

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

1 In the Matter of:

2 IE TMI INVESTIGATION INTERVIEW

3 of James R. Floyd, Supervisor of Operations
4
5
6
7
8

9 Trailer #203
10 NRC Investigation Site
11 TMI Nuclear Power Plant
12 Middletown, Pennsylvania

13 May 2, 1979
14 (Date of Interview)

15 June 30, 1979
16 (Date Transcript Typed)

17 91
18 (Tape Number(s))
19
20

21
22 NRC PERSONNEL:
23 James S. Creswell
24 Dorwin R. Hunter
25 Donald C. Kirkpatrick
Mark E. Resner

7908290640

894 169

1 RESNER: The following interview is being conducted of Mr. James R.
2 Floyd. Mr. Floyd is a Supervisor of Operations, Unit No. 2, Three
3 Mile Island Nuclear site. He is employed by Metropolitan Edison. The
4 present time is 4:04 Eastern Daylight Time. Today's date is May 2,
5 1979. This interview is being conducted in Trailer 203, which is
6 located just south of the south gate to the Three Mile Island site.
7 Individuals present for this interview are Mr. James S. Creswell. Mr.
8 Creswell is a Reactor Inspector of Region III of the Nuclear Regulatory
9 Commission. Also present, Mr. Dorwin R. Hunter. Mr. Hunter is an
10 Inspector Specialist with Region III of the US Nuclear Regulatory
11 Commission. Also present, Mr. Donald C. Kirkpatrick. Mr. Kirkpatrick
12 is a Nuclear Engineer at IE Headquarters, Bethesda, Maryland. The
13 moderator of this interview is Mark E. Resner, and I am an investigator
14 with the Office of Inspector and Auditor, the US Nuclear Regulatory
15 Commission. Prior to this interview, Mr. Floyd was provided with a
16 copy of an advisement document, which addressed his rights concerning
17 information to be obtained regarding the incident at the Three Mile
18 Island. This document apprised Mr. Floyd of the purpose of this
19 investigation, the scope of the investigation and the authority by
20 which Congress authorizes the Nuclear Regulatory Commission to conduct
21 this investigation. The document consists of two pages, and on the
22 second page Mr. Floyd has indicated, he answered three questions. For
23 the record, these questions are (1) Do you understand the above? Mr
24 Floyd has indicated his answer to be in the affirmative. Is that
25 correct Mr. Floyd?

894 170

1 FLOYD: Yes sir.

2
3 RESNER: Question No. 2. Do we have your permission to tape the
4 interview? Mr. Floyd has indicated affirmative to this question. Is
5 that correct Mr. Floyd?

6
7 FLOYD: Yes sir.

8
9 RESNER: Question No. 3. Do you want a copy of the tape or a transcript.
10 Mr. Floyd has indicated that he would like a copy of the transcript.
11 Is that correct Mr. Floyd?

12
13 FLOYD: Yes sir.

14
15 RESNER: Thank you. If you will, Mr. Floyd, for the record, would you
16 please give us your background in the nuclear industry.

17
18 FLOYD: In 1959, I went to Advanced Nuclear Power School in Mare Island,
19 California. I was an enlisted man at the time, but I completed the
20 officer's program there. To this day, I am probably the only white
21 hat that's ever done that trick. I followed that up with six months
22 of training at the prototype at ALW. Stayed on as a instructor in
23 instrumentation and control for a little over two years, put in a year
24 on the Enterprise before I got out of the Navy in January of 1964. At
25 that time, I had completed three years of my chemical engineering

894 171

1 degree so I went to Columbia University and completed that degree in
2 chemical engineering, being much too late to change to nuclear at that
3 point in time. While at Columbia, I was employed half time as an
4 assistant to Dr. Marconian in the Nuclear Engineering Department,
5 doing basic research in the fission process. I graduated from Columbia
6 in 1965, came to work for Met Ed in September of '65, out at Saxton.
7 I was there five months and acquired my senior operator's license at
8 Saxton Nuclear Experimental Reactor. I became Supervisor of Operations
9 at the same time, till late 1968, when I came to Three Mile Island. I
10 was Supervisor of Operations on Unit 1, took it through its startup
11 and test program and first year of commercial operation, in that
12 position. At which time I came south to Unit 2 and I have done the
13 same trick with Unit 2, except we didn't get through the first year of
14 commercial operation. That probably brings us up to date.

15
16 RESNER: Thank you Mr. Floyd. At this point I'll turn the questioning
17 over to Mr. Creswell.

18
19 CRESWELL: Jim, I'd like, if you could, to describe where you were on
20 the day of March 28, when the event occurred.

21
22 FLOYD: For better or for worse, I was in Lynchburg, Virginia, undergoing
23 my annual requalification on the simulator.
24
25

894 172

1 CRESWELL: Okay, Jim. How long had you been there at the simulator?

2
3 FLOYD: Since Sunday night.

4
5 CRESWELL: That would have been, what, four or five days prior?

6
7 FLOYD: was Wednesday, so - Sunday, Monday, Tuesday, Wednesday - four
8 days.

9
10 CRESWELL: Okay. When did you first become aware that there was some
11 sort of abnormal condition existing at the plant?

12
13 FLOYD: At breakfast that morning, about 7:00 o'clock. One of the
14 gentlemen with me had been in communication with someone here at the
15 site, who had told him that the safety valves on Unit 2 had blown for
16 two hours that morning from about 4 to 6. So as soon as we finished
17 breakfast, we went over to B&W offices, and I got on the phone - it
18 must have been about 7:30 or twenty of eight - to the island. I
19 got through to the Unit 2 control room and I got a few sketchy pieces
20 of information from, I believe the first phone call was with Kenny
21 Bryan the shift supervisor. I took the several pieces of information
22 which I had and tried to reproduce the initial portion of the transient,
23 through and including the introduction of emergency feedwater to the
24 steam generators. My information, at that time, said they were about
25 ten minutes late bringing in the emergency feed, that they had the

894 173

1 reactor coolant system pressure down around 1000 pounds or 1200 pounds,
2 and I tried to simulate that on the B&W simulator. I called back into
3 the plant later in the morning, it must have been in the area of 9:30.
4 I also found out at the earlier phone call that there was a number on
5 the reactor building gaseous activity . . . and I don't remember the
6 value of that number, but based on the value of that number, I estimated
7 at least a third of the cladding had failed, or an eighth of the
8 cladding had failed. I called back in for more information about 9:30
9 in the morning and found out that the electromatic relief had been
10 stuck open. So I then introduced that parameter into my simulation.
11 In none of these was I able to drag the simulator down to 1000 pounds
12 or 1200 pound pressure. At the time, I guess we were outside the
13 simulation capability of the machine, and it would not recognize a
14 bubble in the head or in the hot legs and cause the pressurizer level
15 to respond as it does respond. So I spent most of the day, up until
16 4:00, working with the simulator, varying the possible time delay
17 between the two feed pumps tripping and not knowing they had gone,
18 effectively, simultaneously,. sticking the electromatic relief valve
19 open for various lengths of time, bringing in emergency feed at different
20 flow rates at different points in time, trying to force the simulator
21 down to its knees at a 1000 pounds. I was never successful in doing
22 that, however. Those traces were preserved . . . I think Bernie Smith
23 still has them.

894 174

1 CRESWELL: Bernie Smith? Jim, who is Bernie . . .

2
3 FLOYD: He is the shift supervisor in both units.

4
5 CRESWELL: Now you mentioned that you received a call while you were at
6 breakfast . . .

7
8 FLOYD: No, I received information from another gentleman in our
9 group. The group that was down there was Bernie's crew, consisting of
10 himself, Dick Hoyt, the shift foreman, and three control room operators,
11 and one of those gentlemen brought the information to breakfast that
12 the safety valves had been stuck open for two hours, which was enough
13 to trigger me to call the plant.

14
15 CRESWELL: I see. Do you recall who that gentleman was that had received
16 the information, that you had breakfast with?

17
18 FLOYD: I believe it was Dick Hoyt, but I wouldn't swear to that.

19
20 CRESWELL: Does Dick work for Met Ed?

21
22 FLOYD: Yes.

23
24 CRESWELL: How many people did you have up at the simulator with you?
25

1 FLOYD: I named them - myself, Bernie Smith, Dick Hoyt, Ray Brewer,
2 Harold Hartman, and the CRO trainee.

3
4 CRESWELL: I see. What was his name?

5
6 FLOYD: I can find out if it is important to you.

7
8 CRESWELL: Okay, we can check into that later. So the gentleman with
9 you at breakfast had received a telephone call, and I believe you said
10 that a safety valve had hung open for two hours?

11
12 FLOYD: That is the word he got on the telephone from a non-technical
13 person at this end.

14
15 CRESWELL: Do you know who that individual was on this end?

16
17 FLOYD: No.

18
19 CRESWELL: Okay, so then you proceeded over to, what, the office
20 building, to make your call?

21
22 FLOYD: Yes.

23
24 CRESWELL: And I believe you named the gentleman that you talked to.

25
894 176

1 FLOYD: Kenny Bryan.

2
3 CRESWELL: He was the shift engineer?

4
5 FLOYD: The shift supervisor I talked to him on one of the two calls.
6 I made two calls back to the site where I got into the Unit 2 control
7 room, one at 7:30, one at effectively 9:30 or 9:15, somewhere in that
8 region. On one of those two calls I talked to Kenny Bryan, I don't
9 know who I talked to on the other one any more.

10
11 CRESWELL: Did you get the impression that Kenny was in the control
12 room?

13
14 FLOYD: Yes he was, because I dialed straight into the control room.

15
16 CRESWELL: Okay, did you have any trouble getting in?

17
18 FLOYD: No, not at that hour of the morning.

19
20 CRESWELL: And this would have been about time?

21
22 FLOYD: 7:30, and between 9:15 and 9:30. Now, I have some unlisted
23 numbers in my wallet that . . .

24 894 177
25

1 CRESWELL: I see.

2
3 FLOYD: That aren't the public domain. So later in the afternoon B&W
4 called me up to their board room to try to call some information into
5 the plant with those unlisted numbers. At that time in the afternoon
6 . . . I don't remember whether it was three or four or five . . . but
7 somewhere in that region, while I was in the board room, I could not
8 get into the Unit 2 control room. So the information that they wanted
9 relayed I called into the Unit 1 control room to a Shift Supervisor
10 over there by the name of Rich Hutchinson, and I told him who I was
11 and it was very important to get this information to the Shift Supervisor
12 in Unit 2 and to send a courier over to do that, to hand carry the
13 information. So later in the day, it was impossible to get into the
14 Unit 2 control room, so I went in through the Unit 1 control room,
15 couriered to Unit 2 control room.

16
17 CRESWELL: Okay. When you went to the board room there at B&W, do you
18 recall who the individuals from B&W were that you talked to?

19
20 FLOYD: There had to be 35 to 40 people in the room.

21
22 CRESWELL: Was there one individual that appeared to be in charge?

23
24 FLOYD: Yeah, there were probably a couple of vice presidents there.
25 I was probably introduced to them but I don't remember who they were.
I can probably remember a couple of people in the room . . .

1 CRESWELL: Well that's fine

2
3 FLOYD: Who could get back to tell you who was there. Our previous
4 project manager for B&W, Grant Ward, was my primary contact with the
5 upper management there.

6
7 CRESWELL: Okay.

8
9 FLOYD: Grant brought a group of people down in the morning - the
10 8:30, 9:00 o'clock type time frame - and I sat them down in the classroom
11 and I briefed them on what I knew and what I suspected, from what I
12 knew had happened. And then I heard no more of them until the afternoon
13 when they summoned me to the board room to try to get some information
14 back into the Unit 2 control room.

15
16 CRESWELL: The briefing that you conducted, do you recall . . . and I
17 understand that you are getting preliminary information out of the
18 site . . . but do you recall what the subjects were that were discussed,
19 what you felt at that time, at that point in time?

20
21 FLOYD: I knew that we had had a loss of both feed pumps.

22
23 CRESWELL: That's the emergency feed pumps?

24 894 179
25

1 FLOYD: No, the main feed pumps, which . . .

2
3 CRESWELL: Oh, the main feed pumps.

4
5 FLOYD: Which promulgated the whole trip, leading to the reactor trip,
6 high pressure injection, and high activities in the reactor building,
7 which of course, indicated failed cladding to me, at least. That I
8 knew. I did not know the real reason the feed pumps tripped, that,
9 that I was attempting to simulate the course of the transient from the
10 feed pump trip to the failed fuel, and that is what I was unsuccessful
11 in doing on the simulator.

12
13 CRESWELL: I see.

14
15 HUNTER: Jim, you mentioned about the auxiliary feed pumps being cut
16 in within ten minutes. Were you aware that at that time, in this
17 meeting, that the auxiliary feed pumps were in fact not cut in for ten
18 minutes?

19
20 FLOYD: Yes. It was approximately ten minutes, was the number I was
21 given on the phone. So on the simulator I varied from, like through
22 six, seven, eight, nine, ten, eleven, twelve minutes on different
23 runs, trying to see what difference it would make to the machine as
24 one variable. Then after I had gone through that evolution, I simultane-
25 ously failed open the electromatic relief and went through the same

1 evolution, changed another one parameter at a time to see how it would
2 affect the plant. But in no way was I able to bring reactor coolant
3 system on the simulator down to 1200 pounds. The other thing which
4 was an anomaly - I knew the simulator would go up above 2500 pounds on
5 the reactor coolant system pressure, having run this same transient on
6 it before. Simultaneous loss of both feed pumps leads the simulator
7 to something greater than 2543 pounds, which was the max range of the
8 best instrument we had available to us there. And it was above that
9 point for about two seconds. How high it got and came back down, I
10 don't know. When I came back to the site, one of the first things I
11 was interested in was, were we above 2500 pounds? And I can find no
12 evidence to that effect.

13
14 KIRKPATRICK: Jim do you know if the simulator allows for water to be
15 vented from the relief valve, or is the simulator relief valve value
16 based only on steam?

17
18 FLOYD: I do not know, but I never got the pressurizer solid on the
19 simulator. I understand since then, the simulator has been changed
20 and now gives a very good representation of what went on here. But of
21 course it was programmed to give that representation because this is
22 the way this B&W plant behaves. So they didn't model SMUD in this
23 case, they modeled Three Mile Island 2. And of course, the modelers
24 can make it do anything they want it to do. I have been very intimate
25 with the simulators since its initial inception. I was in on the

1 design of the machine originally, before it was even a cardboard
2 mockup. I have more operating hours on the simulator than I have on
3 these two units together, actually turning controls, because it's
4 something I very rarely do in the control room. I direct my control
5 room operators, but I rarely turn the controls myself. And I have
6 been outside the simulation before, and I usually recognize when I am
7 outside of it. So I spent the eight hours that I had rented the
8 machine for that day for my training, trying to simulate the accident,
9 then turned it over to B&W, and proceeded to get some supper before
10 coming home.

11
12 CRESWELL: Jim, how well . . . this is your opinion . . . how well was
13 the simulator in its modeling of TMI 2 for normal training purposes?

14
15 FLOYD: Beautiful.

16
17 CRESWELL: Okay. You mentioned at one time, you had estimated a
18 certain percentage of the clad had failed. How did you arrive at that
19 type of conclusion?

20
21 FLOYD: That is a very good question and B&W had the same question in
22 their minds. Our emergency plan calls for us to declare a site emergency
23 if we have . . . or a general emergency, we can declare a general
24 emergency if we have a site emergency and 8 R per hour on the dome
25 monitor. That 8 R per hour number is one I derived back in Unit 1,

1 and we carried it over to Unit 2. I derived that number based on gap
2 activity, as I recalled, at the simulator. And I had a number . . . a
3 number was transmitted on the phone to me for the dome monitor, but
4 based on the dome monitor, which the number was transmitted was somewhere
5 around 80 or 90, or 8 or 9 times 10 to the fifth counts per minute off
6 the recorder, and until I throw the four inches of lead in front of
7 the detector, all of a sudden I have a number which is horrendously
8 high and I cannot believe, which is why I went to the only other
9 activity number I had, was the gas monitor on the reactor building.
10 And I took a sensitivity for that gas monitor and I calculated it
11 backwards to find out what was in the building, and based on that
12 activity and what I remembered from calculating 8 R per hour, I don't
13 know, five, six, eight years ago, I said at least an eighth of the
14 clad had failed at that point in time. It was based solely on what I
15 remembered from numbers, not on anything that I had with me to look
16 up.

17
18 CRESWELL: Okay.

19
20 FLOYD: I could not have documented justification why it was one
21 eighth instead of two eighths.

22
23 CRESWELL: I am just trying to get a feeling.
24
25

894 183

1 FLOYD: To me it was a large fraction of the core that the cladding
2 had failed in.

3
4 CRESWELL: Okay. I would like to go back to the time that you were in
5 the board room there at B&W, when there . . . I think you estimated
6 30, 35 people in there . . . and you gave them a restricted telephone
7 number to reach the site with. Did they establish somewhat permanent
8 communications on that line?

9
10 FLOYD: No, I did not give them the telephone number. I dialed the
11 number for them on a squawk box, and I was unsuccessful in getting
12 through to Unit 2. So that is when I dialed into Unit 1, had the
13 messenger run over to Unit 2. I had no more than rung off from that
14 phone call when our squawk box rang, and one of the B&W reps from the
15 site, Greg Schaedel was, I believe, at the Visitors Center. He was
16 not on the site, but he had just gotten information from the site.
17 And he was of course desirous in getting this back to B&W's offices.
18 He came on the phone and he told us the current plant status, as best
19 he understood it, and claimed that they thought they had collapsed the
20 bubble in the hot leg, the A hot leg, in particular. But the numbers
21 he gave us on the phone are above the saturation curve. I did not
22 have a set of steam tables with me, but the temperature and the pressures
23 he gave me are just in the superheat region. And so I lost my cool a
24 little bit and ended up the conversation by telling him to look at
25 their steam tables because, if those temperature and pressures were

1 true, they had not in fact collapsed the bubble in the A hot leg.
2 While the discussion was going on, one of the other B&W engineers down
3 near the end of the table apparently had a steam table with him and he
4 confirmed that we were still in a superheat region. I passed to Greg
5 the information that I tried to send through the Unit 1 control room,
6 I asked him to try to get back in, and after getting off that phone
7 conversation I called back into the Unit 1 control room to Rich
8 Hutchinson again and reiterated the importance of getting my previous
9 message into the Unit 2 control room . . . that message was get at
10 least four to five hundred gallons per minute of HPI water going into
11 that vessel.

12
13 CRESWELL: How did you arrive at the four to five hundred gallon
14 figures?

15
16 FLOYD: Straight B&W recommendation, which seemed reasonable to me, so
17 I transmitted it.

18
19 CRESWELL: Okay, do you recall who made the recommendation, from B&W?

20
21 FLOYD: No, they had their best minds in Lynchburg at the table. I
22 don't know who, what the man's name was that scratched the back of the
23 envelope.

24 894 185
25

1 CRESWELL: How long would you estimate that you and this group of
2 people sat at the table in communications with the control room?

3
4 FLOYD: We were never in communication with the Unit 2 control room.
5 I was only in communication with the Unit 1 control room for two
6 periods of time long enough to transmit the information . . . a matter
7 of several minutes on each call. We were in communication with Greg
8 Schaedel at the Visitors Center, a B&W employee over there . . . he is
9 the second in command normally here at the site for B&W so I know Greg
10 very well. We were on that conversation for, oh, probably a half hour
11 or 45 minutes. I was probably in the board room in the area of two
12 hours, total.

13
14 CRESWELL: Did you have any indication that anybody from B&W at the
15 site was in communications with the corporate offices, that is, from
16 the Unit 2 control room?

17
18 FLOYD: No, they were not. They wouldn't have been pinging on me if
19 they had an open line.

20
21 HUNTER: Right. The people who were asking you for information, it
22 was very clear then that they had no communication with the site at
23 that time . . . Established at that time?

1 FLOYD: No continuous communication.

2
3 HUNTER: Okay. At what time did the word get back to the site, approxi-
4 mately, that they should in fact get four to five hundred gallon per
5 minute high pressure injection to the flow? To the core?

6
7 FLOYD: Well, let me see if I can sort out the times in my mind.
8 Right after lunch, I went up to the second floor on another technical
9 problem which was a low priority item I found out when I got up there,
10 at least I thought it was. I come back down to the simulator, I
11 continued simulating. It was probably after two o'clock when I went
12 to the board room. It was probably about four or five o'clock when I
13 left the board room.

14
15 HUNTER: Okay and in your opinion . . . okay, we'll take a break.

16
17 RESNER: Excuse me gentlemen. At this time we'll take a break to
18 change the tape. The time is now 4:32 Eastern Daylight Time.

19
20 RESNER: This is a continuation of the interview of Mr. James R.
21 Floyd. The time is 4:35 Eastern Daylight Time. I will now turn the
22 interview over to Mr. James Creswell.

23
24 CRESWELL: Okay, let's go back to the simulations that you tried on
25 the simulator and the sequence that you went through. I believe that

1 you said that you tried delaying the emergency feedwater initiation,
2 you tried failing the power operated relief valve open, you said that
3 the minimum pressure that you could get would be something like 1200
4 pounds.

5
6 FLOYD: I never got that low.

7
8 CRESWELL: Never got that low?

9
10 FLOYD: In fact, I had trouble getting high pressure injection to come
11 in.

12
13 CRESWELL: Which would come in at 1600 pounds?

14
15 FLOYD: Yes, well, in the simulator, the way it was set up there was
16 1500, but the same difference.

17
18 CRESWELL: With the power operated relief valve . . .

19
20 FLOYD: Even with it open.

21
22 CRESWELL: You couldn't get down to, or had difficulty reaching the
23 engineered safety features actually.

1 FLOYD: And the reason, of course, was that I didn't leave it open for
2 two hours.

3
4 CRESWELL: Okay.

5
6 FLOYD: I was working in real time and I was just trying to simulate
7 up until the timer brought in emergency feedwater. I thought it was a
8 combination of the electromatic relief and emergency feedwater with
9 the elevated Tav sucking the bottom out of the pressurizer. But in
10 fact, it was the electromatic relief just took all the hot water out
11 of the pressurizer eventually, and that is what led to the depressurization.

12
13 CRESWELL: How long would you estimate you left the power operated
14 relief valve open?

15
16 FLOYD: I don't think I ran any of the transients more than about
17 twenty minutes, individual transients, and that wasn't enough time to
18 drain all the hot water out of the pressurizer. Plus, they may have
19 had more heat in their pressurizer than we have in ours, I am not sure
20 of that.

21
22 CRESWELL: Okay, how did the pressurizer level respond whenever you
23 took out the, or didn't have emergency feedwater initiation?

24 894 189
25

1 FLOYD: It just responded with a rapid rise in T average. In the runs
2 I made, Tav got up in the area of 605 to 615, by the time I bring in
3 emergency feed. And again, I am not sure that our cavitating ventureries
4 are simulated on the simulator, so I may have been able to bring in
5 more emergency feedwater than would be possible in this plant, which
6 of course, would suck the pressure down that much faster.

7
8 CRESWELL: The cavitating ventureries are used on this plant to measure
9 emergency feed water flow?

10
11 FLOYD: No, to restrict emergency feedwater flow. So that on the
12 steam break in the reactor building, you do not get too much inventory
13 in the building too fast.

14
15 CRESWELL: Okay.

16
17 FLOYD: They are just downstream of the emergency feed pumps. We do
18 not measure emergency feed flow in this unit.

19
20 CRESWELL: About what time period in the morning were you doing these
21 types of simulations?

22
23 FLOYD: As soon as I got off the phone with the site. By 8:00 o'clock
24 I was on the simulator and I carried it through into the afternoon.
25 So it was several period of time I left the simulator to talk to the

1 B&W group when they came down stairs, when I went upstairs right after
2 lunch, when I went up to the board room. Bernie Smith continued on
3 with the simulations. We also varied the tripping of the two, the
4 time of tripping of the two main feed pumps. I delayed them on fifteen
5 second intervals, tripping one and tripping the other one simultaneously,
6 then delaying the second one for fifteen, thirty, fortyfive seconds,
7 up to about two minutes because I wasn't sure that both feed pumps went
8 simultaneously here. After I came back I find out that they did go
9 simultaneously and I wouldn't have had to run a lot of those runs, but
10 my information was very limited at the simulator.

11
12 CRESWELL: Understood. Did you try tripping off any reactor coolant
13 pumps?

14
15 FLOYD: No.

16
17 CRESWELL: Did you have any information that the reactor coolant pumps
18 had been tripped off at the plant?

19
20 FLOYD: Not until I went to the board room in the afternoon.

21
22 CRESWELL: Okay. At that period of time could you describe what the
23 conversation was like in the board room?

1 FLOYD: Well, the primary purpose of getting me there was to get the
2 four to five hundred gallon a minute high pressure injection flow into
3 the core, to get that information into the Unit 2 control room. So
4 that was the initial; introduced to a half a dozen of the 30 or 40
5 people that came in; got on the phone, unsuccessful into Unit 2 control
6 room, got it into Unit 1, hung up from that; Greg Sheddel called,
7 extended conversation. As soon as I rang off from that, I went back
8 to the Unit 1 control room . . . well, I tried Unit 2 again, and
9 couldn't get in on three or four different numbers. So I went back to
10 Unit 1 control room and reiterated to Rich that that information had
11 to get over to Unit 2. By that point in time, they probably had
12 collapsed the bubble in the hot leg.

13
14 CRESWELL: Okay.

15
16 FLOYD: The other piece of information which was discussed at some
17 length in the board room was the hundred amps on the running pump. It
18 was very important to us there, whether it was 100 amps, 125 amps or
19 140 amps. 100 amps happens to be no load on the motor, which would
20 indicate a sheared shaft; 125 is probably the seal, the extra current
21 caused by the seals on the pump; and 140 or 145 would be indicative of
22 the bearing in the pump itself, taking up that additional horsepower.
23 And the number that came into us was 100 amps, and I know that came
24 from an operator looking at some current gages up there, and I know
25 those current meters well, and when it dropped down he knocked the

1 pump off and he said, "the needle was about here, that's 100 amps." I
2 was sure he hadn't looked at it in that detail. So while I had Greg
3 Schaedel on the phone, I asked him to try to get back into the operator
4 and find out, or if they ran another pump, to read the amp meter very
5 accurately. I couldn't believe that we had two sheared shafts, but we
6 had two pumps that gave us 100 amps when they were running. So we
7 needed to know . . . from the amperage reading, we could trouble shoot
8 some of the problems that it could have been. It was, in fact, probably
9 a 150 or 160 amps, but when its 33 amps per division on the meter, it
10 is very easy to misread them.

11
12 CRESWELL: I see. Had you been in the control room during this period
13 of time, would you have gone through that type of evaluation?

14
15 FLOYD: Negative, that was B&W inputted those horsepower numbers to me,
16 those amperage numbers.

17
18 CRESWELL: Okay. And this is in the afternoon. . . . Roughly . . .
19 ?

20
21 FLOYD: Yes, between two and four.

22
23 CRESWELL: Did you have any indications that someone from the site,
24 like, let's say, Lee Rogers, was in contact with B&W-Lynchburg?

1 FLOYD: Greg Schaedel is Lee's assistant and the gentlemen we talked
2 to finally. I don't know whether it was said or not, but I had the
3 impression that Lee was in the plant. Greg could not get into the
4 plant and so Greg was trying to relay the information to B&W. I think
5 I said on the earlier tape that I don't think there was an open line
6 to B&W or they wouldn't have been calling me to the board room to try
7 to get into the control room with information. If they had had an
8 open line, they would have sent the information on their open line.

9
10 CRESWELL: When was it in time again, that you realized that they had
11 significant fuel failures? That was around, what 8:00?

12
13 FLOYD: Yeah, that was in the morning. Very early in the morning.

14
15 CRESWELL: And basically you had made that decision on the information
16 you had about the dome radiation monitor?

17
18 FLOYD: No, on the gaseous activity in the reactor building.

19
20 CRESWELL: The gaseous activity. Okay, could you go into that a
21 little more?

22
23 FLOYD: Well, as I said, I had a number for the dome monitor, which I
24 could not believe and which I cannot believe the one that I still have
25 on it up there in the control room today. If, in fact, I had 500 or

1 5000 R, whatever it translates out to be, inside the reactor building
2 I would certainly see something outside the concrete, which we do not.
3 So the only way that instrument, that dome monitor, can be seeing
4 radioactivity is if I've breached the shield around it, and its
5 seeing a beta field. Then that number of ten to the fifth that it's
6 giving me now could be accurate, and it could be a beta field that
7 high in there and I wouldn't see it outside the concrete. But it
8 certainly can't be a valid gamma number, so the four inches of lead
9 must be breached and possibly even the shield around the detector
10 itself is breached to let beta become, to let the detector become beta
11 sensitive. I recognized that the number that was transmitted to me at
12 7:30, quarter of eight, in the morning was too high to be a real gamma
13 number, as far as I was concerned. So I based my feeling on core
14 damage on the number that was transmitted to me on the reactor building
15 atmospheric monitor, the gaseous channel, and by dividing the sensitivity
16 of that instrument into the reading, I got back to some number of
17 curies in the building. Then, based on previous knowledge when I was
18 calculating the 8R per hour for the dome monitor from the number of
19 curies in the building, I thought it was about, represented about
20 1/8 of the cladding had failed at least, and this was the number that
21 was transmitted to me before 8:00 o'clock in the morning.

22
23 CRESWELL: Okay. Were you aware of any other equipment problems, . .
24 . let's see, we've mentioned, what, the feedwater pumps. . . .?
25

894 195

1 FLOYD: The trip of the feedwater pumps, which lead to the reactor
2 trip and of course, it also tripped the turbine, but that wasn't too
3 surprising, the delay in the opening of the emergency feed valves - I
4 was told about ten minutes - and then later in the morning, the piece
5 of information I got that was helpful to me in the simulation was the
6 fact that the electromatic relief was leaking badly. Based on that, I
7 had to go and simulate different reactor coolant system, different
8 size leaks and I finally got to the point where I had the valve, I
9 just opened the valve on t,he trip or when it opened I'd fail it open
10 and leave it open, but what I had failed to do was to run the thing
11 out for two or three hours to where I took all the heat out of the
12 pressurizer and allowed the next hottest part of the water in the
13 reactor coolant system to flash. I never ran out past, I don't think,
14 twenty minutes of any one simulation.

15
16 CRESWELL: And those are basically . . . we already mentioned the
17 reactor coolant pump.

18
19 FLOYD: That information I didn't get until the afternoon, when Greg
20 Schaedel called in to the plant.

21
22 CRESWELL: In that context, that time period, were there any other
23 equipment problems that you became aware of?
24
25

894 196

1 FLOYD: There may well have been, but none that I remember.

2
3 CRESWELL: You mentioned that at that period of time, B&W was requesting
4 at least 400 gpm high pressure injection flow. At any time during the
5 conversations, did the history of high pressure injection flow come
6 into the power station?

7
8 FLOYD: No.

9
10 CRESWELL: Dorwin, do you have any questions?

11
12 HUNTER: Jim, when you go back and look at the simulator and you talk
13 in terms of simultaneous feed pump trip, turbine trip, reactor trip on
14 high pressure, what's the simulation for makeup flow during that
15 event? Do you recall?

16
17 FLOYD: Well, on any reactor trip you get a contraction, and if you
18 let the emergency feed come in normally, why the contraction will call
19 for the MUV-17 to open and keep pressurizer level high, at set point.

20
21 HUNTER: Jim, could you go into MUV-17?

22
23 FLOYD: Sorry about that. MUV-17 is the automatic control valve that
24 is positioned by pressurizer level to hold a constant setpoint in the
25 pressurizer, constant level setpoint in the pressurizer. So that if

1 we cool down the reactor coolant system some 25 degrees on a reactor
2 trip, the water will contract, pressurizer level will drop and MUV-17
3 will open to take water from the makeup tank and put it into the
4 pressurizer. That's very normal on a reactor trip.

5
6 HUNTER: In the simulator, Jim, would, in fact, the simulator also
7 require, or would it, in fact, include starting the second makeup pump
8 and taking the suction off the BWST?

9
10 FLOYD: The simulator does not but we do it with our people as a
11 matter of course, when we are there. When you get the red light that
12 says "reactor trip" at the simulator, why, the operator automatically
13 starts the second makeup pump and opens MUV-16 Bravo valve.

14
15 HUNTER: Okay, as another point in the procedures, in your procedures,
16 for makeup system - upon a trip it's normal you start one makeup pump
17 and isolate the letdown, Okay, to try to keep the pressurizer level
18 up. Also another step in the procedure is to, if pressurizer level
19 goes below twenty inches, to start the third makeup pump. Is this a
20 routine. . . .?

21
22 FLOYD: Well, normally the first two, you can prevent the third from
23 happening.

24 894 198
25

1 HUNTER: Have you seen the third come on, in your review of any transients
2 or trips?

3
4 FLOYD: We have had a dry pressurizer here on one or more trips.

5
6 CRESWELL: You are going to have to clarify that a little bit, Jim,
7 what you mean by "dry pressurizer" . . . loss of indication or loss. .
8 . . ?

9
10 FLOYD: Level indication went to zero.

11
12 CRESWELL: But you did not drain the pressurizer?

13
14 FLOYD: Yes.

15
16 CRESWELL: You drained the pressurizer?

17
18 FLOYD: Yes, oh yes. It wasn't just indicating dry, it was dry.

19
20 HUNTER: And in that case the operator would have started the third
21 makeup pump, I presume?

22
23 FLOYD: In that case, we'd probably have high pressure injection
24 before that point and two makeup pumps, A and C, come on and B gets
25 kicked off, in that case.

894 199

1 HUNTER: And would you describe the makeup flow path then, at that
2 time on high pressure injection?

3
4 FLOYD: Well, it's from the BWST through the DHV-5s, A and B, MUV-148
5 through the two makeup pumps, through the MUV-16A, B, C, and D valves.

6
7 HUNTER: Okay, you just described to me the two suction valves to the
8 split section header from the BWST to pump discharge valves, and then
9 the loop discharge valves, which would be the 16A, B, C, and D. Those
10 then would come open on the high pressure injection and supply a
11 certain amount of flow through the loops.

12
13 FLOYD: 500 gallons per minute per pump, 250 gallons per loop.

14
15 HUNTER: Okay Jim.

16
17 CRESWELL: This time where you voided the pressurizer, did you have
18 automatic emergency feedwater level control?

19
20 FLOYD: On some of those, I don't know that, it was imposed on us by
21 loss of feed, but if we had had a loss of feed then we yes, had automatic
22 level control in the emergency feed system. If the reactor trip is
23 for some reason other than loss of feed, of course, the emergency feed
24 pumps do not get called on to operate.

1 CRESWELL: Okay so . . .

2
3 FLOYD: We could have maintained steam generator levels of 30 inches
4 on the main feed system.

5
6 CRESWELL: Do you have an automatic control, level control, for the
7 emergency feedwater?

8
9 FLOYD: Oh yes.

10
11 CRESWELL: And it is presently set at 30 inches?

12
13 FLOYD: For the loss of two feed pumps, yes. It goes up to 50 percent
14 on the operating range for loss of four reactor coolant pumps. It's a
15 fairly intelligent control system. It looks at what's happening
16 before it tells you what set point to go to.

17
18 CRESWELL: But the incident that you related earlier, where you voided
19 the pressurizer, can you recall about when that happened?

20
21 FLOYD: No, but our reactor trip reports will indicate it. There were
22 at least two occasions that I know of when we ended up with dry pressurizers
23 . . . the pressurizer dry, on Unit 2.

24 • 894 201

25

1 CRESWELL: Ok.

2
3 HUNTER: I don't have any further questions, Jim.

4
5 CRESWELL: No, I think that that's all that I have.

6
7 HUNTER: Don.

8
9 KIRKPATRICK: No, I don't have any more questions.

10
11 RESNER: All right. Thank you very much for your time, Mr. Floyd.
12 This will conclude this particular interview. It should be noted the
13 interview was concluded at 4:55 p.m. Eastern Daylight Time, May 2,
14 1979.

15
16 . 894 202
17
18
19
20
21
22
23
24
25