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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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

Plaintiffs, : 80 CIV. 1683
: (R.O.)

-against-

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

Defendants. :
-----x

Continued deposition of GPU Nuclear
Corporation, by ROBERT L. LONG, taken by
defendants pursuant to adjournment, at the
offices of Davis Polk & Wardwell, Esqs., One
Chase Manhattan Plaza, New York, New York,
on Friday, May 21, 1982, at 9:50 o'clock
in the forenoon, before Joseph R. Danyo, a
Notary Public within and for the State of
New York.



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

DOYLE REPORTING, INC.
CERTIFIED STENOTYPE REPORTER
369 LEXINGTON AVENUE
NEW YORK, N.Y. 10017
TELEPHONE 212 - 867-8220

A p p e a r a n c e s :

KAYE, SCHOLER, FIERMAN, HAYS & HANDLER, ESQS.
Attorneys for Plaintiffs
425 Park Avenue
New York, New York

By: STEVEN J. GLASSMAN, ESQ.,
of Counsel

DAVIS POLK & WARDWELL, ESQS.
Attorneys for Defendants
One Chase Manhattan Plaza
New York, New York

By: RODMAN W. BENEDICT, ESQ.,
of Counsel

Also Present:

DEBORAH JACOBS

* * *

1
2 R O B E R T L. L O N G, having been
3 previously duly sworn, resumed and testified
4 further as follows:

5 (16-page handwritten memorandum dated
6 July 17, 1979 was marked B&W Exhibit 726 for
7 identification, as of this date.)

8 (Multipage document, first page headed
9 "Preface" at the top, was marked B&W Exhibit
10 727 for identification, as of this date.)

11 EXAMINATION (continued)

12 BY MR. BENEDICT:

13 Q Do you understand that your testimony
14 today continues to be under oath?

15 A Yes.

16 Q I would like to show you two documents that
17 have been marked as B&W 726 and B&W 727.

18 B&W 726 is apparently a 16-page handwritten
19 memorandum dated July 17, 1979, which reads in the
20 first line on the first page, "Summary of operational
21 aspects."

22 What has been marked as B&W 727 is a
23 multipage document, the first page of which reads
24 at the top, "Preface," and if you turn in a few pages,
25 the document appears to be dated July 16, 1979.

KAYE, SCHOLER, FIERMAN, HAYS & HANDLER, ESQS.
Attorneys for Plaintiffs
425 Park Avenue
New York, New York

DAVIS POLK & WARDWELL, ESQS.
Attorneys for Defendants
One Chase Manhattan Plaza
New York, New York

* * *

25

1
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4 further as follows:

5 (16-page handwritten memorandum dated
6 July 17, 1979 was marked B&W Exhibit 726 for
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8 (Multipage document, first page headed
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10 727 for identification, as of this date.)

11 EXAMINATION (continued)

12 BY MR. BENEDICT:

13 Q Do you understand that your testimony
14 today continues to be under oath?

15 A Yes.

16 Q I would like to show you two documents that
17 have been marked as B&W 726 and B&W 727.

18 B&W 726 is apparently a 16-page handwritten
19 memorandum dated July 17, 1979, which reads in the
20 first line on the first page, "Summary of operational
21 aspects."

22 What has been marked as B&W 727 is a
23 multipage document, the first page of which reads
24 at the top, "Preface," and if you turn in a few pages,
25 the document appears to be dated July 16, 1979.

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2 Looking first at what has been marked as
3 B&W 727, is this a copy of the draft of nureg 0600
4 that you mentioned in your testimony yesterday?

5 I might note for the record that this document, 727,
6 came from your files.

7 MR. GLASSMAN: It was identified as coming
8 from his files?

9 MR. BENEDICT: It was identified by you
10 as coming from his files, as a matter of fact.

11 A It appears to be. I don't know with
12 certainty that it is the draft that I reviewed, but
13 it certainly appears to be. I seem to remember
14 though that there were two volumes. There was a
15 health physics volume as well as an operational volume.
16 I don't know whether they were really part of nureg
17 600 or whether physics was a separate number.

18 Q Is this the operational portion of the
19 draft that you remember?

20 A It appears to be that, yes.

21 Q By "this," I meant B&W 727.

22 A Yes.

23 Q Could you look at B&W 726 and tell me
24 whether these notes are in your hand?

25 A Yes, they are.

1
2 Q Is B&W 726 a series of notes that you
3 prepared on or about the 17th of July, 1979 relating
4 to your review of the draft 0600?

5 MR. GLASSMAN: There are slightly different
6 dates that appear at the top of the various
7 pages.

8 MR. BENEDICT: Mr. Glassman makes a good
9 point. The document is dated the 17th, the 18th,
10 the 19th, and the 20th, the 22nd-- that seems
11 to be it -- through the course of its 16 pages.

12 Q So on or about the dates noted or sometime
13 in July?

14 A Yes, they were notes prepared, from a
15 review of this document, over a number of days.

16 Q By a review of this document, you mean 727?

17 A Yes.

18 Q On the first page of B&W 726, about two-
19 thirds of the way down in the far left margin, there is
20 a notation which reads, "NC," then either a dash or a
21 dot, "TS."

22 Is that an abbreviation for noncompliance
23 technical specification?

24 A Yes, that is a notation that indicates
25 according to the draft report there was a potential for

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noncompliance with technical specification. It doesn't say that there was such a noncompliance.

Q In terms of the abbreviation noted here, that does stand for noncompliance technical specification; is that right?

A Yes.

Q Could you turn to what is noted as page 2 of your notes, which is in fact the third page of the exhibit, because there is a repeat page on the second, and note at the top at the far left margin there is an entry which reads "NC-EP."

Is that an abbreviation for noncompliance emergency procedure?

A Yes. Again, that is an abbreviation for noncompliance emergency procedures. It doesn't necessarily indicate that that is what there was.

Q Farther down toward the center of that page, there is an entry in the far left margin which reads, "NC-APP B."

Is that an abbreviation for noncompliance Appendix B?

A Yes.

Q Is the Appendix B referred to Appendix B to 10 CRF part 50?

1
2 A Yes.

3 Q Immediately below that entry, there is an
4 entry which reads "NC-MP."

5 Does that abbreviation stand for
6 noncompliance preventive maintenance procedures or
7 maintenance procedures?

8 MR. GLASSMAN: Throughout these questions,
9 I assume you are just looking for the meaning
10 of the abbreviation. You are not asking a
11 substantive question as to what else it indicates?

12 MR. BENEDICT: I am asking what the
13 abbreviation means. That's right.

14 A Yes.

15 Q Would you turn to what is marked as the
16 third page of your notes, which is the fourth page of
17 the exhibit. In the left margin at the top of the
18 page, immediately below an entry which reads "NC-TS,"
19 there is a parenthetical which reads "(Ross yes)."
20 Then below that, toward the middle of the page, there
21 is another entry which reads "NC-TS" and then below
22 that it reads "(Ross no.)"

23 What is the significance of these entries
24 or what was the significance of those entries?

25 MR. GLASSMAN: You are asking for the

1
2 witness's recollection or are you asking him
3 to speculate?

4 MR. BENEDICT: I am asking for his
5 recollection.

6 A I don't remember what the circumstances
7 were where I made those notations.

8 Q At the last line of the page marked as
9 page 3 of your notes, there is a line which reads,
10 "Verify against QB corrections."

11 Does QB Refer to Quincy Billingsley?

12 A Yes, it does.

13 (Multipage document, first page headed
14 "I&E Radiological SOE," dated July 19, 1979,
15 was marked B&W Exhibit 728 for identification,
16 as of this date.)

17 Q I would like to show you a document marked
18 for identification as B&W Exhibit 728. It is a
19 multiple-page document composed of both handwritten
20 and typed entries. The first page is headed "I&E
21 Radiological SOE," and it is signed by Ed Wallace,
22 and dated July --

23 A That is not signed by Ed Wallace.

24 Q It indicates Mr. Wallace's name. Mr.
25 Wallace's name is at the bottom of the page and it is

1
2 dated July 19, 1979. I am only seeking to identify
3 it for the record. The document appears to be a
4 compilation or a group of comments from various
5 individuals with respect to the draft 0600 report.

6 Do you recognize this as being a group of
7 comments collected by you sometime in the summer or
8 fall of 1979 relating to the draft 0600 report review
9 which has been marked as B&W 727?

10 A Although I don't remember each of these
11 being received, it appears to be just that, yes.

12 Q Could you turn to the pages in B&W 7~8
13 starting with the litigation page No. 9544 and going
14 through page No. 9549. The first page has written
15 on it at the bottom, "comments received from Mike Ross
16 7/23/79."

17 Could you tell me whether these pages
18 were the source for the marginal notations we
19 discussed before, the parenthetical reference to Mr.
20 Ross in what has been marked as B&W 726?

21 MR. GLASSMAN: Are you asking whether
22 seeing this document refreshes Dr. Long's
23 recollection?

24 MR. BENEDICT: Yes, I am asking whether
25 seeing this reminds him that that is where he

1
2 got the information contained in the parentheticals
3 on B&W 726.

4 A No, it doesn't, and I don't know whether
5 that comment refers to the following pages or not
6 because I don't remember the order in which these were
7 in my file.

8 Q You can't identify the typed pages
9 following the notation relating to Mr. Ross as being
10 comments that you in fact received from Mr. Ross?

11 A No, I cannot.

12 Q What, if any, role did Mr. Ross have
13 with respect to the review of the draft
14 which has been marked as 727 that you and I discussed
15 yesterday?

16 MR. GLASSMAN: Objection as to form.

17 A I believe I indicated to you yesterday
18 that there were a number of people who had review
19 responsibilities. I remember that Mike Ross was one
20 of them.

21 Q Did Mr. Ross have a specific area of
22 responsibility?

23 A From my recollection?

24 Q Yes.

25 A I don't know.

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Q Who, if anyone, supervised the review of the draft NUREG 0600 marked as B&W Exhibit 727?

A As I told you yesterday, I coordinated the collection of the comments on NUREG 0600.

Q Other than that, you are not aware of any person who played any supervisory role with respect to assignment of responsibility or resolution of open items?

A No, I don't remember.

Q What did you do with the comments that you collected including the comments that are part of what has been marked as B&W Exhibit 728?

MR. GLASSMAN: Objection. The witness has not yet related the fact of B&W 728 to the process you stated.

MR. BENEDICT: He said it appeared to be that, and I will take that as the foundation of my question.

A As I told you yesterday, to my knowledge, the comments on NUREG 0600 were conveyed verbally in a meeting which took place at the Three Mile Island.

Q Other than that, you are not aware of any other use that was made of the comments that you collected?

1
2 A Not that I can recall.

3 (Two-page handwritten document dated
4 July 22, 1979, was marked B&W Exhibit 429 for
5 identification, as of this date.)

6 Q B&W 729 is a two-page handwritten
7 document dated July 22, 1979, which reads at the top
8 line "NRC sequence of events - miscellaneous notes
9 for Keaten task force."

10 Are these notes in your handwriting?

11 A Yes, they are.

12 Q Do these represent additional notes
13 taken by you around the date indicated on B&W 729
14 with respect to the draft NUREG 0600 which has been
15 marked as B&W Exhibit 727?

16 A I don't remember preparing these notes.

17 (Three-page memorandum from E. G. Wallace,
18 dated August 6, 1979, was marked B&W Exhibit
19 730 for identification, as of this date.)

20 Q I show you a document that has been marked
21 as B&W Exhibit 730. It is a three-page memorandum
22 from E. G. Wallace to a list of people including Dr.
23 R. L. Long, dated August 6, 1979, subject: TMI-2
24 NRC I&E investigation task items.

25 Does this memorandum relate to the review

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of the draft 0600 which has been marked as B&W Exhibit
727?

MR. GLASSMAN: Are you asking the witness
to review it now and tell us what it seems to
read? We can all read it. Are you asking him
whether he received it and recollects what it
means?

MR. BENEDICT: I know how you have
instructed your witnesses, sort of, and I know
how we have gone through these questions, and
I think it is pretty evident that I am not asking
Dr. Long to speculate.

MR. GLASSMAN: Your question is phrased
in a manner that makes a witness take a document
and try to read it and tell you what it looks
like. I can do the same thing for you. Your
question should be properly phrased.

MR. BENEDICT: My question is properly
phrased. If you don't believe so, make your
objection and be quiet.

THE WITNESS: Can I have the question
reread?

(Record read.)

A I don't remember receiving this particular

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2 memorandum.

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Q What, if any, role do you recall Mr.

5

Wallace played with respect to the review of the draft
NUREG 0600?

6

7

A Mr. Wallace was in the licensing group,

8

section, whatever it was called at that time, and

9

licensing normally put together the responses to

10

NRC requests or requirements.

11

Q Does seeing B&W Exhibit 730 refresh your

12

recollection as to whether Mr. Wallace had any

13

supervisory role with respect to the review?

14

A No, it does not.

15

Q The subject of this memorandum reads,

16

"NRC I&E investigation task items."

17

Are you aware or do you recall today the

18

existence of any investigation with respect to the

19

TMI-2 accident conducted by I&E during this time period

20

in the summer of 1979 other than that represented by

21

the draft NUREG 0600?

22

A I am not sure I understood the question.

23

Q I will restate it.

24

Other than the investigation by the NRC,

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the results of which are indicated in the draft NUREG

0600, what, if any, investigations do you know of that

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the I&E people at the NRC were conducting during the summer of 1979 as it related to the TMI-2 accident?

A The only other I&E activity I am aware of was the one represented in the health physics section of this report, referring to B&W 727.

(Letter from Mr. Woodard to Dr. Long, dated July 12, 1979, and attached multipage document, was marked B&W Exhibit 731 for identification, as of this date.)

Q I show you a document marked as B&W Exhibit 731. It is a multiple-page document covered by a letter from Mr. Woodard of Pickard, Lowe & Garrick to Dr. Robert Long, dated July 12, 1979. The text of the letter reads, "Enclosed are Xeroxed copies of our comments on the NRC's radiological sequence of events and I&E's testimony to the Commission on same."

Was this review that Mr. Woodard sent to you in July 1979 a part of the review that was being conducted of the draft NUREG 0600?

MR. GLASSMAN: Objection as to form. I don't know if you are asking for Dr. Long's understanding of what Mr. Woodard was doing or what Dr. Long was doing. It is a most ambiguous question. The witness can answer so far as he

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understands it.

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(Record read.)

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A I don't want to play games with you, but I don't really quite understand the context of that question.

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Q I recognize that B&W Exhibit 727 is only the operational portion, as you have indicated, of the draft of NUREG 0600. If it helps you in understanding, the NUREG 0600 that was ultimately released to the public, I will represent to you, included a radiological section, if that helps you in recalling what Pickard, Lowe & Garrick was doing in the summer of '79 and whether or not it related to the review of the draft 0600. Maybe now you can answer the question.

A Yes. With that information that the radiological portion was part of NUREG 0600, this was part of that review.

Q What, if anything else, did Pickard, Lowe & Garrick do with respect to reviewing material pertaining to the draft 0600 during that summer?

A I don't recall any other involvement that they would have had.

Q Do you recall that you were the person

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who was dealing with the people at Pickard, Lowe & Garrick with respect to the radiological issues covered in B&W 731?

A Yes, I had been from the time when the assignment of the task for that review was part of the accident assessment documentation team.

Q Was the review that we have been discussing of the draft NUREG 0600 that was done in the summer of 1979 done under the aegis of the accident assessment documentation team?

A No.

Q What work was Pickard, Lowe & Garrick doing for the accident assessment documentation team?

A They were working on two reports. One on on-site doses and one on off-site doses.

Q What, if any, other projects did Pickard, Lowe & Garrick undertake with respect to investigation into the Three Mile Island accident during the summer and fall of 1979?

A I don't know.

Q Do you know of any other activities they undertook with respect to investigation of the Three Mile Island accident at any time between the day of the accident and now?

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A I think we already discussed Mr. Lowe was a member of the Wilson so-called "investigation" team that arrived on the Island on March 29.

Q Other than Mr. Lowe's involvement and what we have discussed in the last few questions, do you know of any other work that Pickard, Lowe & Garrick has done for the GPU system relating to the Three Mile Island accident?

A No, I don't know.

Q What, if any, other outside vendors or consultants participated in the review of the draft NUREG 0600?

A The members of the sequence of events team reviewed the NRC sequence of events.

Q Did that team include people from outside vendors or consultants?

A Yes.

Q Who did it include?

A If you mean by who the names of the members of the team --

Q If you can remember who it was, yes.

A The only name that I would be sure that was still on the team would be Mr. Van Witbeck.

Q Other than through individual participation

1
2 in predominantly GPU groups, are you aware of any
3 work done by outside consultants or vendors with
4 respect to the review of the draft 0600, excluding the
5 work by Pickard, Lowe & Garrick we already discussed?

6 A No, I am not.

7 Q Do you recall whether MPR Associates did
8 any work on it?

9 A I don't know.

10 Q Other than Mr. Van Witbeck's role and
11 people who were working for Mr. Van Witbeck, are you
12 aware of anything that Energy Incorporated did?

13 A I don't know whether they did anything
14 other than that work or not.

15 Q I am going to ask you some questions that
16 relate to the testimony you gave before the Atomic Safety
17 And Licensing Board considering the restart of
18 TMI-1. I have put in front of you what, at least to
19 my knowledge, is all of the testimony that you gave
20 before the restart board, and I will be referring you
21 to pages from time to time. I would like you to feel
22 free to refer to any portion of your testimony,
23 whether or not it is a page that I refer to, if you
24 need to do so in answering any of my questions.

25 My first question would be if you could

1
2 look through the four volumes I have put in front of
3 you and tell me if you can recall giving testimony
4 on any days other than February 11, February 12,
5 February 13, and February 18, 1981.

6 A I don't recall any other before the Atomic
7 Safety and Licensing Board.

8 Q Do you recall any other testimony you
9 gave with respect to the restart of TMI-1, whether in
10 deposition or before an administrative law judge?

11 A I don't recall any deposition. I did
12 appear before the administrative law judge.

13 Q Which judge was that?

14 A Judge Mulholland.

15 Q What was the subject matter of your
16 testimony at that time?

17 A Some general information on the training
18 program and some information on procedures on the
19 administration of examinations.

20 Q Was this testimony given as part of Judge
21 Mulholland's investigation into allegations of cheating
22 on licensing and other exams by TMI personnel?

23 A Yes.

24 Q What date or approximately when did you
25 give that testimony?

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A It was early in 1982.

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Q Did you receive a copy of a transcript of that testimony?

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A Yes.

6

Q How long did you testify?

7

A Approximately two hours.

8

Q Returning to your earlier testimony before the Atomic Safety and Licensing Board, I would like to turn your attention to the volume which is dated February 11, and particularly to the written testimony that appears immediately after page 12,140 in the text.

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MR. BENEDICT: We have not received a copy of the testimony that Dr. Long says he received a copy of, the testimony that he gave before Judge Mulholland, and I can't examine him with respect to that testimony before I have seen it.

MR. GLASSMAN: It is obviously unresponsive, as to time, and it has not been requested by you. You had notice of those hearings, and you were well able to request them.

MR. BENEDICT: We may have to go to the judge on the issue of responsiveness and the time element, the relevance to this litigation.

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2 When we do, I just want you to be advised that
3 Dr. Long may be subject to being recalled.

4 MR. GLASSMAN: You can advise us of
5 whatever you think you would like to advise us
6 of. As I just stated --

7 MR. BENEDICT: Having reviewed Judge
8 Mulholland's --

9 MR. GLASSMAN: I would appreciate it if
10 you would stop continually interrupting me in the
11 middle of a statement.

12 MR. BENEDICT: It is hard to tell when
13 your statements end.

14 MR. GLASSMAN: Aside from the nature of your
15 personality, I would like to get on to the merits.
16 As I just stated, the material that you just
17 alluded to is not responsive to any requests
18 in the litigation. If there should be requests
19 for further documentation, we will treat them
20 as we have all other requests and be cooperative
21 where at all possible in providing appropriate
22 information.

23 MR. BENEDICT: I hope that is true. I am
24 not disputing that at this time. I am simply
25 advising you that I am not going to attempt to

1
2 examine Dr. Long on his testimony at this time,
3 because I haven't been provided with a copy of it.

4 MR. GLASSMAN: You haven't asked for it.

5 MR. BENEDICT: If there comes a time when
6 Dr. Long's testimony is required with respect
7 to issues of cheating and allegations of cheating,
8 he may be subject to recall.

9 MR. GLASSMAN: You can make whatever
10 statement you want. You haven't asked for the
11 document, and if you ask for it --

12 MR. BENEDICT: I will ask for it right
13 now, and we will continue and I will examine him
14 Monday morning about it, if you can provide me
15 with it this evening.

16 MR. GLASSMAN: You know very well this is
17 a waste of time and colloquy. You have been
18 advised of the Mulholland proceedings for some
19 time now. You were aware of the report of the
20 administrative law judge. You had ample time to
21 request it before Dr. Long came here this week.
22 You had ample time during this testimony to
23 request any document you wanted. If and when
24 we receive the request in the form that we have
25 always received it from you, we will respond.

1
2 If at that point you find it necessary to recall
3 Dr. Long or to ask for any particular witness,
4 we will address that at the time in the course of
5 our normal proceedings.

6 MR. BENEDICT: My comments with respect
7 to that are I recognize what you say. With
8 respect to the Mulholland findings, Dr. Long's
9 name nowhere appears, nor does his title. There
10 was no reason to believe that he had given
11 testimony, based on the publicly available
12 information on this testimony. I therefore
13 request his testimony now. I will not terminate
14 this deposition today, until such time as we have
15 had a chance to examine that or any other
16 material in Dr. Long's possession relating to the
17 allegations of cheating, and then we will resume
18 after we have had a chance to examine the
19 document and determine whether any questions
20 have to be asked.

21 MR. GLASSMAN: You can proceed on whatever
22 basis you feel appropriate. Dr. Long is here
23 this week. As you advised me before, you were
24 going to finish today. Dr. Long is prepared to
25 testify at length, and he continues to do so.

1
2 MR. BENEDICT: I agree that he is here
3 today. I also agree that the practice in
4 these depositions is to attempt to finish our
5 depositions as soon as possible. I was not
6 aware of his testimony until this minute. It
7 was impossible for me to ask for something that
8 I was not aware of until this minute.

9 MR. GLASSMAN: We will see. Continue
10 with your questioning.

11 BY MR. BENEDICT:

12 Q Turning to page 4 of your written testimony,
13 the top paragraph, which is a full paragraph, at the
14 top of page 4, reads, "All training associated with
15 GPU Nuclear Corporation's nuclear facilities is
16 coordinated by the director - training and education
17 of the nuclear assurance division of the GPU Nuclear
18 Corporation located in Parsippany, New Jersey. The
19 director - training and education's areas of management
20 responsibility include the training departments for
21 TMI-1, TMI-2 and Oyster Creek; the corporate training
22 department; and the GPU Nuclear Corporation system
23 laboratory."

24 At the time you gave this testimony,
25 were you the director of training and education?

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2

A Yes, I was.

3

4

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Q Was there any similar overseer of training in the GPU system prior to the Three Mile Island accident on March 28, 1979?

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A No, there was not.

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Q Looking down immediately below that, to the first sentence in the second paragraph on page 4, it reads, "The activities of the training departments located at each of GPU Nuclear Corporation's facilities are coordinated and reviewed by the corporate training department."

13

What is the corporate training department?

14

15

A A small training department that is located in Parsippany.

16

17

18

Q Did such a department exist in Parsippany, whether by that name or another, prior to the accident on March 28, 1979?

19

20

MR. GLASSMAN: You are talking of such a department in name or function?

21

MR. BENEDICT: In function.

22

A No, it did not.

23

24

25

Q I think Mr. Glassman's point is well taken. When I refer to whether something was done before, I am referring to its function, not to whether the

1
2 actual individual is the same person or whether
3 the title is the same.

4 Looking to the bottom sentence in that
5 paragraph, the sentence reads, "The technical content
6 of training programs is defined by the technical
7 functions division and agreement is obtained from the
8 supervisor of each group receiving training on the
9 scope and content of applicable programs."

10 What is the technical functions division,
11 or what was it when you gave this testimony?

12 A Technical functions division is a support
13 division of GPU Nuclear. It primarily has the
14 engineering support capability and the licensing
15 responsibilities.

16 Q Did such a division exist within GPU
17 prior to the Three Mile Island accident?

18 A Yes, it did.

19 Q Did it have the same name? Do you recall?

20 A Yes.

21 Q Was it part of GPUSC?

22 A Yes.

23 Q Did its function, to your knowledge,
24 change following the Three Mile Island accident?

25 A Yes.

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Q How would you describe the changes that you are aware of?

A Prior to the accident, technical functions provided construction and engineering support for all three of the GPU operating companies, including both fossil and nuclear stations. Beginning with the formation of the TMI generation group in August 1979, that division became part of the TMI generation group and turned over the support of the fossil stations to the operating companies.

Q Other than changes in its place within the organizational structure of the GPU system, do I understand you to be saying that the difference that you recognize was that they had given away their responsibility with respect to fossil plants?

A They did that over a period of time, so that they were after that transition period providing technical support to the nuclear plants.

Q Did the technical functions division decrease in size or staffing following the distribution of its responsibilities with respect to fossil plants?

A I don't know the exact staffing patterns of that division.

Q The first sentence of the last paragraph

2 on the page reads, "The corporate training department
3 is the organization which coordinates the development
4 of common training needs of the three GPU nuclear
5 facilities, e.g., radiological control training."

6 Did you understand at the time you
7 prepared this testimony that the common training needs
8 would also include thermal dynamics, heat transfer,
9 or fluid flow?

10 A Those topics, among many others, are
11 common to both BWR and PWR plants, yes.

12 Q So they would be subjects that would be
13 coordinated by the corporate training department? You
14 understood that?

15 A Yes.

16 Q Turning to the next page of your written
17 testimony, the only full paragraph on that page reads,
18 "The director - training and education with assistance
19 from the technical functions division and the corporate
20 training department is actively reviewing and upgrading
21 the simulator training programs for GPU Nuclear
22 personnel."

23 What, if any, work was done prior to the
24 Three Mile Island accident with respect to reviewing
25 and upgrading the simulator training programs for

1
2 operating personnel in the GPU system?

3 A With the exception of the information
4 that we discussed the other day, that there was some
5 consideration given to simulators, I don't know what
6 work was done prior to the accident. I did not have
7 responsibility.

8 Q Looking down the list of things that are
9 indicated in the following sentences in that paragraph,
10 do you know whether prior to the Three Mile Island
11 accident there was any effort made toward the
12 preparation of behavioral learning objectives for
13 simulator training?

14 A No, I don't know.

15 Q What, if any, activity do you know of that
16 occurred prior to the Three Mile Island accident
17 related to clarification of objectives for the
18 training provided at the B&W simulator in Lynchburg,
19 Virginia?

20 A I don't have knowledge of what the interaction
21 between TMI and Lynchburg was prior to the accident.

22 Q Turning to page 6 of your written
23 testimony, the first sentence in the paragraph starting
24 in the middle of the page reads, "The director -
25 training and education provides policy guidance to all

1
2 of the educational and support organizations for which
3 he is responsible."

4 That would include your responsibility with
5 respect to the training at TMI-1 of operators,
6 the training at TMI-2 of operators, and the training
7 of Oyster Creek operators; is that correct?

8 A Yes.

9 Q Are you aware of whether there was any one
10 individual who had this responsibility for policy
11 guidance prior to the Three Mile Island accident?

12 A There was not someone who had responsibility
13 for both TMI and Oyster Creek. I don't know whether
14 the Jersey Central and Met Ed organizations had
15 somebody with responsibilities for their particular
16 company.

17 Q Was there anyone within GPU, to your
18 knowledge, separate from Metropolitan Edison, who
19 was responsible for providing policy guidance to
20 training of Metropolitan Edison operators?

21 A I don't know.

22 Q At the time you gave this testimony,
23 Dr. Knief reported to you; is that right?

24 A Yes.

25 Q In Dr. Knief's individual written testimony

1
2 in the testimony that was admitted before the ASLB
3 on page 11, there is a sentence toward the bottom of
4 the page which reads, "The manager of training has
5 established an industry experience review procedure
6 whereby significant events at other nuclear plants are
7 identified and information thereon routed to the
8 cognizant supervisors for incorporation into appropriate
9 training programs."

10 Did any such program exist anywhere within
11 the GPU system prior to the accident on March 28, 1979?

12 A I don't know whether it did or not.

13 Q What is your understanding of the content
14 of the industry experience review procedure or the
15 method by which it accomplishes its task?

16 MR. GLASSMAN: Objection as to the form.

17 I have not the foggiest idea of what this
18 multiple question is driving at.

19 MR. BENEDICT: I am morally certain that
20 you understand full well what it means, but
21 I will restate it.

22 Q What is the industry experience review procedure
23 as it is indicated to exist in this sworn testimony?

24 MR. GLASSMAN: Objection to the form.

25 A The industry experience review procedure

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is a procedure that describes how the training

3

department is to handle and incorporate industry

4

experience review items as they are provided to them.

5

Q Is it a written procedure included within

6

the corporate procedures of GPU Nuclear?

7

A The procedure referred to here is a

8

TMI training department procedure.

9

Q Do you know whether this procedure is

10

new since the Three Mile Island accident?

11

A I don't know what the training department

12

at TMI had prior to the accident.

13

Q Focusing now rather than on the function,

14

just as an exception to our general rule, rather than

15

the function that the industry experience review

16

procedure has and considering instead the specific

17

procedure, do you know whether that procedure is

18

new since the Three Mile Island accident?

19

A No, I don't know.

20

Q To your knowledge, in the TMI training

21

department today, is there an accumulation or volume

22

of procedures by which the department is supposed to

23

function?

24

A Yes.

25

Q Does this collection of procedures have a

1

2 name?

3

A TMI Training Administrative Manual.

4

5 get a copy of that?

6

A I have my own copy.

7

8 Do you know whether it was provided to
9 your counsel at the time you were asked to produce
documents with respect to this litigation?

10

A No, it did not exist at that time.

11

12 Q When is your first recollection of such
a manual existing?

13

A Sometime toward the end of 1981.

14

15 Q Do you have any knowledge as to whether
16 any efforts were made to implement a procedure similar
17 in function to the industry review procedure prior to
the Three Mile Island accident?

18

19 A I have no knowledge of what was done prior
to the accident in training.

20

21 Q Could you turn to page 29 of your written
22 testimony. In your testimony in this deposition to
23 date, you have mentioned that you became aware
24 sometime following the Three Mile Island accident
25 that some consideration was given within GPU to the
acquisition of a simulator for the TMI facilities.

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Other than the box of documents you told me you were given -- was it by Mr. Hetrick?

A Yes.

Q What other knowledge do you have with respect to that consideration prior to the Three Mile Island accident?

A I don't recall having any.

Q Do you know whether Mr. Hetrick was involved in the consideration prior to the accident?

A Yes, but I don't know what his involvement was.

Q Other than Mr. Hetrick, do you know of any other GPU system employee or officer who was involved in the consideration of the acquisition of a simulator prior to the Three Mile Island accident?

A I don't know of the others.

Q Other than Mr. Hetrick, whom would you ask if you wanted to find out who was involved in that consideration?

A I would start with him.

Q Turning over to page 30 of your written testimony, this seems to be a discussion about something indicated as OARP, which is operator accelerated requalification or retraining program. Is

1

2 that correct?

3

A One or the other.

4

Q Which one? Do you recall?

5

A Since you used both, no, I don't remember.

6

Q At the bottom of the carry-over paragraph,

7

there is a sentence which reads, "The TMI-1 training

8

department provided guidance to B&W for the simulator

9

training objectives and reviewed the training plans."

10

With respect to preaccident training, do

11

you know whether the training department at TMI

12

participated in providing guidance to B&W for simulator

13

training objectives and reviewed the training plans?

14

A I don't know. In that statement you read,

15

it does refer to the OARP training in particular.

16

Q Further down that page, I will read from

17

the paragraph immediately below the sentence we just

18

read: "In the fall of 1980, four trainees participated

19

in an eight-week 'cold license' training program for

20

replacement operators. This program was closely

21

monitored by GPU/Met Ed personnel. During the last

22

six weeks, a licensed SRO shift foreman or supervisor

23

participated and assisted the B&W staff in relating

24

the simulator performance to actual TMI-1 plant

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experience."

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Do you know whether prior to the Three Mile Island accident GPU or Met Ed ever sent licensed SRO shift foremen or supervisors to the B&W simulator to assist the B&W staff in relating simulator performance to actual plant experience?

A I don't know what the practice was prior to the accident.

Q Isn't it a fact that you know that this practice was new after the Three Mile Island accident?

MR. GLASSMAN: I think it has been asked and answered in a different form.

MR. BENEDICT: You direct the witness not to answer?

MR. GLASSMAN: You can try again.

A I don't know whether that is a fact or not.

Q I would like to refer your attention to testimony further or, live testimony given on February 11, 1981. In particular, to page 12,278 and lines 18 through 22 of that page. This is Dr. Long testifying, "One of the key and very first recommendations to come out of that effort was the determination to have a licensed shift foreman present full-time with each -- during each week of the subsequent six weeks of training. That has worked very effectively for us."

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Does that refresh your recollection as to the fact that you knew that sending shift foremen or shift supervisors to the simulator at B&W to supervise and participate in simulator training was a new idea or new occurrence after the Three Mile Island accident?

A That is not a correct characterization of what that is talking about.

Q What is it talking about?

A It is talking about the situation that involved people reviewing the first two weeks of that eight-week training program and deciding based on those first two weeks which occurred in 1980 that to continue that program for the next six weeks, there should be a shift supervisor or shift foreman present.

Q Is it your understanding today that GPU intends to continue to send shift supervisors or shift foremen to assist in simulator training?

A I don't know whether they have continued to do that or not. It should be noted that that also referred to training of new operators, not previously licensed operators.

Q Do you know whether the practice was continued or utilized for or during the simulator

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training of currently licensed operators?

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A In the training of currently licensed operators, the shift supervisor and shift foreman go as a team along with the operators.

6

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Q In other words, the simulator training is done on a shift basis or by shifts?

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A For the requalification training, yes.

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Q The next sentence in that paragraph back on page 30 of your written testimony reads, "Also during each week a representative of the TMI and corporate training departments or technical functions observed several days of both the classroom and simulator sessions." The next sentence goes on to say, "Exit critiques were provided to the B&W training center supervisory personnel and significant improvements incorporated as the program progressed."

Are you aware of any instance prior to the Three Mile Island accident where representatives of either the TMI or the GPU training groups or departments went to the B&W simulator and observed its function?

A I don't know what the practices were prior to the TMI-2 accident.

Q At the time you gave this testimony, you were the director of training and education; is that

1
2 correct?

3 A Yes.

4 Q And you have subsequently taken the title
5 of director of nuclear assurance; is that correct?

6 A Yes.

7 Q Which has as part of its charge the
8 management of the training and education group?

9 A Yes.

10 Q At any time since you originally took the
11 job as director of training and education in 1980,
12 have you made any effort to review the training
13 practices within the GPU system prior to the Three
14 Mile Island accident as they existed?

15 A I have looked at the reports from the
16 many different people who looked at the training
17 program. I didn't do a separate examination or
18 investigation of my own.

19 Q I would like to refer you back to your
20 testimony at page 9 of the written testimony, the
21 last paragraph immediately above the entry relating to
22 Mr. Knief, "In sum, Dr. Long has had extensive
23 technical experience in nuclear reactor operations;
24 extensive experience as an educator; and extensive
25 management experience. He is also familiar with

1
2 personnel at GPU Nuclear Corporation and understands
3 the nature of and the basis for the changes in the
4 training organization since March 1979.

5 What was your basis for understanding the
6 changes in the training organization since March
7 1979?

8 A I had prepared for me a table which
9 identified all of the criticisms that had been made,
10 all of the suggestions for changes that had been
11 made, all of the recommendations that had been made
12 by all the different groups that had reviewed TMI
13 training. That gave me a rather extensive list of
14 the experience prior to the accident where it was
15 relevant to what should be happening after the
16 accident.

17 Q Who, to your knowledge, was the most
18 knowledgeable person with respect to the organization
19 and content of training at Metropolitan Edison prior
20 to the Three Mile Island accident?

21 A I don't know which of the people that were
22 involved would be classified as the most knowledgeable
23 person.

24 Q I don't mean to hold you to that
25 classification. Who are the three people who you

1
2 would think to be the people who know the most about
3 that subject?

4 MR. GLASSMAN: Objection.

5 MR. BENEDICT: I will explain it. I think
6 Dr. Long is hesitating about the word "most."

7 Q Who is someone who is very knowledgeable
8 about that subject?

9 MR. GLASSMAN: I object again. I am not
10 sure whether the question is directed to who
11 might have conducted studies after the accident
12 or who was around before or who has firsthand,
13 secondhand or tenthhand knowledge. The question
14 is rather vague and general. If you are asking,
15 as you did in your last question, who would Dr.
16 Long think is knowledgeable --

17 MR. BENEDICT: I can't ask Dr. Long anything
18 other than what he thinks. I am seeking who
19 Dr. Long would go to if he was interested in
20 finding out what the condition of the training
21 program was prior to the Three Mile Island
22 accident.

23 A Mr. Zechman would be one of the people that
24 I would talk to.

25 Q Is there anyone else you can think of?

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A Mr. Tsaggaris.

3

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Q What was, as you recall, Mr. Tsaggaris' position prior to the Three Mile Island accident?

5

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A At one point, he had supervisory responsibility over Mr. Zechman. I don't know exactly when that was.

7

8

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Q Was Mr. Tsaggaris a GPU employee as opposed to a Met Ed employee?

10

A No, he was a Met Ed employee.

11

Q Is Mr. Tsaggaris still with the GPU system?

12

A No, he is not.

13

Q Do you know where he is today?

14

15

A He is with a company called Energy Consultants Incorporated.

16

17

Q Where does Energy Consultants hang its shingle, if you know?

18

19

A Somewhere in the Pittsburgh area. I don't know whether it is actually a Pittsburgh address.

20

21

Q About how long has it been since Mr. Tsaggaris left?

22

A It has been at least a year ago.

23

24

25

Q Could you turn to page 12,145 of your oral testimony. That is still in February 11. There is a question which begins on line 7 which reads, "Are you

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planning to purchase a full replica simulator of the
TMI control room - control rooms, I should say?

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"Answer (Witness Long) Yes. The 1981
budget for the training programs includes \$400,000
to begin the effort of developing specifications and
initiating the acquisition of a replica simulator
for TMI-1."

9

10

11

Does it continue to be true that the GPU
system intends to buy a full replica simulator for
TMI-1?

12

A Yes.

13

Q The next question and answer down read:

14

"Question: What is the time schedule on that?

15

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"Answer (Witness Long) The manufacturers
at the present time indicate delivery times of 3
to 36 months from the time an order is placed. We
are hoping to have fully developed the specifications
and request bids in the third quarter of this year,
so we are talking about approximately four years."

21

22

Did you complete specifications and request
bids in the third quarter of 1981?

23

A No, we did not.

24

Q Has that process occurred to date?

25

A No.

1

2

Q There has not yet been a request for bids?

3

A It may be on my desk right now waiting

4

for review.

5

Q Is it still your understanding that there

6

is still a 32 to 36 month lead time after the bids

7

are requested or bids are in?

8

A I don't know whether there has been a

9

change in that or not.

10

Q Turning to page 12,260 -- actually I would

11

like you to refer back a couple of pages. This is a

12

rather long and involved series of questions which

13

appear to relate to some method of utilizing a computer

14

for training purposes, and I want you to be confident

15

you recognize the content of these questions, because

16

I am going to read an answer and a portion of another

17

answer. Obviously if Mr. Glassman thinks something

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further should be read, he can put it in.

19

Have you had a chance to generally

20

familiarize yourself with the testimony around page

21

12,260?

22

A Yes, I have.

23

Q I would like to read your answer which

24

begins on line 13 of that page. It reads, "Witness

25

Long: And we display that data on a cathode ray tube

1
2 display in color and there is a fairly well defined
3 trajectory when you plot pressure versus temperature."

4 What was the data that was displayed on
5 the cathode ray tube?

6 MR. GLASSMAN: What was displayed? What
7 would be displayed?

8 MR. BENEDICT: What did he mean when he
9 said "that data"?

10 MR. GLASSMAN: We are talking about
11 something in the context of this testimony
12 that was being considered or discussed in this
13 testimony of February 1981?

14 MR. BENEDICT: That's right.

15 A The data plotted is hot leg temperature
16 versus RCS pressure and cold leg temperature versus
17 steam generator pressure.

18 Q Were these data plotted versus time?

19 A No. They are plotted in time but not
20 versus time.

21 Q In other words, it was a graph that had an
22 ordinate and abscissa and one of them was time?

23 A No.

24 Q Was it a graph?

25 A The graph has an ordinate which is

2 temperature, and the abscissa is pressure, and at the
3 beginning of a transient, you have a certain temperature
4 and pressure. A minute later you may have a different
5 temperature and pressure, and you plot that, so you
6 get a trajectory that changes with time.

7 Q The answer goes on to read, "That pressure
8 versus temperature plot will go from 100 percent power
9 to a normal shutdown condition along with a fairly
10 well defined path, unless something unusual is happening.

11 "Dr. Jordon: I see.

12 "Witness Long: For example, a loss of
13 coolant accident. It will deviate very significantly
14 in a short time from that path."

15 Prior to your recollection at this time,
16 did you ever compare the actual data from the TMI-2
17 accident of March 28, 1979 to the normal hot shutdown
18 or the path defined going from 100 percent power to
19 hot shutdown?

20 A Yes.

21 Q Did it deviate very significantly in a
22 short period of time?

23 A Yes, it does.

24 Q Turning to the next page, 12,261, your
25 answer continued, and again I am going to only read

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a portion of it. If you think there is any more that should be added, please do so. Starting on line 14, "This method of analyzing plant behavior was taught in the operator accelerated retraining program where the operators were taught to make these plots by hand, because it is not a rapid time."

Are the plots that you referred to in that sentence the same plots that you were discussing as appearing on the cathode ray tube screen, except prepared by hand?

A Yes.

Q You then go on and say, "You can do it every 30 seconds, just take the data and plot it."

Does that mean that the temperature-pressure relationships would be plotted at 30-second intervals?

A Yes.

Q Finally, you say, "And they found it very helpful in understanding the plant behavior, so we have gotten very positive response back from the operations personnel that this is a real useful device."

In line 19 when you say "they," are you referring back to the operators who were trained in the operator accelerated retraining program?

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2

MR. GLASSMAN: What period are you talking

3

about?

4

MR. BENEDICT: When he gave this testimony

5

in 1981.

6

A Yes.

7

Q Are you aware of whether or not this method

8

of analyzing plant behavior was ever taught to the

9

operators prior to March 28, 1979?

10

A No. I think it was developed jointly

11

by B&W and GPU Nuclear following the accident.

12

Q So it is your understanding that it wasn't

13

taught prior to the accident?

14

A Not to my knowledge, but I don't know the

15

content prior to the accident.

16

Q What did Mr. Newton do in 1981 at the time

17

of this testimony? What was his job?

18

A His job was supervisor of operator

19

training, including both licensed and auxiliary

20

operators.

21

Q Was he a GPU Nuclear employee?

22

A At that time we were still in a transition

23

stage. I don't know whether he was on the Met Ed

24

Service Corp. payroll. There were no GPU Nuclear

25

employees as such at that time.

1
2 Q Did Mr. Newton report either directly or
3 indirectly to you at this time?

4 A He reported to Dr. Knief who reports to
5 me, or who reported to me.

6 Q There is a question and answer which
7 appears on page 12,267 through page 12,268 where the
8 respondent was Mr. Newton. I would like to read that.

9 "Question: You talked somewhat in your
10 oral testimony about on-the-job training, and I am
11 wondering, is that -- is that on-the-job training
12 similar to the Navy program having a call" -- it says
13 "hard, I believe it should be "call" -- "card having
14 a guy qualify on various watch stages or as an
15 alternative qualify in performing certain functions
16 before he can become a supervisor of that function?

17 "Answer (Witness Newton): Yes, sir,
18 it is very similar. In fact in the task sheet that
19 we are building right now, they are not complete,
20 but the task sheets that we are building for the
21 auxiliary operator program where auxiliary operators
22 are specifically assigned to four or five different
23 locations, the task sheets are functionally -- for
24 example, secondary plant operations. There is a task
25 sheet, if you will, a call card for that. The task

1
2 sheets for the control room operator's card are not
3 broken down further into, say, specific panels,
4 because that is not the nature of how they do their
5 job. They do their job essentially encompassing the
6 control room as a whole and the task sheets are formed
7 that way. But the sheets themselves are very, very
8 similar to the Navy call cards, almost, I guess, about
9 as similar as I could make them without actually
10 writing Navy terms in there."

11 Are you aware of whether or not task sheets
12 similar to those described here by Mr. Newton were in
13 use in Three Mile Island training prior to the
14 Three Mile Island accident?

15 A I don't know whether they had anything
16 similar or not prior to the accident.

17 Q Did you have any role in supervising Mr.
18 Newton's project with respect to the creation of these
19 task sheets?

20 A I did not have any direct role, no.

21 Q You didn't review his work or comment on it?
22 Other than managing as manager, did you have any role
23 with respect to these?

24 A I reviewed both the auxiliary operator
25 and the control room operator training programs that

1
2 were eventually developed by Mr. Newton and approved
3 by Dr. Knief.

4 Q So that would include reviewing the task
5 sheets; is that right?

6 MR. GLASSMAN: You are assuming the witness
7 had knowledge of that particular item.

8 A I am not sure whether the task sheets were
9 part of the program description that I reviewed or not.

10 Q Are you familiar with what Mr. Newton is
11 discussing here as task sheets in a general sense?

12 A Roughly. I don't have any familiarity
13 with the Navy sheets.

14 Q Not the call cards, the task sheets that
15 were being created by Mr. Newton at the time he was
16 giving his testimony, you were aware of that work; is
17 that right?

18 A Yes.

19 Q Turning to page 12,293, in your testimony
20 on that page in lines 18 and 19 you refer to something
21 called the OARP review committee report. What is
22 that report?

23 A That was a report prepared by a committee
24 of consultants that GPU hired and asked to review the
25 OARP program.

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Q Is that report, or in the course of your testimony was that report sometimes called the Uhreg report, U-h-r-e-g?

A Yes.

Q Is that the name of a person who was involved in preparing the report?

A Yes.

Q Who was on the OARP committee?

A Dr. Robert Uhreg, Professor Rick Gardner, Dean William Kimel, Mr. Richard Marshak, and Dr. Julian Christensen.

Q What professional or academic affiliations did these people have?

A Dr. Uhreg was a vice president of Florida Power & Light. I am referring to their positions at the time of this committee work. Professor Gardner was a professor emeritus from Syracuse University. Dean Kimel was dean of engineering at the University of Missouri - Columbia. Mr. Marshak was manager of the nuclear power training program located at the MaGuire Station. I don't know his exact title. Dr. Christensen was a consultant with an engineering firm.

Q Was Dr. Uhreg the chairman of this group?

A Yes.

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Q Who established the OARP review committee?

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A Mr. Lawyer identified and organized that

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group.

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Q Was the committee report presented to the

6

Atomic Safety and Licensing Board considering the restart

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of the Unit 1?

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A Yes, it was an exhibit presented to the

9

board.

10

Q What, if any, responsibility did you have

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with respect to the preparation or review of the

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report prior to its submission to the ASLB as an exhibit?

13

A I met with the committee on a couple of

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occasions for discussions of their work and to answer

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questions, and I reviewed one or perhaps more drafts --

16

I don't remember -- of the report.

17

Q Who, if anyone, else who was employed by

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GPU or the GPU system had responsibility with respect

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to this report prior to its submission?

20

A Primarily Mr. Lawyer, who was manager of the

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TMI training department at the time the report was

22

finalized.

23

Q Where would you look today for any prior

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drafts or material that you had with respect to your

25

review function?

2 A As far as I know, they would be in the
3 file boxes provided in this litigation, if there were
4 any that were in the files at the time the files were
5 boxed up.

6 Q When do you recall doing the review
7 function that you mentioned or performing the review
8 function?

9 A The spring of 1980.

10 Q So it was almost a year before your
11 testimony before the board?

12 A Yes.

13 Q I would like to direct your attention
14 now to the volume of testimony dated February 13, 1981,
15 and in particular to page 12,727 of that volume.
16 There is some testimony here by someone designated as
17 Witness Christensen. Who was Mr. Christensen?

18 A That was Dr. Julian Christensen, a member
19 of the review committee that we were just discussing.

20 Q There is a question and answer at the top
21 of the page which reads:

22 "By Mr. Dornseif: Dr. Christensen, the
23 operators are on watch when they are on shift, are
24 they allowed to study procedures and refresh their
25 training when they have nothing else to do?

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"Answer (Witness Christensen): I think that that is more appropriate for Dr. Long.

"Dr. Long: Yes. When they do not have specific assignments on the board, they are involved very often in on-the-job study and training."

At the time you gave this testimony in February 1981, did you know whether the union agreements pertaining to operating personnel permitted the assignment of off-shift homework?

A It is my understanding that the union agreement does not allow specific assignment of off-shift homework.

Q Do you know whether that was true prior to the Three Mile Island accident?

A I don't know what the history of the union agreement is.

Q You don't know whether the same agreement is in effect that was in effect prior to March 1979?

A I don't know.

Q At the time that you participated in the preparation of the written testimony and gave the oral testimony that appears in the four volumes in front of you during the month of February in 1981, were you aware of cheating or allegations of cheating

on NRC licensing exams by TMI personnel?

A No, I was not.

MR. BENEDICT: With the exception of issues that may or may not be relevant related to the Mulholland report or findings, I have no further questions.

Do you have any cross?

MR. GLASSMAN: Are you done with your questioning or not?

MR. BENEDICT: Yes, I am done with my questioning except for anything relating to issues pertaining to what is covered in the Mulholland testimony.

MR. GLASSMAN: I have no questions at this time.

(Time noted: 12:05 p.m.)

Robert L. Long

Subscribed and sworn to before me
this day of 1982.

CERTIFICATE

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

I, JOSEPH R. DANYO, a Notary
Public of the State of New York, do hereby
certify that the continued deposition of
ROBERT L. LONG was taken before
me on May 21, 1982 consisting
of pages 420 through 478;

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 8 day of June 1982,

Joseph R. Danyo
JOSEPH R. DANYO

I N D E X

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E X H I B I T S

B&W FOR
IDENTIFICATION

726	16-page handwritten memorandum dated July 17, 1979	422
727	Multipage document, first page headed "Preface" at the top	422
728	Multipage document first page headed "I&E Radiological SOE," dated July 19, 1979	427
729	Two-page handwritten document dated July 22, 1979	431
730	Three-page memorandum from E. G. Wallace, dated August 6, 1979	431
731	Letter from Mr. Woodard to Dr. Long, dated July 12, 1979, and attached multipage document	434

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