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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. :

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Deposition of GPU Nuclear Corporation,
by ROBERT L. LONG, taken by Defendants, pursuant
to notice, at the offices of Davis Polk &
Wardwell, Esqs., One Chase Manhattan Plaza,
New York, New York on Tuesday, May 18, 1982
at 9:50 o'clock in the forenoon, before Joseph
R. Danyo, a Shorthand Reporter and Notary Public
within and for the State of New York.

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

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

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BY: RODMAN W. BENEDICT, ESQ.,

of Counsel

Also Present:

DEBORAH JACOBS

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IT IS HEREBY STIPULATED AND AGREED by
nd between the attorneys for the respective
parties hereto that the sealing, filing and
certification of the within deposition be,
and the same hereby are, waived; that the
transcript may be signed before any Notary
Public with the same force and effect as if
signed before the Court.

IT IS FURTHER STIPULATED AND AGREED
that all objections, except as to the form
of the question, are reserved to the time of
trial.

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R O B E R T L. L O N G, having
been first duly sworn by the Notary Public
(Joseph R. Danyo), was examined and testified
as follows:

EXAMINATION BY MR. BENEDICT:

- Q Would you state your name for the record?
- A Robert Long.
- Q Could you tell me your business address?
- A GPU Nuclear Corporation, 100 Interspace

1
2 Parkway, Parsippany, New Jersey.

3 Q And your home address?

4 A 104 Brooklawn Drive, Morris Plains, New
5 Jersey.

6 MR. BENEDICT: I would like to mark as
7 B&W Exhibit 668 a resume provided to me by
8 counsel for Dr. Robert L. Long.

9 (Resume of Robert L. Long marked B&W
10 Exhibit 668 for identification, as of this
11 date)

12 Q Does B&W 668 accurately represent your
13 educational and work experience to date?

14 A Yes, it does.

15 Q It indicates that you received a
16 Bachelor of Science degree in electrical engineering
17 from Bucknell University in 1958.

18 Did you at the time you were at Bucknell
19 take any courses in nuclear engineering or in
20 physics?

21 A Yes, I took one introductory course in
22 nuclear engineering, and I took the normal physics
23 courses required of engineering students.

24 Q For your Bachelor of Science degree,
25 did you study fluid flow, heat transfer?

2 A Only to a very limited extent.

3 Q Did you have a course of study, among
4 the courses you took for your BS, in thermal
5 dynamics?

6 A No, I did not.

7 Q Up to and including receiving your
8 Ph.D., did you take any academic courses in thermal
9 dynamics?

10 A No, I did not.

11 Q What was the subject of your Master's
12 dissertation or thesis, if you had one?

13 A I didn't have a thesis for the Master's
14 degree.

15 Q Did you have a Master's project that
16 you did independent research for?

17 A No, it was all course work.

18 Q What was the thesis for your Ph.D.?

19 A The Ph.D. dissertation, I don't remember
20 the exact topic, but it was on resonance integral
21 cross-section measurements.

22 Q Is that something related to nuclear
23 physics?

24 A More related to reactor physics.

25 Q In a very general 25 words or less, if

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2 you can, what does that entail or encompass?

3

A It is measurements of the neutron
4 reaction rates at energies between thermal energies
5 and fast energies.

6

Q You indicated that only to a limited
7 degree did you study heat transfer and fluid flow
8 for your Bachelor's degree. Did you in the course
9 of any of your postgraduate education study heat
10 transfer and fluid flow?

11

A In a limited extent, in various nuclear
12 engineering courses, yes.

13

Q It indicates here that during the time
14 you were getting your Ph.D. at Purdue, you worked
15 as a student research associate at the Argonne
16 National Laboratory. What did you do at Argonne?

17

A That is where I performed my
18 dissertation. I made the measurements on the
19 Argonne thermal source reactor. It is a small
20 research reactor.

21

Q From 1962 to 1965, you indicated that
22 you were a reactor specialist at the White Sands
23 Missile Range in New Mexico. Were you in the
24 military service at the time?

25

A Two years I was in the military and one

2 year in the Civil Service.

3 Q What branch of the service were you in?

4 A The Army Ordnance Corps.

5 Q What did you do as a reactor specialist?

6 A I was supervisor of the White Sands
7 fast-burst reactor facility.

8 Q Earlier you described the reactor at the
9 Argonne National Laboratory. Did you say it was a
10 thermal reactor?

11 A Yes, it was called the thermal source
12 reactor.

13 Q Was this a pressurized water reactor?

14 A No.

15 Q Was it a light water reactor?

16 A Yes.

17 Q Was it a pool reactor?

18 A Yes.

19 Q Is that the kind of reactor you had at
20 the University of New Mexico when you were on the
21 faculty there, a pool reactor?

22 A No, the reactor at the University of
23 New Mexico was called the aerojet general nuclear
24 model 201. It essentially is a solid reactor
25 core made of a polyethylene and uranium

2 homogeneous mixture operated at a maximum power
3 level of five watts.

4 Q How is criticality controlled at the
5 reactor at the University of New Mexico?

6 A The use of control rods which are made
7 of fuel material, so it is insertion and withdrawal
8 of fuel.

9 Q You said you worked on a fast-burst
10 reactor at White Sands. What is a fast-burst
11 reactor?

12 A Fast-burst reactors are a rather unique
13 reactor type that is used to produce very intense
14 short-duration pulses of radiation. It is made of
15 again a homogeneous metal core, approximately eight
16 inches in diameter, eight inches high. The power
17 level goes from zero to 30,000 megawatts and back
18 to zero in a pulse with a width of half maximum
19 pulse of about 45 microseconds.

20 Q What is the fast-burst reactor used for?

21 A Primarily as a radiation source for
22 weapons effects testing.

23 Q How is the fast-pulse reactor
24 criticality controlled?

25 A Insertion and withdrawal of fuel.

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2 Q You next list on your resume a 13-year
3 stint as a faculty member of the nuclear engineering
4 department at the University of New Mexico. What
5 were the various titles, if they changed, that you
6 held at UNM?

7 A I began as an assistant professor in
8 1965 and was promoted to associate professor in
9 1968. Full professor in 1973. I was assistant
10 dean of the College of Engineering from '72 to
11 '74. I was acting department chairman of the
12 chemical & nuclear engineering department in '74-75,
13 and chairman from '75 to '78.

14 Q Did you teach courses while you were
15 a faculty member?

16 A Yes.

17 Q Did you also participate in university-
18 sponsored research?

19 A Yes, but more outside-sponsored than
20 university-sponsored.

21 Q Were you acting as an independent
22 consultant working for outside-sponsored research,
23 or were you working as a member of the faculty at
24 the University of New Mexico?

25 A I did some of both.

1

2 Q Did you teach courses while you were
3 in the University of New Mexico in thermal dynamics?

4 A No.

5 Q Did you teach any courses that related
6 to the dynamics, whether nuclear or hydraulic, of
7 pressurized water reactors?

8 A Yes. I taught courses in nuclear power
9 reactor controls and talked about the dynamics a
10 great deal, principally the nuclear kinetics and
11 reactor kinetics.

12 Q So these were nuclear physics issues
13 as opposed to mechanical-type issues?

14 A Primarily, yes.

15 Q When you served as the chairman of the
16 department of chemical and nuclear engineering,
17 were you still acting as a teacher?

18 A Yes, I was.

19 Q Did you prepare certain written
20 testimony for submission to the Atomic Safety and
21 Licensing Board that is considering the restart of
22 TMI Unit 1?

23 A Yes. I participated in the preparation,
24 yes.

25 Q Did you include in that written material

2 a description of your past experience to date?

3 A Yes, I think so.

4 Q In the written testimony that was dated
5 December 22, 1980 and introduced before the Atomic
6 Safety and Licensing Board considering the TMI-1
7 restart on February 11, 1981, at pages 7 through 9,
8 there is a discussion of Dr. Long's past experience.

9 As Mr. Glassman knows, it hasn't been
10 our practice in the past to mark testimony which
11 has been sworn in this case as an exhibit. I
12 mention that because this is the source of the
13 following questions I am going to ask you. If you
14 need to look at it, just ask, and I will be happy
15 to show it to you.

16 I would just like to understand some of
17 the outside jobs you did while you were at the
18 University of New Mexico. One of the things that
19 this testimony indicates is that you served as a
20 project engineer for the design of the Sandia
21 Laboratory SPR-2 fast-burst reactor.

22 Is this fast-burst reactor similar to
23 the one you told me about at White Sands?

24 A Yes.

25 Q Could you tell me what your tasks or.

2 your job responsibilities were as the project
3 engineer on that matter?

4 A Yes, I was on a half-time research
5 contract the university had with Sandia, and I was
6 the leader of a team of people designing a new
7 pulse reactor for Sandia Labs.

8 Q Who was on this team of designers? Were
9 these other people from the University of New
10 Mexico?

11 A No, they were primarily from Sandia
12 Labs.

13 Q It indicates you were "project
14 engineer." Does that mean you were the supervisor
15 of this project?

16 A In the technical sense, yes, but there
17 was a Sandia supervisor who was the administrative
18 man and corporate supervisor of those people.

19 Q Was it principally your experience at
20 White Sands which provided you with the necessary
21 background to participate in this project?

22 A Yes.

23 Q When in your career did this occur?

24 A 1965-1966.

25 Q The next task or job that you had

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2 during this time, at least as indicated by this
3 resume, is that you are listed as the "principal
4 investigator for a contract with Consolidated
5 Edison Company of New York to analyze axial xenon
6 redistribution and power shaping in large
7 pressurized water reactors."

8 What was your role as the principal
9 investigator?

10 A I had a contract with Con Ed. The work
11 was primarily performed by one of my doctoral
12 candidates who was located here in New York with Con
13 Ed to do that work.

14 Q Were you principally supervising work
15 being done by this student?

16 A Yes.

17 Q Do you know what if any application Con
18 Ed intended to put this work to?

19 A Yes. They were looking for a technique
20 of doing rapid calculations on the effect of xenon
21 after reducing power, particularly on weekends.

22 Q This was with respect to power reactors?

23 A Yes.

24 Q At what time were you doing this job
25 or doing this review work?

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2 A I don't remember the exact starting
3 time. It was 1971-1972, and the work was completed
4 in 1974-1975.

5 Q What if any formal training had you had
6 prior to initiating this work as principal
7 investigator which related to the design,
8 construction, or operation of large pressurized
9 water power reactors?

10 A My course work at Purdue covered the
11 design of pressurized water reactors as well as
12 boiling water reactors. I worked for Con Edison
13 for a year in 1970 and 1971 at Indian Point 1.
14 I taught courses in designing reactors.

15 Q You indicated earlier that you did not
16 in the course of your formal education take a
17 course in thermal dynamics. What was the nature of
18 the course you took which included the subject of
19 the design of pressurized water reactors?

20 A You are going back a long time.

21 Q I appreciate that.

22 A We had a design course. I am trying to
23 remember the textbook. I think it was probably
24 Glasstone-Sizonski, which has the title Nuclear
25 Reactor Engineering. Sizonski was one of my

2 professors at Purdue. We also had a project design
3 course where we worked through the design of a
4 portable nuclear power plant which was strictly a
5 project design. No one ever built one, at least
6 not like the one we designed.

7 Q What course or courses did you teach
8 while you were at the University of New Mexico which
9 related to pressurized water design?

10 A We had a similar project design course
11 where the students worked on a team. I taught it
12 several times. Sometimes the students would do an
13 original design. Other times they would study or
14 maybe do a comparison study between two different
15 manufacturers' designs.

16 Q Do you recall ever considering the
17 design of a B&W plant in the course of teaching these
18 courses?

19 A Not specifically B&W plants, no.

20 Q What textbooks or textbook did you use
21 for your design course?

22 MR. GLASSMAN: When?

23 MR. BENEDICT: When he was at the
24 University of New Mexico.

25 A Seems like we followed a text that was

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2 published by Professor Sizonski which was kind of a
3 follow-up to the Sizonski and Glasstone text.

4 Q Is that a publication that was publicly
5 available or was it privately printed?

6 A No, it was a published text.

7 Q Do you recall the names of the authors?

8 A Siskonski was I think the sole author
9 of that particular one.

10 Q Did you also use the textbook that you
11 recall using when you were at Purdue?

12 A Yes, Glasstone and Sizonski is kind of
13 a good reference text that we have used all through
14 the years.

15 Q What if any training or education had
16 you had prior to this project for Con Ed on the
17 operational aspects of a pressurized water power
18 reactor?

19 A Nothing more than what we already
20 discussed. The reason for going to Con Ed was to
21 get more experience with commercial power reactors.

22 Q You indicated that you had spent some
23 time prior to this project at Con Ed's Indian Point
24 Unit 1, I think you said a year, starting in 1970,
25 is that right?

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2 A Yes, 1970-1971.

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Q What was your job responsibility or
4 project or reason for being at Indian Point 1?

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A I went there under a program sponsored
6 by the American Society for Engineering Education
7 to provide university faculty members with industry
8 experience. I think my title at Con Ed was
9 associate reactor engineer.

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When I got there, they had just
recently discovered problems with a thermal sleeve
in their primary coolant system, and they asked me
whether I would keep track of all of the quality
assurance, nondestructive activities associated
with repair of that problem.

16

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Q What kind of reactor is Indian Point 1?

A Indian Point 1, which is no longer
operating, is a pressurized water reactor.

19

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Q Do you recall who designed the nuclear
steam supply system?

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A I am pretty sure B&W did the nuclear
steam supply system. At the time I was there, they
had changed the core from the B&W core to the
Westinghouse core.

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Q Do you know whether the heat exchanger

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or steam generator was a once-through steam generator?

A No, they were U-tube generators located in a horizontal position. They were rather unique.

Q What was the approximate thermal output of the Indian Point 1 reactor?

A As I remember, it was about 280 megawatts. Something close to half of that came from an oil-fired super heater which is also unique.

Q So at least with the addition of the oil-fired heat input, Indian Point 1 operated with a super heat component in its secondary side?

A That's right.

Q Was Unit 1 being used to generate electricity at the time you were there?

A Yes, we got it started up before I left. The repair job took about six months and then it ran for a while during the time I was still there.

Q What was the nature of the repair work that you were involved in?

A We had to remove the nozzle that was a connection for adding makeup water into the primary system. We also had to cut out a portion of the

2 primary hot leg, the major piping, and replace it
3 with another nozzle and with a new thermal sleeve,
4 and then we closed the line.

5 Q That was work that you did prior to the
6 work we were talking about earlier with respect to
7 xenon redistribution, I take it?

8 A That's right.

9 Q The next task that is indicated or
10 listed in your written testimony is that you were
11 the "supervisor in charge of the design,
12 development and installation of a fossil power
13 plant simulator at the University of New Mexico
14 under the sponsorship of the New Mexico Energy
15 Resources Board and the Public Service Company of
16 New Mexico."

17 What was your role or responsibility
18 with respect to the installation of the simulator?

19 A Again, as principal investigator, I
20 directed the activity of a Ph.D. student, and there
21 were a couple of other student research associates
22 working on the same project.

23 Q Prior to this work, what if any
24 experience had you had with respect to power plant
25 simulators?

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A Prior to that work, none.

Q Was the simulator at the University of New Mexico a full-function simulator?

A No, it was a limited-scope simulator designed to demonstrate principles of operation of fossil plants.

Q Did it purport to replicate a typical control room for a fossil plant?

A No, it did not.

Q How long and when did you work on this project?

A I think we began work on it about the 1973 time period. This funding began in the fall of 1974, and the student completed the work somewhere in the 1976-1977 time period.

Q Do you know whether this simulator is still being used at the University of New Mexico?

A No, I don't know.

Q The next task listed is "consultant for General Physics Corporation, with the task of revising the reactor engineering volume of General Physics' 'Academic Program for Nuclear Plant Personnel.'"

What was your job as a consultant to

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General Physics?

A General Physics had I think a whole set of volumes of textbooks that they marketed for use by the industry in training reactor operators and other power plant technicians, and they asked me to help revise and update a copy of the Nuclear Reactor -- whatever that title is.

Q "Academic Program for Nuclear Plant Personnel."

A Yes.

Q With whom did you work or did you work with a number of people in doing this consultation?

A I worked with several people. The only names I remember is Bob Deutch, who was and still is I think president of General Physics, and another engineer named Dick Burdette.

Q Is General Physics a vendor of training services to utilities?

A Yes.

Q They sell more than just textbooks? They also sell the services of trainers or consultants?

A Yes, they do provide instructors for use at the utilities.

2 Q Was it your understanding that the
3 textbook that you were revising was going to be used
4 by licensed operators or by people who were in
5 training to be licensed operators for nuclear power
6 plants?

7 A I don't remember whether that was
8 specifically for operators or whether it was a more
9 general text for various kinds of technicians.

10 Q Did the textbook, as you recall, have
11 specific discussions of the operation of pressurized
12 water reactors?

13 A Yes.

14 Q Did it have specific discussions of the
15 operation of boiling water reactors?

16 A Yes.

17 Q Since your arrival as an employee of
18 GPU or a GPU subsidiary, have you ever recommended
19 to GPU or Met Ed the use of General Physics for
20 training operators or other plant personnel?

21 A No, I haven't recommended that.

22 Q Have you ever recommended the use of
23 this textbook?

24 A No.

25 Q Do you know whether the textbook is

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still being used?

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A No, I do not.

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Q Do you know whether GPU or Met Ed or any other part of the GPU system used the textbook or General Physics?

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A I don't know whether they used the textbook. We have used materials from General Physics, and we have used staff members from General Physics to assist us in our instruction of programs.

Q Do you know whether GPU has used General Physics prior to the Three Mile Island accident on March 28, 1979?

A No, I don't know.

Q You do, however, know that at some time since your arrival they have used General Physics' services?

A Following the accident time period, I am aware of them using General Physics, yes.

Q Did you have any role in administering or supervising the General Physics program or presentation at GPU or Met Ed?

A Only very indirectly, once I became director of training and education.

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Q Do you know what subjects General Physics were requested to train on?

3

4

MR. GLASSMAN: What time frame?

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MR. BENEDICT: Whenever he remembers.

6

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A No, I don't recall the specific subjects.

8

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Q Do you recall that they were training licensed personnel?

10

A I don't know.

11

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Q When you were at Argonne, did you have an operating license for the thermal source reactor?

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A No, I didn't have an operating license, because that is a Government reactor, and they don't actually issue licenses. I was a certified operator, however.

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Q What was your first reactor operating experience? Was it at Argonne or was it prior to that in an academ' setting?

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A No, the first reactor operating experience was on the Argonne thermal source reactor as a trainee, and then I became certified as an operator so I could do my dissertation work on the reactor.

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Q What if any operating experience have you had on light water reactors?

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A I have not had any direct operating experience on light water reactors.

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Q Wasn't the Argonne reactor a pool reactor?

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A Yes. I was thinking light water power reactors. Yes, the Argonne reactor was a pool reactor.

9

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Q You had no operating experience at the Indian Point Unit 1 reactor?

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A Nothing other than observing operations.

14

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Q You say you were certified as an operator for the Argonne facility. Have you ever held an AIC or NRC-issued license?

16

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A Yes.

18

Q For what facilities were you licensed?

19

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A I was licensed as a senior reactor operator on the university's training reactor.

21

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Q That is the reactor you were telling me about that has a solid core?

23

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A That's right.

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Q Is your reactor license still valid?

A No, not once I terminated employment

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2 with the university.

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Q What was your work at the United Kingdom
4 pulsed experimental reactor?

4

5

A I went there in 1966-1967 on leave from
6 the university to assist them in the starting up of
7 that pulsed reactor, and I functioned as, I guess
8 you would call it, a reactor supervisor. I don't
9 remember the exact title.

9

10

Q Senior reactor physicist?

11

A Yes.

12

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Q What was your job as a senior reactor
14 physicist?

14

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A That meant that I could be in charge of
16 a shift and make the decisions with respect to the
17 operations of that reactor.

17

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Q What was the general design of this
19 reactor?

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A First off, it is a fast-pulse reactor,
20 but its design is somewhat different than the
21 White Sands or Sandia reactors. It uses pin-type
22 fuel elements. They are in a solid matrix of
23 copper and epoxy resin, and the whole system is
24 reflected by copper.

Q What is the purpose of this reactor?

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A It is also used to produce pulses of radiation for radiation effects testing.

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Q Your writer testimony indicates that you "spent one year with the Electric Power Research Institute as project engineer with responsibility for managing projects in availability engineering and development of utility power system data bases."

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First, when did you spend this year at EPRI?

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A I was on sabbatical leave in 1976-1977 from the university.

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Q What was your job as project engineer with responsibility for availability engineering?

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A EPRI staff members essentially managed the work, from EPRI's viewpoint, that is being done by contractors. You have prime contractors who assign the projects. The EPRI staff member negotiates their contract in terms of its technical content, monitors the work, reviews the reports.

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Q What is availability engineering?

A In general, availability engineering is a term used to describe the activities used to find ways of improving the reliability of power plants.

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Q What if any specific projects can you recall working on during your year at EPRI?

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A One project was developing essentially literature shirts and a base for describing what availability engineering was, how it was being applied in the industry. Another was developing a review and some recommendations for reliability data bases for the power industry.

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A third was a survey of the performance of steam generators across the nuclear industry.

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Q What was the issue with respect to the performance of steam generators?

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A At that time, the steam generators were just starting to experience what the industry calls denting problems.

15

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Q What is denting?

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A A phenomenon where you get crud buildup in the cracks on the secondary side of the steam generators, which tends to squeeze or dent the tubes and can lead to cracking of the tubes and thus to tube leaks in the steam generator.

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Q Did this project include consideration of both U-tube and once-through steam generators?

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A Primarily it is associated with U-tube

2 steam generators, since at that time the OTSG's
3 almost had no problems with tube leaks.

4 Q According to B&W 668, in June 1978 you
5 came to GPU Service Corporation as the manager of
6 generation productivity. Was there any relation
7 between your job function in your new job at GPU
8 and what you had been doing at EPRI?

9 A A very direct relation, yes.

10 Q What is the relationship?

11 A GPU had decided to form a new department
12 in the Service Corp. that would focus attention
13 on improvement of the performance of their power
14 plants throughout the system.

15 Q Were you brought in to manage a group
16 or unit that was set up for the first time upon
17 your arrival?

18 A Yes, that's right. I was brought in to
19 up basically, to recruit the staff, and initiate
20 the work.

21 Q How was your job responsibility described
22 to you when you arrived at GPU?

23 A Basically, I was asked to work with the
24 operating companies, to guide their development of
25 performance improvement programs, primarily

1
2 focusing on the large coal plants in western
3 Pennsylvania.

4 Q Your work included both nuclear and
5 fossil?

6 A Yes.

7 Q In the approximately nine months between
8 your arrival in June 1978 and the accident at Three
9 Mile Island in March 1979, approximately, what
10 percentage of your time was spent dealing with
11 issues related to nuclear facilities in the GPU
12 system?

13 MR. GLASSMAN: You don't want him to
14 guess, I assume?

15 MR. BENEDICT: No, what he has as an
16 approximation. I am not going to hold him
17 to the decimal points.

18 A I don't know percentage, but I would
19 say perhaps a week or two weeks out of those nine
20 months might have been focused on nuclear. I was
21 primarily concerned with the fossil plants.

22 Q Was it your understanding that that was
23 to be the emphasis in your job when you arrived?

24 MR. BENEDICT: I am trying to
25 differentiate between happenstance or

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circumstance during those nine months which led him to spend most of his time on fossil as opposed to his understanding at the time he arrived as to where his emphasis would be for the first year that he was at work.

A No, that was consistent with my understanding.

Q When did the generation productivity -- is it a division or group?

A Department.

Q When did the generation productivity department jell into something that was actually doing work corresponding to its mandate?

A We were beginning to feel we had a fairly well-defined program in place just about at the time of the TMI accident.

Q Prior to the accident in March 1979, had you had any responsibility with respect to the training of any GPU or Met Ed personnel?

A No, I did not.

Q You didn't have any responsibility with respect to reviewing operator training or any other training?

A No.

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Q Do you recall whether prior to the Three Mile Island accident you knew who was the head of the training department for Three Mile Island?

A No, I don't think I did.

MR. BENEDICT: I would like to have marked as B&W Exhibit 669 a document provided to us by counsel for GPU, which is headed "GPU Service Corporation, Generation Division, Division 30," and it bears the date in the lower right corner of April 1st, 1979.

(Document headed "GPU Service Corporation, Generation Division, Division 30," dated April 1, 1979, marked B&W Exhibit 669 for identification, as of this date)

Q Does B&W 669 accurately reflect the generation productivity department that you set up prior to the Three Mile Island accident in March 1979?

MR. GLASSMAN: You want the witness to review each title and each name?

MR. BENEDICT: I am more interested in the titles than the names for the moment. It is the lower quarter of the document that I am interested in.

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2 MR. GLASSMAN: Are you then, so we're
3 clear, are you then referring to the titles
4 appearing beneath the title "Manager of
5 Generation Productivity"?

6 MR. BENEDICT: That's right.

7 A Yes.

8 Q For approximately how long had this
9 organization been set up and these people listed
10 here filled these jobs prior to the April 1st date
11 of B&W 669?

12 MR. GLASSMAN: You are referring to
13 the individuals beneath the title "Manager,
14 Generation Productivity"?

15 MR. BENEDICT: That's right, beneath
16 Dr. Long's name.

17 A The organizational structure was set up
18 within a few months after my arrival at GPU. Some
19 of the people, namely, Mr. Locke and Mr. Weiser,
20 were already employed by GPU when I arrived, and
21 then they were assigned to me. Ms. Niebo began
22 work for us I believe in late 1978. Mr.
23 Billingsley began work for us in early 1979. I
24 don't remember the exact month.

25 Q Had Mr. Billingsley worked at GPU prior

2 to that?

3 A No.

4 Q Did you interview and hire Mr.
5 Billingsley?

6 A Yes.

7 Mr. Christy was a co-op student from
8 the University of Cincinnati who joined us in
9 March 1979 about a week before the TMI-2 accident.

10 Q Beginning when you were hired in June
11 1978 through until the day of the accident in March
12 1979, did you report to Mr. Bachofer?

13 A Yes.

14 Q Did you at any time prior to the Three
15 Mile Island accident report to anyone other than
16 Mr. Bachofer directly?

17 A No.

18 Q Did you know Bob Keaten prior to the
19 Three Mile Island accident?

20 A Yes.

21 Q In the GPUSC hierarchy, what were your
22 relative levels, if you know?

23 A He was a manager, reporting to a
24 director, as was I.

25 Q So as you understood it, he was

2 essentially the same corporate level?

3 A Yes.

4 Q According to your written testimony
5 before the Atomic Safety and Licensing Board, you
6 were "a member of the TMI-2 recovery team from
7 March through July of 1979."

8 During this time period, did you do any
9 work or have any responsibility with respect to the
10 generation productivity department?

11 A Very limited.

12 Q Your time was principally taken up with
13 your responsibilities with respect to the recovery
14 team?

15 A That's right.

16 Q Your testimony then indicates that you
17 "served as director of the TMI generation group's
18 reliability engineering division." That is also
19 noted on B&W 668.

20 What was the nature of your job
21 responsibilities as the director of reliability
22 engineering?

23 A We were setting up a new division under
24 the TMI generation group, which was headed by Mr.
25 Arnold. The division included the systems

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2 laboratory.

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Q When you say "systems," that is the GPU systems?

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A Yes.

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Q It included the laboratory?

7

A Yes. The quality assurance department.

8

Q The information management department?

9

A Yes. And I think to begin setting up the nuclear safety assessment department.

10

11

Q Was this a new group within the generation division?

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MR. GLASSMAN: Which group are you now referring to?

14

15

Q Reliability engineering? Is that a new group within the generation division?

16

A I can't answer that directly.

17

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Q It was still part of GPUSC. This was prior to the creation of GPU Nuclear?

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A Yes, it was prior to the creation of GPU Nuclear, but the TMI generation group combined people from the Service Corp. generation division and Met Ed, so that we had all the personnel at TMI, some people from Med Ed, Reading, and then large numbers of staff people from the Parsippany Service

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Corporation group reporting to the head of the TMI generation group.

Q Was Mr. Arnold the head of TMI generation group?

A Yes.

Q And your division was part of the TMI generation group?

A Yes.

Q So as of the summer of 1979, I take it what we have marked as B&W 669 was no longer an accurate representation of the setup?

A That's right.

Q At GPU?

A Right.

Q You said one of your responsibilities was the setting up of the nuclear safety assessment department. What was the nuclear safety assessment department?

A It was intended to be a small group that would provide an overview of all activities in GPU or in this case, the generation group, which might impact on nuclear safety.

Q Were you the head of this department?

A No, I was the director over that

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department, and I was in the process of recruiting who the staff should be and even defining what the functions of the department should be.

Q Who was ultimately recruited for this department? Who was the first full staff?

A The first full staff was a contractor from Burns & Roe, and the man's name was Don McCormick, and then eventually we recruited a GPU person whose name was Robert Whitesel.

Q Mr. McCormick didn't work for the GPU system?

A No.

Q He was --

A We contracted with Burns & Roe for his nearly full time, I think about 80 percent at that time.

Q Who if anybody did Mr. McCormick have working with or for him?

A When he began, he had I believe two other Burns & Roe engineers. I don't remember their names.

Q Does the nuclear safety assessment department continue to exist in some form at GPU?

A Yes.

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Q Who is the current head?

3

A The current head is Robert Whitesel.

4

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Q Does Mr. Whitesel have anybody working for him?

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A Yes, he has at the present time, he has a secretary and he has some people at TMI reporting to him. He is recruiting again for his Parsippany staff.

10

Q Does Mr. Whitesel report to you?

11

A Yes, in my current position.

12

13

Q What is the current name of Mr. Whitesel's department or group?

14

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A It has the same name, nuclear safety assessment department.

16

Q However, it is now part of GPU Nuclear?

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A That's right.

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Q You indicated in your earlier testimony that one of your responsibilities or tasks during this period was to define the responsibilities of the nuclear safety assessment department. How did you define those responsibilities?

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MR. GLASSMAN: What point in time?

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MR. BENEDICT: In the initial creation

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of the departmer

2 A Would you clarify what you mean by
3 "how"?

4 Q I don't mean the mental processes. What
5 were the responsibilities as you defined them?

6 A One major responsibility was to support
7 the activities of the GPU general office review
8 boards, known as the GORB's. Another is to manage
9 the activities of the independent on-site review
10 groups. There is one of those functioning now at
11 TMI-1. There will be one at Oyster Creek
12 eventually, and perhaps there will be one at TMI-2
13 in the more distant future.

14 Then the corporate group, in addition
15 to supporting the GORB activities, has, as I
16 mentioned earlier, kind of an oversight
17 responsibility for looking at any and all activities
18 that might impact on nuclear safety. They also
19 perform the function of a nuclear safety ombudsman
20 for the GPU Nuclear Corporation.

21 Q These were the roles or responsibilities
22 as you defined them in the summer of 1979?

23 A They were certainly considered in the
24 late summer and fall of 1979, and I more fairly have
25 described them as they have evolved at this point in

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time.

Q Are you aware of any description or documentation of the responsibilities of the nuclear safety assessment department?

A Yes.

Q What are you aware of?

A There is a GPU nuclear organization book which describes their responsibilities.

Q Did you draft the contents of that book with respect to this department?

A The very earlier drafts were prepared by Mr. McCormick and I reviewed them.

Q Are you aware of any people or groups or departments within the GPU system who held the responsibilities you have defined for the nuclear safety assessment department prior to its creation in the summer of 1979?

MR. GLASSMAN: Are you talking about someone who had all of these responsibilities or particular ones?

MR. BENEDICT: Let's hear it back.

(Record read)

Q By that, I mean any of the responsibilities, not necessarily all of the

1
2 responsibilities.

3 A The GORB groups were functioning for
4 some period of time. I don't know when they
5 started at GPU, and they were supported by some
6 staff from the Service Corporation.

7 Q Are you a member of either of the GORBs?

8 A No, I am not.

9 Q Were you ever?

10 A No.

11 Q Are you a member of any of the other
12 groups or committees, review groups, within GPU?

13 A No, not at the present time.

14 Q Have you ever been a member of any such
15 review groups other than the accident review group
16 we discussed earlier?

17 A No.

18 Q Who, if anyone to your knowledge, had
19 responsibility for, as you have put it, oversight
20 responsibilities with respect to safety-related
21 matters prior to the Three Mile Island accident?

22 MR. GLASSMAN: During what period are
23 you talking about? Mr. Long was only with the
24 company a very short period of time.

25 MR. BENEDICT: Any time he is aware of

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prior to the Three Mile Island accident.

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A Certainly that oversight responsibility is one of the responsibilities of the GORBs.

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Q Other than the GORBs, are you aware of any group or unit or person or organization within GPU who had that responsibility prior to the accident?

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A I am not aware of who those might be, but I am not familiar with the Met Ed organization.

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Q Does the nuclear safety assessment department have any review or oversight responsibilities with respect to the training of licensed personnel at Met Ed or JCP&L?

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A At the present time?

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Q Yes.

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A First off, Met Ed and JCP&L don't have control --

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Q You are right. Let me fix the question.

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Today, does the nuclear assessment department have any responsibilities with respect to NRC-licensed employees of GPU?

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A Insofar as that group might think they have an impact on nuclear safety, they could

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certainly look at them.

Q You are not aware of any ongoing responsibilities that that group has or department has?

A Not a specific assignment, no.

Q Does the nuclear safety assessment department have any responsibilities with respect to assuring compliance with 10 CFR, Part 21?

A No; again, not directly in terms of assuring compliance.

Q What do you understand the general requirements to be of 10 CFR, Part 21 today, just very generally? I am not looking for specifics.

A I think I would want to go back and read 10 CFR, Part 21 to answer that.

Q Do you understand that 10 CFR, Part 21 imposes certain requirements on you as an employee of GPU to report to the NRC or take steps to see to it that the NRC is notified of certain safety-related issues?

A Yes.

Q When did you first become aware of your having any responsibilities personally with respect to 10 CFR, Part 21?

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A When it was issued, but I don't remember the date of issue.

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Q If I told you it was January 1978 that it became effective, would that help you place it in time?

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A That sounds about right. I would have been notified as a licensed operator and responsible lab director at the University of New Mexico.

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Q At any time following your arrival at GPU, but prior to the Three Mile Island accident, did you receive any training or education or written material with respect to your responsibilities under 10 CFR, Part 21?

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A None that I recall, but remember, I was primarily associated with the fossil plants.

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Q Since the Three Mile Island accident, have you received any training or written material or education with respect to your responsibilities under 10 CFR, Part 21?

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A Yes. That is discussed in the general employee training that is provided to all personnel who have access badges to either site.

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Q And has that training been provided to you?

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A Yes.

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Q And that was since the Three Mile Island

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accident?

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A Yes.

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Q What are the independent on-site review

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groups that you spoke of earlier?

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A I can't tell you very many details,

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because it is just starting to function, and I am

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just starting to get familiar with them again. I

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was not directly associated with them for some

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period of time until my recent new position. We

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have reorganized the safety review process at the

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site, and eventually the plant operating review

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committees will no longer be functioning, and the

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IOSRG are part of the review process that replaces

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that older PORC process.

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Q Is the concept of the independent

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on-site review group something that has been

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developed since the Three Mile Island accident, to

21

your knowledge?

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A Yes.

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Q What is the expected composition in

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terms of position or title of the independent

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on-site review group?

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MR. GLASSMAN: Expected by whom?

MR. BENEDICT: Expected by Dr. Long.

A Primarily it would be engineering graduates with some minimum number of years of experience.

Q Employees of the General Public Utilities system?

A They will be employees of GPU Nuclear.

Q Will it include any licensed personnel, to your knowledge, or require the inclusion of any licensed personnel?

A It does not require personnel to be licensed.

Q What did you mean when you said that one of the responsibilities of the nuclear safety assessment department was to act as an ombudsman?

A The ombudsman function I think is one that you are familiar with in general terms. It is someone you can go to in confidence and express a concern and be assured that that concern has been addressed. That is basically the function of the nuclear safety ombudsman.

Q To your knowledge, did such a person or organization, or did that person or organization

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exist at GPU or Met Ed with that responsibility prior to the Three Mile Island accident?

A No, it did not.

Q You were, as you say, involved in the establishment of this department in the summer of 1979. Whose idea was this department?

A The concept I believe evolved from discussions between Mr. Arnold and Mr. Dieckamp.

Q Do you know whether any of these discussions had occurred prior to the Three Mile Island accident?

A I think they had discussed them some before the Three Mile Island accident, yes.

Q Are you aware today of any efforts made prior to the Three Mile Island accident to organize or establish something that became or was to become the nuclear safety assessment department?

A Since I wasn't associated with that, I don't know what was done prior to the accident.

Q Earlier, you had difficulty answering one of my questions because I was unclear about the current role that the Metropolitan Edison and JCP&L subsidiaries play with respect to the operation of Unit 1 at TMI and the Oyster Creek

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2 plant.

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Could you briefly describe for me what the current status is of the licensing of those facilities?

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A GPU Nuclear Corporation became official in January 1982. We formed the administrative structure for GPU Nuclear in early 1980 and began all the requests to the various agencies to transfer licenses and get approvals of the utility commissions and the Federal Regulatory Commission and the Securities and Exchange Commission and eventually the Nuclear Regulatory Commission to where GPU Nuclear is now the operator of the TMI and Oyster Creek stations. The owners of those stations are still the operating companies. Met Ed, Jersey Central and Penn Electric.

Q We discussed earlier the form or the structure of the reliability engineering department which you became the director of in August 1979, and stayed at until January 1980.

Could you describe the roles or responsibilities of this department?

A The systems laboratory provides chemistry and metallurgical laboratory services to

2 all the operating companies in the GPU system. The
3 QA department provides, in the fall of 1979 when it
4 was the TMI generation group, provides quality
5 assurance, quality control, support of TMI. That
6 would include both the operational kind of quality
7 assurance, quality control activities and the
8 activities associated with engineering modifications,
9 design, purchase, all the typical QA functions. The
10 informational management group was set up to really
11 effectively organize the very complex records
12 keeping that is required by regulatory and corporate
13 activities, and the nuclear safety assessment
14 department I think we already discussed.

15 Q During your stint as the director of the
16 reliability engineering department or unit, did the
17 department have any responsibility with respect to
18 training of licensed personnel or people seeking
19 their licenses?

20 A No.

21 Q Prior to your appointment as director of
22 training and education to the GPU Nuclear Corporation
23 in February 1980, did you have any responsibility
24 at GPU with respect to the training of licensed
25 personnel or people seeking licenses?

2 A No, other than the fact that the QA
3 department does review training as it reviews just
4 about everything that goes on.

5 Q Do you recall having any direct
6 involvement in quality assurance or quality control
7 with respect to training prior to your receiving the
8 title of director of training and education?

9 A No.

10 Q Prior to your arrival at GPU,
11 encompassing your whole professional career, did you
12 have any responsibility with respect to the training
13 of licensed personnel or people seeking their
14 licenses?

15 A Training of students and faculty members
16 at the University of New Mexico to be licensed on
17 the University of New Mexico reactor, yes.

18 Q Did you have any responsibility with
19 respect to the training of any people with respect
20 to light water reactors?

21 A I gave a few lectures to operator
22 candidates when I was at Con Ed.

23 Q On what subjects, if you can recall, did
24 you lecture?

25 A Health physics and nuclear reactor

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instrumentation.

Q Do you mean nuclear instrumentation or the instrumentation of the nuclear reactor?

A Nuclear instrumentation.

Q You indicated earlier that GPU Nuclear was set up in early '80. Did you take the job of director of training and education at the time that GPU Nuclear was first established?

A Yes.

Q What were the responsibilities of the section or unit that you directed?

A At the time we began, it was to provide the management direction of the training at TMI, to set up a corporate training group, and eventually to bring in the Oyster Creek training group, but that was a phased operation.

Q Is it fair to say that your work as the director of the reliability engineering unit was similar in kind to the work that you did as manager of the generation productivity unit, although broader, as you have a position higher in the corporate hierarchy?

A No, I wouldn't characterize it as having any similarity.

2 Q Did the reliability engineering
3 department have any responsibility with respect to
4 the issues of generation productivity and
5 reliability that you discussed as being the
6 responsibility of that unit?

7 A Only indirectly in the sense that the
8 QA program is designed to assure that the plant is
9 properly operated and maintained, which leads
10 hopefully to good performance and good reliability.

11 Q But it was not a matter of your being
12 promoted within a section of the organization that
13 also at the same time had a name change? It was
14 definitely a different job, I take it.

15 A That's right.

16 Q I take it also it was a different job
17 to become the director of training and education?

18 A Yes.

19 Q Did you take with you any of the people
20 you had had in the reliability engineering
21 department when you moved to your new job?

22 A Yes, the systems laboratory continued
23 to report to me as director of training and
24 education, and I had a special projects director
25 who moved with me to the new job.

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Q Who was that?

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A Mr. Hetrick.

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Q Is it accurate that you were the director of an organization or unit called training and education?

6

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A Yes.

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Q What was the responsibility of the training and education group or unit?

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A I thought I described that earlier.

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Q You said that administratively at least you incorporated the Met Ed training, is that correct, and that you intended to incorporate the JCP&L training?

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A No, I wouldn't say it that way. I was responsible for direction of the training at the TMI site with a manager of training there reporting to me.

19

Q Who was the manager reporting to you?

20

A In February 1980, it was Mr. Lauer.

21

Q L. L. Lauer?

22

A Yes.

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Q Did that position, manager of training at TMI, change in the course of your tenure as the head of training and education?

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A Yes.

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Q Who did it become?

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A The man who replaced Mr. Lauer is Dr.

5

Ron Knief.

6

Q Do you know whether Mr. Lauer held that

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position prior to the Three Mile Island accident?

8

A No, he did not.

9

Q Do you know who held the position prior

10

to the Three Mile Island accident?

11

A There was not anything equivalent to

12

that position prior to the accident.

13

Q Following the Three Mile Island

14

accident, was a new -- was the training at TMI

15

reorganized with Mr. Lauer as its head?

16

A The training was reorganized. I am not

17

sure exactly when Mr. Lauer was made head, whether

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that was right at the time of the reorganization or

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whether it happened a little later.

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Q What was the nature of the

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reorganization, as you understood it?

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A The program was expanded to include

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personnel in addition to the licensed reactor

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operating training programs. I would say that was

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the major change.

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Q Do you know who was the head of licensed training at TMI prior to the Three Mile Island accident?

MR. GLASSMAN: Are you talking about a title?

MR. BENEDICT: Yes.

MR. GLASSMAN: The witness was not there during that period.

MR. BENEDICT: I understand. Dr. Long also spent a lot of time reviewing the accident. This fact may have come to him.

A At the time of the accident, Mr. Zechman I believe was supervisor of operating training.

Q What did your responsibilities encompass during the 25-month period that you served as director of training and education? What I am interested in is to what extent were you an administrator and to what extent were you participating in the review or preparation of training material? To what extent were you involved in the hiring or firing of training personnel?

MR. GLASSMAN: Would you like the

2 witness to answer each of those questions
3 separately?

4 MR. BENEDICT: I think it is a very
5 general question. I will pursue anything
6 that comes up. I just want -- Dr. Long looked
7 a little puzzled at my first question. I
8 wanted to give an idea of where I was going.

9 A Certainly one of the major activities
10 was to assure that the programs were organized
11 effectively, that their technical content was
12 consistent with the requirements that had evolved
13 after the accident. I interviewed and hired three
14 managers, Dr. Knief for TMI, the corporate training
15 manager, and the Oyster Creek training manager. I
16 also interviewed some of the key section head
17 candidates at both of the sites. I interacted
18 extensively with the sites in discussions of both
19 simulator training and the developing plans for
20 purchase of simulators, and in addition, continued
21 my responsibility for the systems laboratory, which
22 really doesn't have anything to do with training,
23 but also that took some portion of my time.

24 Q How did you determine the appropriateness
25 of the technical content of the training?

2 A Certainly I reviewed the program
3 descriptions that were being developed. I asked
4 other people to look at technical areas where I had
5 concerns. I read documents that had come out of
6 investigation as well as the documents which began
7 to come out of the Institute of Nuclear Power
8 Operations once it was functioning.

9 Q Did you attend lectures?

10 A Occasionally.

11 Q Did you review quiz answers?

12 A Not directly.

13 Q Did you review prior training outlines
14 or practices?

15 A No, I did very little of that. Just
16 things were changing so dramatically, I didn't feel
17 it was appropriate to go back and look at the old
18 stuff.

19 Q Did you attempt to institute a new
20 training program from the ground up?

21 A No, I would not characterize it that way.

22 Q Did you or your trainers rely on the
23 content of training material prepared prior to the
24 Three Mile Island accident at least as a basis for
25 the program?

2 A Certainly as a base for licensed
3 operator training, that's correct.

4 Q What was your role with respect to the
5 simulator or the consideration of the acquisition of
6 a simulator by GPU?

7 A You want the latter part answered?

8 Q Yes.

9 A I participated in the discussions among
10 the TMI and the technical functions people and the
11 corporate training people on what kind of
12 simulators we ought to consider, what the time frame
13 should be, who the possible vendors were, how to
14 evaluate those vendors in terms of getting started
15 on such a project.

16 Q Has the determination been made, to
17 your knowledge, at GPU to acquire a full-function
18 simulator for the TMI-1 facility?

19 A Yes, we do plan and we have told the
20 licensing board that we are going to get a replica
21 simulator for TMI-1.

22 Q Are you aware of any consideration
23 within GPU prior to the Three Mile Island accident
24 related to the acquisition of the replica simulator,
25 as you call it?

2 A Yes, there was some consideration. I am
3 not sure of the time frame. I don't know any of the
4 details.

5 Q Do you know who was involved in those
6 considerations?

7 A Mr. Hetrick had something to do with it
8 because he provided to me a file box full of
9 material that was gathered at the time they were
10 considering it.

11 Q Do you know where that file box full of
12 material is today?

13 A Some of it may still be in the file box
14 in storage. Pieces of it may be spread around to
15 the various people. We didn't use it very much.
16 We just looked at it to see what they had done
17 before and then began to gather new information.

18 Q Where would you look if you wanted to
19 find the material that was contained in that box
20 Mr. Hetrick gave to you?

21 A I have to ask my secretary to look at
22 the list of boxes that we have in storage.

23 Q You believe that the first place you
24 would look would be in storage which you have some
25 control over, is that right?

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A I don't control storage, but the storage we send things to.

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Q Is this GPU central file storage?

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A I wouldn't call it the GPU central file. It is a storage area where you can send old materials that are no longer active.

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Q Do you know what the name of this outfit is?

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A No.

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(Recess taken)

12

BY MR. BENEDICT:

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Q Referring to your title as director of training and education, do you know whether such a position or job description existed prior to the accident in March 1979?

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A No, it did not.

18

Q Did such a position exist prior to the creation of GPU Nuclear?

19

20

A No, it did not.

21

Q Do you know whether anyone or any group of people held the same responsibilities that you held as the director of training within the GPU or GPUSC organization prior to the creation of GPU Nuclear?

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A No, I don't know that.

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MR. BENEDICT: I would like to have marked as B&W 670 what appears to be an organization chart for at least part of the nuclear assurance division for GPU Nuclear dated November 10, 1980.

(Organization chart for part of GPU Nuclear, dated November 10, 1980, marked B&W Exhibit 670 for identification, as of this date)

Q Does this exhibit accurately reflect the organization of your group, particularly on the second page of the exhibit at the date of the document?

MR. GLASSMAN: Is the question then directed to the entire exhibit or solely to the second page?

MR. BENEDICT: Just the second page to begin with.

MR. GLASSMAN: What point in time?

MR. BENEDICT: The date of the document.

A Yes, it does.

Q Going back to the first page, is it correct at this time you reported to Mr. Herbein?

2 A Yes.

3 Q Did you through the time that you held
4 this position or at all times that you held this
5 position report to Mr. Herbein?

6 A No.

7 Q To whom else did you report?

8 A From February 1980 through early
9 September of 1980, I was the acting division
10 director in addition to director of training and
11 education.

12 Q Did you continue to report to Mr.
13 Herbein until you changed jobs or job positions in
14 April 1982?

15 A Yes.

16 Q Did you take over Mr. Herbein's job in
17 April 1982?

18 A Yes.

19 Q As the director and vice president of
20 nuclear assurance division of GPU Nuclear
21 Corporation, as noted on B&W 668, did you serve the
22 same function that Mr. Herbein was serving during
23 the time that you reported to him?

24 A Basically, yes.

25 Q Does the organization of the training

2 and education group continue today to be what is
3 represented on page 2 of B&W 670 with the exception
4 of you no longer being the director?

5 A You mean the current date?

6 Q Yes.

7 No, there is some slight changes.

8 Q Who is the current director?

9 A Mr. Ross is the acting director, and
10 according to the memo announcing my appointment, I
11 am still the director until the new director is
12 recruited or obtained from within the organization.

13 Q What changes from this organizational
14 chart dated November 10, 1980 would have to be made
15 in order to make it currently accurate?

16 A Manager of the systems lab no longer
17 reports to the director of training and education.

18 Q To whom does he report?

19 A He now reports to a materials and
20 chemistry director in the technical functions
21 division.

22 Q Any other changes that would have to be
23 made to make this currently accurate?

24 A Yes, the TMI-2 training manager is now
25 shown as a manager of TMI-2 training, reporting to

1
2 Dr. Knief, who is training manager for TMI rather
3 than exclusively TMI-1.

4 Q Who is the current training manager or
5 manager for training at TMI-2?

6 A That position is not filled. Knief is
7 essentially still acting.

8 Q What is your current job description,
9 the one you have held since just April of 1982?

10 A I now have overall responsibilities for
11 training and education, for quality assurance, for
12 nuclear safety assessment, and for emergency
13 planning.

14 Q Does page 1 of B&W 670 continue to be
15 an accurate description of the groups and
16 individuals reporting to you as the director of
17 nuclear assurance?

18 A Not, it is not.

19 Q What would have to be changed to make
20 it accurate today? You are acting director of
21 training and education as well as being the director
22 of nuclear assurance, is that correct?

23 A No.

24 Q Didn't you say --

25 A There is an acting director of training

2 and education who is Mr. Don Ross. I am now the
3 director and vice president of nuclear assurance.
4 Met Ed would not appear there anymore. I am a vice
5 president of GPU Nuclear. Mr. Herbein was a vice
6 president of Met Ed at the time of the date on this
7 chart. Mr. Bachofer is no longer in that position.
8 There is nobody in that position, manager of
9 special projects, nuclear. Mr. Kazanas has the
10 title of director of quality assurance, rather than
11 manager. The NSAD position is described as NSAD
12 director, and the name is R. M. Whitesel. Emergency
13 planning is the same as shown here with Rogan.

14 Q NSAD is nuclear safety assessment
15 department, right?

16 A Yes.

17 Q Who do you report to today?

18 A Office of the president-GPU Nuclear,
19 which has Mr. Clark as executive vice president and
20 Mr. Arnold as president.

21 Q What is Mr. Herbein's current job, if
22 you know?

23 A Mr. Herbein is now vice president of
24 operations for Pennsylvania Electric.

25 Q He is not a part of GPU Nuclear anymore?

2 A That's right.

3 Q Do you hold any additional
4 responsibilities currently that we haven't talked
5 about other than as the director of nuclear
6 assurance?

7 A Yes. I have one special assignment as
8 the group leader of the failure analysis task force
9 for the TMI-1 steam generator problem.

10 Q Have you held any other such special
11 assignments since the Three Mile Island accident?

12 A Yes.

13 Q What other assignments can you recall?

14 A One was a member of the Keaten task
15 force, and then I had a variety of special
16 assignments in the period just following the
17 accident, the initiation of the accident.

18 Q Relating to review or investigation
19 into the accident?

20 A Yes. Some of them were.

21 Q Are you a member of any industry
22 organizations?

23 A I am not sure what you mean by industry
24 organizations.

25 Q Maybe, organizations that are

1
2 engineering organizations or nuclear-related industry
3 groups.

4 MR. GLASSMAN: Professional society?

5 MR. BENEDICT: Yes.

6 A Yes. The American Nuclear Society.

7 Q Other than that?

8 A Atomic Industrial Forum.

9 Q Are you a member of any of the committees
10 for the Atomic Industrial Forum?

11 A No.

12 Q Have you ever served as a committee
13 member for the AIF?

14 A No.

15 Q What if any publications or recorded
16 speeches or presentations have you made with respect
17 to the accident at Three Mile Island on March 28,
18 1979?

19 A I made a number of talks to groups at
20 many different locations following the accident.

21 Q Are you aware of whether any of those
22 were recorded or did you prepare a synopsis or
23 summaries or written memoranda with respect to the
24 contents of those presentations?

25 A Most of them I did not. I speak from

1
2 notes and slides. There is one paper that is
3 published in the journal called Nuclear Technology
4 which I gave as a presentation to several different
5 groups.

6 Q Do you preserve or have you preserved
7 any of the notes or slides that you used in any of
8 these presentations with respect to the accident?

9 A Yes, not organized according to an
10 individual talk.

11 Q Have your counsel approached you with
12 respect to the Three Mile Island accident and asked
13 you to either review or make available files that
14 you have control of production in this
15 litigation?

16 A Yes.

17 Q Have you done so?

18 A Yes.

19 Q Did you produce or make available to
20 your attorneys these notes and slides with respect
21 to your presentations?

22 A I don't know.

23 MR. BENEDICT: We have reviewed the
24 files that have been given to us as having as
25 their source Dr. Long, and I haven't seen any

1
2 such notes or slides. I would appreciate it
3 if you would look over those things and we
4 will leave that as an open item so that later
5 in the week or sometime hereafter--

6 MR. GLASSMAN: We can certainly look for
7 them. Obviously I can't sit here and
8 identify what they are nor whether they are
9 responsive in time or substance. We don't
10 know exactly what they are, but we'll be
11 pleased to look for them.

12 BY MR. BENEDICT:

13 Q Since the Three Mile Island accident,
14 have you provided any lectures or presentations or
15 prepared any written material that you know is
16 going to be used by licensed people at GPU?

17 MR. GLASSMAN: Are you talking about
18 used in any sense or used in a training
19 program?

20 MR. BENEDICT: Provided to them, yes,
21 for information purposes.

22 MR. GLASSMAN: I assume anything by Dr.
23 Long would be hopefully read by someone.

24 MR. BENEDICT: No, I mean that he knew
25 there was some connection between what he said

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and information that was going to be
communicated to the operators. I don't think
the question is that hard to understand.

A In terms of information provided to the
operators, no.

BY MR. BENEDICT:

Q When did you first hear about the
occurrence at Unit 2 of Three Mile Island, the
occurrence that happened on March 28, 1979?

A Probably around nine o'clock in the
morning on March 28.

Q What did you hear at that time?

A Very sketchy information that the plant
had been shut down and that there was some problem.

Q What was the source of this information?

MR. GLASSMAN: You mean who told it to
Dr. Long?

MR. BENEDICT: Yes, the immediate source.

A I don't remember who it was.

Q It was someone within GPU?

A Yes, it was somebody within the GPU
companies.

Q You hadn't heard it on a news report or
read it in the paper or something like that?

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A Not that I recall.

Q You say the only thing you can remember hearing about it was sketchy information and that the plant was shut down. Do you remember hearing anything about the current condition of the plant in this first time that you were presented with information about it?

A No.

Q What was the next bit of information that you learned about the Three Mile Island accident?

A Sometime during the day I learned that there was some radiation releases.

Q Did you participate or were you in any meetings or conversations that you can recall related to the Three Mile Island accident during that first day, March 28?

A No.

Q Were you given any job responsibility during the first day?

A No.

Q Did you discuss with anyone, who was a supervisor of yours that you can recall, the incident or work that was being done or going to be

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done with respect to it?

A No.

Q Approximately when did you leave the office on Wednesday, the 28th of March?

A I wasn't in the office.

Q Where were you on the 28th?

A I was at Oyster Creek on the 28th of March. I left Oyster Creek at the end of the work day.

Q Did you make any effort to communicate with people in Parsippany with respect to the accident on the 28th?

A No.

Q Did you continue with whatever business which had you at Oyster Creek that day after you heard about it?

A Yes.

Q Did you conduct or carry on normal business that day?

A Yes.

Q When did you return to Parsippany?
When did you return to your office in Parsippany?

A To my office, about 7:30 the next morning.

2 Q Is that your normal time to arrive?

3 A Yes.

4 Q As of your arrival at 7:30 on the
5 morning of the 29th, what if any information did
6 you have about the accident other than what we have
7 already talked about? There has been a radiation
8 release and that the plant had been shut down?

9 A I am sure it was on the news by then.
10 I don't remember what the news said.

11 Q You didn't speak with anyone following
12 your return home that evening on the 28th?

13 A No.

14 MR. BENEDICT: I would like to have
15 marked as B&W Exhibit 671 a collection of
16 handwritten notes we received as having come
17 from Dr. Long's files with microfilm numbers
18 1312-9789 through 9799. The notes are dated
19 at various times on March 28, 1979, except
20 for the last page, which is dated May 10, 1979.

21 (Collection of handwritten notes, with
22 microfilm numbers 1312-9789 through 9799,
23 dated March 28, 1979 and May 10, 1979, marked
24 B&W Exhibit 671 for identification, as of
25 this date)

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2 Q When if ever did you first see what has
3 been marked as B&W Exhibit 671?

4 MR. GLASSMAN: You are assuming this
5 was an entire exhibit?

6 MR. BENEDICT: It was provided to us as
7 a single file. If Dr. Long has to separate
8 pages out, he can.

9 A The dates when I received it is written
10 at the top except it is not legible. "Received
11 noon" --

12 Q If you look at my microfilm copy, I
13 think it says "Originals (Moore notes received 1800
14 hours, 5/10/79)." Is that a fair reading of that
15 writing?

16 A Yes, it is 5/10/79, 1800 -- I think that
17 is an 8.

18 Q Is that your handwriting, just that
19 portion where it says --

20 A Yes.

21 Q Do you recognize any of the handwriting
22 on any of the pages as being your own other than
23 that?

24 A The last page is my writing.

25 Q Do you recall having seen these notes

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prior to -- not the last page, but the pages dated

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March 28, 1979, do you recall seeing these pages

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prior to your receipt as noted here on May 10, 1979?

5

A No, I don't recall.

6

Q How did these notes come into your

7

possession?

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A I believe that I requested them as part

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of the accident assessment activities that I was

10

involved in.

11

Q Of whom did you request them?

12

A Mr. Moore.

13

Q Is it your understanding that these are

14

Mr. Moore's notes?

15

A Yes, it is.

16

Q Is it your understanding that these are

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notes that were made at approximately the times on

18

the date noted on the pages?

19

A That's right.

20

Q Who is Mr. Moore?

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A He is an engineer with the technical

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functions division of GPU Nuclear.

23

Q What was his position on the 28th of

24

March, if you recall?

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A He was an engineer in the technical

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functions group of the GPU Service Corporation.

Q Is that a group that was under your charge?

A No.

Q How did you come to know that Mr. Moore had notes related to the first day of the accident?

A I don't recall.

Q I recognize that we seem to be pushing the clarity of these fairly far, but I was wondering if you can look at the first page of B&W 671 and I will show you the best copy I have, which is directly from the microfilm printer, and ask you whether or not you can identify writing in the right margin which appears to say either "could" or "would blow quench tank rupture disk."

Can you recognize that as your own handwriting?

A No, I don't believe that is my handwriting at all.

Q Do you know whether that notation was on the notes when you received them from Mr. Moore?

A No, I do not.

Q Did you discuss with Mr. Moore his notes around the time you received them?

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A Yes, I believe we had some discussions about them.

Q Did he tell you what the source of the information contained in his notes was? Focusing specifically on pages 9791 and 9792, which are the second and third pages of the exhibit, they are headed at the top 3/28/79, 10:05 a.m. There is then a series of people's names, Keaten, Cronberger, Broughton, Capodanno, Lentz, Moore, Lehman. Do you know -- did Mr. Moore tell you that these notes were his notes taken at or of a meeting among those people at about the time noted?

MR. GLASSMAN: The question is whether Mr. Moore told Dr. Long that?

MR. BENEDICT: Right.

A I don't remember.

Q Did you understand that these notes were taken contemporaneous with the times noted on them?

A Yes, I did understand that.

Q Did you know whether on the day of the accident or do you know whether on the day of the accident a meeting of these people occurred in the morning?

2 A No, I don't know that.

3 Q You were not, as I understand your
4 testimony, in Parsippany on that day, is that
5 correct?

6 A That's correct.

7 Q Do you know whether any effort was made
8 to get in touch with you on March 28?

9 A None that I am aware of.

10 Q Turning to the three pages in the
11 exhibit which are marked for this litigation as
12 9796 through 9798, did Mr. Moore tell you or did
13 you come to understand by some other means that the
14 information contained on these pages was provided to
15 Mr. Moore by Mr. Kunder at or about 6:00 p.m. on
16 March 28, 1979?

17 MR. GLASSMAN: What do you mean by
18 provided?

19 MR. BENEDICT: The source of the
20 information to Mr. Moore was Mr. Kunder.

21 MR. GLASSMAN: You are talking about
22 the source of all the information on this or
23 whether this was Mr. Kunder's words? The
24 question is fraught with ambiguities.

25 MR. BENEDICT: It is a discovery question.

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I will take a chance with it.

MR. GLASSMAN: Objection to the form.

A I don't recall the details of the conversation I had with Mr. Moore.

BY MR. BENEDICT:

Q Did you have any understanding about the time you received and reviewed this material as to what the source of the information was that is contained on pages 9796 through 9798?

MR. GLASSMAN: When you talk of understanding, are you talking about whether the witness might have guessed or thought?

MR. BENEDICT: I think the word "understanding" has a clear definition in current parlance and I will take a chance on the question.

MR. GLASSMAN: In this context I am not so sure it is clear. Therefore, I object to it. But the witness can answer if he understands it.

MR. BENEDICT: If you can use it, so can I.

A I understood at the time that these were notes that Jim Moore had made and were in some

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respect from Mr. Kunder.

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Q Looking at page 9796, about a third of the way down the page, there is a statement that reads, "Suspect steam bubble in dome forced water up into pressurizer."

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When if ever did you become aware of such a suspicion that such a thing might have occurred in the course of the Three Mile Island accident?

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A I can't recall when that particular thing might have first come to my mind.

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Q As of March 28, 1979, what if anything did you know about an incident which occurred at Three Mile Island Unit 2 on April 23rd, 1978 in which main steam relief valves stuck open and the system experienced an overcooling transient?

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A I didn't know anything about that.

Q Did you come to learn for the first time after the Three Mile Island accident about such an incident?

22

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A That's right.

Q Turning to the last page of the exhibit which you said were your notes or which were your handwriting, the first portion of the written

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2 paragraph reads, "At 5:00 p.m., 28, March '79 -
3 Moore on site." Does that represent your
4 understanding that Jim Moore was on the Three Mile
5 Island site or at least nearby by at least 5:00
6 p.m. on the day of the accident?

7 MR. GLASSMAN: My copy is somewhat
8 illegible there, and you might well say what
9 you say.

10 MR. BENEDICT: Maybe Dr. Long can look
11 at the microfilm copy and tell me whether that
12 is a fair reading of his handwriting.

13 A Yes.

14 Q Did you know or had you learned at the
15 time you wrote that that Moore had arrived at Unit 2
16 or at least at the TMI site by 5:00 p.m. that day?

17 A Yes, he was there by 5:00 p.m. I don't
18 know when he arrived.

19 MR. GLASSMAN: We are now referring to
20 a note of Dr. Long's dated 10 May 1979?

21 MR. BENEDICT: Right.

22 Q You indicated earlier that you requested
23 Mr. Moore's notes of Mr. Moore because you were
24 working on some review work following the Three
25 Mile Island accident of the accident. What if any

1
2 specific reasons do you recall having for wanting
3 to see his notes?

4 A As best I can recall, these are notes
5 that might have been helpful in looking at the
6 sequence of events.

7 Q Were you interested at the time you
8 requested these notes in the information flow from
9 the site?

10 MR. GLASSMAN: Objection. I am not
11 sure what you mean by "information flow from
12 the site."

13 The witness can answer if he understands
14 it.

15 A I don't recall whether that was
16 something that would have prompted my interest or
17 not at that particular time.

18 Q The only recollection you have as to
19 why you might have wanted these notes or why you
20 did want these notes was for information that might
21 have been useful in preparing a sequence of events
22 related to occurrences at the plant?

23 A Yes, from what I can remember, yes.

24 Q At the time you reviewed Mr. Moore's
25 notes, do you recall considering this statement I

2 quoted earlier, "suspect steam bubble in dome forced
3 water up into pressurizer"?

4 A No, I do not.

5 (Discussion off the record)

6 MR. BENEDICT: You make a good point
7 off the record. These are illegible, and I
8 suspect there will come a time not in the too
9 distant future that we have to go back and
10 ask to see the originals. They are hard to
11 read. It is a consequence of copying and
12 microfilming and a lot of other things. If
13 we can get the originals --

14 MR. GLASSMAN: I am not sure what your
15 point is or what your intended
16 characterization of my comment is, but in
17 terms --

18 MR. BENEDICT: My recollection of your
19 comment is that you said that this was another
20 set of illegible notes. I am perfectly
21 willing to agree with you. I am also
22 perfectly willing to make it clear to you
23 that you have in your possession the originals
24 of these, and there may come a time when we
25 may want them. That is all I am saying.

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2 MR. GLASSMAN: If you are saying that,
3 you know you are fully capable of saying that
4 to me at any time, and we are very
5 cooperative in this litigation, making
6 documents available. As far as the particular
7 document, and I would appreciate if you would
8 let me finish the statement, a review of this
9 copy will reveal that while there may be a
10 word or two that are blotched on the front
11 page, they are capable of being read, and
12 the additional pages of the document appear
13 to be very legible. I am not sure what your
14 problem is.

15 MR. BENEDICT: If that is the case,
16 then I will hold you to it.

17 BY MR. BENEDICT:

18 Q I would like to show you what has been
19 marked as B&W Exhibit 672 for identification. It
20 is a collection of handwritten notes dated at
21 various times on March 29, 1979, which were
22 produced to us as having come from your files, Dr.
23 Long.

24 First, can you identify the handwriting
25 on these pages as being your own?

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(Collection of handwritten notes dated at various times on March 29, 1979 marked B&W Exhibit 672 for identification, as of this date)

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A Yes, it is my handwriting.

7

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Q Do you see in your review any spaces that appear not to be your handwriting?

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A No.

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Q You indicated you arrived at the office in Parsippany about 7:30. That is your normal time of arrival on March 29, 1979. What if anything did you learn about the Three Mile Island accident after your arrival on that day?

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MR. GLASSMAN: You are talking about at the very beginning of the day?

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Q Yes, what is the very first thing you remember learning about the Three Mile Island accident?

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A Essentially the first thing I did that morning was to call Mr. Arnold and tell him that I was aware of the TMI-2 problems from the meeting in Oyster Creek and from the news, was there something I could do to help.

25

Q What was Mr. Arnold's response to your

2 proffer of assistance?

3 A His response was, "Yes, I would like you
4 to be on one of the groups that we are sending to
5 Three Mile Island. Go pack your bags and get to
6 my office as soon as you can."

7 Q When did you return to Mr. Arnold's
8 office with your bags packed?

9 A Somewhere around 8:30 or 9:00 o'clock.

10 Q What then transpired?

11 A We had a brief meeting and, to the
12 best of my recollection, we were told there was
13 going to be two groups, one under Ron Williams that
14 was to look at what needed to be done to recover
15 the plant, and one under Mr. Richard Wilson which
16 was to determine essentially the sequence of events
17 or what had happened in the incident.

18 Q Who was in this meeting in Mr. Arnold's
19 office?

20 A I guess with certainty the only ones
21 I can be sure of were Mr. Arnold and myself.

22 Q Were there other people?

23 A Yes.

24 Q More than five?

25 A I can't remember that specific meeting.

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Q What if any new information did you learn about what had happened at Three Mile Island since 4:00 a.m. on March 28 in that meeting with Mr. Arnold?

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A I don't recall any specific new information.

7

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Q Was any written material provided to you?

9

A I think we were shown drafts of the two brief memos appointing the two committees.

10

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Q Were those typewritten memos?

12

A I don't remember at the time whether they were typed yet or not.

13

14

Q Who were these memos from?

15

A I think they were -- I don't remember.

16

Q What --

17

A The subject of the memos was setting up the two committees.

18

19

Q The Wilson committee and the Williams committee?

20

21

A Yes.

22

Q What next happened after the meeting in Mr. Arnold's office on that day?

23

24

A In my case, I went to the car pool and got a company car and drove to Three Mile Island.

25

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2

Q Did you drive alone?

3

A Yes.

4

Q About when did you arrive at Three Mile

5

Island?

6

A Approximately 1:30 in the afternoon.

7

Q If I can turn your attention to B&W 672

8

and specifically to the second and third pages

9

marked for this litigation as pages 9815 and 9816,

10

which are noted in the upper right margin, page 1

11

of 2 and page 2 of 2, approximately 1415 hours, 29

12

March 1979, I take it 1415 hours is about 2:15 p.m.,

13

is that right?

14

A Exactly 2:15 p.m.

15

Q Do you recall Mr. Herbein provided you

16

with some information about that time and you took

17

these notes?

18

A He was not providing this to me

19

directly, but yes, he was providing the information.

20

Q He was giving a briefing?

21

A Yes.

22

Q To whom was he giving this briefing

23

other than to you?

24

A Senator Hart and other members of the

25

committee that were there. I think there may have

2 been some press people there, but I am not sure.

3 Q Where did this meeting take place?

4 A In the TMI visitors center.

5 Q Were there other people from Parsippany
6 there that you can remember?

7 A Yes, I think most of the people on
8 these two committees werethere at about that same
9 time.

10 Q Were you there for the beginning of Mr.
11 Herbein's briefing to Senator Hart, et al.?

12 A I don't think so. I think I arrived a
13 little bit after it started.

14 Q Are these notes that you took during
15 the presentation by Mr. Herbein?

16 A Yes.

17 Q About how long did Mr. Herbein's
18 briefing last, if you can recall?

19 A From my notes, I indicate that the NRC
20 rep began speaking at 1500 hours, so that would
21 indicate about 45 minutes.

22 Q The NRC representative immediately
23 followed Mr. Herbein?

24 A I think so.

25 Q In the middle of the first of these two

1

2 pages, there is a passage that appears to read "5
3 assemblies seem to have temperature approximately
4 500 degrees Fahrenheit." Is that a fair expansion
5 of your abbreviations?

6 A , Yes.

7 Q And then below that, there is a series
8 of ditto marks, but correct me if I am wrong, "Other
9 assemblies seem to have temperature approximately 300
10 degrees Fahrenheit," and then there is a
11 parenthetical next to that which reads "177
12 assemblies."

13 Did you understand the source of this
14 information to be in-core thermocouples?

15 A Not at that time.

16 Q. Have you since learned that that was
17 the source of this information?

18 A No, I don't know what the source of
19 that information is.

20 (Discussion off the record between the
21 witness and his counsel)

22 (Recess taken)

23 BY MR. BENEDICT:

24 Q Turning to the second page of your
25 two-page collection of notes on Mr. Herbein's

1
2 presentation and looking at the top of the second
3 page, it appears to read "Electromatic relief valve
4 on pressurizer apparently stuck open - discharge
5 into drain tank."

6 Do you recall whether Mr. Herbein
7 mentioned that the rupture disk on the drain tank
8 had burst?

9 A No, I don't recall.

10 Q Do you recall whether Mr. Herbein said
11 that there had been a flow from the drain tank into
12 the reactor building sump?

13 A No, I don't recall.

14 Q Do you recall Mr. Herbein described in
15 any manner the pathway of fission products from the
16 reactor coolant system to the containment or
17 environment?

18 A Only what it says in my notes. I don't
19 recall that.

20 Q In other words, you don't recall -- you
21 don't have a specific recollection of him saying
22 this?

23 A So.

24 Q But you don't have any reason to
25 believe that he didn't say that?

1

2

A Didn't say the thing that is in my notes.

3

4

Q Right, or words to that effect?

5

A Yes.

6

Q What is indicated by your notation "NRC rep" on that second page?

7

8

A There was a speaker who was an NRC employee.

9

10

Q Was he asked by Mr. Herbein, to your knowledge, to make a presentation?

11

12

A I don't know.

13

14

Q Are these notes immediately following or under the statement "NRC rep," are these your notes that you took of his presentation?

15

16

A Yes, they are.

17

18

Q Did you stay until the end of his presentation?

19

A Yes.

20

21

Q Was there any other speaker or speakers following the NRC representative?

22

A I don't recall.

23

24

25

Q You testified that you arrived at the site approximately 1:30 on March 29 and these notes are time dated as being approximately 2:15. Do you

1

2 recall what if anything you did in the interim
3 between your approximate time of arrival and this
4 presentation by Mr. Herbein?

5 A Very vaguely, I was trying to locate
6 other members of the team and determine where and
7 when we were going to meet.

8 Q Do you recall whether prior to your
9 meeting with Mr. Herbein and after your departure
10 from Parsippany that morning, you received any
11 information with respect to the condition of the
12 plant or the occurrences of the day before?

13 A I heard some brief news clips on the
14 radio driving over there. I don't remember what they
15 were.

16 Q Other than that, you don't recall any
17 information?

18 A No.

19 Q What did you do after the NRC
20 representative stopped talking?

21 A We made arrangements to -- I don't
22 remember whether we got badged or what, but I know
23 we picked up dosimeters so we could go on site.

24 Q What then did you do once you got on
25 site?

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A We had what my notes here describe as the initial team meetings.

Q There is a three-page set of notes starting at 9817 and going through 9819 which are noted in the upper right-hand corner on the first to be page 1 of 3 and to be time dated 1540 hours, 29 March '79. That is 3:40 in the afternoon. I take it you don't recall doing anything prior to 3:40 and after the end of the NRC rep's presentation other than doing the necessary work to get onto the site?

A That's right.

Q Do these three pages of notes represent notes that you took during what is characterized here as the initial team meetings of the Wilson group and Williams group?

A Yes.

Q What did you understand the charge to be of the Wilson group which according to this document you are not listed as a member of?

MR. GLASSMAN: I think that has been asked and answered.

MR. BENEDICT: I will strike that question.

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Q In the upper right-hand corner of page 9817 there are two columns. One says "Wilson" and the word "Wilson" is underscored. Immediately under that are the names Broughton, G. Kunder, J. Moore, D. Reppert, Lee Rogers, and Ed Wallace.

Was it your understanding that those were the people who made up the Wilson group?

A I don't recall what my understanding was at the time.

Q You don't have any reason to believe that that is not what it represents?

A No.

Q Do you recall the constituency of the Williams group as being the people who are listed under the underscored name "Williams"?

A Yes.

Q Were you a member of the Wilson group?

A No, I was not a member of the Wilson group.

Q What did you understand the charge of the Wilson group to be?

MR. GLASSMAN: I thought that had been asked and answered.

A I think basically, as my notes here say,

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2 gather info, establish facts, describe the sequence
3 of events, and they were not charged with
4 identifying blame.

5

6

7

8

Q The quotation you read is "gather info,
establish facts to describe sequence of events,"
and then a new line, "--not charged with identifying
'blame.'"

9

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Isn't it correct that subsequent to this
meeting you did have responsibility with respect to
preparation of sequences of events pertaining to the
Three Mile Island accident?

13

A Yes, that's right.

14

15

16

Q Was that responsibility carried out
under a charge that was different from the charge
given here to the Wilson group?

17

A Yes.

18

19

Q Under whose direction was your work
with respect to sequences of events done?

20

21

A I think during that effort I was
reporting directly to Mr. Arnold.

22

23

24

Q Do you know whether the Wilson group
was working in parallel to you at the time you were
working on sequences of events?

25

A No.

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Q Had the Wilson group been disbanded, to your knowledge, at that time?

4

A Not officially.

5

6

Q Was it doing any work with respect to sequences of events during the time that you were working on sequences of events?

7

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A No.

9

10

Q You testified you were a member of the Williams group. What was your understanding of the charge of the Williams group?

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A The Williams group -- I guess it is not talked about here in these notes -- it is, 1-B, responsibility of the Williams group, clean up plant and restarting to normal service. That was my understanding when we were in Parsippany, and it was still our understanding that afternoon, that we were to be concerned with the clean-up and restoration of the service of the unit.

20

21

Q For how long did you pursue that charge as a member of the Williams group?

22

23

24

25

A Almost not at all. I think in this particular meeting the team members recognized that the plant was still not in a satisfactory, stable configuration that we understood and that we needed

2 to probably use our resources differently than had
3 been originally allocated by Mr. Arnold in
4 Parsippany.

5 Q Was the Williams group as formulated at
6 this time effectively disbanded without doing any
7 work soon after March 29?

8 MR. GLASSMAN: Objection as to form.

9 The witness can answer.

10 A Other than the one meeting that evening, of
11 the Williams group later that evening, I don't think
12 it ever met again.

13 Q You indicated that the group understood
14 at that time that the plant was not in a position to
15 be prepared for reinstatement of normal service.
16 What was the basis at the time that you wrote this,
17 3:00 or 4:00 in the afternoon on the 29th, to say
18 that? What information did you have?

19 A Basically we had high radiation levels
20 in many locations in the plant. The reactor coolant
21 system was not behaving properly. I think at that
22 time they may not have had RC pumps operating. I
23 don't remember the details, but just those kinds of
24 things.

25 Q Turning to the second page of your

1
2 notes which is marked for this litigation as 9818,
3 there is a passage starting a couple of inches from
4 the top of the page which reads, "Wilson reading of
5 Dieckamp letter March 28, 1979, assume --"

6 MR. GLASSMAN: I am not clear on my copy
7 as to the date there, whether that is March 29.

8 MR. BENEDICT: I agree. It is hard to
9 tell. I accept that as a question.

10 Q It says, "Assume - one year outage -
11 \$30 million core cost may have to be replaced."

12 Is that an accurate reading? Is the
13 second word "cost" in that line?

14 A I think so, yes.

15 Q Then another dash, another line, another
16 dash "\$20-30 million may be cost of cleanup."

17 Do you recall whether at the time of this
18 meeting there was any disagreement, either you held
19 any disagreement or anyone else voiced any
20 disagreement, with respect to Mr. Dieckamp's
21 assumptions?

22 MR. GLASSMAN: Objection, lack of
23 foundation. There has been no discussion of
24 whether these were assumptions of Mr.
25 Dieckamp or estimates or guesses or anything

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else.

MR. BENEDICT: Your objection is on the record.

(Record read)

MR. GLASSMAN: You have to establish first whether they were assumptions and then you have to ask whether the witness recalls any discussion of disagreement.

MR. BENEDICT: Is this an objection to the form?

MR. GLASSMAN: And, otherwise, as stated.

MR. BENEDICT: I think you know we preserved objections except as to the form.

A I don't know if these are Mr. Dieckamp's assumptions, and I don't recall any discussion of them.

Q Do you recall a reading of a letter from Mr. Dieckamp during this meeting?

A No.

Q Returning back to the first page of these notes, there is a heading labeled "B." It is the page marked for litigation as 9817, which reads, "Primary Importance - Timewise - operating staff interviews - Wilson approach - first talk into tape

2 recorder - transcribe and review - interactive mode
3 with groups of people."

4 First, is that a fair reading of what is
5 written there?

6 A Yes.

7 Q Isn't it true that either during March
8 29 or immediately thereafter you participated in
9 interviews of operators at the TMI site?

10 A Yes. That's correct.

11 Q Were you participating in a program laid
12 out in this meeting?

13 A Yes.

14 Q Was it your intention at the time to
15 follow the approach set forth here?

16 A. Basically, yes.

17 Q Isn't it true that you did talk to the
18 operators and report the conversations by tape
19 recorder?

20 A Yes.

21 Q And that subsequently those interviews
22 were transcribed?

23 A Yes.

24 Q And reviewed by you?

25 A Yes, and by others.

2 Q Were they reviewed by the person who was
3 being interviewed?

4 A Yes.

5 Q Was there then an interactive meeting of
6 a group of the operators?

7 A Yes. I think there may have been
8 several of those.

9 Q Did you participate in those?

10 MR. GLASSMAN: Which ones are we talking
11 about?

12 MR. BENEDICT: Whatever ones he recalls.
13 There were several of those, is what he said.

14 MR. GLASSMAN: Are you asking whether
15 Dr. Long participated in all such interviews?

16 MR. BENEDICT: If he recalls
17 participating in any of them.

18 MR. GLASSMAN: Objection to the form.

19 A I may have participated in one which took
20 place a fairly long time after the accident. I did
21 not participate in the ones that took place in the
22 immediate postaccident period.

23 Q Did you participate in group discussions
24 as part of your responsibilities as a member of the
25 Keaten task force?

2 A I think that is the one I recall, yes.

3 Q Turning to the page marked for
4 litigation purposes as 9818, which is the second page
5 of your notes of these meetings, there is a heading
6 numbered 4, followed by the word "Data,"
7 underscored, and it reads, "Wants to set up data
8 base accessible to SC"--which would stand for
9 Service Company?

10 A I believe that is right.

11 Q -- "ME" -- would stand for Metropolitan
12 Edison?

13 A Yes.

14 Q -- "and plant," and then a paragraph,
15 "Data box in control room office has originals --
16 G. Miller and Joe Logan" -- and then an insert --
17 "G. Kunder, Wallace, Kunder," Rodriguez?

18 A No, Rodgers.

19 Q -- "will set up data management.
20 Broughton and" -- M-u-r-i-l-l.

21 A Murill Shaffer.

22 Q -- "to arrange space, badging, clerical
23 help."

24 What was in fact done, to your
25 recollection, with respect to the creating of a data

2 base that was accessible to people working on the
3 accident review?

4 A Went through several steps. As
5 represented here in these notes, I think it is
6 really kind of a first discussion of where data was
7 from the early part of that transient. Someone
8 other than myself had responsibility for kind of
9 collecting what was there in those first few days.

10 In discussions with someone, I can't
11 remember who, I volunteered to bring Jerry Weiser
12 to the site, who worked for me at the time, and he
13 and perhaps one or two others who might have come
14 with him started to catalogue things and identify
15 the strip charts, computer printouts, log sheets,
16 those kinds of things, within probably the first five
17 days, I would guess.

18 Q Do you remember what if any system there
19 was for storing and making accessible data prior to
20 the arrival of Mr. Weiser?

21 A No, I don't know whether you could call
22 there being any system in place at that point.

23 Q Was there any central location where you,
24 during those early days, could obtain access to
25 data related to the transient, written data or hard

2 data?

3 A On the first couple of days, there was
4 not. I suppose the first major assignment I had was
5 to set up the data reduction and management group.
6 I don't remember exactly what day that was, whether
7 that was the fifth or sixth day, but somewhere in
8 that time frame, we felt very much and very strongly
9 the need to make sure that all the data was being
10 captured, that it was being identified and
11 catalogued, and that it could be made available to
12 whoever wanted it.

13 Q Are you aware of whatever happened to
14 the data that Mr. Weiser organized and that you
15 accumulated in the data reduction and management
16 group?

17 A Yes. Initially, the group was set up
18 in a trailer. I think the first trailer was off
19 the island near the observation center. I brought
20 in a consultant to help us with just organizing
21 the procedure, someone experienced in records
22 management. We began to set up a sign-out process,
23 and in fact, we stopped people from taking things
24 out the trailer. We started microfilming. We did
25 all the things necessary to try to make sure that

1

2 none of the information got lost.

3

Q Who was permitted access to the
4 information contained in that trailer?

5

A I don't know as we had hard-and-fast
6 rules at the start, but generally the people who
7 would have been using it were the commission, the
8 technical staff, and people from the industrial
9 advisory group that had been set up.

10

Q Are you aware of any limitations imposed
11 on access to information with respect to the NRC?

12

A None at all.

13

Q It was your understanding that the NRC
14 had access to any information contained or that was
15 in the possession of the data reduction and
16 management group?

17

A Yes.

18

Q Was that a firm policy that someone else
19 had established?

20

A Yes.

21

Q Do you know today where the information
22 is that was accumulated in those early weeks?

23

A No, I don't know the specific location
24 today.

25

Q Is it your understanding that it has

1

2 been preserved?

3

A Yes.

4

5 Q Was it your understanding or did there
6 come a time following the Three Mile Island accident
7 where you understood that GPU was under an obligation
8 to preserve information related to the accident, an
9 obligation imposed by the Nuclear Regulatory
10 Commission?

11

A Yes. I don't remember exactly when that
11 happened, but it happened fairly early on.

12

12 Q What was your understanding of your
13 obligations?

14

A We were to preserve our notes and any
15 records that we had of the work we were doing.

16

16 Q Has there come a time since the Three
17 Mile Island accident where you understood that that
18 obligation no longer applied?

19

A It seems to me, yes, there was some
20 memo that came eventually that said that that
21 original memorandum, which is the way it came to us,
22 in a memorandum from Mr. Arnold, no longer applied.

23

23 Q Do you recall an approximate time frame
24 of that? Was it since the formation of GPU Nuclear?

25

A I don't remember.

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Q Do you recall whether it was before or
3 after the institution of this litigation, which for
4 your information was instituted on March 25, 1980?

5

A No, I don't remember.

6

Q Did you at the time or at any time since
7 receiving the second memo you discussed make an
8 effort to clean out your files of old material?

9

A Not that I can remember, cleaning out
10 files associated with TMI-2 things.

11

Q Have you made an effort, despite the
12 receipt of the second memorandum, to preserve
13 material related to your work on the Three Mile
14 Island accident?

15

A No, I have not made a special effort.

16

(Lunch recess taken at 1:10 p.m.)

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A F T E R N O O N S E S S I O N

(2:45 p.m.)

R O B E R T L. L O N G resumed and

testified further as follows:

EXAMINATION (continued)

BY MR. BENEDICT:

Q Returning to what has been marked as

B&W Exhibit 672 for identification and turning to

the page that has been marked for litigation as 9819,

there is a numeral 7 at the top, and it reads after

that, "Report by Kunder."

Do you recall receiving a report from

Mr. Kunder on March 29, 1979 after your arrival at

Three Mile Island?

A Yes, Mr. Kunder talked to the group

during our meeting at Three Mile Island.

Q So this was part of the meeting that we

were talking about earlier, the initial team

meetings, as you said?

A Yes.

Q There is an entry immediately below what

I just read, "still has bubble in RV dome."

A This is a "p."

Q What is the PV?

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A Pressure vessel.

Q I thought it might have been reactor vessel. Is the reactor vessel and pressure vessel the same thing?

A Yes.

Q What is the earliest time you can remember hearing that there was a bubble in the pressure vessel or reactor vessel dome?

A I don't remember. I can't remember the details of this particular meeting either.

Q Can you recall whether you understood at the time that Mr. Kunder was giving this presentation what the bubble at the top of the pressurizer was composed of?

A I don't even remember him saying that.

Q At this point you have no independent recollection of what he was talking about when he said that?

A No.

Q Going to the first page of the exhibit, there is a single-page note, headed at the top "2130 hours, 29 March 1979." 2130 hours is 9:30, is that correct?

A 2130 hours, yes.

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Q The notes are headed "Meeting of Williams Committee." It lists as present Williams, Lowe, Long, Lauer and Crimmins. Is this the meeting you were referring to earlier when you said there was one meeting of the Williams committee later in the evening?

A Yes.

Q Did you ever do any work on any of these assignments following this meeting in the context of a committee composed of some or all of the people listed above?

A Not in the context of the committee, no.

(Group of handwritten documents, first page dated June 15, 1979, marked B&W Exhibit 673 for identification, as of this date)

Q I show you a document that has been marked as B&W Exhibit 673 for identification. It has the date at the top right margin of 15 June 1979, and it appears to be some form of chronology.

Is this document composed of your handwriting?

A Yes, it is.

Q Is this document a comparison prepared by you on or about the date noted of the NRC, EPRI,

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and GPU chronologies?

A It appears to be that over a fairly limited period of time.

Q By "limited period of time," you mean the period covered by the chronology?

A Elapsed time, yes.

Q What caused you to prepare this?

MR. GLASSMAN: You mean was there a particular reason in his mind?

MR. BENEDICT: Was he asked to prepare it or did he have a purpose that he intended to put to this document.

MR. GLASSMAN: Objection to the form. Are you asking whether anyone --

MR. BENEDICT: I will stand on my question. Let's not have a colloquy. Your objection is noted. That all has to be in the Southern District, as your partner keeps telling me.

MR. GLASSMAN: It is not clear whether you are asking the procedural question as to how it was prepared or whether someone directed Dr. Long to prepare it.

(Continued on next page)

2 BY MR. BENEDICT:

3 Q I will limit my question. My question is
4 not focused on the method by which you prepared this.
5 Rather, the purpose for which you prepared this.

6 A I can't recall.

7 Q Do you recall whether you were asked by
8 anyone to prepare this?

9 A No. I don't recall.

10 Q Can you tell me what the significance
11 of the three right-hand columns is, some of which
12 contain X's?

13 A Not based on recollection, but based on
14 what I am looking at now, they are indications of
15 whether or not those particular times and event
16 descriptions were in any of those three sequences
17 of events.

18 Q Do you recall whether you used for this
19 purpose the chronology which appears in nureg
20 0600?

21 A No, I don't recall.

22 Q Do you recall what the source was of the
23 NRC chronology that you used in this comparison?

24 A No.

25 Q Do you recall what the source was of the

1

2 EPRI chronology used?

3 A No.

4 Q What, if you recall, or which GPU
5 chronology or sequence of events did you use? Do
6 you recall?

7 A I don't know.

8 Q Do you recall whether you used a
9 preliminary sequence of events or annotated sequence
10 of events prepared within GPU?

11 A I don't know. There were so many
12 sequences of events prepared by all three groups that
13 I have no way of knowing which one it was or which
14 ones.

15 Q Was this document prepared about June
16 15, 1979?

17 A Yes.

18 Q What did you mean when you wrote in the
19 second and third lines on the first page, "GPU
20 should address -- particularly availability of info
21 to operator"?

22 A Generally -- specifically, that specific
23 statement "pressure began increasing in the reactor
24 coolant drain tank" standing by itself may or may
25 not have been known to the operator.

2 Q So it is your recollection that when you
3 said "availability of info to operator," you were
4 referring to reactor coolant drain tank parameter
5 information?

6 A That particularly, yes.

7 Q If you could look for the moment at the
8 second page of the document marked for litigation
9 as page 1877, and there is an entry which is under
10 the "Elapsed Time" column marked as approximately
11 15 minutes, and the entry reads "Reactor coolant
12 pump-related alarms began coming in (verify these
13 were being -- or not being seen in real time)."

14 Did there come a time after you prepared
15 this document that you verified whether or not that
16 information was being seen in real time?

17 A I don't recall.

18 Q Do you today know whether or not
19 information relating to the reactor coolant pumps was
20 being seen by the operators in real time?

21 A Not without looking at another final kind
22 of report.

23 Q Turning to the last page of the exhibit
24 marked 1880, there is an entry which is timed
25 approximately 20 minutes and onward, and the entry

2 reads, "Both NRC and EPRI particularly give
3 attention to condensate pumps/hot well problems.
4 Is it important, should it be included in GPU
5 sequence?"

6 What if anything did you conclude with
7 respect to the question you have written there?

8 MR. GLASSMAN: What time frame? At or
9 about the time this document was written?

10 MR. BENEDICT: We can start there.

11 A I don't recall.

12 Q Did there ever come a time that you
13 concluded whether or not attention should be paid
14 in GPU sequences of events to condensate pump and
15 hot well problems?

16 A I don't remember.

17 (Group of documents marked B&W Exhibit
18 674 for identification, as of this date)

19 Q I would like to show you a document
20 marked as B&W 674, which was provided to us by your
21 counsel. The source given by your counsel was your
22 files.

23 Exhibit 674 represents an entire file as
24 we have received it and the file jacket is headed
25 "Conclusions/Recommendations, Report Draft 7 April

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'79."

Is that your handwriting on the file jacket label on the first page?

A Yes.

Q Could you page through what has been marked as B&W Exhibit 674 and tell me whether you recognize any of the other handwriting that appears on the documents as yours?

A I see three pages which have notations that I recognize as my writing.

Q What pages are those?

A 8704, 8706 and 8707.

Q Focusing first on the first two pages after the cover page, which are marked for litigation as 8701 and 8702, is it correct that the handwriting that appears on 8701, you do not recognize it as your handwriting?

A I do not.

Q Again focusing on the second and third pages of the exhibit, did you have any role in preparing either of these two pages?

A No, I did not.

Q When did you receive these two pages?

A I don't remember.

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2 Q Do you recall from whom you received
3 these pages?

4 A Not a specific person, no.

5 Q Do you recall whether you received these
6 pages sometime in early April of 1979?

7 A Yes.

8 Q Is it your recollection that you did?

9 A Yes.

10 Q Did you receive them about the date
11 noted here, April 7?

12 A It was around that date, when I was
13 assigned the responsibility for the sequence of
14 events team. I don't know the exact date.

15 Q Do you know who prepared these two pages,
16 the typewritten portions?

17 A No.

18 Q The page labeled 8701 has the numeral
19 9 at the top, and it starts with a subheading or a
20 heading numbered 5. Do you know from what these two
21 pages were removed?

22 MR. GLASSMAN: Objection. No foundation.

23 MR. BENEDICT: If they are removed from
24 anything.

25 A As I remember, these were part of one of

1
2 the earliest sequence-of-events documents that I saw.

3 Q Who was preparing the sequence-of-events
4 documents during this early time period, as you
5 recall?

6 A There was a small team of people, maybe
7 as many as five or six people involved. Tom Van
8 Witbeck, John Flynn, Bill Behrle, and I think Ed
9 O'Connor. I am not sure.

10 Q Was Mr. Van Witbeck in charge of this
11 project?

12 MR. GLASSMAN: What point in time?

13 MR. BENEDICT: This early stage.

14 A Not at the time that I received this
15 document.

16 Q Did Mr. Van Witbeck report to you on
17 these projects?

18 A Not at the time I received this. He
19 did when I assumed the responsibility for this
20 project.

21 Q Who did you understand was in charge of
22 the project at the time you received these two pages?

23 A I am not sure.

24 Q Do you know to whom Mr. Van Witbeck
25 reported, whether or not that person was in charge

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of it?

A No, I don't know.

Q Mr. Van Witbeck at this time worked for Energy, Incorporated, is that right?

A Yes.

Q Who was John Flynn at that time? Who did he work for? What did he do?

A John Flynn was a B&W engineer. He worked on site. I don't know what his function was.

Q What did Mr. Behrle do at that time?

A He is an engineer and he was working for Met Ed. I don't know what his particular assignment was.

Q Mr. O'Connor was from JCP&L, is that right?

A Yes.

Q Was he working full time on Three Mile Island accident-related matters at this time?

A I don't know.

Q Looking at the second of the two pages we were talking about, marked for litigation as 8702, there is a passage after this numeral (5) which reads, "...The design of the pressurizer electro-pneumatic relief valve should be

2 investigated and replacement with a different type
3 valve should be considered. Positive valve position
4 indication, should be installed that is initiated
5 from valve stem movement."

6 Were you aware of this recommendation at
7 or about the time that you received this document?

8 MR. GLASSMAN: Is the question directed
9 to something other than having read the
10 document?

11 MR. BENEDICT: Yes, it is broader than
12 that. If the source of his information was
13 reading the document that is fine. If he is
14 aware of it from some other reason, I am
15 interested in that as well.

16 A. To the best of my recollection, this
17 list of recommendations was the first I saw those
18 kinds of things, and they were very, very
19 preliminary.

20 Q Did you know at the time that you
21 received and reviewed these two pages that prior to
22 the Three Mile Island accident, there had been
23 consideration within the GPU organization to change
24 the type of indication of PORV position that existed
25 at the Three Mile Island Unit 2 site?

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A No, I didn't.

Q Have you since the time you received this document become aware of that fact?

MR. GLASSMAN: Which fact?

MR. BENEDICT: The fact that within GPU prior to the Three Mile Island accident and after the installation of the light which indicated solenoid power on the PORV sometime after March of 1978 that GPU or people within GPU considered changing that to a different type of indication.

MR. GLASSMAN: Objection. Lack of foundation.

The witness can answer.

A I don't recall having known that.

Q Were you aware prior to your receipt of this document that the pilot-operated relief valve at Three Mile Island didn't have a valve stem that was directly connected to the valve disk in the valve itself?

A No, and I am not sure that that is what this says.

Q Did you understand at the time you read this that the reference here to valve stem movement

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was referring to the movement of the pilot valve stem? .

A I don't recall what I remembered when I read this.

Q Moving down the page, following numeral (7) there is an entry which reads, "Consideration should be given to more frequent operator training on reactor plant simulators. Emphasis should be placed on unusual incidents (e.g. the small break LOCA)."

Were you aware at the time that you received this that prior to the Three Mile Island accident the frequency of licensed TMI operators' visits to the B&W simulator was reduced from once a year to once every two years?

A No, I was not.

Q Are you today aware of the fact that there was a period prior to the Three Mile Island accident when Metropolitan Edison or GPU reduced the frequency of operator visits to the Lynchburg simulator?

A Yes, I am.

Q Is it your understanding that that frequency was reduced from once a year to once every

2 two years?

3 A Yes.

4 Q When do you recall first becoming aware
5 of that fact?

6 A I see no way I could name a time.

7 Q You can't pin it down?

8 A No.

9 Q Do you recall whether you became aware
10 of it during the summer that you worked on accident-
11 related studies in the summer of 1979?

12 A I don't recall.

13 Q Turning now to the pages marked as pages
14 8703 through 8712, which compose the remainder of
15 this document, Exhibit 674, looking first at 8703,
16 are the words "Appendix A" as written on this page,
17 is that your handwriting?

18 A No.

19 Q Do you know whose handwriting that is
20 written in?

21 A No.

22 Q Did you have any role in the preparation
23 of the typed portion of the pages following the
24 page saying "Appendix A"?

25 A No, I did not.

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Q When do you recall first receiving this?

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A At the same time as I received the other

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pages.

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Q Did you receive them from the same

6

person?

7

A I don't know.

8

Q When did you put the handwriting on it

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that you noted on the three pages as being yours?

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A At about the time I received the

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documents.

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Q What if anything was this an appendix

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to or this to be an appendix to?

14

A To the best of my recollection, as I

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already mentioned, this was attached to either the

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earliest or one of the earliest sequence-of-events

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documents I saw.

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Q Do you know who prepared these pages?

19

A No.

20

Q The typed portion?

21

A No.

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Q Do you know whether the same person or

23

the same group of people prepared the first two

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pages of B&W 674 and these last pages, the pages

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following Appendix A?

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A No, I don't.

Q There is a recommendation which follows the numeral (7) on page marked 8704, carrying over to 8705, which reads, "Make HPI logic impossible to bypass below 1600 to 1700 psig unless T hot is less than 500 degrees Fahrenheit. You could use other appropriate" -- it appears to read "values" with a correction in hand from "valves" -- "of temperature and pressure that would prevent you from bypassing HPI at anywhere near saturation conditions near normally expected values of reactor coolant T hot following a transient."

Prior to the time that you read this, were you aware that high-pressure injection should not be terminated at Unit 2, TMI, when the reactor coolant system is at saturation, at least assuming low-pressure injection is not operating?

A No, I was not.

Q Prior to the Three Mile Island accident on March 28, 1979, were you aware that high-pressure injection or was it your understanding that high-pressure injection, if automatically actuated, should not be terminated at Three Mile Island Unit 2 if saturated conditions exist within the reactor

2 coolant system outside of the pressurizer?

3 A Prior to the accident, I wouldn't have
4 thought about or talked about high-pressure injection
5 at Three Mile Island.

6 Q Did Indian Point Unit 1 have an
7 emergency core cooling system?

8 A No, it did not.

9 Q Other than its normal makeup and
10 letdown system, assuming it had one of those, did it
11 have any system for the emergency provision of
12 cooling water?

13 A I don't think so. I think that is why
14 it is now shut down.

15 Q Was it your understanding that the
16 reactor at Indian Point 1 was under normal operating
17 conditions to be kept at subcooled conditions within
18 the reactor coolant system and outside of the
19 pressurizer?

20 MR. GLASSMAN: What point in time?

21 MR. BENEDICT: At the time he was working
22 there.

23 A I don't remember ever even talking about
24 those kinds of topics.

25 Q During the time you worked for Con Ed

2 and were involved with the Indian Point reactor, did
3 you have any involvement in considering the
4 installation of an emergency core cooling system at
5 Unit 1?

6 A No, I did not.

7 Q Looking at the bottom of the page marked
8 8705 and reading the entry after the numeral (11),
9 "Require each site to have its own simulator and,"
10 underscored, "a six-shift schedule, such that one
11 shift is always in training. Keep the training,"
12 underscored, "shift in training," underscored, "and
13 do not use them on other jobs. Make each individual
14 sign a statement each training period that he has
15 received simulated transients of the following
16 nature."

17 There is then a list of five simulated
18 transient types.

19 Prior to your reading this sometime in
20 early or mid-April of 1979, what was your
21 understanding as to the number of shifts of operators
22 at Unit 2?

23 A I had no idea. I never talked to anybody
24 about it.

25 Q During the course of your work related

2 to the Three Mile Island accident that summer
3 following the accident, did you become aware of the
4 fact that Unit 2 had a five-shift operator schedule?

5 A I was aware that at some point in time
6 they had a five-shift schedule, yes.

7 Q Did you understand that the result of
8 having a five-shift schedule was to reduce the
9 number of training weeks available to members of
10 each shift vis-a-vis having a six-shift schedule?

11 A No, I don't think I would characterize
12 that change from six to five the way you have.

13 Q Is the difference between having a
14 five-shift schedule or was the difference between
15 having a five-shift schedule at Unit 2 prior to the
16 Three Mile Island accident and the time when it had
17 a six-shift schedule, was the effect of that
18 difference to reduce the amount of training weeks
19 available to the individual operators in each shift?

20 A I don't know.

21 Q One of the sentences in the passage I
22 just read said, "Keep the training shift in training
23 and do not use them on other jobs."

24 Prior to your reading this, were you
25 aware of any practice or use of operators during

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their training week for other jobs at Unit 2?

MR. GLASSMAN: Are you asking whether the witness was aware of your statement prior to reading this document?

MR. BENEDICT: I will restate the question.

Q Prior to the time that you read this, were you aware that there were times at Unit 2 at Three Mile Island where the training shift was being used for other jobs and not being given training during their training week?

A No, I was not, and reading this, I don't remember that I agreed with any of the things that are in this document when I read them. I don't remember.

Q Did there come a time during the course of your review of the Three Mile Island accident that you learned that such indeed had occurred?

MR. GLASSMAN: What had indeed occurred?

MR. BENEDICT: The training weeks had been spent doing other things than training.

MR. GLASSMAN: Are you talking about any training weeks, any operator?

MR. BENEDICT: It depends on what Dr.

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Long remembers.

MR. GLASSMAN: Objection to the form.

The witness can answer if he understands the question.

It is a little bit obscure to me.

A I guess I can't answer that question. I don't know how to answer that question the way it is phrased.

Q Subsequent to the Three Mile Island accident, did it ever come to your attention that operators were not spending their training week or there were instances in which operators did not spend their training week at Three Mile Island prior to the accident in training, but rather spent them doing other jobs?

A Yes.

Q It came to your attention that that occurred?

A That individuals didn't always get their training if they were having to serve on a relief shift, for example.

Q Did you make any recommendations with respect to eliminating that situation?

A Me personally?

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Q Yes.

A Not on an individual basis. Not myself alone, no.

Q Are you aware of any such recommendations ever being made following the Three Mile Island accident, that is to say, recommendations to prevent operators from doing other jobs during their training weeks?

A They may have been in something like the Keaten task force report, but I don't remember the details.

Q You don't remember any such recommendation one way or the other?

A No.

Q Turning to the next page, there is a long passage beginning in the middle of the page which reads, "Many symptoms of LOCA were present:

"1). Rapidly falling reactor coolant pressure.

"2). Pressurizer level increasing more rapidly than normal.

"3). Reactor coolant drain tank temperature and pressure increasing rapidly.

"4). Reactor Building pressure

2 increasing after five minutes when the reactor
3 coolant drain tank safety valve lifted and much more
4 rapidly at 15 minutes when the rupture disk blew.

5 "5). Reactor Building sump level
6 increasing rapidly and both," underscored, "reactor
7 Building sump pumps starting and still not having
8 enough capacity to pump the sumps down.

9 "6). Auxiliary Building sump overflowing
10 and water coming out of the floor drains.

11 "7). Reactor Building temperature
12 increasing.

13 "8). Gradual degradation of reactor
14 coolant pump flow caused by voiding."

15 Numeral 12 in the left margin, "None
16 of these symptoms separately or together were
17 assimilated by the operators to be consistent with
18 a LOCA."

19 Immediately to the left of the indented
20 subparagraphs, you have written, "These probably
21 all true -- but bombshells!"

22 MR. GLASSMAN: You are talking of the
23 indented paragraphs 1 through 8?

24 MR. BENEDICT: Yes.

25 Q In the course of your work on the

2 postaccident investigations that you did following
3 the Three Mile Island accident, did you ever discover
4 that any of the symptoms listed in numerals 1
5 through 8 were not true or had not occurred on the
6 day of the accident?

7 A I don't remember, without looking in
8 detail at a final sequence of events.

9 Q Working from your recollection at this
10 time, today, do you have any reason to believe that
11 in fact all eight of those symptoms did not occur
12 or any of those eight symptoms did not occur on the
13 day of the accident?

14 MR. GLASSMAN: Objection. It has not
15 been established that Dr. Long looked into
16 these issues at all.

17 MR. BENEDICT: I will stand on my
18 question.

19 A Would you repeat the question?

20 (Record read)

21 MR. GLASSMAN: I object both on grounds
22 of lack of foundation as to whether the witness
23 ever looked into the particular items, and
24 secondly, as to the ambiguity in form in the
25 meaning of the word "occur" in the sense of

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whether something after the fact was found to have occurred or whether it was seen on the day of the accident or by whom or how.

The question is very vague and unclear.

MR. BENEDICT: I will take my chances.

A I don't know. The reason for my comment is that I was concerned that certainly all this information simply wasn't available to the operators.

Q Do you know today which or if any of this information was in fact not available to the operators on the day of the incident?

A Item No. 3, for example, was not available to them, I don't believe.

Q By "available," I take it you mean was not seen by them? There are in fact real time meters recording reactor coolant drain tank temperature and pressure within the control room, isn't that correct?

A I don't know if that is correct or not.

Q Are there any others of these eight things that you know the operators were not aware of on the day of the accident?

A Not without looking at the details of the accident.

2 Q Still on page 9706, is the writing on
3 the top third of the page where there is a change
4 in the text, the typed text, is that your handwriting
5 as well?

6 A I am not sure whether that is mine or
7 not.

8 Q The passage I read marked in the margin
9 is in your handwriting, is that correct?

10 A Yes.

11 Q Looking again at what has been marked as
12 B&W 674, what if anything do you recall doing with
13 this material after you received it other than
14 reviewing it and making the marginal notes that we
15 have discussed and the others that are on the
16 document?

17 A I put it in the file folder and I am
18 not sure that I ever looked at it again.

19 Q Excluding for the moment any reviews of
20 this material you may have had with counsel, when
21 was the last time you can recall seeing any of the
22 pages that are included or even the file jacket
23 that are part of B&W 674?

24 A Probably in the summer when we got the
25 request for documents associated with the accident.

2 I kind of took a quick look at my files.

3 Q Would that have been the summer of 1980?

4 Can you recall?

5 A I think so.

6 Q Was there any material other than the
7 pages we have talked about included in the file
8 jacket with the heading, a copy of which is shown as
9 the first page of Exhibit 674?

10 A I don't recall.

11 Q You don't recall taking any pages out
12 before providing them to your counsel?

13 A I am sure I did not do that.

14 Q And you can't tell by reviewing it
15 whether or not this constitutes the entire file as
16 you produced it?

17 A No, I can't.

18 (Sequence of events report, TMI-2,
19 3/28/79 incident, marked B&W Exhibit 675 for
20 identification, as of this date)

21 Q I show you a document marked as B&W
22 Exhibit 675 for identification. It appears to be a
23 sequence of events related to the accident at Three
24 Mile Island on March 28, 1979. There is a
25 handwritten entry on the last page of the exhibit

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which states, "This was sent to NRC approximately 8:00 p.m. Tuesday, April 3rd, 1979."

When did you first see this document, if ever?

A I remember seeing it, but I have no idea when was the first time.

Q Do you recall whether it was about the date that is on the document, early April, soon after the accident?

A Yes, it would have been not necessarily -- I would be surprised if it was as early as the 3rd, but a few days or a week later.

Q The textual material at the top of the first page of B&W Exhibit 675 reads, "The following sequence of events for the TMI-2 incident of 3/28/79 has been formulated by B&W engineers using available plant data."

Do you know who this is referring to when it says "B&W engineers"?

A No, I do not.

Q Were you aware in the early weeks immediately following the Three Mile Island accident that B&W people were preparing some sequences of events with respect to the incident?

2 A I was aware there were some B&W people
3 on the team working at TMI. I don't know whether
4 there were other B&W people who were doing something.

5 Q Do you know whether the B&W engineers
6 referred to here as the people who prepared Exhibit
7 675 were the same engineers from B&W that you had
8 working on the team creating sequences of events?

9 A No, I don't know.

10 Q Do you know who the Larry is who is
11 referred to on the last page as the signator of the
12 note?

13 MR. GLASSMAN: You don't want a guess?

14 MR. BENEDICT: No.

15 A No, I do not.

16 Q Do you recognize any of the handwriting
17 on this document --and let me show you my microfilm
18 copies of the middle two pages -- as being
19 handwriting of yours?

20 A No, I don't believe that is my
21 handwriting.

22 Q Are you aware of any sequences of events
23 prepared within or by or for GPU that precede
24 April 4th, 1979?

25 A I don't know when the first one would

1
2 have been prepared. It was right around that time,
3 but whether it was before or after April 4, I don't
4 know.

5 Q Did there come a time when you were given
6 certain responsibilities with respect to assisting
7 in the preparation of a sequence of events relating
8 to the accident on March 28?

9 A Yes.

10 Q When did you get that responsibility or
11 those responsibilities?

12 A I can't remember the exact date. Mr.
13 Arnold established an accident assessment
14 documentation team. He made me head of that team.
15 There is a memo that is dated. You probably have
16 something that tells you. It had, as I remember,
17 13 tasks, one of which was a sequence of events.

18 Q If I told you that your counsel had
19 told us that the document or the accident assessment
20 documentation team was formed on April 15, would
21 that comport with your general recollection?

22 MR. GLASSMAN: Objection as to form.

23 A That is about the right date, but I don't
24 know whether that is the exact date or not.

25 Q Did you do any work with respect to the

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creation of a sequence of events prior to receipt of the formal memorandum from Mr. Arnold that you mentioned setting forth the tasks for the accident assessment documentation team?

A Nothing other than help provide information from the data reduction and management trailer. I think I was aware of the group because they came to us for information.

Q How many tasks did you say Mr. Arnold's memorandum set forth?

A I think there were 13 tasks.

Q Were you responsible for assuring the completion of each of those tasks?

A Yes. Basically, many of them had individuals assigned, and I was just to see that they put the stuff together.

Q You were the supervisor?

A Yes.

Q Did you have any hands-on responsibility as to any of the 13 tasks?

A I think in every case I had somebody subordinate to me who had the lead responsibility for the task.

Q With whom did you work or who was on

1

2 your team or task force?

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4 A I can't remember all the names or even
5 all the tasks. At that point certainly Tom Van
6 Witbeck was head of the sequence of events team.

6

7 Q Do you recall who Mr. Van Witbeck had
8 working with him on the sequence of events team,
9 as you call it?

9

10 A Not on that date, because that team
11 kept changing.

11

12 Q Who-all, not limiting it to any given
13 time, but focusing on the subgroup of the accident
14 assessment documentation team headed by Mr. Van
15 Witbeck, that had the responsibility for preparing
16 the sequences of events, who do you recall working
17 with him on those matters?

17

18 A I think I gave you some names earlier.
19 Bill Behrle, Ed O'Connor, John Flynn, and there was
20 another John from B&W. I can't remember his last
21 name.

21

22 Q Do you know someone named Putnam from
23 Energy, Inc., J. Putnam?

23

24 A John Putnam I think was B&W.

24

25 Q You do remember Mr. Putnam and he was
involved with Mr. Van Witbeck in drafting?

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A Yes, I think that is the name.

There were others from EIF. There were others from Met Ed. I don't remember names.

Q I take it Mr. Van Witbeck's group was not composed solely of Energy, Incorporated people?

A Not at all.

Q Other than the possibility that Mr. Putnam was also from Energy, Incorporated, do you know of any other people who worked on the accident assessment documentation team and worked on the sequence of events who was from Energy, Incorporated?

MR. GLASSMAN: Objection. There appears to be some confusion here as to Mr. Putnam's employment. If I recall, the witness thought that he might have been with B&W. Counsel seems to think he was with Energy, Incorporated. We may be proceeding on assumptions.

Q Other than Mr. Putnam, who may or may not have worked with Energy, Incorporated, are you aware of any other people other than Mr. Van Witbeck from Energy, Incorporated who worked on the sequence of events?

A Yes, but I don't recall names.

2 Q Was the accident assessment documentation
3 team budgeted? Did it have a separate budget that
4 you were responsible for administering?

5 A No. There wasn't any budget as such.

6 Q Again, I am just asking for a ball park
7 figure. What percentage of time did you spend on
8 work with respect to the accident assessment
9 documentation team during the three months
10 immediately following the accident, the summer,
11 basically?

12 A I don't think I can give you an estimate
13 in terms of the percentage of time. My job changed,
14 and I wasn't associated with it for a while, and
15 then I came back to it.

16 Q How long did your association with the
17 team continue uninterrupted from its initiation or
18 establishment sometime in April of 1979?

19 A About two weeks.

20 Q What did you do following the two weeks?

21 A The last two weeks I was at the island
22 during that crisis period which was the first two
23 weeks of May. I was group leader of the planning
24 and contingency task force or some such title.
25 I don't remember the exact title.

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2 Q What was the function of this task force?

3 A It was a group that had been in
4 existence for about a month under Mr. Crimmins. He
5 had to return to Jersey Central. Mr. Arnold asked
6 me to take that task on, and they were really in
7 a windup phase of a lot of contingency studies that
8 had been done during the crisis period.

9 Q Is it a fair characterization for me to
10 say that by "contingency" you mean to consider
11 possible things that could happen to TMI-2 at that
12 time and how to deal with them if they were to lose
13 the reactor coolant pump, for example, or if they
14 were to lose pressurizer level indication?

15 A Yes.

16 Q And you worked on that for about how
17 long?

18 A About two weeks.

19 Q Did you work on it until the plant was
20 taken into natural circulation?

21 A It was taken to natural circulation
22 around April, I think, so I got into it just about
23 the time that was happening.

24 Q During the two weeks that you spent on
25 this task force, did you do any work or any

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2 significant amount of work that related to viewing
3 how the accident had occurred or the early sequence
4 of events, say the first day of the accident?

5 A Not during that period. I was focused
6 more on the immediate problems that were being faced.

7 Q Following your two-week stint at that,
8 did you then return to work on the accident
9 assessment documentation team?

10 A I don't think I ever did officially. I
11 went back to Parsippany and kind of worked on
12 whatever assignment Mr. Arnold gave to me.

13 Q Was part of that work, though,
14 administering the accident assessment documentation
15 team work?

16 A Yes. There was some responsibility for
17 at least some of the tasks.

18 Q Did there come a time when your
19 responsibilities with respect to the accident
20 assessment documentation team work dropped off
21 sharply or was it a gradual reduction in the amount
22 of time you spent on it?

23 A It was a gradual reduction and ended
24 fairly abruptly when we created the reliability
25 engineering position, and then I assumed a whole new

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2 role.

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Q When you took over your new job in August of 1979, you terminated effectively your oversight of the accident assessment documentation team work?

A Basically, yes.

(Multipage document entitled "Sequence of Events, Draft," marked B&W Exhibit 676 for identification, as of this date)

Q I show you a document that has been marked B&W 676 for identification. It bears the typewritten heading "Sequence of Events" and in the upper right margin is written in hand "Draft approximately 0700 13 April '79."

First, is it your handwriting that wrote the time and the date?

A Yes.

Q Do you recognize any of the other handwriting that appears throughout B&W 676?

A There are very few limited comments which I recognize as my handwriting, mixed in with an awful lot of other people's handwriting.

Q Focusing first on the handwriting that appears on the first page, marked for litigation as 2416, is any of that your handwriting other than

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the upper right corner?

A I don't think so.

Q Turning to the last page of the exhibit, marked for litigation as 2433, are the other entries enumerated 1 and 2 in your handwriting?

A Yes, the two entries that are the last on the page.

Q Is there any other writing or marking on this page that is yours?

A I don't know whether the circle and question mark are mine or not.

Q The remainder --

A None of the others is mine.

Q -- you identify not as being yours?

A That's right.

Q Did you receive the typewritten portion of this document on or about April 13 at about 7:00 in the morning?

MR. GLASSMAN: You are referring to a typewritten document without the hand markings on them?

MR. BENEDICT: Yes, I am removing for the moment consideration of the handwriting.

A I don't know.

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Q Do you remember whether the first time you saw this document it had the handwriting on it other than, of course, your own?

3

4

5

A No, I don't remember.

6

Q You don't remember one way or the other?

7

A Right.

8

Q Do you remember that you received this document sometime around 7:00 in the morning on the 13th of April 1979?

9

10

11

A No.

12

Q Do you remember ever having seen this document before?

13

14

A In terms of actually remembering receiving it, no.

15

16

Q Who prepared the typewritten portion of this? Who drafted the typewritten portion of this document?

17

18

19

A I don't know.

20

Q Is this an early draft of a sequence of events being prepared under the aegis of the accident assessment documentation team?

21

22

23

A Yes.

24

Q Does your answer with respect to who prepared it or --

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2 A If you mean specifically who, I don't
3 know.

4 Q Who was assigned the responsibility at
5 that time for preparing drafts of sequences of
6 events for the accident assessment documentation
7 team?

8 A On the 13th of April, I am not sure.

9 Q Do you recall that during April Mr.
10 Van Witbeck was responsible for doing that?

11 A At some point I recall clearly assigning
12 him the responsibility for the lead, but I don't
13 know when that date was.

14 Q Do you recall during the latter weeks
15 of April 1979 reviewing drafts of sequences of
16 events?

17 A Yes, many of them.

18 Q Do you recall that the sequences of
19 events you reviewed took a form like the one in
20 front of you?

21 MR. GLASSMAN: Objection. I don't know
22 what you mean by "a form like." They were
23 typed. They had notes.

24 MR. BENEDICT: I recognize the question
25 has some problems, but I will stick by it.

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MR. GLASSMAN: I don't see --

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MR. BENEDICT: I will withdraw it and I

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will make it a negative.

5

BY MR. BENEDICT:

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Q Do you recognize that this document is

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not in the format of the sequences of events drafts

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that you reviewed during that time period?

9

MR. GLASSMAN: That is the same question.

10

MR. BENEDICT: No, I disagree.

11

MR. GLASSMAN: Either question is going

12

to be totally undecipherable. Perhaps I can

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help you out. Maybe you want to ask the

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witness whether he saw any documents that had

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time periods sequentially listed or something

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that you can tell us you are looking for.

17

MR. BENEDICT: I will stand by the

18

question. It is not going to be the last

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question I will ask on the sequences. Let's

20

put it this way.

21

A I guess I don't know what you mean by

22

"the form." Did I see them typed with handwritten

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marks on them?

24

Q Do you recognize this document as being

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different in form, for whatever reason different in

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form from the documents that you recall reviewing that were sequences of events?

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A Yes.

5

Q This is different in form?

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A Yes.

7

Q What differences do you recognize or can you recall?

8

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A There were some sequences which had at least three different columns, and perhaps four.

10

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Q Were these sequences arranged horizontally on the paper so that you had to turn the paper so that its long side was horizontal in order to read the typing?

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A They may have been.

16

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18

Q I am limiting my question now to the early period in April. Does that continue to be your testimony?

19

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A In the early period in April -- by "early," you mean --

21

22

Q I mean early in the preparation of sequences of events, not early in the calendar month.

23

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A Somewhere the form changed from that in B&W 676 to a different format.

25

Q Do you have any reason to believe today

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2 that what has been marked as B&W 676 is not a copy,
3 however marked up in hand, do you have any reason
4 to believe that it is not a copy of an early draft
5 of the sequence of events that was being prepared
6 under the aegis of the accident assessment
7 documentation team?

8

MR. GLASSMAN: Objection as to form.

9

A The date you told me about the accident
10 assessment documentation team is the 15th of April.
11 If that date is accurate, then this was not done
12 under the aegis of the accident assessment
13 documentation team.

14

Q That is one of the reasons why I asked
15 you whether or not you recalled whether any work
16 had been done prior to the date of the memorandum
17 that you received from Mr. Arnold.

18

Do you now recall whether or not you did
19 any work with respect to preparation of sequences
20 of events, whether or not it was under the specific
21 title of the accident assessment documentation team,
22 during this period?

23

A No, I don't recall.

24

Q Looking at page 2422 for purposes of
25 this litigation and focusing on a sentence that has

2 been struck out which appears after the entry of 24
3 minutes and 58 seconds, the lined-out sentence
4 reads, "This temperature monitored by a
5 thermocouple strapped to the pipe never gets above
6 290 degrees Fahrenheit due to heat losses."

7 MR. GLASSMAN: There is some earlier
8 material that is also crossed out.

9 MR. BENEDICT: That's right. I have no
10 reason to put it in the record. If you want,
11 you can.

12 Q I want to ask you whether at the time
13 that this draft is dated, around the middle of
14 April, did you have any information with respect to
15 the maximum expected temperature reading you would
16 get on the thermocouple connected to the PORV
17 discharge line on Unit 2?

18 A I don't remember having any such
19 information.

20 Q Has there come a time since the Three
21 Mile Island accident up until today when you have
22 learned or obtained information with respect to the
23 maximum expected temperature that the thermocouple
24 would indicate on the discharge line for the PORV?

25 A I am sure the question has been looked

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at, but I don't remember the results.

Q Again looking at the entry on page 2424, after two hours, part of the passage following that entry that has been crossed over is a sentence which reads, "At this point, T hot A appears to be superheated; therefore, superheated steam exists in high point of the A loop from this point on in the transient for at least the next hour."

At the time that this draft is dated, were you aware of the fact that the Three Mile Island Unit 2 reactor coolant system had contained superheated steam at some time during the accident on March 28, 1979?

A Yes, at the time this draft was prepared, I was aware that -- no, excuse me. I am not aware that there was superheated steam. Certainly I was aware that there was steam in the primary system.

Q You don't recall having any knowledge specifically related to the steam being superheated as opposed to being saturated during this time?

A No.

Q Prior to the accident at Three Mile Island, did you understand that superheat could be added to steam only by exposing 100 percent quality

2 steam to a heat source?

3 A No, I don't think prior to the accident
4 I understood that. I am not sure that is a correct
5 statement.

6 Q Prior to the Three Mile Island accident,
7 did you understand that if a heat source was
8 totally submerged in saturated liquid water, that
9 superheated steam could not be created in any
10 significant quantities?

11 A I don't think I ever thought about that
12 question.

13 Q Did you understand that prior to the
14 Three Mile Island accident, that the secondary side
15 of Unit 2 operated with a superheat component in the
16 steam created for purposes of turning the turbine?

17 A Yes, I knew that the B&W once-through
18 steam generators produced superheated steam.

19 Q Did you know that U-tube steam
20 generators of the type used by Combustion Engineering
21 and Westinghouse did not produce superheated steam?

22 A Yes.

23 Q Did you understand that the U-tubes in
24 the steam generator of the Westinghouse and CE
25 designs were totally immersed in secondary side

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water?

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

Q My question is really, did you understand prior to the Three Mile Island accident? Do you have any recollection of knowing that fact prior to the Three Mile Island accident.

A First off, I don't know that that is a fact.

Q You don't recall knowing that fact, true or false, prior to the Three Mile Island accident?

A No.

Q Were you aware prior to the Three Mile Island accident that the once-through steam generator tubes in the B&W steam generator were only partially covered with liquid secondary side water?

A Yes.

Q Did you understand that steam produced from the boiling secondary side water in the B&W steam generator passed by heated steam generator tubes on its way out of the secondary side of the steam generator vessel?

A What point in time?

Q Prior to the Three Mile Island accident.

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A Yes.

Q Did you understand that it was by that method of passing steam across the heated steam generator tubes that the superheat component was added to the secondary side steam at Unit 2? Did you have this understanding prior to the Three Mile Island accident?

A When you specify Unit 2, you give me problems answering the question. If I didn't think about Unit 2 --

Q If I expand the question to your knowledge of B&W once-through steam generator design prior to the Three Mile Island accident, would that change your answer?

A My very limited knowledge of B&W once-through steam generator design, yes, I understood that the superheat occurred in the tube portion of the generator.

Q Above the surface of the saturated secondary side water?

A I don't think that is an accurate statement. I won't agree to that.

Q Is it your understanding that superheated steam can be created when a heat source -- assuming

2 the pressure remains constant, that superheated steam
3 can be created where the heat source is immersed
4 completely in saturated water?

5 MR. GLASSMAN: Now you seem to be
6 shifting your question to present understanding
7 where before the question seemed to be
8 directed to preaccident.

9 MR. BENEDICT: I am interested now in
10 what Dr. Long knows today. I will go back to
11 try to put it in time. I may be asking the
12 question wrong, and if that is true, I would
13 like to know, because I don't think we're
14 communicating.

15 (Record read)

16 A. Since I do very little thinking, if any,
17 about superheated steam, I can't really answer.

18 Q You don't know whether that statement
19 is wrong or right?

20 A I don't know whether that statement is
21 wrong or right.

22 Q Did you understand prior to the Three
23 Mile Island accident that it was an abnormal
24 occurrence for there to be steam generated within
25 the reactor coolant system of Unit 2 outside of the

2 pressurizer?

3 A Prior to the accident, again, I just
4 didn't have any contact with Unit 2.

5 Q A pressurized water reactor?

6 A A pressurized water reactor, I would
7 think it would be unusual to have steam outside the
8 pressurizer, yes.

9 Q Did you understand prior to the Three
10 Mile Island accident that steam could exist outside
11 of the pressurizer in a pressurized water reactor
12 coolant system as a result of an accident
13 situation?

14 A Yes.

15 Q Did you recognize prior to the Three Mile
16 Island accident that the Unit 2 reactor was a
17 pressurized water reactor?

18 A Yes.

19 Q If I understand your testimony, at the
20 time in April of 1979, you don't recall knowing that
21 superheated steam conditions existed within the RCS
22 at Unit 2 during the accident?

23 A I am not able to recall that at the
24 present time.

25 Q You do recall at that time that steam

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existed within the reactor coolant system outside the
pressurizer?

A Yes.

(Recess taken)

(Documents marked as B&W Exhibits 677
through 681 for identification, as of this
date)

BY MR. BENEDICT:

Q I would like to show you a series of
documents which I will describe for the record and
which have been marked as B&W Exhibits 677 through
681.

Turning first to B&W 677, it is headed
in typewritten words "Preliminary Sequence of Events,"
and then in what appears to be your handwriting in
the upper right corner, "Draft, Midday, 13 April
'79."

Is it correct that the handwritten
notation in the upper right is yours?

A Yes.

Q I turn your attention for the moment to
B&W 678, which again is headed in typewriting,
"Preliminary Sequence of Events," and has the
notation in the upper right margin of "Draft 2215

2 hours," which is 10:15 p.m., is that correct?

3 A Yes.

4 Q Or 13 April 1979. Is that notation in
5 your hand?

6 A Yes.

7 Q I ask you to look at B&W 679, again
8 headed "Preliminary Sequence of Events." It has a
9 handwritten notation in the upper right corner which
10 has been crossed over, which appears to read "0930
11 hours, 13 April '79." There is then something
12 written after it which I can't read. Can you make
13 out what that says, something three letters or copy?

14 A Your copy may be better than mine.

15 Q I am afraid not in this case.

16 Do you read that it says "April 14"
17 on it?

18 A It says "ELB copy April 14." There are
19 some other things which I can't read.

20 Q Does ELB mean anything to you in this
21 context?

22 A Yes. Those are the initials of Ernie
23 Blake.

24 Q Are you aware of whether Mr. Blake had
25 any responsibility with respect to preparation of

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2 sequences of events around about April 14, 1979?

3 A No, he did not have responsibility for
4 preparation of sequence of events.

5 Q Did he have any responsibility with
6 respect to review or consultation on such sequences?

7 A Yes, he reviewed them.

8 Q Is the inscription, both the one that
9 has been crossed out and the portion of the lower
10 one that we can read, do you recognize that as being
11 in your hand?

12 A The words "ELB copy" do not look like
13 my handwriting. The "April 14" does. The "0930
14 hours, 13 April '79" are my handwriting.

15 Q Now looking at B&W 680, which is headed
16 "Preliminary Sequence of Events," and written in
17 the upper right margin is what appears to read
18 "Last Draft - 4/15/79," is that a fair reading of
19 what you see?

20 A I think so, but it is not entirely clear.

21 Q Is it sufficiently clear for you to
22 identify whether it is or is not your handwriting?

23 A Yes, it is my handwriting.

24 Q Finally, I would like you to look at
25 what has been marked for identification as B&W 681,

2 the first page of which is a letter on letterhead of
3 the GPU Service Corporation from R. L. Long to R. C.
4 Arnold, and it is headed "Preliminary Sequence of
5 Events, TMI 2 Accident of March 28, 1979." The
6 letter is dated April 16, 1979. And the second page
7 of B&W Exhibit 681 is headed "Preliminary Sequence
8 of Events, TMI 2 Accident of March 28, 1979, Issued
9 April 16, 1979."

10 First focusing on the document marked
11 as B&W 681, do you recognize 681 as a preliminary
12 sequence of events that was prepared under your
13 supervision at the request of Mr. Arnold sometime
14 prior to April 16, 1979?

15 A Yes.

16 Q Is this the sequence of events which you
17 had been asked by Mr. Arnold to prepare as part of
18 your job as the director of the accident assessment
19 task force?

20 MR. GLASSMAN: Objection as to form.

21 Obviously Mr. Arnold didn't ask him to produce
22 a particular document in its final form. If
23 you are asking the witness if this was produced
24 in response to Mr. Arnold's request, that would
25 make some sense.

2

MR. BENEDICT: I think the question, the import of the question is the same.

3

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You can answer your counsel's question.

5

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A I did prepare it at the request of Mr. Arnold.

7

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Q Do you remember whether it was part of the accident assessment task force responsibility to see to it that this document was prepared? Is that part of your job as the director of that team?

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A Yes, but, Counsel, you have introduced some confusion in my mind as to when the task force was formed.

14

15

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Q No, I didn't. I only asked you -- I am only telling you what your counsel has confused me with, and that is a date of April 15.

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MR. GLASSMAN: I don't know which counsel you are referring to.

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MR. BENEDICT: In answer to an interrogatory posed in this litigation. It was certified by an officer of GPU Corporation as being accurate to the best of his knowledge.

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MR. GLASSMAN: We can mark it as an exhibit. I would like to know what counsel

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is referring to.

MR. BENEDICT: There is your answer.

Q Do you recognize the documents that have been marked as B&W Exhibits 676 through 680 as prior drafts of what has been marked as B&W 681?

A I didn't look at each one to see if that is all they are.

Yes, they are all drafts of the sequence of events, the preliminary sequence of events.

Q Which has been marked as B&W 681, is that correct?

A Yes.

Q Is it your understanding that the drafts that have been marked as B&W 676 through 680 are marked in chronological order from earliest to latest?

MR. GLASSMAN: You are referring to chronological order of drafting, as opposed to chronological order of receipt by Dr. Long?

MR. BENEDICT: If Dr. Long can testify as to their timing of the preparation, I will take that. If he has to limit himself as to the order in which he received them, I will accept that.

2 A The notations indicate the order in which
3 I received them, although I am not sure about B&W
4 679.

5 Q You have no reason at this point to
6 believe that these are not marked in the order of
7 their preparation?

8 A I don't think you can tell from the
9 notations when B&W 679 was received by me or who
10 marked on it.

11 Q I don't disagree with your statement,
12 but I press for an answer to my question, which is,
13 and it is a focused one, do you have any reason
14 today to believe that the order in which I marked
15 them does not represent a chronological progression
16 from earlier to later? I am not asking you to
17 review each page of the documents. I want to know
18 whether you today have any knowledge which would
19 suggest that I made a mistake in my order.

20 A No.

21 Q Are you aware today of any other drafts
22 of B&W 681 other than the ones that have been
23 marked as B&W 676 through 680?

24 A I am not aware of any.

25 Q Turning to 677, could you look through

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677 and tell me whether there is any of your handwriting on this document other than the notation in the upper right corner of the first page?

A A very few of the notations appear to be my handwriting.

Q Could you direct me to those that you believe are your writing?

A Page 2402, the entry at 0400:37. There is a handwritten word "automatic."

Page 2403, there are a couple of notes associated with the entry at 0401:16.

Page 2404, an entry at 0402:03.

Page 2405, some notations associated with the entry at 0408:06.

Q All of those entries in that area?

A I don't know about the circle with the line through it, and there are some strikeouts, and I don't know whether they are mine.

Q All the writing is yours?

A The writing, yes.

Q Anyplace else?

A Page 2408, the entry at 0645:37, "Makeup pump C was stopped." The parens that are out to the right of that entry that says "Inference could

2 be deleted," close parens. Only that part. Those
3 are all that I can recognize with certainty.

4 Q Did you look over B&W 677 and make those
5 entries at about the time and date noted on the
6 front in your handwriting?

7 A I don't recall at this point in time.

8 Q Do you have any reason to believe that
9 those notations were made at some -- at any time
10 after the preparation of what has been marked as
11 B&W 681?

12 A No.

13 Q Is it your recollection that you
14 reviewed B&W 677 prior to the completion of B&W 681?

15 A I certainly can't say that with any
16 certainty.

17 Q Do you have any reason to believe that
18 you didn't review B&W 677 prior to the completion
19 of 681?

20 A Since I can't recall, I don't --

21 Q There is a difference, and I am sure
22 your counsel can explain this to you better than I,
23 but there is a difference between having a
24 recollection of something and the question of whether
25 or not you have any reason to believe that something

2 is or is not true, and that is, do you possess
3 other information other than a recollection of this
4 document that tells you that in fact you didn't do
5 what I am suggesting? That is the difference
6 between the first question and the second question.

7 MR. GLASSMAN: Frankly, I think your
8 rewording of it is probably helpful and avoids
9 any negative inferences that might otherwise
10 be drawn from the record.

11 MR. BENEDICT: I am only interested in
12 whether he has any reason to believe that he
13 did not read it and review it prior to the
14 preparation of 681.

15 A I don't possess any information at this
16 point in time that tells me that I did it other
17 than at that time.

18 Q Do you have any information as to who
19 else's handwriting this is on B&W 677?

20 A No, I do not.

21 Q Turning to B&W 678, why don't you page
22 through and tell us if you come to any handwriting
23 that is yours other than the entry in the upper
24 right margin of the first page.

25 A Page 2387, the two circles in the left

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margin of page 2387.

On page 2388, the entry at 0400:45, the word "pressurizer."

Page 2390, the entry at 0402:38, the words "reactor coolant." I don't know whether the "B" associated with that is mine or not.

Page 2391, an entry at 0405:43, the insert of the word "inches."

0405:52, the changing of the tense of the word "trip" to "tripped."

Page 2393, the entry at 0542:37, the word "operator," and the entry at 0554:37 underneath that notation, the word "approximate."

Page 2394, all of the word entries on that page, handwritten word entries, are mine. I don't know about the kind of editorial remarks.

Page 2395, again all of the handwritten word entries. I can't be sure of the editorial remarks.

Page 2396, all of the handwritten word entries.

Page 2397, all of the handwritten word entries. I can't tell about a single letter.

Page 2398, the two word entries, the

C E R T I F I C A T E

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

I, JOSEPH R. DANYO, a
Notary Public within and for the State of New York,
do hereby certify that the foregoing deposition
of ROBERT L. LONG was taken before
me on TUESDAY, MAY 18, 1982;

That the said witness was duly sworn
before the commencement of his testimony 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 parties herein 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 31 day of May 1982

Joseph R. Danyo
JOSEPH R. DANYO

I N D E X

WITNESS	PAGE
Robert L. Long	3

E X H I B I T S

B&W
FOR IDENTIFICATION

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