

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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

Plaintiffs, :

-against- :

80 CIV. 16
(R.O.)

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

Defendants, :

-----X

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 Friday, February 19, 1982, at 10:05
o'clock in the forenoon, before Catherine
Cook, a Shorthand Reporter and Notary Public
within and for the State of New York.



WALTER SHAPIRO, C.S.R.
CHARLES SHAPIRO, C.S.R.

8306290859 830219
PDR ADOCK 05000289
T PDR

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BY: ROBERT F. WISE, ESQ.,

of Counsel

Also Present:

NINA RUFFINI

-oOo-

Q U I N C Y B I L L I N G S L E Y , I I I ,

having been previously duly sworn by a

Notary Public, was examined and continued

to testify as follows:

EXAMINATION (continued)

BY MR. WISE:

Q Mr. Billingsley, you understand you

1
2 are still under oath from yesterday?

3 A Yes, I do understand that.

4 MR. WISE: I would like to have marked
5 as B&W Exhibit 439 a set of notes from a file
6 that was produced to us by your counsel shortly
7 before this deposition began.

8 (Set of notes, the first page of which
9 is a copy of file jacket entitled "EMOV License
10 Submittal, 2-29-80" marked B&W Exhibit 439 for
11 identification, as of this date.)

12 Q At the top page of Exhibit 439 is a
13 photocopy of the file jacket which I presume contained
14 the remainder of the notes in the exhibit. File
15 jacket is labeled "EMOV License Submittal, 2-29-80."

16 EMOV is the same as the PORV; isn't it?

17 A Yes, it is.

18 Q Is this a file you maintained?

19 A Yes, it is.

20 Q What license submittal did this file
21 refer to?

22 A You have to give me a few minutes to take
23 a look at this.

24 This is part of that submittal in
25 response to an NRC audit finding. I believe the

1
2 response was made sometime in December to the NRC.

3 Q December 1979 or December 1980?

4 A I don't recall if it's '79 or '80. I
5 would have to see the document. I would have to
6 assume it was '80, but I would have to see that
7 document.

8 Q What is your best recollection as to
9 whether this file in any way related to the PORV
10 leakage investigation that was reflected in TDR-126
11 which we discussed yesterday?

12 A I believe this is directly related.

13 Q Were these papers part of that investigation?

14 A Yes.

15 Q I would like you to look at the back of
16 the exhibit first because it appears that the papers
17 are placed in chronological order with the most
18 recent towards the top and the earliest toward the
19 back.

20 So beginning at the back of the exhibit,
21 would you look at the page marked for litigation
22 purposes W23713 which is headed "PORV" and bears
23 the date in the right-hand corner January 17, 1980.
24 Page 713 I think is the first page of three pages
25 of notes that are the last three pages in the exhibit.

1

2

Do you see the portion I am referring to?

3

A Yes.

4

Q Do you recall what these notes relate

5

to? Is this a meeting or some investigation you

6

were conducting?

7

A These pages were part of what I was

8

requested to obtain as far as data goes.

9

Q Who made these requests to you?

10

A These requests were made by Ed Wallace

11

and Don Croneberger. Additional requests may have

12

been made by other people but those stand paramount

13

in my mind.

14

Q Do you recall participating in some

15

meeting where these requests were passed on to you?

16

A I can't say these are meeting notes.

17

Q A portion of these three pages of notes

18

relate to insulation on the discharge pipe leading

19

from the relief valves at the top of the pressurizer.

20

Is that right, on just brief review?

21

Have I correctly understood what these notes are

22

about?

23

A I see one line that discusses insulation,

24

page 2713, the very last line.

25

Q The top line?

1
2 A The top line as well. Those are the
3 two places that I notice insulation is discussed.

4 Q Do you have any recollection -- before
5 that let's look at the next page, 714. It starts
6 by saying "Stello says that conduction won't
7 support the temperatures we saw." Then there is
8 more information below that.

9 Mr. Stello was the gentleman from the
10 NRC?

11 A Correct.

12 Q Do you recall whether the material that
13 appears underneath that comment related to questions
14 of how well the discharge pipe was insulated?

15 A I can't say what the basis of Mr. Stello's
16 statement is.

17 Q Would you look at the third page of the
18 notes, page 715. Could you read what you wrote there?

19 A "See Floyd or Siezlitz about insulation,
20 RCV3 spray valve, some insulation may have been
21 removed, check control room and see pictures."

22 Q After looking at these three pages, isn't
23 it correct that these notes reflect consideration
24 being given by you to get information concerning
25 insulation on the discharge pipes?

1

2

A That is -- well --

3

MR. GLASSMAN: Are you asking if these

4

notes refresh the witness' recollection as to

5

the entire document?

6

MR. WISE: Yes.

7

A I can say that this reflects insulation.

8

I cannot say this reflects insulation on the inlet

9

or the discharge. From what I have here, I cannot

10

tell.

11

Q Do you have any recollection of the work

12

that you did in connection with these notes, what

13

this is all about, other than just looking at it

14

today cold?

15

A Yes. This is all part of areas that

16

I was asked to try and obtain data for and information

17

for, all relating to TDR-126.

18

Q For instance, let's look at page 713,

19

the bottom note, "call Don Shovlin and find out

20

about insulation on code and electromatic."

21

Do you see that?

22

A Yes.

23

Q The electromatic is the PORV?

24

A Right.

25

Q Did you ever call Mr. Shovlin concerning

1

2

that subject?

3

A I may have.

4

Q Do you have any recollection of doing so?

5

A No, I do not.

6

Q Do you have any recollection of anything

7

you found out about insulation on the tailpipe leading

8

from the relief valves at the top of the pressurizer?

9

A No, I don't recall any information about

10

what I found out concerning insulation.

11

Q Do you recall whether you or the

12

individual who was responsible for gathering that

13

information and making some report with respect to

14

it?

15

A I can say I was requested. I don't

16

know if anyone else was requested, but the final

17

information concerning insulation was not obtained

18

by me to the best of my knowledge.

19

Q Who did get it?

20

A I cannot say. I don't know.

21

Q Do these notes reflect your thinking

22

and work or are they simply to the best of your

23

recollection a transcription of what you were being

24

told by Mr. Wallace and others? For instance, look

25

at page 714, the second page of your notes, comment C

1
2 makes a statement of some sort about tailpipe
3 temperatures and RCS pressure and so on.

4 Does that reflect work that you had done
5 in thinking that you had gone through or is that
6 simply a transcription of something someone was
7 telling you?

8 MR. GLASSMAN: Is the question directed
9 to item C?

10 MR. WISE: Let's take that as an
11 example and go beyond that.

12 A It's difficult for me to say. I have
13 a name written across "Stubbs." This may have been
14 information I was given and I wrote down. I cannot
15 say that this reflects my thinking nor my knowledge.

16 Q For instance, underneath this comment C
17 there is an item 1 which reads, "If we find that
18 at low pressure temperature is less than 170 degrees
19 Fahrenheit, must get data."

20 Is that something you thought or are you
21 simply reflecting something somebody else told you
22 there?

23 MR. GLASSMAN: You want the witness'
24 recollection?

25 MR. WISE: Yes.

1

2

A I don't recall.

3

Q I guess what I am trying to get at,

4

Mr. Billingsley, whether you were taking an active

5

part in actually trying to make some determinations

6

and reach conclusions with respect to this investigation

7

or whether you were simply transcribing material

8

that others were giving you and chasing down

9

information for them?

10

A Yes, I think statement number 1 accurately

11

reflects what my role at this particular point was,

12

data gathering. There may have been, and I am sure

13

there were, other people involved in data gathering

14

as well.

15

Q Would you look at comment D which reads,

16

"Temperature Profile." The first item is, "Need

17

picture of pressurizer relief valve area that shows

18

insulation."

19

Was that something you were supposed

20

to do?

21

A I cannot make a positive statement with

22

respect to that.

23

Q Do you know if you ever got a picture --

24

A I never saw a picture of that area to

25

the best of my knowledge.

1

2

3

4

5

6

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25

Q Second item, "Did TMI-2 ever do a temperature profile of pressurizer area (top of pressurizer)."

Was that something you were supposed to find out?

A Yes, I believe so.

Q Did you?

A To the best of my memory I don't recall ever finding that information out for TMI-2.

Q Third item, "Look at Unit 1 data (temperature profile and insulation)."

Was that something you were supposed to do?

A I cannot say with certainty. No, I don't know.

Q Do you have any recollection as to why you wrote that?

A This may have been something I was told. There were a number of meetings that went on concerning TDR-126 and what would be required to be utilized in that evaluation and investigation. I can't say that I in fact found that data. I can't say that I was in fact solely responsible for locating that data.

1

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Q Do you know whether anybody ever found that data?

A I recall that the temperature profile was performed on Unit 1. I don't recall whether or not I saw that particular data.

Q Who did the work?

A Someone in Unit 1. I don't recall the name.

Q Do you recall anything about what that profile showed?

A No.

Q Moving forward in your notes to the next preceding page which is 23712 it is marked 1-18-80 which is the day following the three pages of notes we have just been discussing. The heading is "PORV Responsibilities."

Do you see that?

A Yes.

Q There are six items listed underneath that heading. This is in your handwriting, I take it?

A Yes.

Q In addition to several of the items that we have just discussed that came from your January 17

1

2

notes, this January 18 memo has two additional

3

notes E and F.

4

5

E reads, "Look at temperature detectors inside containment around S/G shield wall ('D' rings) and see if a representative temperature can be determined from the detectors for the pressurizer and associated valves."

6

7

8

9

Do you see that?

10

A Yes, I do.

11

Q Do you recall who asked you to do that?

12

A No, I do not.

13

14

Q Is that something you thought up on your own or something somebody else asked you to?

15

A Someone must have asked me to do it.

16

Q Do you remember whether you did it?

17

A I don't believe I did this, no.

18

Q Do you know if anyone else did?

19

A I do not.

20

21

Q Item F, "Data on reactor coolant drain tank level and pressure from day 1."

22

23

What is your recollection of what that comment meant?

24

25

A That was a request made to attain this data which I believe was from the data when the unit

1

2

first went into operation.

3

4

Q Is that something you thought up to do
or someone asked you to do?

5

A Someone asked me to do.

6

Q Did you ever perform that task?

7

A I believe I did.

8

9

Q What did you do with the data once you
had it?

10

11

A I had it transferred to Parsippany and
provided it to someone involved with the investigation.

12

Q You don't remember who?

13

A No, I don't.

14

15

16

17

18

19

20

21

22

23

24

25

Q Would you look at the next two preceding
pages marked 23710 and '11. They constitute two
pages of handwritten notes, the first of which bears
the date of January 17, 1980.

Do you see that?

A Yes.

Q Were these handwritten notes that you
made during a meeting of some sort?

A I am not sure. These may have in fact
been meeting notes, but I am not sure.

Q Towards the bottom of the page there is
a list of three items circled a, b and c.

1

2

Do you see that?

3

A Yes.

4

Q Next to b which reads "TMI-2 ever do

5

temperature profile at pressurizer area (top)," you

6

have written in the margin "Dave," it appears to

7

be S-l-e-a-r.

8

A Correct.

9

Q And Bill I-t-c-h-e-r.

10

Do you know who those people are?

11

A I know Dave Slear. I don't recall Bill

12

Itcher.

13

Q What did they have to do with these

14

notes?

15

A I can only say that there must be some

16

association between them and b, but I don't recall.

17

MR. GLASSMAN: I assume the question is

18

just his recollection, not for speculation?

19

MR. WISE: Just his recollection. I

20

don't want his speculation.

21

Q Did you ever work with Mr. Slear in

22

connection with the PORV leakage investigation?

23

A I don't recall working with Slear.

24

Q You don't recall asking him for any

25

information?

1

2

A No, I don't.

3

4

5

6

7

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Q Would you move forward now several pages to the page marked 23707. That's titled "Meeting on PORV Investigation" and bears the date January 18, 1980. I believe your notes there consist of one full page and it is unclear whether the following page, 23708 is part of that or not.

Would you take a quick look at those notes and see whether that helps to refresh your recollection as to whether there was a meeting on January 18, 1980 of a group connected with the PORV investigation?

A Yes, this reflects the PORV investigation.

Q Do you remember the meeting that these notes refer to?

A No.

Q You don't remember who was at such a meeting?

A No, not on that day.

Q Did you remember a Mr. Jim Moore?

A Yes, I know Mr. Moore.

Q Do you remember having a meeting with him sometime in January 1980 in connection with the PORV investigation?

1

2

A I don't recall if I met with him or not,

3

Q How about Mr. Rochino?

4

A I did attend a meeting with Mr. Rochino.

5

I recall one meeting.

6

Q Was Mr. Rochino working on the PORV

7

leakage investigation?

8

A Yes, he was.

9

Q You will note that item 4 of your notes

10

here reads, "Rochino says that at 115 degrees

11

Fahrenheit, thermocouple would be reading ambient."

12

Do you see that?

13

A Yes.

14

Q Underneath the temperature 115 degrees

15

Fahrenheit someone has written "containment air

16

temperature."

17

Is that also in your handwriting?

18

A Yes.

19

Q Do you recall Mr. Rochino discussing the

20

containment air temperature and its relationship to

21

the thermocouple reading on the discharge line on

22

the pressurizer relief valves?

23

A Yes, I believe we did discuss that.

24

Q The comment immediately above that says

25

"Jim Moore also has information on TMI-1 temperature

1
2 profile."

3 Do you recall being told during that
4 meeting that Mr. Moore had the TMI-1 temperature
5 profile?

6 A I don't recall that, no.

7 Q Comment 8 on this page reads "See
8 Julian," and then I can't make out what is written
9 there.

10 Could you spell it for us?

11 A I can spell you what is there.
12 A-b-r-i-m-o-i-c-i. I don't know if it's correct.

13 Q Who is that person?

14 A I don't recall.

15 Q It says, "He plotted primary leak rate"
16 and was working with Jersey Central.

17 Do you recall ever going to see this
18 individual?

19 A No, I don't.

20 Q Do you recall anything about him at all
21 today?

22 A No, I don't.

23 Q Next comment which is labeled 9 reads,
24 "Compare piping arrangement of Unit 1 and Unit 2."

25 Do you remember making that notation?

1

2

A No, I don't remember making that.

3

Q Do you know whether you ever did perform

4

a comparison of the piping arrangement?

5

A I never did.

6

Q Do you know if anybody else did?

7

A No, I don't.

8

Q Would you flip forward in the file now

9

to the page marked 23690. Unfortunately it's hard

10

to read, you might want to look at page '91 and

11

then the page before it because the stamp is

12

superimposed over some of the writing on page '90.

13

On page '90 there is a memorandum in

14

handwriting from J. Stubbs to Q. Billingsley dated

15

January 23, 1980. The subject is RAD Waste

16

Disposal/RC Leakoff Temperature Recorder. Then there

17

is the letter and numeric designation for the

18

recorder and the memorandum consists of three pages

19

with a one-page chart attached which has been marked

20

23693 for litigation purposes.

21

Do you recall receiving this memorandum

22

from Mr. Stubbs on or about January 23, 1980?

23

A No, I don't recall receiving this, no.

24

Q Do you recall asking Mr. Stubbs for this

25

information?

1

2

A No.

3

Q You will note the beginning of his

4

memorandum states "As requested in your letter to

5

me dated 1/22/80, an investigation was made to

6

determine the validity of data recorded by the RAD

7

Waste Disposal/RC Leakoff Temp Recorder." Then it

8

goes on to state his conclusions.

9

Do you recall asking Mr. Stubbs by

10

letter to perform such an investigation?

11

A No, I don't recall.

12

Q Would you look at the third page in the

13

exhibit which is marked 23680. You will see there

14

a handwritten note which begins "What is needed from

15

J. Stubbs." There are two items listed below it.

16

The handwritten note is marked January 22, 1980. You

17

will note beneath the two items that are listed as

18

being needed for Mr. Stubbs, there is the comment

19

"gave Stubbs ink copy of this on 1-22-80."

20

Is that all in your handwriting?

21

A Yes, it is.

22

Q Does it help refresh your recollection

23

as to whether you made a request of Mr. Stubbs on

24

January 22, 1980 for the information provided in

25

his memo to you of January 23, 1980?

1

2

A Does it refresh my recollection? No.

3

Q You have no remembrance of doing that?

4

A No.

5

Q Do you know why you asked Mr. Stubbs for
6 this information?

7

8

9

10

MR. GLASSMAN: Objection. If he has
no recollection of it -- I don't see how he
can answer something that he doesn't recollect
doing.

11

12

13

MR. WISE: If he has no recollection of
why he asked for the information, he can so
state.

14

15

MR. GLASSMAN: I will allow him to
answer that.

16

17

18

19

20

MR. WISE: He may not remember asking
Mr. Stubbs for it. He may remember wanting
the information and why he wanted the
information. I don't think there is a
complete overlap.

21

22

23

A This information was requested by
Mr. Wallace and I complied with that request by
forwarding that on to Mr. Stubbs.

24

25

Q Did Mr. Wallace tell you why he wanted
this information?

1

2

A I don't recall.

3

Q Would you look again at Mr. Stubbs'

4

January 23, 1980 memo to you and particularly to

5

page 23692 which is the last page of the memorandum,

6

the next to the last paragraph he writes, "I have

7

attached a copy of the chart paper. This represents

8

a 'better than average' copy, the original being

9

a little easier to read." Next paragraph, "Please

10

advise me of your intentions in analysing the

11

charts. I can be reached at ext. 8579 or 8482," and

12

signs his name.

13

Attached to this is a rather poor copy

14

of what appears to be a chart from the multipoint

15

recorder, based upon my layman's judgment.

16

MR. GLASSMAN: Thank you, Mr. Wise.

17

Q Do you recall ever seeing a copy of the

18

multipoint recorder chart as attached to Mr. Stubbs'

19

memo?

20

A No, I do not.

21

Q Do you remember ever getting back to

22

Mr. Stubbs to advise him of your intentions in

23

analyzing the charts?

24

A No, I do not.

25

Q You in fact made no analysis of the charts?

1

2

A Myself, no.

3

Q Do you know if anyone else did?

4

A No, I do not.

5

Q Would you look at page 23686 again

6

moving forward in the file. Page 23686 begins a

7

chart which continues on to the next page, page '87,

8

of various parameters for a list of dates beginning

9

sometime in late March, 1978 and continuing through

10

June, 1978.

11

The chart purports to show columns

12

listing time, average temperature, pressurizer level

13

and reactor coolant drain tank level.

14

Did you prepare this chart?

15

A No, I did not.

16

Q Do you know who did?

17

A I do not.

18

Q Do you know how it got in your file?

19

A I placed it there.

20

Q Do you know anything more than how it

21

happened to get into your hands so it could get into

22

your file?

23

A Not on the basis of these charts.

24

Q You don't know where you obtained them

25

from?

1

2

A No, I do not.

3

Q You don't remember for what purpose you

4

obtained them?

5

A No, I do not.

6.

Q Would you look at the following page,

7

page 23688, there is a handwritten note there dated

8

January 22, 1979. It reads, "Spoke with Bill Fels

9

on 1-22-79 about reactor coolant drain tank level.

10

He says that no compensation was used to determine

11

level." The word "no" has been double underscored.

12

Do you recall a conversation with

13

Mr. Fels on or about January 22, 1979 concerning

14

coolant drain tank level?

15

A I don't recall the date. I recall

16

discussing this with him.

17

Q Who is Mr. Fels?

18

A Mr. Fels is a computer engineer at Three

19

Mile Island.

20

Q Did he work for Met Ed or GPU?

21

A I don't know.

22

Q Why did you contact him on this subject?

23

A I don't recall.

24

Q Where did you get his name from?

25

A I knew Bill Fels prior to the investigation

1
2 leading to the publication of TDR-126.

3 Q Did his job responsibilities or area of
4 expertise lead you to believe that he had information
5 that would be useful to you in the PORV leakage
6 investigation?

7 A Yes.

8 Q Why?

9 A Bill Fels was a computer engineer who
10 was involved with inputting various plant parameters
11 into the computer.

12 Q How would that relate to the PORV
13 leakage investigation?

14 MR. GLASSMAN: You are asking him to
15 speculate now or his recollection?

16 MR. WISE: His recollection.

17 A I don't recall.

18 Q Do you remember Mr. Fels telling you
19 that no compensation was used during determining
20 of reactor coolant drain tank levels?

21 A No, I don't recall that.

22 Q Do you know what you meant by "compensation"
23 in this note?

24 A No, I don't recall.

25 Q Let me make sure I understand. You are

1
2 drawing a total blank on this note. You don't
3 remember anything --

4 A Do you want me to speculate?

5 Q I don't want you to speculate. I want
6 to know if you have any remembrance of this
7 conversation that you had with Mr. Fels on the
8 subject matter of the conversation and what he told
9 you.

10 A I remember having the conversation, I
11 remember the subject matter, but I cannot recall
12 without speculation what is meant by the word
13 compensation.

14 Q What was your recollection of what the
15 subject matter was?

16 A The subject matter concerned the
17 determination of reactor coolant drain tank level.

18 Q What did he tell you about that?

19 A He said that there is no compensation
20 used to determine level.

21 Q You remember him telling you that?

22 A No, I don't recall him telling me that,
23 no, I do not.

24 On the basis of my written statement on
25 1-22-79, he says that there is no compensation used

1

2

to determine level.

3

4

5

6

Q Today you have no recollection of what back in January of 1980 you had in mind concerning the compensation level or compensation when used in determining the level?

7

8

A Would you repeat that question again, please?

9

10

11

MR. WISE: Let's break it up.
Q First of all, the note indicates January 22, 1979.

12

13

I take it you would agree with me that that's probably an error?

14

15

16

17

18

19

20

21

22

23

24

25

A I would agree it's an error.

Q It would be January 22, 1980?

A I agree it would be January 22, 1980.

Q Is it your testimony that you cannot today remember what you knew or understood during January 1980 about the need for compensation in determining reactor coolant drain tank levels accurately?

A I cannot recall in the absence of speculation what would be required to determine reactor coolant drain tank level.

Q I am not asking you for the detailed

1
2 technical specifications of how to go about doing
3 it and the formulas that would be used and so on.
4 I am simply trying to understand what today you are
5 able to remember of the investigation in January
6 1980 and specifically what you are able to recall of
7 that aspect of the investigation that looked at
8 the need for compensation in determining reactor
9 coolant drain tank levels accurately.

10 Are you able to recall anything at all
11 about that subject?

12 A I recall that I was requested to take a
13 look at reactor coolant drain tank level with respect
14 to the computer printouts. I cannot recall in
15 detail my conversation with Bill Fels. I know I
16 spoke with him on this matter. I cannot recall our
17 conversation and I cannot recall the conclusions
18 drawn with respect to reactor coolant drain tank
19 level.

20 Q I guess that's not my question,
21 Mr. Billingsley. I want to know if you remember
22 anything today about what you understood in 1980,
23 particularly in January when you were performing
24 this investigation of the need for compensation in
25 determining accurately reactor coolant drain tank

1
2 levels?

3 A No, I cannot tell you that.

4 Q Sitting here today, you have no recollection
5 that there was or was not a need to make a
6 compensating calculation in order to accurately
7 determine levels?

8 A That I do not know.

9 Q You don't know whether it was or wasn't?

10 A I don't know whether it was necessary
11 or not necessary to make compensation.

12 Q You don't have any recollection of
13 making an investigation of it other than what appears
14 on the face of this page?

15 A That's correct.

16 Q Would you look now at the page preceding
17 the chart we just referred to marked 23685. This is
18 another page of handwritten notes bearing the date
19 January 21, 1980 in the upper right-hand corner.
20 It begins, "J. Brummer name was given to me by
21 Putnam."

22 Underneath that, item 1, "Brummer remembers
23 a discussion being held, but can't recall who the
24 discussion was held with and what the conclusion was."

25 Do you recall making that note?

1

2

A Yes, I do.

3

Q Who is Mr. Putnam?

4

A Mr. Putnam was an engineer whose office was in the same trailer that I operated out of at Three Mile Island.

7

Q What was his areas of responsibility?

8

A His areas of responsibility at the time that I knew him was development and writing the sequence of events.

11

Q Did he have any connection with the PORV leakage investigation?

13

A Not to the best of my knowledge.

14

Q Do you recall why Mr. Putnam gave you the name of J. Brummer?

16

A No.

17

Q Do you remember having a discussion with Mr. Brummer?

19

A No.

20

Q After seeing this note, do you have any recollection of what Mr. Brummer's statement which is reflected here was about?

23

A Yes. My discussion with Mr. Brummer concerned meetings held to discuss valve leakage.

25

Q Who is Mr. Brummer?

1

2

A He is an individual at Three Mile Island.

3

I do not recall his title nor who he worked for.

4

Q You don't know whether he worked for

5

GPU or Met Ed?

6

A No, I do not.

7

Q You said that there were discussions

8

concerning leakage. Where these discussions that

9

had occurred before the accident or after?

10

A Before the accident.

11

Q What did Mr. Brummer tell you about

12

those discussions, as best you can now recall your

13

conversation with him?

14

A He told me that meetings had been held

15

to determine possible leakage in pressurizer safety

16

valves.

17

Q Did he tell you what had been said at

18

those meetings or what conclusions had been reached?

19

A I don't recall.

20

Q Beneath that there is a note which

21

reads, "Stubbs is calling NRC inspector who worked

22

on EMOV leakage. Stubbs is calling to determine if

23

NRC used computer thermocouple reading or one of

24

many thermocouple readings off the rad waste system

25

stripcharts."

1
2 Then you skip a line and write, "Ask
3 Jim Stubbs if Wallace has any comment on the
4 increasing leak rate."

5 Do you remember making those notes?

6 A Vaguely.

7 Q I asked you yesterday if you were aware
8 that there were two separate systems for determining
9 the thermocouple temperatures at the discharge pipes
10 from the pressurizer relief valves.

11 Does this help refresh your recollection
12 as to the state of your knowledge in January 1980
13 concerning whether there were in fact two separate
14 systems available for determining those temperatures?

15 A Yes, it helps. It helps me recall, yes,
16 it does.

17 Q There were two systems, were there not?

18 A Yes, there were.

19 Q They were independent of one another?

20 A That I don't know.

21 Q You understood that one of the systems
22 led to the computer which was in the control room?

23 A I do not recall with any great accuracy.

24 Q Do you recall what your comment at the
25 bottom means, "Ask Jim Stubbs if Wallace has any

comment on the increasing leak rate?"

A No, I don't recall.

Q Is that something you were pursuing independently or were you simply asked to relay that question to Mr. Stubbs by someone else?

A I don't recall.

Q Go now two pages forward to the page marked 23683. This has a page of handwritten notes titled "Deadline End of Next Week." Bears the date January 25, 1980.

Is this in your handwriting?

A Yes, it is.

Q Does this reflect work that you were doing?

A It reflects work that I was involved in.

Q Under the first item which is labeled "Rochino analysis," there are four lettered sub-items.

Do you remember why you listed those various sub-items? Are those things for you to follow up on or do or get data or what?

A No. These weren't things for me to do.

Q For instance, the last item says "how many thermocouples on each pipe."

Do you see that, item d under item 1?

1

2

A Yes.

3

Q Was that something you were going to

4

look into to determine how many thermocouples there

5

were on each pipe?

6

A I don't recall.

7

Q Do you remember ever looking into that?

8

A No.

9

Q Beneath that is item 2 which reads, "Pull

10

from Lee and" -- I can't read that, whether it's

11

Itcher, "their reports and" and then you broke off

12

the comment.

13

Do you recall what that item referred to?

14

A No.

15

Q Would you look down at the bottom of the

16

page underneath the line which you have drawn through

17

the middle. There is an item "Tie 1977 data to

18

leakage (RCDT levels, repairs, reactant building

19

temperature). Do same for 1978 and 1979."

20

Was that something you were going to do?

21

A I don't recall.

22

Q Do you remember doing it?

23

A No.

24

Q At the bottom of the page is a comment

25

"Ask Burley how arrived at 130 degree tailpipe

1

2 temperature."

3

Do you remember making that request of

4

Burley?

5

A Yes.

6

Q Who was he?

7

A An engineer at Three Mile Island.

8

Q Did he work for Met Ed?

9

A I don't know.

10

Q Do you remember asking Mr. Burley about

11

this subject?

12

A Yes, I do.

13

Q What was the point in asking, what were

14

you interested in?

15

A I was interested in the technical basis

16

for 130 degrees.

17

Q Where had the figure of 130 degrees

18

come from as you had it?

19

A That figure came out of a procedure

20

that discussed tailpipe temperatures and leakage.

21

Q Had you been reviewing the procedure?

22

A I had looked at that brochure in

23

connection with TDR-126.

24

Q What did Mr. Burley tell you?

25

A He said he didn't know.

1

2

Q Did you ever pursue it with anyone

3

else?

4

A No.

5

Q To this day do you know where the 130

6

degree tailpipe temperature came from?

7

A No.

8

Q Never found out?

9

A No, never.

10

Q Beneath that is the notation "When did

11

control room start leak rate calculation, reactor

12

coolant pump seal leakage" -- "leakoff" I guess is

13

the word.

14

Do you see that?

15

A Yes.

16

Q Is that something you pursued?

17

A I don't recall.

18

Q Did you ever find out when the control room

19

started their leak rate calculations?

20

A I don't recall.

21

Q Would you look at the preceding page

22

marked 23682. It's a handwritten chart there

23

labeled "Downstream Leakoff Temperatures Measured on

24

TR-7167 RAD Waste Disposal-RC Leakage Recovery Temp

25

MP Recorder."

1

2

Do you see that?

3

A Yes.

4

Q Who made up that chart?

5

A I don't know.

6

Q Where did you get it from?

7

A In the absence of speculation, I don't

8

know.

9

Q Why did you put it in your file?

10

A It was given to me.

11

Q I take it there are some things in life

12

that are given to you that you don't put in your file.

13

The question is why this particular

14

piece of paper was put into this particular file.

15

MR. GLASSMAN: If the witness knows.

16

A Because this related to the study that

17

was going on at the time.

18

Q How was it related?

19

A I can't say how it was related back in

20

1980.

21

Q You have no recollection of what this

22

had to do with the investigation you were making?

23

A In the absence of speculation, no.

24

Q I don't want you to speculate, but seeing

25

this doesn't help refresh your recollection as to what

1

2 it's about and why it related to the investigation?

3

4 A These are based on the title here "Downstream
5 Leakoff Temperatures," and looking at all prior
6 documents, appear to be associated with RAD waste
7 disposal temperatures that we have been discussing
8 for the past couple of days.

8

9 MR. WISE: I would like to have marked
10 as B&W Exhibit 440 a set of handwritten notes
11 which bear the date -- it's not very clear.
12 Let's say we can't tell what the day is, but
13 it appears to relate to the reactor coolant
14 drain tank.

14

15 (Handwritten notes relating to the reactor
16 coolant drain tank marked B&W Exhibit 440 for
17 identification, as of this date.)

17

18 Q Are these notes on B&W Exhibit 440 in
19 your handwriting?

19

20 A Yes, they are.

20

21 Q What does this chart reflect as best you
22 now recall?

22

23 A This chart reflects a log that I had
24 copied.

24

25 Q When did you do this?

25

A The date at the top -- no, that's not my

1

2 date.

3

Q Sometime after the accident, wasn't it?

4

A Yes.

5

Q Was it in connection with the PORV leakage

6

investigation?

7

A I can't say for sure.

8

Q Does this reflect a log of the times

9

that the reactor coolant drain tank was pumped down?

10

A Yes.

11

Q Why were you interested in that subject?

12

A I can't recall the basis for me taking

13

this data.

14

Q Do you remember what you did with it?

15

A I was taking this data down in connection

16

with TDR-160.

17

Q That's the TDR that covers the history

18

of the PORV?

19

A Yes.

20

Q What did the pumpdown of the reactor

21

coolant drain tank have to do with the history of

22

the PORV?

23

A I was taking a look at leakage and

24

looking to determine whether or not the reactor -- whether

25

or not the PORV was -- I mean the block valve, the

1

2

PORV block valve was closed at any time.

3

Q What did you find out?

4

A On the basis of this data?

5

6

Q Well, either on the basis of this data or any data you obtained in connection with that

7

work.

8

9

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A I cannot make any determination on whether or not the block valve was closed. On the basis of all information that I was able to obtain, I concluded it was not closed.

Q At any time during the period covered by these notes?

A That's correct.

Q While we're discussing the block valve, let me show you some papers that came from files identified as yours.

I will have them marked as B&W Exhibit 441, a copy of two pages of notes titled "RC-V-2 (Block Valve for Electromatic Relief)." The first page has at the left-hand margin "Unit 1." The second page in the left-hand margin "Unit 2." On the first page seven entries appear for various dates between July 1974 and April 1978. On the second page for Unit 2 there is one entry for

1
2 September 1977.

3 Have you ever seen B&W Exhibit 441 before?

4 A I don't recall this document.

5 (Two pages of handwritten notes titled
6 "RC-V-2 (Block Valve for Electromatic Relief)"
7 marked B&W Exhibit 441 for identification, as
8 of this date.)

9 Q Do you know who prepared it?

10 A No.

11 Q Do you have any recollection or knowledge
12 as to why it appears in your files?

13 MR. GLASSMAN: Objection. Lack of
14 foundation.

15 MR. WISE: I will make a representation
16 subject to linking it up to the source list
17 showing that these documents were provided to
18 us and we were told that these came from
19 Mr. Billingsley's files.

20 Q Do you have any recollection as to why
21 this particular document was in your files?

22 A In the absence of speculation, no.

23 Q Let me go back to B&W 440, your handwritten
24 notes concerning the pumpdown of reactor coolant
25 drain tank.

1

2

3

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25

Did you make up these notes from the control room logs, so-called operator logs?

A Yes.

Q If you look at the last page of those notes, there is a comment which reads "Note: I reviewed 2301-3D1 and spoke with Bernie Smith who said there'd be no reason to close the block valve to make an actual leak measurement of PORV since they are allowed certain amount of known (explained and contained) leakage. I feel that the operator should have extended himself to make a change in system (close block valve). See line 24 of data sheet 1 and line 1 of data sheet 4."

The words "make a change in system" are underscored by you.

First of all, 2301-3D1, refers to leak rate calculation form in use at TMI?

MR. GLASSMAN: The witness' recollection of that?

MR. WISE: I will show it to him in a minute, but yes. I don't want to waste time. I will show it to you. Let's mark it. B&W Exhibit 442 will be a copy of the Three Mile Island Nuclear Station Unit 2 surveillance

1
2 procedure 2301-3D1 consisting of a one-page
3 procedure and certain data sheets which are
4 attached to it.

5 (Document entitled "Three Mile Island
6 Nuclear Station Unit 2 Surveillance Procedure
7 2301-3D1 RC System Inventory" with attached
8 data sheets, marked B&W Exhibit 442 for
9 identification, as of this date.)

10 Q You will note that B&W 442 has some
11 handwriting on it. I believe that's your handwriting;
12 isn't it, on the first page?

13 A Yes, it is.

14 Q These documents came from your files.
15 Do you remember reviewing the surveillance procedure
16 for RC system inventory?

17 A Yes, I do.

18 Q You will note that the number for this
19 procedure is 2301-3D1. You will agree with me that
20 that's the same as the number that appears in your
21 notes at the end of B&W 440?

22 A Yes, it is.

23 Q B&W 442 which is the surveillance
24 procedure is in fact the procedure that refers to
25 calculation by the operators of reactor coolant

1

2

system leak rate, is it not?

3

MR. GLASSMAN: Could I have that read

4

back?

5

(Question read by the reporter.)

6

A Yes.

7

Q Who is Bernie Smith?

8

A He is an operator at Three Mile Island.

9

Q Did you have a conversation with him

10

concerning the calculation of leak rates?

11

A No.

12

Q So your note which says "I reviewed

13

2301-3D1 and spoke with Bernie Smith" is wrong?

14

A No.

15

Q I am sorry, I just asked if you had a

16

conversation with him about this.

17

A About leak rate, I did not discuss leak

18

rate. I discussed leakage. I did not discuss the

19

rate nor the calculation, how it was done. I

20

discussed the results which indicated that there

21

was leakage. I did not discuss the basis of this

22

procedure. Maybe I misunderstood the question.

23

Q You remember having a conversation with

24

Mr. Smith, right?

25

A Yes, I do.

1

2

3

4

5

6

7

8

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10

11

12

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25

Q You discussed with him leak measurement, that's what your note says, Mr. Billingsley, isn't it?

A Yes.

Q Are you telling us that leak measurement is something different than measuring the leak rate?

A No, it's the same.

Q You did discuss with Mr. Smith leak rate measurement?

MR. GLASSMAN: We are getting into a number of closely related terms.

MR. WISE: The witness has chosen to draw some very, very narrow distinctions so I guess we'll have to go through it the long way.

MR. GLASSMAN: I am not sure they are narrow or not, but you can proceed with whatever questions you like.

A Ask the question again.

(Question read by the reporter.)

A Yes.

Q Why did you feel that the operator should have made a change in the system, namely closing the block valve in connection with making

1

2

leak rate calculations?

3

4

5

A Based on my experience at another facility, I was trained where possible to try to obtain any known leakages that you possibly could.

6

7

Q How did you feel that closing the block valve would help?

8

9

10

11

A It would allow you, if there was a leak through that particular valve, it would allow you to change that leakage and allow you to determine known leakage.

12

13

14

15

16

17

18

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21

22

Q Is that what you meant by the comments that appear on the data sheet which is attached to B&W Exhibit 442? I am looking particularly at the last page of the exhibit which is labeled "Data Sheet 1" and in two places there is handwriting which I believe is yours. First comment, "As far as I'm concerned this could include closing block valve to reduce suspected leakage" and the same comment is made or a similar comment is made a little bit further down the page next to another section of the calculations.

23

24

25

A Yes, that is what I meant.

Q Yesterday when we adjourned for the

afternoon, we were in the midst of going through some

1

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longhand notes from your file connected to your work on the history of the PORV which eventually resulted in TDR-160. I would like to now pick up with some more of those documents.

First, I would like to show you and have marked as B&W Exhibit 443 some handwritten notes that do not appear to be in your handwriting but came from your file.

(Two-page handwritten document marked B&W Exhibit 443 for identification, as of this date.)

Q Do you recognize B&W Exhibit 443?

A Yes, I do.

Q Who wrote this?

A Jim Correa.

Q He was working with you on TDR-160?

A Correct.

Q This was a draft of part of what eventually became the report?

A Yes.

MR. WISE: I would like to have marked next as B&W Exhibit 444 some more longhand notes which I believe are primarily in Mr. Billingsley's handwriting.

(Set of handwritten notes marked B&W Exhibit 444 for identification, as of this date.)

Q You recognize B&W Exhibit 444?

A Yes, I do.

Q This is a handwritten draft of TDR-160, is it not, or at least certain portions of it?

A Yes.

Q On the first page of the draft, there appear some additional handwritten comments; do you recognize whose handwriting that is?

A Yes.

Q Is that Mr. Correa?

A Yes.

Q You notice at the top, right underneath the opening paragraph of the abstract there begins a list of facts which the abstract states had become apparent as a result of the investigation or study.

The first one as handwritten by you, "The Unit 2 PORV has experienced operating problems and has undergone repair and modification." Someone has crossed out the words "repair and" and has written at the left-hand side of the comment or of the item,

1

2

"Modify, words are too harsh."

3

Do you see that?

4

A Yes.

5

Q Did you have a conversation with

6

Mr. Correa as to modification of this first item?

7

A I recall those words. I don't recall

8

my discussion.

9

Q In fact, the final TDR eliminates the

10

section -- the phrase "has experienced operating

11

problems," did it not? I will show it to you in a

12

minute.

13

Do you recall that those words were

14

taken out?

15

A No, I don't recall.

16

Q Do you recall why Mr. Correa felt the

17

statement as you originally wrote it was too harsh?

18

A No, I don't.

19

MR. WISE: I would like to have marked

20

next a letter dated October 18, 1979 from

21

Mr. Harding to Mr. Short of B&W. It bears a

22

stamp on the face of it. It appears to be

23

a routing stamp and Mr. Billingsley's name

24

has been written in. We'll have this marked

25

as B&W Exhibit 445.

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25

(Letter dated October 18, 1979 to
Mr. Short from Mr. Harding marked B&W Exhibit
445 for identification, as of this date.)

Q Do you recognize Exhibit B&W 445?

A I vaguely remember this.

Q You were attempting during your work on
TDR-160 to determine how many times the PORV had been
actuated on reactor trips; is that correct?

A That's correct.

Q Is this letter something that you
gathered during the course of that work?

A Yes.

Q This reflects a listing by Mr. Harding
of certain reactor trips that had occurred at TMI-1;
is that right, and resulted in a PORV actuation?

MR. GLASSMAN: According to the letter?

MR. WISE: According to the letter.

A That's correct.

Q Did you use this as part of your
investigation?

A I believe I did.

Q Did you ever come to any overall
determination of how many times the PORV had been
actuated at TMI-1 and 2?

1

2

A Yes, based strictly on reactor trips.

3

Q What did you find?

4

A I don't recall the exact numbers, but I can say that the PORV, to the best of my memory, had more actuations for a given period of time at TMI-2 than it did at TMI-1.

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Q Do you recall ever learning that the PORV at TMI-2 had cycled some odd 50 times prior to the cool down transient that occurred on April 23, 1978 at TMI-2?

MR. GLASSMAN: Could I have it read back?

(Question read by the reporter.)

A No, I don't recall that.

MR. WISE: I am going to mark next a series of letters and memos, various documents which were produced to us from Mr. Billingsley's files. I believe they all relate to the PORV history investigation. They are items which were not included as exhibits to TDR-160. We have omitted those that were included as exhibits because we're going to mark TDR-160 in a moment. These were in your file and for some reason or another they didn't make their way into TDR-160 as exhibits.

1
2 I would like them identified now so we
3 know where they came from and what they relate
4 to.

5 First is a letter or memorandum dated
6 March of 1977 from a Mr. Shovlin at
7 Metropolitan Edison. It's rather difficult
8 to make out the subject matter based on the
9 poor quality of the copy that we have, but it
10 appears to relate to a field modification of
11 some sort to the PORV at TMI-2.

12 (Memorandum dated March 1977 from
13 Mr. Shovlin marked B&W Exhibit 446 for
14 identification, as of this date.)

15 Q Let me ask you something with respect to the
16 entire series of documents that I am going to mark.

17 Do you recall as part of your investigation
18 making a collection of documentation relating to
19 the TMI PORV -- TMI-2 PORV?

20 A Yes.

21 Q You went out and searched through Met Ed
22 files and GPU files in order to gather that
23 documentation?

24 A Correct.

25 Q You collected it all in your file?

1

2

A Correct.

3

4

5

Q Do you recognize this memorandum as being one of the items you found during the course of your study and investigation?

6

7

A I don't remember this particular document, no.

8

9

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Q I will tell you what we'll do. Let's go straight through this and mark all of these and then I will ask you some general questions about them. It might go faster.

MR. WISE: As B&W Exhibit 447 I would like to mark a letter dated March 29, 1978 from a Mr. Bolger of Dresser Industries to Mr. Cotter at Met Ed.

(Letter dated March 29, 1978 from Mr. Bolger of Dresser Industries to Mr. Cotter at Met Ed marked B&W Exhibit 447 for identification, as of this date.)

MR. WISE: As B&W Exhibit 448 I would like to mark a letter dated December 1, 1969 from Dresser Industries to B&W relating to an order for an electromatic relief valve. Attached to it are some certificates and reports, some of which are handwritten.

(Letter dated December 1, 1969 from Dresser Industries to B&W with attachments marked B&W Exhibit 448 for identification, as of this date.)

MR. WISE: By the way, on this particular exhibit there is on the cover sheet a photocopy of the file from which it was taken with the notation "Design Data" written in.

Q Do you see that?

A Would you repeat it?

Q You see the front page of the exhibit has -- is a photocopy of the file jacket from which these documents were taken. It bears a notation "Design Data" in handwriting.

A Yes.

Q Is that your handwriting?

A Yes, it is.

MR. WISE: Next as B&W Exhibit 449 a field questionnaire and problem report relating to the PORV at TMI-2 and certain modifications being made thereto. The covering page bears a date April 6, 1978.

(Copy of field questionnaire and problem report, cover page bearing date April 6, 1978,

1
2 marked B&W Exhibit 449 for identification, as
3 of this date.)

4 MR. WISE: Next as B&W 450 a field
5 questionnaire number 1874 which bears the date
6 May 25, 1977 and has attached to it various
7 drawings and reports.

8 (Field questionnaire number 1874 bearing
9 date May 25, 1977 with attachments marked B&W
10 Exhibit 450 for identification, as of this date.)

11 MR. WISE: As B&W Exhibit 451 a document
12 which appears to be a field change report
13 relating to field change report 188 and attached
14 to it are various documents associated with
15 that field change request.

16 (Copy of field change report with documents
17 attached marked B&W Exhibit 451 for identification,
18 as of this date.)

19 MR. WISE: Next as B&W 452 a letter
20 dated January 24, 1972 from Dresser Industries
21 to B&W relating to an order for a PORV.

22 (Letter dated January 24, 1972 relating
23 to PORV order marked B&W Exhibit 452 for
24 identification, as of this date.)

25 MR. WISE: B&W Exhibit 453, a letter

1
2 dated October 5, 1976 from Dresser Industries
3 addressed to Mr. Stuhrke of Burns & Roe
4 relating to some work done on the TMI PORV.

5 (Letter dated October 5, 1976 from Dresser
6 Industries addressed to Mr. Stuhrke of Burns &
7 Roe marked B&W Exhibit 453 for identification,
8 as of this date.)

9 MR. WISE: As B&W Exhibit 454, a two-page
10 quality assurance data sheet relating to
11 the Dresser PORV.

12 (Two-page quality assurance data sheet
13 relating to Dresser PORV marked B&W Exhibit
14 454 for identification, as of this date.)

15 MR. WISE: Finally, as B&W Exhibit 455
16 a copy of a memorandum to file from Mr. Harbin
17 dated February 1, 1980. The subject is the
18 PORV.

19 (Copy of a memorandum to file from
20 Mr. Harbin dated February 1, 1980, subject,
21 PORV, marked B&W Exhibit 455 for identification,
22 as of this date.)

23 Q Mr. Billingsley, we have now marked
24 Exhibits 446 through 455. Exhibits 446 through 454
25 were produced to us from files represented by your

1
2 counsel to be yours. 455 was produced from
3 Mr. Correa's files.

4 Would you look at 446 through 454, those
5 that came from your file and tell us if you recognize
6 those as being copies of various correspondence,
7 memoranda, field change reports and the like that
8 you collected during the course of your investigation
9 into the history of the PORV?

10 A I vaguely recall B&W Exhibit 450. I
11 vaguely remember 451. I don't recall 452. I don't
12 recall 453. I vaguely recall 454. The other
13 aforementioned documents that you cited.

14 Q 446 through 449, ones that you have not
15 mentioned yet?

16 A The ones that I have not mentioned, I do
17 recall.

18 Q Of those you do recall, 446 through 451
19 and number 454, those are documents you collected
20 from the files of Met Ed and GPU in connection with
21 the history of the PORV?

22 A Yes.

23 Q Let's look at the two you don't recall,
24 452 and 453.

25 452 is a letter from Dresser Industries

1
2 addressed to B&W dated January 24, 1972 and refers
3 to an order numbered 022660LS.

4 Do you recall whether that is the order
5 number that relates to the PORV originally ordered
6 for TMI-2? Does that number ring a bell with you?

7 MR. GLASSMAN: Obviously Mr. Billingsley
8 was not employed by GPU in 1972 so he cannot
9 have a direct recollection of that.

10 If the question were rephrased whether
11 he made such a determination, it would be
12 appropriate.

13 Q Did you ever make a determination as
14 to when and under what circumstances the original
15 order for the PORV at TMI-2 was made?

16 A I recall making a determination of when
17 the valve for TMI-2 was ordered. I do not recall
18 whether or not I determined the circumstances
19 under which the order was made.

20 Q Will you look now at B&W Exhibit 453
21 which is a letter from someone at Dresser addressed
22 to Mr. Stuhrke of Burns & Roe dated October 5, 1976.

23 Did you become aware during the course
24 of your investigation that in 1976 the valve which
25 had originally been ordered for TMI-2 was returned

1
2 to Dresser Industries for refurbishing?

3 MR. GLASSMAN: Could I hear that back?

4 A Would you repeat the question again,
5 please?

6 (Question read by the reporter.)

7 MR. GLASSMAN: Objection insofar as this
8 question tries to tie some investigation
9 conclusion of Mr. Billingsley to a letter he
10 doesn't recall seeing.

11 MR. WISE: I am trying to refresh his
12 recollection to see if we can determine what
13 relationship this letter has to those events,
14 but first we have to establish that those events
15 took place.

16 A I do recall that electromatic was sent
17 back to Dresser for refurbishing. I cannot recall
18 for which unit that valve was.

19 MR. WISE: Let's have marked at this
20 point your TDR-160. We'll have that as B&W
21 Exhibit 456.

22 (Multipage document, TDR-160, titled
23 "TMI-2 PORV Investigation" marked B&W Exhibit
24 456 for identification, as of this date.)

25 Q Exhibit 456 is a copy of your TDR-160;

1
2 is that right?

3 A That's correct.

4 Q That's your signature on the cover page
5 along with that of Mr. Correa's?

6 A Yes.

7 Q Would you look at page 14 of your TDR.
8 Do you have that?

9 A Yes.

10 Q That page contains the beginning of a
11 section labeled "4.3 Valve Repairs and Modifications."

12 Do you see that?

13 A Yes.

14 Q You will note that the Unit 2 PORV is
15 identified as BNO4233. During the course of your
16 investigation you were able to identify the serial
17 number for the PORV for Unit 2?

18 A Yes.

19 Q That is the number?

20 A Yes.

21 Q Go down to the next paragraph which
22 refers to table 3 attached to the report. It says
23 that that particular table provides information on
24 the particular work performed on the valve.

25 I take it that's the work performed on

1

2

the valve for Unit 2? Is that right?

3

A That's correct.

4

Q Final sentence says, "The table does not

5

contain work performed by Dresser Industries in

6

response to a purchase order dated June 8, 1976

7

(see Appendix 6)."

8

Do you see that?

9

A Yes.

10

Q If you turn to Appendix 6 to your report

11

which is at page 1354 as marked for purposes of

12

this litigation, and the actual appendix itself at

13

1355, you will find a work order or purchase order

14

dated June 8, 1976 addressed to Dresser Industries

15

from Jersey Central Power & Light.

16

Do you see that?

17

A Yes.

18

Q Does this help refresh your recollection

19

that in 1976 the Unit 2 PORV was the one that was

20

returned to Dresser Industries for refurbishing?

21

MR. GLASSMAN: Objection. Again,

22

Mr. Billingsley was not there at the time and

23

he cannot testify as to firsthand knowledge.

24

The question would have to be appropriately

25

asked in terms of whether his memory is

1
2 refreshed in terms of the results of whatever
3 investigation he happened to do in connection
4 with this TDR.

5 MR. WISE: That's fair enough. I will
6 accept that amendment to my question.

7 A Repeat that question because now I don't
8 know what the question is.

9 Q It's simply this: Does looking at these
10 papers help refresh your recollection that during
11 your investigation you learned that the TMI-2 PORV
12 was returned to Dresser Industries in 1976 for
13 refurbishing?

14 MR. GLASSMAN: Objection in terms of
15 "as learned." Mr. Billingsley did certain
16 work and obviously he may have reached certain
17 conclusions. We don't know if others reached
18 other conclusions based on data that was given.
19 Learned in the context of what happened in
20 1972 or 1976 can be misleading.

21 MR. WISE: I will stand on the question.

22 A Unit 2 valve was returned to Dresser
23 per this purchase order.

24 Q Would you look at B&W 453 which is the
25 October 5, 1976 letter from Dresser back to Burns &

1

2

Roe. You will note that the subject is the
electromatic relief valve BNO4233. You note that
that's the Unit 2 valve?

4

5

A BNO4233.

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Q Do you remember during the course of
your investigation collecting all the documentation
that you could regarding the 1976 return of the PORV
for Unit 2 to Dresser Industries for refurbishing?

A Yes, I gathered all information that I
could.

Q After going through this review of the
chronology and reviewing the serial numbers for the
valve, does this help refresh your recollection
that B&W Exhibit 453 is a copy of a letter that you
gathered during the course of your information of
the history of the Unit 2 PORV?

A My memory is not refreshed with respect
to Exhibit 453.

Q Would you look now at B&W 455. This is
a file memo from Mr. Harbin dated February 1, 1980
which was produced to us from the files of Mr. Correa.

Do you remember whether you ever saw this
particular file note that Harbin had written?

A I don't recall seeing this document, no.

1
2 Q There is a reference on the -- let me
3 begin again.

4 This file note from Harbin says that
5 "Attached are summaries of recent correspondence
6 related to the TMI-1 PORV. It takes into account
7 only correspondence found in the Unit 1 Superintendent's
8 files as of January 30, 1980. These summaries
9 should be helpful in establishing future action
10 related to the valve, spares and associated piping.
11 Also attached are copies of excerpts from the TMI-1
12 Restart Report (thru Rev. 10) and NUREG 0578 and
13 0560 (?)."

14 Do you recall whether Mr. Correa ever
15 discussed with you his efforts to gather materials
16 related to the TMI-1 PORV?

17 A Repeat that.

18 Q Do you recall whether Mr. Correa ever
19 discussed with you his efforts to gather materials
20 related to the TMI-1 PORV?

21 A No, I don't recall that discussion with
22 respect to TMI-1.

23 Q Would you look at the second page of
24 Mr. Harbin's file note. You will note at the top
25 of the page there is a section labeled "History" and

1
2 there are five chronological notations. The first
3 one refers to July 30, 1975. A letter from Lee
4 Rogers to J.G. Herbein, REM-I-131 warning of
5 corrosion products causing valves to remain open.
6 "Suggests periodic inspections, etc."

7 Did you ever become aware or see
8 Mr. Rogers' July 13, 1975 letter to Mr. Herbein?

9 A I don't recall ever seeing that document.

10 Q Do you remember ever looking for it?

11 A No.

12 Q Let me show you what has been previously
13 marked as B&W Exhibit 163. It's a copy of a memorandum
14 dated September 27, 1973, from Mr. Heward, Project
15 Manager at TMI to Mr. J.E. Wright, TMI Site Quality
16 Assurance Manager.

17 Do you remember ever seeing a copy of
18 this memorandum and the attached memorandum of
19 September 14, 1973?

20 A Never saw this.

21 Q Would you look at the next letter in
22 the exhibit which is dated June 22, 1973 from a
23 Mr. Donald Ross to Mr. A. Giambusso concerning the
24 failure of an electromatic relief valve at Oyster
25 Creek.

1

2

Did you ever see a copy of that letter?

3

A Never.

4

Q Turn now to B&W 456, your TDR-160

5

concerning the PORV investigation.

6

Is B&W 456 the final version of the report?

7

A Yes, it is.

8

Q Was this report approved by anyone?

9

A Not to the best of my knowledge.

10

Q Was it regular procedure to have TDR's

11

signed by an approving official?

12

MR. GLASSMAN: You want this witness'

13

knowledge?

14

MR. WISE: Yes, to the best of his

15

knowledge.

16

A To the best of my knowledge, yes.

17

Q Was there any reason why this particular

18

one does not carry an approval signature?

19

A I have no idea.

20

Q Who did you submit this to?

21

A I submitted a number of copies of this

22

report to Jim Correa who in turn was to submit this

23

to either his boss at the time, Jim Moore, I believe

24

that was his boss and/or Keaten, but that was my

25

understanding.

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Q Who decided on the distribution list that appears on the first page of the TDR, Messrs. Croneberger, Keaten, Long and Wallace?

A I don't recall.

Q Were you able to conclude why the PORV failed at TMI-2 on March 28, 1979?

A No.

Q Were you able to conclude whether it was the valve itself or associated equipment?

A No.

Q Do you know whether anyone within the GPU system has been able to conclude that as of today?

A No.

Q Would you look at the third page of the TDR. There is a list of references which begins on that page and carries over on to the next page.

Do you see that?

A Yes.

Q Did you make any file or repository for those references, someplace where they would all be collected and kept together?

A I will answer that question to the best of my ability. To the best of my knowledge any document that's shown here, I maintained a copy in

1
2 a file drawer.

3 Q Would you look now at page 5 of your
4 report?

5 A Which would be what page on the document?

6 Q Unfortunately it's split there. I think
7 they meant 1299.

8 MR. GLASSMAN: All the pages have 1299.

9 MR. WISE: The stamping appears to have
10 broken down at that point.

11 A Page 5 is references.

12 Q Page 5 I have starts with "Methods."

13 A Are you counting this first page here as
14 a page?

15 Q I am looking at the pages as you numbered
16 them. You will see the last paragraph there which
17 reads "It should be stated that while written
18 documents exist a lack of document organization
19 and control, with respect to the PORV, is
20 apparent. Investigative efforts were consequently
21 hampered which limited, in some cases, the depth
22 of detail."

23 Where did you go to find documentation
24 concerning the PORV history? Where did you look?

25 A I looked in the warehouse, procurement

1
2 offices, I used the document control center that
3 was established at Three Mile Island. I went
4 through boxes of personnel files. I contacted
5 Dresser Industries. I utilized information found
6 by various commissions and consultants who have
7 worked in this area. I went to maintenance records.
8 Personal conversations and leads with people to try
9 and find out what their personal knowledge was which
10 would lead me to additional files. I believe I
11 spoke on a number of occasions with a fellow at
12 Three Mile Island named Lee Rogers. I believe at
13 one point in time I contacted Jersey Central for
14 information.

15 Those are my primary sources. Also,
16 going back to the valve manufacturer, if I didn't
17 mention that.

18 Q What kind of a response did you get from
19 the valve manufacturer, Dresser Industries?

20 A Less than satisfactory.

21 Q What do you mean?

22 A The valve manufacturer in my opinion was
23 extremely slow in providing any information whatsoever
24 with respect to this valve and work that they had
25 performed on it and when the valve manufacturer

1
2 finally did provide information, I didn't find it
3 to be extremely valuable.

4 Q Did the valve manufacturer provide all
5 the information or responses to inquiries that you
6 had made?

7 MR. GLASSMAN: Are you asking if all this
8 requests were answered --

9 MR. WISE: Let's break it down.

10 Q You made a request of Dresser Industries
11 for certain information?

12 A Yes.

13 Q Did you write them a letter?

14 A Mr. Correa wrote the letter.

15 Q That letter asked for various items of
16 information?

17 A Correct.

18 Q Do I take it that when Dresser finally
19 did respond, they did not respond to all of the items
20 that had been requested?

21 A They either did not respond or did not
22 respond in what I thought was adequate detail.

23 Q In your report you and Mr. Correa
24 attempted to list the possible failure modes for
25 the PORV; is that right?

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A Correct.

Q They are presented in Table 1 of the report; is that right?

MR. GLASSMAN: So I understand the question, is the question whether Table 1 lists all possible failure modes or if it lists those that Mr. Billingsley considered?

Q Does Table 1 list possible failure modes for the PORV that you and Mr. Correa identified?

A Yes.

Q In addition --

A Excuse me. I must qualify that statement.

There was a third individual who worked on this report for a short period of time named Mr. Bogart. Mr. Bogart made -- reported this list which was contained in the report signed by myself and Mr. Correa.

MR. GLASSMAN: For the record, we are speaking of Table 1 found at page 22 of the report.

MR. WISE: Yes.

Q In addition to those possible failure modes listed in Table 1, I believe you and Mr. Correa wrote in your report that there were two potential

1
2 failure modes beginning on page 10 and carrying over
3 to page 11.

4 A Correct.

5 Q The first additional possible failure
6 mode is stated to be "distortion of the solenoid
7 coil which could cause the solenoid plunger to
8 stick in the down (valve open) position. To
9 understand and evaluate this mode of failure one must
10 examine the PORV history."

11 Then there is a paragraph which immediately
12 follows it which purports to lay out some of the
13 history.

14 Did you have an understanding as to what
15 it was about that history that indicated that
16 potential failure mode?

17 A I had a broad understanding, yes.

18 Q What was your understanding?

19 A I cannot recall my understanding at this
20 time.

21 Q The paragraph reads, "In October 1974
22 work request No. 4650, for TMI-Unit 1 was initiated
23 to 'remove, replace, and/or overhaul the electromatic
24 relief valve to stop reactor coolant leakage.'"

25 I take it that's the reference to

1
2 remove the TMI-1 PORV?

3 MR. GLASSMAN: The witness' recollection?

4 MR. WISE: Yes.

5 A That's correct.

6 Q As a result of that work Unit 1 PORV was
7 removed and the Unit 2 PORV was put into its place;
8 is that right?

9 MR. GLASSMAN: You are asking the results
10 of the investigation?

11 MR. WISE: Yes.

12 A That's correct.

13 Q The paragraph goes on to read, "One
14 item not mentioned in the work request is the fact
15 that the Unit 1 PORV has a 250V DC solenoid and the
16 Unit 2 valve has a 125V DC solenoid. It is possible
17 that the Unit 2 valve was installed and operated
18 with a 250V DC power supply."

19 Did you come to have any understanding
20 as to what effect that might have on the Unit 2
21 valve?

22 A Yes.

23 Q What effect might it have had?

24 A Stated in the previous paragraph "The
25 first possible cause of failure is distortion of the

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2

solenoid coil which could cause the solenoid plunger to stick in the down position."

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Q Did you and Mr. Correa or anyone else to your knowledge make an investigation to determine whether at the time the Unit 2 valve was installed on Unit 1 some change had been made to correct the voltage in the solenoid?

A I conducted a search for that information.

Q What did you find?

A I could not find any information that would document voltage supply to the valve.

Q The other possible cause in addition to those listed in Table 1 presented on page 10 of your report, "is distortion of the valve due to stresses caused by differential thermal movement between the valve and its discharge piping during normal operation."

Who determined this as an additional potential failure mode?

A Mr. Correa.

Q Did you have any understanding as to what he had in mind with respect to this item?

A At the time, yes.

Q Did you have any understanding now?

1

2

A Very broad understanding.

3

Q What is your understanding of what this

4

was about?

5

A My broad understanding at this time

6

that this concerned thermal stresses which could

7

possibly distort the valve.

8

Q Was it your understanding that the piping

9

and the valve were made of different materials?

10

A That I don't know.

11

Q Was it your understanding that that's

12

what is being suggested in this comment?

13

A That is not my understanding.

14

Q What would account for the difference in

15

thermal movement between the valve and its piping?

16

MR. GLASSMAN: You are asking the witness

17

to speculate.

18

MR. WISE: He did this report. I think

19

I can ask him what he understood and was

20

meant by this statement.

21

MR. GLASSMAN: Fine.

22

A Repeat the question.

23

(Question read by the reporter.)

24

A You are asking me what would cause a

25

thermal expansion?

1
2 Q There is a comment here that a possible
3 cause of the failure was distortion due to stresses
4 caused by differential thermal movement. I think
5 for most laymen that's a lot of gobbledygook. I am
6 trying to get an understanding that if someone gets
7 this to read maybe they can make sense of this
8 comment. That's the purpose.

9 What thermal movement are you talking about?
10 What is the difference you are talking about? What
11 is your understanding of what this means in layman's
12 terms?

13 A My understanding of what this statement
14 means in layman's terms is that temperature
15 differences can cause changes in metal expansion,
16 shrinking can be caused, cooled down, expansion of
17 metals can be caused by heat up. In the consequences
18 of those heat up and cool downs can cause stresses
19 on piping and valves such that typically in those
20 type of situations mechanical damage may be caused.

21 Q Look at page 11, that contains the
22 beginning of a section labeled "4.2.1 PORV Failures
23 (Open Position) At Other Sites."

24 Would you look at the second paragraph
25 in that section. Particularly the last sentence of

1
2 that second paragraph which reads "Appendix 3
3 provides a preliminary assessment of actuations
4 which have occurred at TMI Units 1 and 2."

5 I take it that refers to Appendix 3 which
6 appears at the back of the report beginning on page
7 1338 as marked for purposes of this litigation. Do
8 you see that? Does Appendix 3 represent the sum of
9 your investigation and assessments of PORV actuations
10 at TMI 1 and 2 before the March 28 accident?

11 A Yes, it does.

12 Q Do you know whether anybody has done any
13 further work to try and pin down the number and
14 timing of those actuations?

15 A Not to the best of my knowledge.

16 Q Would you look at that appendix again
17 and take a look at the first part of it which is a
18 series of memoranda from Mr. Harbin to you and then
19 Mr. Logan and to Mr. Miller, with carbon copy to
20 you of which precede a two-page listing of reactor
21 trips and turbine trips at Unit 1 which resulted in
22 PORV actuations.

23 Following that is a memorandum of a
24 phone conversation on September 17, 1979 from Jim
25 Seelinger to someone named Dave with a listing of

1
2 actuations at TMI-1 and second listing of actuations
3 at TMI-2.

4 Are these two listings the report of
5 the phone message from Jim Seelinger, and the chart
6 on Unit 1 provided by Messrs. Logan and Harbin to
7 you the only listing that you received of reactor
8 trips that resulted in PORV actuation?

9 A I believe so.

10 Q Who is the Dave referred to in the phone
11 message memorandum?

12 A I don't know.

13 Q How did this particular piece of paper
14 come into your hands?

15 A I don't recall.

16 Q You have no idea who Mr. Seelinger had
17 his conversation with?

18 MR. GLASSMAN: You are asking him to
19 speculate?

20 MR. WISE: I am asking if he has any
21 idea who it was.

22 MR. GLASSMAN: It sounds to me if he
23 has any idea, it asks for speculation. If
24 you ask if he has any recollection of who he
25 was, that's a different story.

1

2

A I don't know who Dave was.

3

4

Q Did you ever examine any actual TMI data to determine the number of reactor trips where there had been a PORV actuation?

5

6

A No, I never reviewed any data.

7

8

Q Did you ever investigate or know whether anyone else investigated whether leakage through the PORV prior to the accident may have caused thermal stress on the valve?

10

11

A I am not aware of such an investigation.

12

13

14

15

Q Would you turn now to page 14 of your report. On that page the section begins label "4.3 Valve Repairs and Modifications" which were referred to earlier this morning.

16

17

18

19

20

In particular would you look at the last sentence on that page which we also referred to earlier this morning which concerns the work done by Dresser Industries in June 1976 on the PORV for TMI-2.

21

22

Did you ever find out who had requested that that work be performed?

23

24

25

A I don't recall who.

Q Did you ever find out why it was requested?

1

2

A I believe so.

3

Q What did you find out?

4

5

A That work was requested after the valve was removed from Unit 1. I think the basis for singling that valve out is included in this report. To the best of my knowledge I did take a look at why but I can't recall without looking at this report.

7

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Q Is there any other section involving valve repairs and modifications other than the one we are looking at on page 14 and carries over to page 15 and 16?

13

14

15

16

A This would be the only information that I would have on that repair. This is shown on page 14 and 15 and contained in Appendix 6 and Appendix 7.

17

18

19

20

Q You are welcome to look through those but I don't think based upon my reading of them that there is anything in there as to why that work was done.

21

22

23

24

25

A Then I don't have it.

Q Would you look over on page 15, the

last sentence of the opening paragraph reads

"Metropolitan Edison Company (Reading) and Jersey

Central Power & Light Company were contacted to

1
2 locate all records associated with the purchase
3 order dated June 8, 1976; however, as of this
4 writing, repair data detailing work performed has
5 not been located."

6 Was it ever located?

7 A I never located it.

8 Q Do you know whether anyone else ever did?

9 A No, I don't.

10 Q Would you look now at page 17 of your
11 report. You will see that there is a section that
12 begins on that page labeled "4.4.1 GPUSC Leakage
13 Study." That references TDR-126, does it not?

14 A Yes, it does.

15 Q If you look at page 18 which continues
16 that section you will see in the middle of the page
17 a paragraph which reads, "The fact that 130 degrees
18 Fahrenheit PORV tailpipe temperature is incorrect
19 comes from two sources."

20 I take it the reference to the 130
21 Fahrenheit tailpipe temperature, is to the
22 temperature given in the pressurizer system failure
23 in the emergency procedure as a symptom for a leaking
24 PORV; is that right?

25 A This is contained in the procedure that

1
2 is in response to a leaking PORV.

3 Q You give as a reason for why the
4 temperature is incorrect, two references. One is
5 TDR-126 which we have already discussed. The other
6 is GPU startup problem report number 5147, dated
7 October 5, 1977. You go on to state, "While TDR-126
8 was written after the accident, GPU Report number
9 5147 occurred almost two years prior to the accident.
10 The problem report established that the symptom
11 temperature for a leaking PORV is 60 degrees
12 Fahrenheit higher than the value stated in the
13 procedure (see Appendix 10)."

14 If you refer to Appendix 10, you will
15 see the site problem report that you referred to,
16 number 5147.

17 Did you ever make any investigation to
18 determine why nothing had been done following the
19 site problem report in 1977 to correct the temperatures
20 given in the pressurizer system failure procedure
21 for a leaking PORV?

22 A No.

23 Q The site problem report which is
24 Appendix 10 states that the item is for resolution
25 by Mr. Shovlin, page 1392 as marked for litigation.

1

2

Do you see that?

3

A Yes.

4

Q Did you have any discussions with

5

Mr. Shovlin concerning this site problem report?

6

A No, I did not.

7

Q You learned during your investigation

8

that in August 1978 TMI-2 ordered a spare PORV, did

9

you not?

10

MR. GLASSMAN: Can I have that read back?

11

(Question read by the reporter.)

12

A I recall that a spare was ordered. I

13

don't recall which unit ordered it.

14

Q Would you take a look at page 15 of

15

your report. There is a section beginning there

16

"4.3.1" titled "Valve Modifications Suggested By

17

Dresser Industries." The section begins "On

18

August 31, 1978 Metropolitan Edison Company issued

19

Purchase Order number 239715 requesting Dresser

20

Industries to supply (1) PORV, spare parts, and

21

tools. All items requested in the purchase order

22

are specified as 'Nuclear Safety Related'."

23

Do you recall looking at that particular

24

purchase order?

25

A I reviewed that purchase order, yes.

1

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Q During the course of that, did you understand that that spare was to be used at TMI-2?

A I don't recall.

Q Your report goes on to state that in late January 1979 Dresser Industries sent a memo to Met Ed detailing improvements made in the valve design.

Do you recall finding that out?

A I don't recall if I found that out or Mr. Correa found that out.

Q You recall learning of that?

A Sure.

Q Did you find out what happened to the memorandum sent by Dresser concerning valve improvements? What did Met Ed do about it?

A To the best of my memory, Met Ed didn't do anything concerning those valve modifications to be made in the spare PORV.

Q Was your understanding that Dresser also suggested that the modifications or at least I believe five out of six of them could be made to the existing PORV at TMI-2?

A I vaguely remember that.

Q Do you remember finding out what, if

1
2 anything, Met Ed did as far as possibly incorporating
3 those suggested modifications on the existing TMI-2
4 PORV?

5 MR. GLASSMAN: Can I have that read back?

6 (Question read by the reporter.)

7 MR. GLASSMAN: Objection. There has
8 been no testimony that this is something that
9 Mr. Billingsley looked into.

10 Q If you can answer the question, we'll
11 resolve both the objection and my question.

12 A To the best of my knowledge, nothing
13 was done.

14 Q Would you look at page 24 of your report.
15 It's page 1304 as marked for litigation. That's
16 Table 1A which purports to list valve problem
17 reports at TMI Unit 2.

18 You prepared this table, I believe?

19 A Correct.

20 Q Would you look at that first item listed
21 for August 3, 1978. Yesterday I attempted to read
22 from one of your handwritten notes what I believed
23 to be the same item. Here we have it in typewritten
24 form and it is a bit clearer. It relates to the
25 setpoints or certain setpoints modified pursuant to

1
2 equipment change modification 9093 and it reads,
3 "Since HPI setpoint is 1640 and reactor coolant low
4 pressure trip setpoint is 1900 psig, it will be
5 advisable to have the R.C. pressure lo-lo annunciator
6 setpoint moved to 1700 psig because of the apparent
7 advantage of forewarning about ES FAS actuation."

8 ES FAS is emergency safeguards features
9 actuation system; is that right?

10 A I don't recall exactly the acronym.

11 Q It refers generally to the emergency
12 safeguard systems; is that right?

13 A Yes.

14 Q HPI was part of that system; is that
15 correct?

16 A Yes.

17 Q Does seeing this in your report help
18 refresh your recollection as to what this equipment
19 change modification had to do with the pilot operated
20 relief valve?

21 A Without sitting down and carefully
22 reviewing this, it would only be speculation on my
23 part.

24 Q Where can I find a copy of equipment
25 change modification of 9093?

1

2

A It's not in this report?

3

Q I am afraid not.

4

A I am surprised.

5

Q I would very much like to see it.

6

A I know you would. That's disappointing,

7

that's not in there. I must be quite honest with

8

you. It could possibly be in my files but I don't

9

know why it is not here. By any chance, did you

10

look at any of these documents to see if it's in

11

there?

12

Q I went through them. I am not an expert,

13

but I must say that I was not able to find anything

14

that looked like that.

15

A I could find it at Three Mile Island

16

probably. As a matter of fact, B&W might even have

17

a copy of this. I say that sincerely.

18

Q Why do you say that?

19

A Because it's an engineering change

20

modification. It's possible that B&W may have that.

21

Q You have no recollection of what event

22

prompted the change modification?

23

A No.

24

Q The documents in Appendices 4 and 5

25

which begin at page 1345 came from Met Ed files; is

1

2 that correct?

3

A Correct.

4

Q Is that true also for the documents in

5

Appendix 6?

6

A Appendix 6.

7

Q Page 1354 and 1355, that's the purchase

8

order for the work done in 1976?

9

A Yes. 1355 came from Met Ed files.

10

Q Would you look at Appendix 8 which is

11

on page 1360 and the documents that appear as part

12

of that appendices. Did they come from Met Ed files?

13

A Yes, they did.

14

Q Would you look at Appendix 9, the documents

15

that are contained as part of that. Did they come

16

from Met Ed files?

17

A Yes.

18

Q Next would you look at Appendix 10 which

19

is the site problem report that we referred to

20

earlier. That came from Met Ed's files; is that

21

correct?

22

A Yes, it did.

23

MR. WISE: Let's take our lunch break.

24

(Luncheon recess taken at 1:40 o'clock P.M.)

25

AFTERNOON SESSION

(2:43 o'clock P.M.)

QUINCY BILLINGSLEY, III,

having been previously duly sworn, resumed,

and continued to testify as follows:

EXAMINATION (continued)

BY MR. WISE:

Q Mr. Billingsley, did you ever become aware that a task force had been formed to investigate the TMI-2 accident that is internal task force within GPU Service?

A I understand that such a task force did exist.

Q Did that involve Mr. Keaten, Mr. Long and others?

A Yes.

Q Did you in any way participate in the activities of that task force?

A My understanding is that the TDR's I wrote were a consequence of that task force, yes.

Q Let me ask you to refer to B&W 456 which is a copy of the TDR-160 on PORV history and investigation. Take a look at the very last page of that exhibit which is Appendix 12.

1

2

Do you recognize what that is?

3

A Yes, I do.

4

Q What is it?

5

A That is basically my charter for my

6

TDR-160.

7

Q Do you know where that page came from?

8

A I don't recall who made that page up -- who

9

made this charter up, I don't recall.

10

Q Do you remember if it was part of a

11

larger document?

12

A I can't recall.

13

Q Let me show you what has previously

14

been marked as B&W 340. B&W Exhibit 340 consists of

15

a cover memorandum dated July 26, 1979 from

16

Mr. Keaten to Mr. Arnold concerning the investigators'

17

plan of action. Attached to it is an outline which

18

we have identified earlier as the draft plan of

19

action for the investigators. If you will look at

20

the -- it's about four pages from the back under

21

task force PORV failure, mode team Long and Keaten.

22

A Yes.

23

Q Do you recognize that as being the page

24

at which ends up as Appendix 12 to your TDR-160 of

25

B&W 456?

1
2 MR. GLASSMAN: Objection. Are you
3 asking the witness to compare these two
4 documents now or are you asking him whether
5 he knows whether the page appended as Appendix
6 12 to B&W 456 in fact came from a larger
7 document identified as 340?

8 MR. WISE: I thought I was asking
9 him whether he recognizes this particular page
10 as the page which occurs at the end of his
11 TDR.

12 MR. GLASSMAN: Again the question is
13 confusing because we can all sit here and
14 read it and find out whether it's identical
15 or not.

16 MR. WISE: I am not asking whether it's
17 identical. I am asking whether seeing it here
18 as part of B&W Exhibit 340 he is able to tell
19 us this is in fact where the last page of TDR -160
20 came from. We can see it's identical. It's
21 a visual exercise.

22 A I don't know for sure.

23 Q You don't remember seeing 340 as a whole?

24 A No.

25 Q Where did you obtain your copy of what

1

2

became Appendix 12 to your TDR?

3

A I don't recall.

4

Q Did Mr. Long give that to you?

5

A I don't recall.

6

Q You will note question f under subtask

7

1 reads, "What was the leak rate prior to the

8

accident? Was the 'unidentified' leakage outside

9

of tech specs, and if so, why?"

10

You can look at either of them. It's

11

identical in both copies.

12

MR. GLASSMAN: I think it's inappropriate

13

in terms of the question that he look at this

14

one or the one attached to 456.

15

MR. WISE: Look at that one, if it makes

16

a difference.

17

A What's the question?

18

Q Item f, under number 1, did you consider

19

that part of your charter for work that you were to

20

perform in preparing TDR-160?

21

A Yes.

22

Q Did you ever do anything to get answers

23

to those questions?

24

A It was not necessary.

25

Q Why was it not necessary?

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A Because the answer to that was addressed in TDR-126.

Q Is it your understanding that TDR-126 contains a conclusion concerning whether the unidentified leakage was outside the tech specs?

A Repeat that question again, please.

Q Is it now your understanding that TDR-126 contains a conclusion regarding whether the unidentified leakage was outside the tech specs and if so, why?

A Yes.

Q Let me show you B&W Exhibit 428 which is a copy of TDR-126.

Would you take a look in there and tell me where it addresses that subject?

A On page 1b of TDR-126 under section "III. Conclusions," item 1, "The PORV was not leaking prior to March 28, 1979."

Q You believe that answered the question whether unidentified leakage was occurring at TMI-2 outside the tech specs?

A Yes.

Q You thought that question referred only to the PORV?

1

2

A Yes, correct.

3

4

Q Are you aware that there were grand jury proceedings instituted in Pennsylvania concerning the leak rate at TMI-2 before the March 28 accident?

5

6

A No.

7

Q You never heard of that up to this day?

8

A That's correct.

9

10

Q Did you participate in the writing of any of the reports prepared by the investigators?

11

A The question is unclear to me.

12

13

Q You are aware that the investigators which include Mr. Keaten and Mr. Long eventually wrote some reports; are you not?

14

15

A Vaguely familiar.

16

17

18

19

Q We have identified in prior depositions various drafts of the reports that were prepared between September 1979 and the final copy of the report issued in late 1980.

20

21

22

Did you participate in the drafting, review or editing of those drafts of the report or the final report?

23

A No. I only wrote TDR-160 and TDR-118.

24

25

Q Let me show you B&W Exhibit 352 previously marked -- before we go to the task force report let

me ask one additional question.

Do you recall reviewing Mr. Stubbs' memorandum concerning unidentified leakage?

A I don't recall reviewing that memo.

Q Let me show you what's been previously marked as B&W 352 which is one of the drafts of the investigators' interim summary report. This particular one is dated November 28, 1979.

I would ask you to turn to page 20 of the report. You will see a section which begins on that page labeled D, the pressurizer relief valve failure mode. The section continues through page 20 and on to page 21.

Would you take a brief look at that and tell us if you had any hand in the drafting or editing of that section of the draft task force report?

A No, I did not.

Q Do you know who did?

A No, I do not.

Q Did you participate in the drafting of any predecessor section similar to this for the task force report?

A No, I did not.

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Q Let me show you the final copy of the task force report which has been marked B&W Exhibit 356. I should say this is the final summary report dated December 15, 1980.

Would you take a look at page 24 of that report. Again there is a section labeled D, pressurizer relief valve failure mode. It begins on that page and carries over on to page 25.

Do you see that?

A Yes.

Q I will not waste your time now by having you compare this section with the section I showed you earlier from B&W Exhibit 352. I will represent that I have compared the two and they are quite different.

Do you know who drafted or edited the section that appears on B&W Exhibit 356?

A No, I do not.

Q Did you have any hand in that?

A No, I did not.

Q Would you look at the chart that appears on the following page, page 25 of 356, there is a table there labeled "Table 3, Stuck Open PORV's in PWR's." Did you have any hand in the preparation of

1

2 that table?

3 A No.

4 Q Did you send any information to anyone
5 for the purpose of having that chart prepared, to
6 your knowledge?

7 A Did I send any information to anyone?

8 Q Yes.

9 A That's signed on the front of B&W Exhibit
10 356?

11 Q Yes.

12 A I did personally not provide this report
13 to any of the parties listed on 356.14 Q You have no knowledge as to the source
15 presented in the chart on page 25 was?16 A I only have speculation as to where the
17 source --18 Q I don't want your speculation. Do you
19 have any knowledge gained from any source as to where
20 that information came from?

21 A No.

22 Q Did you ever receive a copy of the GPU
23 Accident Review Task Force summary report?

24 A Never.

25 Q Did you ever receive a copy of the

1
2 interim report which I believe was issued in
3 December 1979?

4 A No, I did not.

5 Q I believe at the beginning of your
6 deposition you mentioned that you also performed
7 work on a study of make-up pump operation and during
8 the accident; is that correct?

9 A That's right.

10 MR. WISE: I would like to have marked
11 as B&W's next exhibit, I believe it is B&W
12 Exhibit 457, a copy of some handwritten
13 notes, perhaps a handwritten draft, titled
14 "Things That Still Must Be Added to the
15 Report." Attached to that is what appears to
16 be a handwritten draft of certain portions
17 of what we'll later have marked as an exhibit,
18 a copy of TDR-118.

19 (Handwritten notes titled "Things That
20 Still Must be Added to the Report" marked
21 B&W Exhibit 457 for identification, as of
22 this date.)

23 Q Do you recognize B&W Exhibit 457?

24 A Yes, I do.

25 Q There are at least two sets of handwritings

1
2 throughout the exhibit.

3 Do you recognize one of those sets of
4 handwritings as being yours?

5 A Yes.

6 Q In whose handwriting are the other
7 comments; are those Mr. Long's comments?

8 A I believe so.

9 Q Do you recall preparing a draft report
10 on your study of make-up pump operation?

11 A Yes.

12 Q Is this a copy of your first draft of
13 that report?

14 A Yes.

15 Q Did you submit it to Mr. Long?

16 A Yes, I did.

17 Q Did you receive comments from him?

18 A Yes, I did.

19 Q In fact these are the comments that he
20 gave you, those marked in the heavy dark writing?

21 A I believe so.

22 Q Would you look now at the cover page

23 titled "Things That Still Must Be Added to the

24 Report." Mr. Long's comment at the bottom has an

25 arrow referring to item 3 on the list of things that

1

2

still needed to be done. Do you see that?

3

A Yes.

4

Q Item 3 as you wrote it, "design change must be elaborated on."

6

7

What design change were you discussing there?

8

A I don't recall.

9

Q You had found, had you not, that the wiring to the computer in the control room at TMI had been changed at some point with respect to the indications of pump operation, make-up pump operation?

13

A Are you asking me a question?

14

Q Yes. You had found that, had you not?

15

A Without reading this report, I am not qualified to make a yes or no statement.

17

18

19

MR. WISE: Let's mark the report and see if we can get this clarified. We'll have it marked as B&W Exhibit 458.

20

21

22

(Copy of draft TDR titled "TMI-2 Make-Up Pump Operation" marked B&W Exhibit 458 for identification, as of this date.)

23

24

Q You have seen B&W Exhibit 458 before, haven't you?

25

A Yes, I have.

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Q Is that a copy of the final report that you prepared as a result of your study of make-up pump operation during the accident?

A No, this is only a draft.

Q Was there ever a final report prepared?

A Yes.

Q One that you signed?

A Yes.

MR. WISE: For whatever reasons, we do not seem to have a copy of the signed report. Either it hasn't been produced to us or if it has, we haven't been able to find it.

MR. GLASSMAN: Off the record.

(Discussion off the record.)

MR. WISE: There is an indication that counsel for both parties are not aware of a signed report.

Q You have a recollection of signing one?

A Yes.

Q What did you do with it?

A Should have been in everything I turned over. I believe it had a TDR number on it. TDR-118.

Q Let's work from the draft, B&W Exhibit 458 seeing that seems to be the latest copy that we

1

2 have here today.

3

4

You recognize this as one of the drafts
of the report?

5

A Yes.

6

Q Would you take a look at page 4 of this
draft, you will see a section labeled "3.2 Computer
Input Electrical Modification."

8

9

Do you see that?

10

A Yes.

11

Q It continues over on to the next page,
page 5.

12

13

Would you briefly look at that and see
if it helps refresh your recollection that you
discovered during the course of your investigation
that a design change had been performed with respect
to the wiring to the control room computer for
indication of make-up pump operation?

18

19

A This does refresh my memory.

20

Q Is that the design change you were
referring to in the item 3 on B&W Exhibit 457, your
list of things that still needed to be added to the
report?

23

24

A I believe so, yes.

25

Q Now would you look at Mr. Long's note

1
2 with an arrow pointing to that item. It reads
3 "This needs a separate section. Should describe
4 reasons for 'design' change - when change was
5 done - when it was discovered that there was wiring
6 error - by whom? When corrective action was
7 taken - if not done (as you have told me) this should
8 also be stated (diplomatically)."

9 Do you recall having discussions with
10 Mr. Long where you informed him that no correction
11 to the wiring error had been made?

12 MR. GLASSMAN: Could I hear it back?

13 MR. WISE: Let me withdraw it and lay
14 some foundation for it.

15 Q What is the wiring error referred to in
16 Mr. Long's note? You may want to refer to B&W
17 Exhibit 458, if it helps to refresh your recollection.

18 MR. GLASSMAN: Objection again in terms
19 of what something is in Mr. Long's note. Maybe
20 Mr. Long is in a better position to tell you
21 what was in his mind.

22 A better question is what, if anything,
23 Mr. Billingsley understood as to this note.

24 MR. WISE: That's fair enough.

25 A I can't recall simply because my report

1
2 discusses two change modifications because I don't
3 know which one item number 3 of B&W 457 that this
4 refers to.

5 Q Did you become aware during your
6 investigation that as a result of a wiring error the
7 printout from the computer with respect to make-up
8 pump operation was caused to be in reverse, that
9 is the printout tripped when it should have been
10 operating and vice versa?

11 A I believe that was the case.

12 Q Do you remember discussing that error
13 with Mr. Long at any point?

14 A Yes.

15 Q Did you tell him that there was a wiring
16 error that resulted in that reversal?

17 A I believe so.

18 Q Did you ever discover that corrective
19 action has been taken as to that wiring error before
20 the accident?

21 A No.

22 Q How long before the accident did you
23 find that wiring error had existed?

24 MR. GLASSMAN: The question is, I assume,
25 during the course of Mr. Billingsley's work

1
2 after the accident, what period of time did
3 his investigation show with regard to a prior
4 wiring error?

5 MR. WISE: I will break it down.

6 Q As a result of your investigation, were
7 you ever able to learn when the wiring error occurred?

8 A I don't recall.

9 Q Take a look at page 5 of the draft of
10 your TDR which we have marked as B&W Exhibit 458, you
11 will see a section there titled "3.2.1 30T Contract,"
12 I believe that should be contact, "/not part of
13 Change Modification number 2-0126."

14 Do you see that?

15 A Yes.

16 Q It reads, "The discussion in 3.2 above
17 dealt with the wiring change in one of the two
18 30T contacts. For the purpose of disclosing a major
19 problem area, the remaining 30T contact will be
20 addressed at this time. As stated in Section 3.1.1,
21 Input Data, the 30T contact is wired in reverse.
22 The consequence of this error (reverse wiring) is
23 that pump status, as printed by the computer, will
24 be reversed."

25 You then give an example of the result

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of that and continue, "On May 25, 1979, the TMI-2 Computer Engineer Supervisor checked those MPX points (3172, 3173, 3174) associated with the 30T contact and verified that the computer is receiving erroneous information due to a wiring error. As of this writing the error has not been rectified."

Does reviewing this help refresh your recollection as to which of the modifications -- design modifications was involved in the possible wiring error or in the wiring error that occurred?

A Based on this writing in section 3.2.1 of B&W Exhibit 458 this section does not address any of the design modifications.

Q Section 3.2 discusses two modifications, is that right?

A Right.

Q One on October 5, 1978 and one on March 27, 1979. Do you see that?

A Yes.

Q Am I correct that neither of those two modifications involved work on the so-called 30T contact which was the -- which was responsible for the reversal in the indication shown on the printout for make-up pump operation?

1
2 MR. GLASSMAN: Could I have that read
3 back?

4 (Question read by the reporter.)

5 MR. GLASSMAN: Perhaps I am confused as
6 to the question, but I don't see particular
7 dates involved in the particular page here and
8 maybe counsel is reading from a different
9 page.

10 MR. WISE: I am referring to page 4 of
11 the draft which has a section entitled 3.2.

12 MR. GLASSMAN: I see the problem. Pages
13 4 and 5 are reversed in my copy. That's why
14 I had some confusion with counsel's question.

15 MR. WISE: 3.2 discusses two modifications,
16 one in October '78 and the one the day before
17 the accident in 1979.

18 If I am reading this properly, neither of
19 those two modifications, Mr. Billingsley says
20 in his paper, involve changes to the particular
21 contact that was responsible for the reversal
22 in the indications shown on the printout for
23 make-up pump operation.

24 Q My question is: Is that correct,
25 Mr. Billingsley?

1

2

A That's correct.

3

4

Q Did you ever find out when the wiring error did occur?

5

A No.

6

7

8

Q Consequently you have no idea for how long it existed prior to the accident on March 28, 1979?

9

A No.

10

11

12

13

14

A No.

15

16

17

18

A No.

19

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24

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Q Am I correct that as a result of this wiring error that an operator looking at the computer printout was told a pump was off when in fact it was on?

MR. GLASSMAN: Objection. The witness cannot testify as to what an operator would or wouldn't be told. It's totally misleading.

1
2 We don't even know if an operator looks at
3 these things, when he looks at these things.

4 Mr. Billingsley is in a totally different
5 position. It's a speculative question.

6 If you would like to find out the result
7 of Mr. Billingsley's investigation, that's
8 fine. To have him indicate what operators
9 would have seen, might have seen, when he
10 didn't talk to them about this, is inappropriate.

11 MR. WISE: Let's ask a few prefatory
12 questions then.

13 Q I take it that the investigation that
14 you made involved looking at what instruments
15 printed out the status of the make-up pump in the
16 control room?

17 A No.

18 Q What did you investigate?

19 A My original charter was to investigate
20 when the make-up pumps were put into operation
21 either in manual or in automatic, determine when
22 the pumps were operating and at what times.

23 Q Did you ever find out whether any
24 instrumentation at all was provided at TMI with
25 respect to the status of the make-up pumps?

1

2

A Yes, there is a printer that prints out the computer data which I analyzed.

3

4

Q Where is that printer located?

5

A I don't recall.

6

Q Is it located somewhere at TMI-2?

7

A Yes.

8

Q In the control room?

9

A I don't recall.

10

Q What is that printer hooked up to?

11

A I can only assume based on my past experience with computers and printers.

12

13

Q You mean in your investigation you never bothered to find out where all these contacts that you mentioned at length in your report were located?

14

15

16

17

A That was not necessarily for the purpose of my investigation.

18

19

Q Whether it was necessarily or not you found out about it, didn't you, Mr. Billingsley?

20

21

A Yes, I did.

22

Q Would you look at page 3 of your draft report. You see the chart there, box diagram, flow chart, whatever you want to call it. See where it shows the computer, electrical circuit, pumps, input,

23

24

25

1

2 output, printer, input.

3

4 hooked up, didn't you?

5

A No.

6

Q You are telling me -- who drafted this --

7

A I did.

8

Q You were the one who wrote the box that
9 says computer with an arrow pointing to the printer?

10

A Yes.

11

Q You made that up out of whole cloth?

12

A No.

13

Q Is that fantasy?

14

A That's based on my common knowledge of
15 computers and printers.

16

Q Common knowledge, you never bothered
17 to find out if this was in fact the case at TMI-2?

18

A Physically looking at that, no, I did
19 not.

20

Q I am not asking if you physically looked
21 at it.

22

A That's the only way I could really come
23 to conclusion.

24

Q We have run into a problem we have run
25 into with several witnesses. I thought we went

1

2 through this yesterday. I am not limiting my
3 question as to what you personally went and looked
4 at yourself. I am entitled to get the basis of
5 your knowledge even if you obtained it from sources
6 other than going to look at something with your
7 own eyes and feeling it with your own hands.

8 Did you talk to anybody or get information
9 from anyone or any source whatsoever indicating to
10 you that the printer whose output you were looking
11 at in connection with your investigation was hooked
12 up to a computer at TMI-2?

13 MR. GLASSMAN: We are talking about aside
14 from the answer that Mr. Billingsley gave
15 earlier?

16 MR. WISE: I don't recall --

17 MR. GLASSMAN: He gave some information
18 about general knowledge but not the particular
19 equipment at TMI. The question is whether he
20 talked to anyone else about the equipment at
21 TMI, particularly?

22 MR. WISE: Yes.

23 A Are you asking me how I ran my investigation?

24 Q Yes.

25 A The way I ran my investigation was that

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I initially started out with the computer printout of the make-up pump operation during the March 28, 1979 accident. Upon a close investigation of that computer printout, it came to my knowledge that there was some discrepancies in what I had earlier learned either through verbal investigation and/or through various reports which had earlier reported make-up pump operation on the date of the accident.

Due to the discrepancies in various information that I had gotten a hold of, I determined that it was quite necessary to obtain an electrical schematic of the contacts which inputted to the computer and naturally a computer must print out, must provide an input to something to provide physical hard core data which was the printer.

As part of my investigation, it was not necessary that I verify the position of computer printer. It was only necessary that I determine where the computer obtained its inputs. It was not necessary that I determine exactly what piece of equipment known as a computer -- known as a printer and know where that printer was located to evaluate

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the results of that computer printout.

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So upon analyzing the electrical circuit,

I was able to determine what discrepant data the

computer would print out. I analyzed the results

which is the hard core printout and I analyzed the

input to the computer.

Q Did you ever make an analysis of whatever

information was available to the operator?

A No.

Q Would you look at your report which you

wrote at page 5. Take a look at section 3.3 which

begins there "Information Available to the Operator."

Did you write that?

A Yes.

Q Did you make it up?

A No.

Q Is it still your testimony that you made

no investigation of what information was made

available to the operator?

A Upon seeing page 5 of B&W Exhibit 458,

my memory is refreshed that I did get information

as to the operators.

Q As part of your investigation?

A Yes.

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Q You found out that the printer we have been talking about was in the control room available to the operators?

MR. GLASSMAN: You are asking the witness whether that particular paragraph which we have referred the witness to refreshes his recollection?

MR. WISE: I am asking what happened. If he has a recollection from another source, I would like to know that, too. We have wasted a lot of time.

MR. GLASSMAN: We have not wasted a lot of time. You have asked the witness without showing a particular paragraph he didn't recall. If you had shown him the paragraph to begin with, maybe we would have saved some time.

MR. WISE: I am shocked that someone doesn't know that the printer on the computer is located on the control room of TMI-2. It's taken a long time to establish what I think most people have conceded as a very well known fact.

MR. GLASSMAN: I am shocked at your statement here. I assume there are a lot of

1
2 people who don't know where things are located.
3 It was not something I was familiar with
4 earlier and not even familiar with at this
5 particular point in time. I couldn't testify
6 on it. I doubt other people in this room
7 could have testified to it. I don't know
8 why you are beating on this witness because
9 he doesn't have a recollection.

10 MR. WISE: Because GPU assigned him to
11 investigate this point. He wrote a report. He
12 is now telling me that he doesn't know where
13 the printer was located.

14 MR. GLASSMAN: The document in front of
15 him was written sometime ago. If you would
16 like to save time, you should have shown him
17 the report and found out what it meant rather
18 than trying to lead up to it and just prolong
19 the deposition.

20 A Your question again, please?

21 (Question read by the reporter.)

22 A Yes, this information in Appendix 4 was
23 available -- let me put it this way: This information
24 is in the control room.

25 Q What computer did you find the printer

1
2 was hooked up to? You testified earlier that you
3 looked at the electrical diagrams with respect to
4 it. It showed that there was a computer involved.

5 A To the best of my knowledge there is only
6 one computer at TMI. That's hooked up to that
7 computer. The location of that computer, I don't
8 recall.

9 Q What is that computer used for?

10 A I don't know all the applications of that
11 computer.

12 Q Did you ever find out whether one of its
13 uses was to provide data on plant parameters to
14 the operators in the control room?

15 A I know it provided this information.

16 Q As a result of your investigation were
17 you able to conclude that on the day of the accident
18 the printout that the computer was generating showed
19 the status of the make-up pumps in exact reverse of
20 what their actual status was?

21 A Yes.

22 Q Make-up pumps are the same physical
23 pumps that are sometimes referred to as the HPI
24 pumps; is that right?

25 A Correct.

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Q Is it true that when they were operating the HPI mode their status would be shown in reverse?

MR. GLASSMAN: You are asking the witness to speculate --

Q Based on the investigation you made following the accident.

A Correct.

Q Did you ever interview any of the operators who were on duty on the day of the accident to determine whether or not they were aware that the printout was showing the pump status in exact reverse of its actual condition?

A I don't recall whether I asked that.

Q Do you know whether anyone else did?

A No, I don't.

Q Did you ever make any investigation to determine when the fact that the printout was showing the pump status in exact reverse of its actual condition was first discovered by anyone?

A To the best of my knowledge this is the first time it was ever discovered.

Q That is when you made your investigation?

A Correct.

Q You are not aware of any corrective action

1
2 that had been taken at Met Ed before the March 28
3 accident to attempt to correct the error?

4 A Correct.

5 MR. GLASSMAN: I should note for the
6 record that it's rather difficult for one to
7 answer the question differently if someone
8 didn't discover it until later on. It's rather
9 hard to do something until later on.

10 Q Let me ask you for a moment about alarms.

11 Am I correct that there is also located
12 in the control room something called an alarm
13 printer?

14 A I have heard that word alarm printer
15 used. I am not sure at this point in time whether
16 it's a different printer or not.

17 Q Did you become aware that there was
18 data available for the March 28 accident which
19 came from the so-called alarm printer?

20 A I vaguely remember that, yes.

21 Q You saw some of that data?

22 A I can't say for sure.

23 Q Did you make an investigation to determine
24 which alarms would result in a notation on the
25 alarm printer? In particular I would ask you to

1
2 refer to your section 3.3 at page 5 of your report
3 and the various items shown in the appendix of TMI
4 Unit 2, Appendix 4 which begins at page 4064 as marked
5 for purposes of this litigation. You will note
6 that you have a series of pages each one appears to
7 describe a particular alarm related to the make-up
8 pump.

9 For instance, the first one is make-up
10 pump motor coolant flow lo and the second one talks
11 about make-up pump discharge pressure lo and so on.

12 Do you see that?

13 A Yes.

14 Q Do you know what those sheets are?

15 A Yes, this is a manual kept in the control
16 room which discusses the alarm panels.

17 Q Where did you get a copy of that manual
18 from?

19 A Came from the control room.

20 Q How did you get your hand on it?

21 A I went to the control room.

22 Q While you were there, did you notice
23 there was a printer in the room?

24 A I may have.

25 Q It's pretty hard to miss, isn't it,

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2

Mr. Billingsley?

3

MR. GLASSMAN: Wait a second. If you

4

were there, maybe you would like to be a witness.

5

We'll be glad to call you.

6

Q Looking at the sheets which are part of

7

Appendix 4, did you collect all of the sheets that

8

you could find that describe alarms that were

9

related to the make-up pump operation?

10

A Yes, I did.

11

Q Did you include them all as part of this

12

appendix?

13

A I believe so.

14

Q Did you ever determine where these alarms

15

would print out, the ones described in Appendix 4?

16

A I don't recall.

17

Q Do you recall learning whether or not

18

any of these alarms would be sent in for the

19

actuation of HPI?

20

MR. GLASSMAN: Could I hear that again?

21

MR. WISE: Let me rephrase it. I will

22

withdraw it.

23

Q Do you recall finding out whether or

24

not there was any alarm that would print out on the

25

alarm printer as a result of actuation of HPI on an

1

2 emergency safeguard signal?

3

4 A You asked me if anything of these were
printout?

5

6 Q No, I am asking as a result of your
7 investigation, you ever determined whether an
8 actuation of HPI on emergency safeguard signal would
result in an alarm being put on the alarm printer?

9

10 A I don't recall if there was an alarm
that went on as a consequence of that.

11

12 Q One of the purposes of your investigation
13 was to find out as described in Section 3.3 what
14 sources of information the operator had as to the
15 condition and status of the make-up pump and whether
or not they were operating.

16

17 Could you find out if they could tell
18 the status of the make-up pumps by looking at the
alarm printouts?

19

20 MR. GLASSMAN: The question is not
21 directed whether or not the operator actually
22 saw something or determined something but
23 whether there was some equipment in the
control room to that effect?

24

25 MR. WISE: That's right. In other words,
whether based on your investigation you were

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able to determine the fact that an operator could not tell anything as to the status or the operation of the make-up pumps by looking at the alarm printer.

A I am thoroughly confused. Are you asking me if -- Appendix 4, alarm printout?

Q That's a good start.

A To the best of my knowledge these do not print out.

Q What are they?

A These are panel alarms. That does not necessarily imply printing out.

Q Did you find out whether there was any log or list of the alarms that would result in a printout?

A No, I did not. Not to the best of my knowledge.

Q Was there any panel indicator or alarm that would show the status or condition of the make-up pumps as to their operation?

A Yes, there are panel alarms that would show status and condition.

Q Would those panel alarms show whether or not the pump was operating in an HPI mode?

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A I don't recall.

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Q As a result of your investigation, what indications would an operator in the control room have of whether or not the pumps were operating in an HPI mode?

A I don't recall there ever being anything to the best of my knowledge that stated that the pump was in an HPI mode.

Q Could you get that off the computer printer?

MR. GLASSMAN: You are asking him to speculate?

MR. WISE: I am asking if he learned one of the things that could happen before the accident is that the operator could get the printout of the computer which would show whether or not the pump was operating in an HPI mode.

A Not to the best of my knowledge.

Q If I understand your report properly, and I may not, printout that you discuss at length in your report would show various conditions for the make-up pumps; is that right?

A What do you mean by various conditions,

1

2

whether it was on or off?

3

Q It would show more than on and off.

4

A Problems with the bearing temperatures,

5

things of that sort?

6

Q Let's take a look at Section 4 of your

7

report which begins on page 7. You will note there

8

that you have a section covering manual pump start.

9

A Yes.

10

Q You have a section covering attempted

11

manual start.

12

A Yes.

13

Q And on page 9 you have an example of

14

some of the printouts that might be seen as a

15

consequence of that such as failed start, second

16

start, successful start.

17

A Sure.

18

Q Those are examples of printouts that

19

were available to the operators by using the computer;

20

is that right?

21

MR. GLASSMAN: Objection. The question

22

is now what is available to the operators. I

23

don't know what you mean by available.

24

Something that's physically in the control room

25

that's one thing. The question is unclear.

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MR. WISE: I never understood that

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objection. It makes no difference to me.

4

Q These are examples of what the printout

5

would show?

6

A Yes.

7

Q This was a printout that was run off

8

the plant computer?

9

A Yes.

10

Q It was the only computer there was?

11

A As far as I know, yes.

12

MR. WISE: We'll try to get testimony

13

that that was hooked up to the printer in the

14

control, seeing you don't know.

15

MR. GLASSMAN: You are certainly able

16

to examine other witnesses. We have had many

17

witnesses here. We'll cooperate in supplying

18

other witnesses as you request them.

19

Q In fact, these three that are listed on

20

page 9 that these are the various kinds of printouts

21

that would be made from the computer with regard

22

to the pump operations?

23

A That's correct.

24

Q There in fact are others; is that right,

25

various other printouts that are associated with?

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There are other examples in your report. Next page there are five different examples or so given there. Do you see those? One under "Automatic Start" on page 10, "Cont 2921."

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A Sure.

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Q There are a couple of others given on that page, right?

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A Yes.

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Q With respect to all those indications that you mentioned in your report, do you see them there?

13

A Yes.

14

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Q What I want to know now is whether or not you ever determined -- whether you determined amongst the various indications that were available through this system, was one that would show the operators whether or not the pumps were operating in the HPI mode?

20

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MR. GLASSMAN: I think that was asked and answered.

22

MR. WISE: I don't think so.

23

24

A I have never seen a printout that said the pump was in the HPI mode.

25

Q You saw a printout that the pump had

1

2

actuated in the HPI mode?

3

A No.

4

Q Would you look at page 6 of your report.

5

You have a section titled "3.4 Engineered Safety

6

Features/High Pressure Injection."

7

Do you see that?

8

A Yes.

9

Q Beneath that under 3.4.1 you have

10

something called "ES Signal," emergency safeguard

11

signal?

12

A Yes.

13

Q You have an example under "Automatic ES"

14

of what the printout would show, don't you?

15

A Yes.

16

Q "ES actuation A two-thirds logic, emergency

17

injection GP1 actuated;"do you see that?

18

A Yes.

19

Q That would show on the printout that

20

there had been an actuation of the HPI in the

21

automatic mode; is that right?

22

A It most certainly shows that.

23

Q You did learn that was available through

24

the printout?

25

A Yes, I did. Thank you for refreshing my

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memory.

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Q Was it your findings as a result of the investigation that this printout would be reversed given the wiring error that existed at TMI-2 on March 28, 1979?

A I don't believe I ever came across reversing of printouts for the emergency actuation of high pressure injection.

Q Would you look at the first example you give there.

Did you ever come to an understanding as to what that particular line would indicate on the printout, ES actuation A 2/3 logic, emergency injection GP1 Act? What does that indication mean?

A I can only tell you generally what that means. It's telling you that your emergency safeguard system has been automatically actuated.

Q Do you know what the reference to GP1 is?

A No, I don't recall.

Q There are two sets of indications given, 3 with the letter A and 3 with the letter B. Do you know what A and B refer to?

A I don't recall, no.

Q Did you ever submit a draft of this report

1

2

to Mr. Zewe to get his comments on it?

3

A I don't believe so.

4

Q Do you know whether anybody else did?

5

A Not to the best of my knowledge.

6

Q Did you ever receive comments from

7

Mr. Zewe?

8

A Not to the best of my knowledge.

9

MR. WISE: Let me have marked as B&W

10

Exhibit 459 a copy of a handwritten note

11

along with just the first page of what appears

12

to be -- cover page for TDR-118.

13

(Handwritten note with attached copy of

14

cover page for TDR-118 marked B&W Exhibit 459

15

for identification, as of this date.)

16

Q Exhibit 459 is a handwritten note from

17

Ed Wallace to GPM. I believe we have identified in

18

previous testimony that Gary P. Miller has those

19

initials. It is dated August 2 and reads, "Please

20

have Zewe plus any others of your staff review this

21

draft. Comments should be sent to Q. Billingsley

22

or Bob Long by 8/10. Thanks. Ed Wallace."

23

Did you ever see a copy of this note

24

or know that Mr. Wallace sent it?

25

A No.

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Q Did you ever receive any comments from
Mr. Zewe?

A Not to the best of my knowledge.

Q Did you ever receive any comments from
Mr. Long which he identified to you as having come
from Mr. Zewe?

A No, not to the best of my knowledge.

Q Let me now ask you to take a look at
B&W Exhibit 458 which is your draft of the TDR and
turn to the first page. Rather, the first page of
text.

You see you have a section entitled
"Abstract"?

A Yes.

Q And various points are listed under that.
I believe there are five points.

Taking the first one which reads, "Computer
printouts of make-up pump (MUP) operation (starts
& stops) can be misleading, therefore, an analysis
is required of all printouts recording MUP starts
and stops."

Why did you believe that the computer
printouts could be misleading?

A Because reverse wiring, if the printout

1

2

said stop, I believe that the pumps may have been

3

stopped when the computer printed start. When

4

the computer printed start, the pumps had stopped.

5

Q Is that the same explanation for your

6

point 2, "Computer printouts having computer

7

multiplexer (MPX) identification numbers 3172 & 3174

8

for MUP MU-P-1A & 1C respectively provide erroneous

9

information"?

10

A I believe so, yes.

11

Q Point 4, "MPX point 3173, for MU-P-1B,

12

is not operational." Why was that point not

13

operational?

14

A I would have to go through the text of

15

the report to find out. Do you want me to do that?

16

Q We'll come to it in a minute. Let me

17

go through these points and see if we can learn

18

anything else before going to the specifics. Maybe

19

we should take a look at that.

20

MR. GLASSMAN: Can I take a quick break?

21

(Recess taken.)

22

BY MR. WISE:

23

Q Before the break we were discussing

24

B&W Exhibit 458 and in particular I was going

25

through the list of five items contained in your

1
2 abstract at the beginning of the report. I questioned
3 you about the indication for make-up pump 1B which
4 is the fourth item listed under your abstract and
5 indicates that that particular point was inoperative.

6 Would you take a look at page 3 of your
7 report, the very last line in the section under the
8 title "3.1.1 Input Data" reads, "The computer input
9 for MU-P-1B (MPX 3173) is not functional (does not
10 printout)."

11 Based on my review that's the only
12 mention I see of that point in the entire report.
13 Are you aware of any other point in your report
14 where it is discussed?

15 A I don't believe so. I don't believe it
16 is discussed any other place.

17 Q Did you ever find out why that point was
18 not functional?

19 A I don't recall.

20 Q Did you find out whether it had been
21 functional on the date of the accident?

22 A I don't believe so.

23 Q For how long had it not been functional,
24 to your knowledge, before the accident?

25 A I don't know.

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Q Did you ever make any investigation to determine how long it had been non-functional before the accident?

A I do not believe so.

Q If I understand your testimony right, you don't know why it wasn't functional?

A No.

Q You never found out?

A Not to the best of my knowledge.

Q What did you find out was the consequence of that point not being functional?

A To the best of my knowledge, I don't believe it made any difference whatsoever.

Q What is the reason as you found it that it made no difference?

A I would have to go back and look at this report in detail. But there are two sets of multiplexer points, MPX points for the make-up pumps, the 29 series and the 30 series. I don't believe it was significant. I would have to go back through this report, however, to take a look. I will if you would like.

Q What is the difference between a 29 series and 30 series that you recall?

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A I believe those are strictly contact numbers in the electrical circuit.

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Q So that if a particular contact in one series was not operative, it would make no difference if the contact for that particular indication was operative in the other series; is that what you are saying?

A Would you repeat that question again, please?

(Question read by the reporter.)

A I believe that to be the case, however, again, I would have to go back and take a good look at the report.

Q Let me switch to another topic.

Would you look at page 5 of your report under the section labeled "Information Available to the Operator."

Did you make an investigation as to what information was available to the operator on the morning of the accident?

A No. It was not relevant to my study.

Q Would you look at the third paragraph of that section which reads, "At 4:02:38 'B' make-up pump auto stopped. Once in the auto stop mode, all

1

2

other make-up pump trips ('A' & 'C') pumps would be blocked from actuating the panel alarm."

3

4

5

Does the indication 4:02:38 refer to a time?

6

A Yes.

7

8

Q Refers to a morning, to a time on the morning of March 28, 1979, does it not?

9

10

11

A I would have to recall and I can't whether that's real time or zero time. I am not sure, but it's a time.

12

13

Q It's a time that occurred on the morning of March 28, 1979?

14

15

A Again, I must say that if it's real time or zero time.

16

Q Putting aside --

17

A It's a time on the morning of March 28.

18

19

20

21

Q You did take a look at the chronology of what happened on the morning of March 28 in connection with your section "Information Available to the Operator," is that right?

22

A Yes.

23

24

Q You made this notation concerning what happened to make-up pump B, right?

25

A Yes.

1

2

Q You found that it automatically stopped?

3

A Yes.

4

Q Your comment here is that once that had happened all of the other make-up pump trips, that is, the A and C pumps would be blocked from actuating the panel alarm. What did you mean by that?

9

A Based on how I read that statement today --

11

Q Your counsel will object to that.

12

Do you have any recollection as to what you meant there?

14

A No.

15

Q Do you have any recollection today as to what the consequence was of having the B make-up pump in the auto stop mode?

18

MR. GLASSMAN: Could you read that back?

19

(Question read by the reporter.)

20

A Based on the preceding paragraph of section 3.3, panel 8.D37 would not actuate.

22

Q Did you make a determination that after 4:02:38, whether that's real time or time from the beginning of the incident on March 28, 1979, because of the position of the B make-up pump panel

25

indications were unavailable with respect to trips of the A and C make-up pumps?

A Are you talking panel alarms?

Q Yes. That's what you were talking about here in this memo.

A Yes, that's exactly what that was talking about. I don't recall.

Q The A and C pumps are the ones used for HPI, you learned that as a result of your investigation, didn't you?

A I do not recall if safety injection is limited to just those two pumps.

Q Take a look at the next page.

A Page 6?

Q Yes, the top, "Engineered Safety Features/High Pressure Injection," Section 3.4, "The make-up pumps are required for high pressure injection (HPI). During normal operation two of the three pumps are in standby while the remaining pump is used to service system requirements (make-up & letdown). The preferred mode of pump operation, at TMI-2, is MU-P-1A & 1C in standby (HPI) and MU-P-1B in operation."

Does that help refresh your recollection

1

2

that at TMI-2 it was make-up pumps 1A and 1C that
were used for high pressure injection?

3

4

A Yes.

5

6

Q Would you look now at Table 1 of your
report?

7

A Yes.

8

Q What is that?

9

10

A Table 1 is an actual accounting of pump
status during the accident.

11

12

Q Begins on page 13 and carries over to
page 14?

13

A Correct.

14

Q Is this a chart that you prepared?

15

A Yes, it is.

16

17

Q From what information or sources did
you get the data necessary to prepare this chart?

18

19

A Computer printouts and analysis of the
electrical circuit.

20

21

Q There is a column at the left-hand side
marked "Time," do you see that?

22

A Correct.

23

24

Q Is that real time or time from the
beginning of the event?

25

A I don't recall. I can't recall.

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Q Well, the time column contains various times, each of which has three parts separated by colons. First, there is a single digit colon, double digit colon and another double digit.

Do you see that?

A Yes.

Q Is the number to the far left, is that meant for hours?

A Yes.

Q Digits in the middle are minutes?

A Yes.

Q And digits at the far right are the seconds?

A Correct.

Q Do you have any recollection as to what time the accident at Three Mile Island commenced on the morning of March 28, 1979?

A I don't recall.

Q Do you remember that it was about four o'clock in the morning?

A If you say so. I don't recall.

Q You have no recollection of that?

A No.

Q Do you know how long it was after the

1
2 accident began that the operators began operation
3 of the make-up pumps?

4 A No, I don't.

5 Q You were performing an investigation
6 to find out when the make-up pumps were operating
7 during the accident?

8 A That's a fact.

9 Q You never found out how long after the
10 accident started the operators went and --

11 A I could tell you based on time, but I
12 must remind you that everyone in the industry played
13 games with time. Some people used zero time and
14 some people used real time. Unless I can recall
15 what I took for time and when the accident occurred -- you
16 are asking me for answers to facts which you have
17 immediately and I don't.

18 Q You prepared this?

19 A Yes.

20 Q You have columns on the left-hand side
21 of the page beginning with approximately 4:00:50
22 seconds.

23 A Correct.

24 Q Are you telling me today that you do
25 not remember that that in fact refers to the real

1
2 time of the accident as it began on the morning of
3 March 28? Do you really have any doubt --

4 A If you are telling me that you are sure
5 that that is the real time that the accident
6 started, I would be able to place this time -- I
7 can give you what I believe my understanding of
8 what this time is. What time did it start?

9 Q Approximately 4:00 A.M. on the morning
10 of March 28.

11 Q Then this is real time.

12 Q You were involved in the preparation
13 of the sequence of events, weren't you?

14 A Yes.

15 Q You were involved in that for several
16 months?

17 A Yes.

18 Q Did it ever come to your attention what
19 time the accident started?

20 A Yes.

21 Q What time did it start?

22 A I can't recall.

23 Q Sometime in the morning?

24 A Sometime in the morning.

25 MR. GLASSMAN: We are wasting time. We

1
2 can all get to the bottom of it very easily.

3 MR. WISE: I agree.

4 MR. GLASSMAN: Your problem is that you
5 somehow have this great perception that every
6 witness has to have a recollection of events
7 similar to yours. The witness wasn't at
8 Three Mile Island on the date of the accident.
9 He may have learned something, he may have
10 forgotten it. If you and I would like to
11 take this witness' testimony on this point
12 subject to our knowledge and understanding
13 which may be this witness doesn't recollect
14 that the accident started at about four o'clock,
15 we can go that way.

16 MR. WISE: Let's try and proceed.

17 Q Do you notice that on your chart, Table
18 1, you have an indication at 4:02:38. Do you have
19 an indication that make-up pump 1B was tripped?

20 A Correct.

21 Q If I am right that the accident started
22 about 4:00 A.M., it would mean that this make-up
23 trip at approximately --

24 A Assuming base time is correct.

25 Q Assuming again it was almost four o'clock

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on the nose, this would be about two minutes or some odd seconds into the accident?

A Correct.

Q Do you remember from all your work on the sequence of events and this investigation whether in fact you learned at some point that the operators at about two minutes or 30 seconds so into the accident had stopped make-up pump 1B?

A I am not aware that the operator stopped the pump.

Q That it had been automatically stopped?

A Based on my report, yes.

Q It had been automatically stopped by an emergency safeguard actuation; is that right?

A That appears to be the case, yes.

Q Pump 1B which was the normal make-up pump would stop and make-up pump 1A and 1C would begin in the HPI mode; is that your understanding based on the investigation that you performed?

MR. GLASSMAN: You are asking for the witness to tell you what's in this chart?

MR. WISE: I am asking for his recollection of what he understood based on this investigation and based on the fact that he was involved in

1
2 the sequence of events which we'll come to
3 in a moment.

4 A Based on my understanding of TDR-118
5 which I prepared, I cannot speak to the sequence of
6 events which I do not have in front of me. C pump
7 started on emergency safeguard actuation. A pump
8 was already in operation.

9 Q Based on your investigation did you
10 determine what the printout was wired to show or what
11 the computer was set up to show for a pump which
12 had been in operation in a make-up mode and then was
13 or received an emergency safeguard actuation and
14 converted to the HPI mode?

15 MR. GLASSMAN: Could I have that read
16 back?

17 MR. WISE: Let me try to clean that up.
18 It got a little messy.

19 Q Based on your investigation of the
20 printout indications that were provided from the
21 computer, did you ever determine what printout was
22 supposed to be received in the event that a make-up
23 pump which was in operation before an emergency
24 safeguard actuation signal received such a signal
25 and went to the HPI mode?

1
2 A I understand your question. Let me make
3 sure I have got it right. The pump is in operation,
4 you have got an ES, you want to know what the
5 printout would look like when it's in operation?

6 Q Yes.

7 A I know what it looks like.

8 Q What should have been printed out?

9 A Based on my recall I am not sure that
10 you would get a printout for a pump that is already
11 in operation.

12 Q Did you ever determine that in connection
13 with your preparation of Table 1 because I note that
14 at the time that there is an indication that make-up
15 pump 1C had gone into emergency safeguard actuation.
16 There is nothing on this chart indicating that pump
17 1A likewise had gone into the HPI mode.

18 A That's correct. That pump was already
19 in operation. On that basis I make the statement
20 that I don't believe that there necessarily would
21 be a printout for a pump already in operation.

22 Q Did you ever determine one way or the
23 other whether in fact that should have occurred?

24 A I don't recall.

25 Q I note that there is nothing on your

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chart between 241 when make-up pump 1C was shown to have actuated in the HPI mode and 515 when there is an indication that pump 1C was tripped through a manual stop. Do you see that? There are no indications of any printout in between those two times.

A Pump A?

Q For either pump A, B or C. You go from 241 to 515. There is nothing in between.

A You are correct.

Q Did you ever determine where on the morning of the accident the pumps either in their make-up mode or their HPI mode had been turned on or off between 241 -- two minutes and 41 seconds into the accident and approximately five minutes and 15 seconds into the accident, again with my assumptions about time?

A On the basis of this, no.

Q Did you ever learn as a result of your work on the sequence of events that the operators had interfered with HPI operation between the time 241 approximately passed four o'clock in the morning and 515 passed four?

MR. GLASSMAN: Objection to the use of

1
2 the word "interfered." If they took some,
3 and he learned of it, fine. There are
4 implications in the word which are unfounded.

5 MR. WISE: You will hear a lot of it
6 at trial but I will go along with some other
7 word now. Actuation or termination of the
8 pumps.

9 MR. GLASSMAN: There has been testimony
10 not only that actuation and termination of the
11 pumps were a part of regular procedure that
12 they happened before, that they were sometimes
13 considered normal and that's the context in
14 which I object to the use of the word
15 "interfered."

16 MR. WISE: We'll fight that battle
17 another day.

18 A I can't say because I don't recall. I
19 can't recall based on my current knowledge of the
20 sequence of events.

21 Q Would you look at the indication for
22 approximately 4:11 A.M. You have there under
23 make-up pump 1A that the pump was manually stopped,
24 manually started and then manually started again.

25 What is your recollection of what

1

2

occurred there with respect to the pump?

3

A Based on my analysis that the pump was

4

started, stopped and started and then started a pump.

5

Q Go down a little bit further. You see

6

an indication that at 4:12:20 make-up pump 1A was

7

successfully started manually.

8

A At 4:12:20, yes.

9

Q Then there is nothing shown here

10

between 4:12:20 A.M. and 7:20:50 A.M.

11

Did you ever determine as a result of

12

your examination on this TDR or as a result of your

13

work on the sequence of events, whether the

14

operators had started or stopped any of the make-up

15

pumps between 4:12:20 and 7:20:50 on the morning

16

of the accident?

17

A No.

18

Q That never came to your attention?

19

A Not to the best of my knowledge.

20

Q Look now at Table 2. Table 2 is

21

labeled "Summary of Table 1." This occurs at

22

page 15 of your report.

23

Do you see that?

24

A Yes.

25

Q You have at the left-hand side various

1
2 descriptions of total number of manual starts, total
3 number of manual stops, so forth and so on. Then
4 you have two columns to the right, one labeled
5 "Before" and one labeled "After." According to
6 the notes, the "Before" column refers to pump
7 operation published in the preliminary sequence of
8 events for March 28. The "After" column refers to
9 your analysis of the computer printouts. Is that
10 correct?

11 A Yes.

12 Q Did you have available to you in
13 preparing TDR-118 a copy of a preliminary sequence
14 of events for March 28, 1979?

15 A I can assume that I did on the basis of
16 this statement, yes.

17 Q Do you remember making out this table?

18 A Yes.

19 Q Do you remember what you made it up from?

20 A Yes.

21 Q What did you make it up from?

22 A I made it up from my analysis and
23 preliminary sequence of events dated 3/28/79.

24 Q You remember having that?

25 A On the basis of this, yes. I must have.

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MR. GLASSMAN: I think the record

should state that the question is not directed
that you must have or should have, but
whether you actually remember having it.

Q What preliminary sequence of events did
you have to prepare the "Before" column?

A I don't recall.

Q You later came to work on the sequence
of events at some point?

A Correct.

Q In doing that work, did you channel in
the results shown in the "After" column in Table 2
of TDR-118?

A Did I channel 118 into my original on
the sequence of events?

Q Yes.

A Yes, I did.

Q Did you make a designations and deletions
as to when the make-up pumps started and stopped
based on the work you had done here?

A Yes, I did.

Could I qualify that statement? I made
recommendations.

Q You didn't have the final say on the

1

2

sequence of events?

3

A No.

4

Q Would you look now at Appendix 1 which
is the following page. That has something called
"Investigation Outline."

7

Who prepared that?

8

A I did.

9

Q Did you pursue all these questions?

10

A I don't recall.

11

Q Question 7, "When a printer fails is there
automatic backup?"

13

Did you ever find out the answer to that
question?

15

A I don't recall.

16

Q Did you ever investigate it?

17

A I don't recall with certainty.

18

Q Would you look at item 9, "Has there
been instances where, due to the quantity of
alarms and/or events, the computer has given
erroneous alarms or messages?"

22

Did you ever find out the answer to that
question?

23

24

A I found out that there are erroneous
messages. I don't recall if I tied in quantity of

25

1
2 alarms and/or events.

3 Q Your last item, "Did anyone keep a
4 log of start/stop attempts on the pump?"

5 What pump are you referring to there,
6 make-up pumps?

7 A Yes.

8 Q Did you ever find out whether anybody
9 kept a log on that?

10 A I don't recall.

11 Q Would you take a look at Appendix 2 to
12 your report? Would you tell us what that is?

13 A This looks like a design modification
14 that was made.

15 Q That's page 4053, 4054, 4055 and 4056.

16 Let me ask you this: Appendix 2 which
17 is 4053 appears to relate to something done in
18 March 1979. You can note that by looking at the
19 dates down at the bottom right-hand corner. You
20 will see the date March 27, 1979. It's very hard
21 to read. I think if you look you will be able to
22 see it.

23 A Yes, it looks like that way.

24 Q So this document relates to the
25 modification that was made and noted in your report

1
2 on March 27, 1979, would that be right?

3 MR. GLASSMAN: Are you asking the
4 witness whether he knows that?

5 MR. WISE: Yes. We are not going to
6 finish if you keep objecting every time on that.

7 MR. GLASSMAN: The witness didn't seem
8 to have any answer before. You just showed
9 him a particular date which is somewhat
10 unreadable. I want to make sure he understands
11 the difference between reading this date and
12 saying that you read it correctly as opposed
13 to his recollection of an event.

14 A The question --

15 Q Take a look back. This is taking much
16 longer than I thought. One, go back to page 4041
17 of your report.

18 A That's it.

19 Q The remainder of these documents in
20 the appendix here come from the files of Met Ed?
21 Is that where you got these?

22 A This Appendix 2?

23 Q Yes.

24 A Doesn't look like like everything in Appendix
25 2 came from Met Ed's files. Some of these are

1

2

drawings that I made.

3

Q Which ones?

4

A Page 4061, 4062, 4063. Those are

5

drawings that I made out of the sources indicated

6

on the drawings.

7

Q I believe those three drawings are a

8

part of Appendix 3. It's very hard to make out. If

9

you look at the top center towards the right you

10

will see in very faint print there, Appendix 3, I

11

think.

12

A Appendix 2 are items taken out of Met Ed

13

files.

14

Q They all relate to the design modification

15

which you reference in your report in Section 3.2;

16

is that right, on page 4 and carrying over to page

17

5? This is the backup documentation for those

18

changes?

19

A That's correct.

20

Q There came a time when you were asked to

21

work on the sequence of events for the March 28

22

accident, I believe you testified to that already?

23

A That's true.

24

Q Let me show you what's been marked

25

already as B&W Exhibit 466. Take a look at that and

1
2 tell us if you recognize what it is. You may
3 want to look. I guess it's the second page of
4 the exhibit.

5 A Which would be page 23218?

6 Q Yours may be different. Let me see the
7 copy that was previously marked. This is the same.
8 Let me ask you -- the second page on the copy that
9 I have is different than what you have got. We are
10 attempting to get the handwritten memo that appears
11 on at least one copy of this particular report which
12 may help you. Until we get that report, does looking
13 through this help you remember whether or not you
14 have seen a copy of this?

15 A Is there a cover page --

16 Q We'll get one in a moment. There is a
17 note signed by you dated November 26, 1979 which
18 reads, "This is the latest edition of the Stafco
19 sequence of events. Please have your people review
20 and pay particular attention to any mention of
21 thermal hydraulics. Forward your comments to me
22 by November 30, 1979. If there are any problems,
23 please contact me." It's written to someone by
24 the name of Gary.

25 MR. WISE: Mark this memo as B&W Exhibit

1
2 510.

3 (Handwritten note signed by Mr. Billingsley
4 dated November 26, 1979 marked B&W Exhibit 510
5 for identification, as of this date.)

6 Q Is Exhibit 510 a copy of a note which
7 you wrote?

8 A Yes.

9 Q Do you remember forwarding a copy of
10 the Stafco report to Gary Miller for his review?
11 That's who the Gary is that's referred to in the
12 note, isn't it?

13 A I don't know.

14 Q You don't remember forwarding this to
15 Mr. Miller?

16 A No.

17 Q You don't remember forwarding anything
18 to Mr. Miller?

19 A Not this particular report. I have
20 dealt with a number of Garys.

21 Q Do you remember who you would have
22 forwarded this to on November 26, 1979?

23 A No.

24 Q Did you ever submit one to Gary Broughton?

25 A I vaguely remember that being the

1

2

individual, yes.

3

Q Did you ever receive any comments from

4

Mr. Broughton?

5

A I don't recall.

6

Q Did you ever receive any comments from

7

Mr. Miller?

8

A On this?

9

Q Yes.

10

A I don't believe so.

11

Q You are asking someone to forward

12

comments to you by November 30. Do you remember

13

who, if anyone, forwarded any comments to you by

14

the end of November 1979 on the Stafco report?

15

A I can say what I remember with respect

16

to this and it's vague in my mind, Mr. Wallace asked

17

me to have Gary Broughton's group I remember -- Gary

18

Broughton's group to take a look at the thermal

19

hydraulics section.

20

Q Do you remember whether you got any

21

comments on that?

22

A I don't recall getting any.

23

Q I guess we're back to the original

24

question which is whether you recognize the Stafco

25

sequence of events itself which appears to be,

1
2 according to a handwritten note on the first page
3 of it, a November 2, 1979 draft.

4 MR. GLASSMAN: What document are we now
5 talking?

6 MR. WISE: B&W Exhibit 466.

7 Q Do you have a recollection of coming
8 into your hands?

9 MR. GLASSMAN: I note an objection, that
10 while for all I know this might be a Stafco
11 work, that does not appear on the face of
12 the document and I guess what we are looking
13 for is the witness' recollection.

14 MR. WISE: This is silly. This has
15 become obstructive.

16 A I have looked at a number of sequence of
17 events. Stafco had one, John Putnam had one.

18 Q Would you take a look at the first page
19 of this exhibit. It says Volume 2.

20 A Yes.

21 Q This volume describes the accident
22 that occurred at Three Mile Island Unit 2 on
23 March 28, 1979. Supporting information in Volumes
24 3 and 4.

25 A Yes.

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Q Do you know if Mr. Putnam's sequence

of events had four volumes?

A I don't believe so.

Q Did the Stafco sequence of events and

reports have four volumes?

A I believe it did.

Q Would you take a look at the actual

sequence of events, the printed portion that begins

at time 00:00:14 seconds and continues for quite

a few pages thereafter.

You see how that's in a printed format

as opposed to typewritten?

A Time 00 --

Q The whole thing, all of this stuff. Do

you see how that's not in normal typescript?

A I guess it isn't. This could be

reduced. Jesus Christ, I don't know. If you say

it is, it is. It is printed.

Q Is there seriously any doubt in your mind

that this is the Stafco report?

A If I was to testify to this under oath,

I can't say it is or isn't because there is no

identifying script on it that says Stafco. This

could be EPRI's report for all I know. Would you

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2

put your life on this statement?

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Q It depends on whether or not you were involved for several months with working on this report. You also were involved with working on the EPRI report.

A I reviewed it.

Q Now you are not able to tell the difference between them?

A If you have codes or names on it, I will tell you. I am under oath, ain't I. You are asking me to testify to the best of my knowledge. If you say so, maybe that is Stafco's report. I can't say for sure.

Q Who else besides you worked on the Stafco GPU Service between November 1979 to May 1980?

A Jim Flarethy.

Q Is he the only person?

A Assigned, yes. I also worked with John Putnam on this as well.

Q You were the prime GPU Service employee who was responsible for reviewing the Stafco report during that period of time; isn't that true?

A That's correct.

1
2 Q You are not able to identify because
3 it lacks identification on it?

4 MR. GLASSMAN: Mr. Wise, come now. We
5 have been through this a lot. You keep on
6 expressing some personal chagrin at the
7 fact that a witness cannot look at a
8 particular piece of paper that he may have
9 looked at several years ago and tell you
10 without an identifying remark whether it's
11 a sequence of events prepared by one person
12 or another. It's a long document.

13 MR. WISE: Let's look at a few other
14 documents and see if that will help.

15 MR. GLASSMAN: I should note that if
16 one witness doesn't recall a particular item,
17 it's traditional to call another witness if
18 you deem it important enough. The problem
19 with the testimony of this witness, it's your
20 examination of him, you persisted in asking
21 more questions about documents that this
22 witness did not author rather than ask
23 questions about documents that he did author.
24 As a result, you have obtained some blanks.
25 I think it's understandable and the problem

1
2 relates to the nature of the question rather
3 than to the nature of answers.

4 MR. WISE: I disagree with you,
5 Mr. Glassman. I think this witness is the
6 proper witness to testify concerning the Stafco
7 report. He just said he was the prime GPU
8 Service person involved with reviewing it
9 for a period of over six months. I cannot
10 think of anyone else to call to ask about it.

11 If your client wants a trial in
12 October 18, 1982, I guarantee you are not
13 going to get it if you persist in making
14 us call every last author of every last piece
15 of paper, when they come in and deny
16 recalling something --

17 MR. GLASSMAN: You have a particular
18 document here that doesn't have an identifier
19 on it. The witness said he has worked on
20 the Stafco report. You are free to ask him
21 any questions you wish on it.

22 The question you are pursuing ad infinitum,
23 whether this witness can sit here and tell you
24 now that this is Stafco's report or not, if you
25 want to cut time by serving a notice to admit

1
2 or doing some other procedure that might
3 allow us to short circuit this to save this
4 witness' time and all of our time, I am sure
5 you know full well how to proceed expeditiously
6 without wasting a half hour on identifying a
7 particular document.

8 BY MR. WISE:

9 Q Do you know Mr. Ankrum?

10 A Yes. Not personally. I believe I have
11 spoken to him on the phone.

12 Q He worked for Stafco, Inc.?

13 A Yes.

14 Q Did you know Mr. McEwen?

15 A Yes. I believe I met him on one
16 occasion.

17 Q Mr. McEwen or Mr. Ankrum?

18 A Mr. McEwen.

19 Q Did you have correspondence with either
20 gentleman?

21 A Yes.

22 Q What was the correspondence about?

23 A I had correspondence with Mr. Ankrum
24 and Mr. McEwen involving my review of Stafco
25 sequence of events.

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Q Do you recall, Mr. Billingsley, becoming aware that Mr. Ankrum had discussions with Jim Floyd on November 8 and 9 concerning the draft sequence of events prepared by Stafco?

MR. GLASSMAN: Could I hear that once more?

(Question read by the reporter.)

A I believe Mr. Ankrum spoke with someone at Three Mile Island, but I don't recall it being Mr. Floyd. I can't say at this point.

MR. WISE: Let me show you what I will have marked as B&W Exhibit 511 which is a copy of a letter dated November 26, 1979 from Mr. Ankrum to Mr. McEwen with carbon copies to Ed Wallace, Jim Floyd and Ron Neve.

(Copy of letter dated November 26, 1979 from Mr. Ankrum to Mr. McEwen marked B&W Exhibit 511 for identification, as of this date.)

Q The memorandum reads, "Attached is the current list of outstanding questions on the Operational Sequence of Events, i.e., Volume II, Section 1.2 of the subject report. These questions have resulted from my discussions with Jim Floyd

1
2 on November 8 and 9 and from Mr. Quincy Billingsley's
3 letter to you of November 19, 1979. This list of
4 questions is being simultaneously sent to Ed Wallace
5 at GPU and Jim Floyd at Met Ed. I will incorporate
6 their responses to these questions, along with
7 any other comments, as soon as possible after receipt."

8 Did you ever receive a copy of B&W
9 Exhibit 511 and the attachments to it?

10 A I can't say I recall the cover letter,
11 but these questions that are attached appear to
12 be questions I have seen before.

13 Q In what connection did you see them?

14 A Working on the sequence of events to
15 respond to particular questions made by Stafco
16 and/or personnel at TMI.

17 Q Two attachments, one is dated
18 November 19, 1979. It is 8 pages long.

19 Do you see that?

20 A Yes.

21 Q Do you recall preparing an 8-page set
22 of questions and mailing it to Mr. Ankrum with your
23 letter dated November 19, 1979?

24 A I would have to see that letter because
25 I don't recall what it is.

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Q You don't recall writing Mr. Ankrum with various questions and comments regarding the sequence of events that had been prepared by Stafco?

A I may have.

Q You don't recall it one way or the other?

A No, I do not.

Q You don't recall whether the particular document that is dated November 19, 1979 reflects your comments?

A These may be my comments. I don't know. If you have the letter, I suggest you show it to me. It would save us time because it's getting close to four o'clock. We haven't been provided with a copy of the letter. If I had it, I would show it to you.

Q Without the letter, you have no recollection as to whether this 8-page series of questions is something you prepared?

A No.

Q You will note that a second attachment begins following the 8-page sequence of events. It's titled "Stafco" typed by Al Ankrum.

A What document page would that be?

1
2 Q 3741 and continuing for the next
3 several pages through 3745, through item 60.

4 I am sorry. The second thing I was
5 talking about is another document that we'll mark
6 in a second.

7 The copy I have has the two of them
8 attached. You have got the copy that just has
9 3715 to 3722.

10 A That's correct.

11 MR. WISE: Let me withdraw my question
12 concerning the second one.

13 Let me show you next a document which
14 we'll have marked as B&W Exhibit 512.

15 (Handwritten document, two pages, marked
16 B&W Exhibit 512 for identification, as of this
17 date.)

18 Q Have you ever seen B&W Exhibit 512 before?
19 It's a copy of a two-page handwritten memo dated
20 November 9, 1979 addressed to Ed and signed by Al
21 Ankrum.

22 A I vaguely remember this.

23 Q There is some handwriting at the top
24 of the page. Do you see that, "Questions:" and three
25 items. That's your handwriting?

1

2

A That's correct.

3

Q So you had a copy of this?

4

A Yes.

5

Q Was the "Ed" Mr. Wallace?

6

A I believe so.

7

Q Do you remember whether you received

8

this shortly after November 9?

9

A No, I don't.

10

Q This particular comment references

11

three typewritten pages which reflect the comments

12

made by you and -- is that "Stack" or "Jack," Jack

13

McEwen?

14

A Where are you reading this?

15

Q From the front page of B&W Exhibit 512.

16

A On the top of this page?

17

Q It's about halfway down. It says, "3

18

typewritten pages reflect the comments made by you

19

and Jack McEwen in Idaho Falls, along with some

20

that I added."

21

A Yes.

22

Q "Many of them were answered or

23

superseded during discussions with Jim Floyd

24

yesterday and today."

25

Do you see that?

1
2 A Yes.

3 Q "Also attached (in very rough form) is
4 a 15-page list of questions and comments generated
5 in discussions with Jim. As I told him, I'll be
6 getting these typed within the next couple of days
7 and I'll send you a new copy." Signed "Al Ankrum."

8 MR. WISE: Let's have marked as B&W
9 Exhibit 513 a three-page typewritten set of
10 comments on the sequence of events.

11 (Three-page typewritten document entitled
12 "Sequence of Events Comments" marked B&W
13 Exhibit 513 for identification, as of this
14 date.)

15 (Discussion off the record.)

16 MR. WISE: We'll come back.

17 (Time noted: 4:00 o'clock P.M.)

18 QUINCY BILLINGSLEY, III

19 Subscribed and sworn to before me
20 this day of , 1982.
21
22
23
24
25

CERTIFICATE

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

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 19, 1982 consisting
of pages 158 through 327;

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 10th day of March, 1982.

Catherine Cook
CATHERINE COOK

I N D E X

WITNESS

PAGE

Quincy Billingsley, III
(continued)

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E X H I B I T S

B&W EXHIBITS

FOR IDENT.

439	Set of notes, the first page of which is a copy of file jacket entitled "EMOV License Submittal, 2-29-80"	160
440	Handwritten notes relating to the reactor coolant drain tank	195
441	Two pages of handwritten notes titled "RC-V-2 (Block Valve for Electromatic Relief)"	198
442	Document entitled "Three Mile Island Nuclear Station Unit 2 Surveillance Procedure 2301-3D1 RC System Inventory" with attached data sheets	200
443	Two-page handwritten document	204
444	Set of handwritten notes	205
445	Letter dated October 18, 1979 to Mr. Short from Mr. Harding	207
446	Memorandum dated March 1977 from Mr. Shovlin	209
447	Letter dated March 29, 1978 from Mr. Bolger of Dresser Industries to Mr. Cotter at Met Ed	210
448	Letter dated December 1, 1969 from Dresser Industries to B&W with attachments	211

E X H I B I T S

B&W EXHIBITS (continued)

FOR IDENT.

449	Copy of field questionnaire and problem report, cover page bearing date April 6, 1978	211
450	Field questionnaire number 1874 bearing date May 25, 1977 with attachments	212
451	Copy of field change report with documents attached	212
452	Letter dated January 24, 1972 relating to PORV order	212
453	Letter dated October 5, 1976 from Dresser Industries addressed to Mr. Stuhrke of Burns & Roe	213
454	Two-page quality assurance data sheet relating to Dresser PORV	213
455	Copy of a memorandum to file from Mr. Harbin dated February 1, 1980, subject, PORV	213
456	Multipage document, TDR-150, titled "TMI-2 PORV Investigation"	216
457	Handwritten notes titled "Things That Still Must be Added to the Report"	255
458	Copy of draft TDR titled "TMI-2 Make-Up Pump Operation"	257
459	Handwritten note with attached copy of cover page for TDR-118	287
510	Handwritten note signed by Mr. Billingsley dated November 26, 1979	314

E X H I B I T S

B&W EXHIBITS (continued)

FOR IDENT.

- | | | |
|-----|--|-----|
| 511 | Copy of letter dated November 26,
1979 from Mr. Ankrum to Mr. McEwen | 322 |
| 512 | Two-page handwritten document | 325 |
| 513 | Three-page typewritten document
entitled "Sequence of Events
Comments" | 327 |

* * *