
16 series of questions on the sequence of events. I
17 believe it is about eight pages long.

18 Do you recall if you ever saw a set
19 of answers to those questions?

20 A Some of these questions look familiar.
21 I think I developed the answers for them.

22 Q Do you recall what was done with the
23 list of questions on the sequence of events that
24 was attached to B&W 511? Was it given to various
25 people and divided up for individuals to go out and

1
2 attempt to develop answers?

3 A Are you talking about these questions
4 here?

5 Q I am talking about the questions in
6 the eight-page attachment to B&W Exhibit 511,
7 Mr. Ankrum's memo.

8 A Are you asking me about these questions
9 or the responses?

10 Q Let's take the questions first and see
11 how the responses were developed.

12 A Some of these look familiar to me.
13 Obviously I worked on, for instance, number 19
14 in this package of 511. Yes, I have seen these
15 questions.

16 Q Do you recall what procedure or what
17 the drill was, if you will, as to how these
18 questions were handled?

19 A These questions may have been split
20 up between myself and Jim Flarethy and I don't
21 know how that split was done. I knew at one time
22 we took the sequence of events, eyeballed the mid
23 point of the package and he got half, I got half
24 and we went off and worked on it. In areas where
25 he had particular knowledge or expertise, he

1
2 handled those questions, even if I was initially
3 given that to respond to and vice versa. If I had
4 a particular area of expertise, I would get those
5 questions that he may have initially worked on.

6 Q Who had the area of expertise concerning
7 high pressure injection flow?

8 A Flow?

9 Q Yes.

10 A Or the pumps?

11 Q Flow.

12 A Nobody. We both were capable of taking
13 a look at flow based on pump curves.

14 Q I take it you were the person
15 responsible for looking at -- primarily responsible
16 for looking at the operation of the make-up pumps
17 both in their make-up mode and high pressure
18 injection mode?

19 A I looked at the pumps strictly from
20 high pressure injection mode point of view, how
21 they were operated during the accident, during the
22 accident they were operated as safety injection
23 pumps or high pressure.

24 Q Based on what you can recollect on
25 all the investigation you did, based on the sequence

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of events or anything else that you did, are you able to state whether the pumps were operated in the high pressure injection mode between the time they were initially terminated at about the first five minutes of the accident and the time that the reactor coolant pumps were turned off at approximately one hour and 40 minutes into the accident?

MR. GLASSMAN: Can I have that read back?

(Question read by the reporter.)

MR. GLASSMAN: I assume the question is related to whether Mr. Billingsley ever made any study or conclusion or in that regard. You are not asking him now to go back and reanalyze what he did before?

MR. WISE: I am not asking him to reanalyze.

A I took a look at the operation of the make-up pumps during the accident. I did not evaluate reasons for operator action which is implied in the question.

Q I didn't think it was. I thought it was a straightforward question.

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A It's implied because the problem with the make-up pumps is it's a make-up pump and it's a safety injection pump and I looked at those pumps during the operation -- during the accident, whether they were on or whether they were off. Whether or not that pump operates as a safety injection pump is determined by plant conditions. I did not necessarily investigate how the operator was using the pump. I am reluctant to make a statement in that area because I looked specifically as to when the pump was on and when the pump was off during the accident.

Q Maybe I am confused. Can you tell from the sorts of data that you looked at, whatever they may have been, whether that particular pump is operating in its high pressure injection mode or the make-up mode?

A You can tell in some instances because if the emergency safeguard system comes in and fires the pumps off, the pump being fired off is a consequence of the safeguard system which is fired off, quote, unquote, to mitigate the consequences of an event.

Typically that event would be high pressure

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injection, that's when it would come in and assist actuation. The operator can manually turn that pump on and manually turn that pump off.

When you start asking about the operation, you have to ask are you addressing actuation of the safety system, which in that particular instance is clear and straightforward the purpose of the pump or are you asking when the operator turned it on and turned it off. In that particular instance you are asking what is operator action, what his response and why is he doing. I did not address that. We are addressing a pump with dual purpose.

Q I am a little fuzzy on what it is you can tell by looking at whatever data you have.

A You can tell when the pump is on or off.

Q You can't tell when the pump is operating in the high pressure injection mode as opposed to the make-up mode unless the high pressure injection has been initiated upon an emergency safeguard features signal?

A Yes, that's true if you are looking strictly at when the pump is on and when the pump

1
2 is off. There may be particular valve lineups
3 that I am not aware of that were not important to
4 my investigation. There may be particular valve
5 lineups that may tell you whether or not the pump
6 is being used for one purpose versus the other, that
7 is, make-up versus safety injection. I cannot give
8 you a knowledgeable answer unless I take a look at
9 all aspects of the pump operation and its intended
10 purpose, that is, valve positions, how it started,
11 what the conditions are in the system, which may
12 give all keys to help you positively identify
13 purpose of pump operation.

14 Q None of your work involved making such
15 an analysis?

16 A I wasn't necessarily, no.

17 Q So based on the data you looked at,
18 you are not able to state today at what times during
19 the first hour and 40 minutes of the accident the
20 pumps were operating in the high pressure injection
21 mode except for those instances where they were
22 actuated upon an ESF signal?

23 A I would say based on my knowledge today
24 which is approximately two and a half years after
25 the time period in which I did that report, that is

1
2 a true statement.

3 Q Let me go back now to B&W 511 and the
4 attached set of questions. It is my understanding
5 that it was divided up. You prepared some answers,
6 Mr. Flarethy prepared some answers.

7 Were there others who prepared answers
8 to these questions?

9 A There may have been, but not to the best
10 of my knowledge.

11 Q Did you send out parts, for instance,
12 to Mr. Floyd, Mr. Miller, Mr. Zewe or others for
13 their response?

14 A I may have.

15 Q When you got all the responses from
16 whomever you may have asked plus your responses
17 plus Mr. Flarethy's responses, what was done with
18 all that?

19 A I believe they were all packaged up
20 and sent out to Stafco.

21 Q What did Stafco do with them, to your
22 knowledge?

23 A I don't recall.

24 MR. WISE: Let me have marked as B&W
25 Exhibit 553 a copy of a four-page typed set

1
2 of responses labeled "Stafoo" typed Al
3 Ankrum.

4 (Four-page typed set of responses
5 labeled "Stafoo" marked B&W Exhibit 553 for
6 identification, as of this date.)

7 Q Do you recognize B&W Exhibit 553?

8 A No, but I recognize my writing.

9 Q You do have some handwriting on there?

10 A Yes.

11 Q I don't want to waste a lot of time on
12 this, but if you would just very quickly look at
13 the numbered questions on the list attached to B&W
14 Exhibit 511 and scan the first couple of numbered
15 items on B&W Exhibit 553 which to my untutored
16 eye appears to be a set of responses to the very
17 questions asked in 511.

18 Would you see if that helps to refresh
19 your recollection that B&W Exhibit 553 is not in
20 fact the typed set of initial responses or perhaps
21 final responses to the questions in B&W Exhibit 511?

22 A They appear to be the same questions or
23 possible responses to those questions posed in 511.

24 Q Do you remember having any discussions
25 concerning the responses in B&W Exhibit 553?

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A No, I don't.

3

Q Do you remember what, if anything, was

4

done with them?

5

A No, I don't.

6

Q The various papers we have been reviewing

7

and documents seem to cluster around a period early

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November through the end of November, perhaps early

9

December of 1979. You testified during an earlier

10

portion of your deposition that you continued work

11

on the sequence of events until May 1980 when you

12

took another position with the company.

13

Do you recall whether there were further

14

documents, memoranda, series of comments and

15

questions that were prepared after the set of comments

16

and questions we have been reviewing here today for

17

November and early December?

18

A I know the work continued with respect

19

to other aspects of the Stafco sequence of events.

20

I cannot say that this is all that was generated as

21

a consequence of that work.

22

Q Besides these materials which we have

23

been discussing, what else do you recall was done

24

on the Stafco?

25

A I know we took a look at various times,

1

2 aside from these questions, took a look at various
3 times for compatibility between Stafco's version of
4 sequence of events and other versions of sequence
5 of events. So I am pretty sure this is not all.

6 Q Did you write further letters or
7 memoranda to Stafco commenting upon their draft
8 sequence of events?

9 A I don't know if I did. I know, for
10 instance, I had written a change order to give them
11 more funding to continue work at the request of
12 Ed Wallace.

13 Q What is the best of your recollection
14 as to how you worked with Stafco, say, from January
15 of '80 through May of '80; was it face-to-face,
16 over the telephone or correspondence?

17 A Correspondence and telephone.

18 Q You continued to deal primarily with
19 Mr. Ankrum?

20 A I think I had a lot of conversations
21 with Mr. McEwen. In the back of my mind it seems
22 like I had more conversations with Mr. McEwen than
23 Mr. Ankrum.

24 Q Did you make notes of your conversations?

25 A Yes, with respect to -- notes similar

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to what you have seen that I have done in the past.

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Q Do you know whether you retained those notes in any file?

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A I have turned everything over. Anything I have would be back in my office for me not to touch. They are in boxes and they are labeled.

MR. WISE: For whatever reasons we seem to have nothing after this sequence of memoranda. I would obviously like to ask Mr. Glassman if there are further notes or documents referring to work done on the Stafco sequence of events following the memoranda and notes that we have already marked here today, we obviously would like to have them produced.

Q My recollection, Mr. Billingsley, that as of the time that you changed positions in May 1980, the Stafco report had not been completed; is that right?

A To the best of my knowledge, that is a true statement.

Q Were there a series of drafts that Stafco prepared over time while you were working on the project?

1
2 A I only recall working with one draft,
3 but there may have been more -- there may have been
4 one before the one I got. There may have been
5 others subsequent to the one I got.

6 Q You don't recall on a weekly or monthly
7 basis that there would be an update reflecting all
8 the comments received to that point?

9 A No.

10 Q At most, the one that you had and you
11 think there might have been one other but it was not
12 a regular thing where there were a series of drafts
13 each one improving on the last?

14 A That's true. I don't know what we used
15 as the final sequence of events.

16 Q Who took over your job when you left?

17 A I don't know.

18 MR. WISE: That's all I have.

19 (Recess taken.)

20 EXAMINATION BY MR. GLASSMAN:

21 Q I show you what has been marked as
22 B&W Exhibit 456. Do you recall being asked some
23 questions earlier in your testimony with regard
24 to that document?

25 A Yes, I do.

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Q I would like you to open up to pages 12 to 14 of that document for a moment.

Do you see those pages?

A Yes, I do.

Q Would you take a few moments to review those pages, please?

A Yes, I recall these.

Q Have you had a chance to review those pages?

A Yes, I have seen it before.

Q What was the source of the information contained in these pages regarding the nature of PORV failures at sites other than TMI?

A The source?

Q Yes.

A The source of this information is taken from the Kemeny Commission report. To investigate to TMI accident.

Q When B&W Exhibit 456 otherwise referred to as TDR-160 was prepared, did you have any knowledge or understanding as to the Kemeny Commission's sources of information?

A No.

Q I would like to refer next to Table 2

1
2 of B&W Exhibit 456 which appears on page 26 through
3 39 of this exhibit. It bears the identifying
4 numbers for purposes of this litigation 1307 through
5 1320.

6 Have you had an opportunity to review
7 those pages?

8 A Yes.

9 Q Can you briefly describe for us the
10 nature of the material on those pages?

11 A These are statements provided by the
12 Kemeny Commission report on PORV failures and this
13 particular data has been extracted verbatim from
14 that Commission report.

15 Q I would like you to turn to page 12 of
16 B&W Exhibit 456. The first paragraph on that page
17 begins with the sentence, "A more complete list of
18 PORV failures is contained in the Technical Staff
19 Analysis Report to the Kemeny Commission."

20 The paragraph continues and concludes
21 with the following sentence, "It should be further
22 noted that the failures at Beznau (Westinghouse
23 Plant with a power operated globe valve) and
24 Davis-Besse (B&W plant with a Crosby PORV) do not
25 merit consideration if evaluating the reliability of

1

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the Dresser PORV."

3

Do you see that sentence?

4

A Yes.

5

Q What was the basis of the statements

6

made in that last sentence?

7

A The basis of these statements are from

8

the comments made in the Kemeny Commission report.

9

Q When B&W Exhibit 456 also known as

10

TDR-160 was prepared, had you become aware of more

11

than one failure of the PORV at Davis-Besse?

12

A Yes, there were two that I became aware of.

13

Q Referring to pages 36 and 37 of B&W

14

Exhibit 456 which have the pages indicated for

15

purposes of litigation number 1317 and 1318, could

16

you tell us what those two pages represent?

17

A This is an accounting from the Kemeny

18

Commission report of two failures at Davis-Besse.

19

Q Did you at any time perform any

20

independent investigation of the reasons for the

21

Davis-Besse PORV failures which are described at

22

pages 36 to 37 of B&W Exhibit 456?

23

A No.

24

Q Looking now at page 37 of B&W Exhibit

25

456, bearing the page number for purposes of

1
2 litigation number 1318 it starts with the heading
3 "Plant: NSS-14 Davis-Besse I," Roman numeral one, and
4 it continues later on in bold face type the
5 notation, "Type of Malfunction:" then continues,
6 "Pilot valve stuck open during PORV testing."

7 Do you see that?

8 A Yes.

9 Q Under that there is a notation "Summary
10 of Incident" and after a colon it continues with a
11 sentence, "PORV was being tested following pilot
12 valve replacement as a result of incident described
13 in SPR 369."

14 Do you know what was meant by SPR 369?

15 A No, I don't recall.

16 Q Referring to the prior page in this
17 document, page 36, there is an indication, the
18 fourth line of that page of an SPR number 369.

19 Does that refresh your recollection
20 as to the meaning of the reference SPR 369 which
21 appears on page 37 of B&W 456?

22 A Yes.

23 Q How does that refresh your recollection?

24 A It's referring to a prior event where
25 they had problems with the relay and it caused the

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valve to cycle numerous times.

3

Q Do you know the origin of the SPR

4

numbers?

5

A No.

6

Q Continuing on page 37 of B&W Exhibit

7

456, there is a further bold face heading

8

"Resolution," and after a colon it reads as follows,

9

"A Crosby representative came to the site and

10

after inspection he recommended increasing the

11

clearances between pilot valve stem and nozzle,

12

eliminating some binding." The paragraph continues.

13

At the time you prepared this document,

14

what was your understanding of the terminology

15

"clearances between pilot valve stem and nozzle"?

16

MR. WISE: I object to that. There

17

is no foundation that this witness examined

18

a Crosby pilot operated valve which is the

19

subject of the comment on page 37. Until you

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have established that foundation, I don't

21

know how he can possibly give any competent

22

testimony concerning the clearances between

23

the valve stem and nozzle on a Crosby valve.

24

MR. GLASSMAN: The question is not

25

directed particularly to the Crosby valve.

1
2 The question is directed in general whether
3 this witness had an understanding of what
4 was meant by the terms "clearances between
5 pilot stem and nozzle.

6 MR. WISE: You are asking him to
7 interpret something in a writing he didn't
8 prepare. He said it came from the Kemeny
9 Commission and he doesn't know where the
10 Kemeny Commission got it.

11 If you are asking him to speak to a
12 specific comment, which relates to a Crosby
13 valve, my objection stands. I don't think
14 there is any foundation for him to testify
15 as to the construction and operation of that
16 valve.

17 MR. GLASSMAN: We agreed that this
18 witness has not laid a foundation for
19 examination of a Crosby valve per se. The
20 question is simply directed to whether this
21 witness has an understanding or had an
22 understanding at the time this document was
23 prepared of the meaning of "clearances between
24 a pilot valve stem and nozzle" in any pilot
25 operated relief valve.

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MR. WISE: My objection stands unless
you lay a foundation that this witness has
made an investigation of pilot operated relief
valves in general and can speak with some
authority not only the Dresser valve but
the Crosby valve and other valves that may be
on the market.

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MR. GLASSMAN: You are helping to
establish the very point I am trying to make.
Namely, the lack of particular investigation
in this regard by this witness. Without
regard to that, I really would like to have
the witness answer the question just to edify
for us on the record as to his understanding
of clearances between the pilot valve stem
and nozzle in a pilot operated relief valve
regardless of manufacturer.

19
20
MR. WISE: My objection stands for the
reasons I stated.

21
22
23
24
25
I will say that I don't understand the
purpose of this line of questioning. If you
want us to stipulate that this is a verbatim
report out of the Kemeny Commission and GPU
will not be held responsible for this or will

1
2 not be held as an admission to GPU, if that's
3 the purpose, let's go to lunch. I don't
4 understand since he already testified that
5 he did not make an independent investigation
6 and he copies this out of the Kemeny Commission.

7 MR. GLASSMAN: I will accept your
8 stipulation but I would like an answer to the
9 question. I have a few more and then we can
10 go to lunch.

11 MR. WISE: My objection stands.

12 Q Mr. Billingsley, you may answer.

13 A I can't say that I do. I am familiar
14 with the stem and nozzle components but I am not
15 sure what is meant by clearances here.

16 Q Does the TMI-2 PORV have a pilot valve
17 stem?

18 A Yes, it does.

19 Q Does it have a nozzle?

20 A Yes, it does.

21 Q During the course of your work on B&W
22 Exhibit 456, TDR-160, did you ever review or
23 investigate the clearances between the pilot valve
24 stem and the nozzle on the TMI-2 PORV?

25 A Never did.

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Q Page 37 of B&W Exhibit 456 continues with the statement, "In addition, the pilot valve was adjusted so that maximum travel is 0.125 inches rather than the previous 0.375 inches."

Do you see that statement?

A Yes.

Q At the time you prepared this document, did you have an understanding of the meaning of the term "maximum travel" in connection with PORV's?

MR. WISE: My same objection stands. I don't think there is any foundation qualifying this witness as an expert with respect to PORV valves generally.

MR. GLASSMAN: We were not trying to qualify him as such. I am trying to find out if he had an understanding in that regard.

MR. WISE: My objection stands.

MR. GLASSMAN: You may answer.

A No, I do not have an understanding of what was meant there only because the valves are small, extremely small valves.

Q During the course of your work on B&W Exhibit 456, also known as TDR-160, did you ever review or investigate the maximum travel on the TMI-2

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PORV?

3

A Not to the best of my knowledge.

4

Q At the end of page 37 on B&W Exhibit 456,

5

after the bold face heading "B&W Follow-up Action,"

6

there appears the sentence, "None - not considered

7

generic since this is our only Crosby PORV."

8

Whose conclusion was that?

9

A I don't know. This was taken from the

10

Kemeny Commission report.

11

Q Do you know to what party the word "our"

12

refers to?

13

MR. WISE: I object. You are wasting

14

our time with this.

15

A No, I don't.

16

MR. WISE: He already testified he didn't

17

write this. How could he possibly answer the

18

question?

19

MR. GLASSMAN: The witness answered the

20

question.

21

MR. WISE: I have made my objection.

22

MR. GLASSMAN: I have no further questions.

23

(Time noted: 1:00 o'clock P.M.)

24

QUINCY BILLINGSLEY, III

25

Subscribed and sworn to before me

this day of

, 1982.

CERTIFICATE

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

I, CATHERINE COOK, a Notary
Public of the State of New York, do hereby
certify that the continued deposition of
QUINCY BILLINGSLEY, III was taken before
me on February 25, 1982 consisting
of pages 332 through 411;

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

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

IN WITNESS WHEREOF, I have hereunto set my
hand this 12th day of ~~Feb~~ March, 1982.

Catherine Cook

CATHERINE COOK

I N D E X

WITNESS	EXAMINATION BY	PAGE
Quincy Billingsley	Mr. Wise	333
(continued)	Mr. Glassman	401

E X H I B I T S

B&W EXHIBITS	FOR IDENT.
550 14-page set of handwritten notes dated November 8, 1979	342
551 Single handwritten page entitled "(From Typed Stafco Questions)"	372
552 Portion of a computer printout	373
553 Four-page typed set of responses labeled "Stafco"	397

* * *