

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

1 In the Matter of:

2 IE TMI INVESTIGATION INTERVIEW

3 of Michael J. Ross
4 Supervisor of Operations

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8
9 Trailer #203
10 NRC Investigation Site
11 TMI Nuclear Power Plant
12 Middletown, Pennsylvania

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20
21 NRC PERSONNEL:
22 Tim Martin
23 Dorwin R. Hunter
24 William H. Foster

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1 FOSTER: The following interview is being conducted of Michael J. Ross.
2 Mr. Ross is Supervisor of Operations at Three Mile Island, Unit 1. The
3 present time is 1:05 p.m. Today's date is May 19, 1979. The place of the
4 interview is Trailer 203 located immediately outside the South Gate of the
5 TMI site. Individuals present for the interview are Tim Martin and Dorwin
6 R. Hunter. Both Mr. Martin and Mr. Hunter are inspection specialists with
7 the offices of Inspection and Enforcement's Performance Appraisal Branch.
8 My name is William H. Foster. I am a senior inspector auditor with NRC's
9 Office of Inspector and Auditor and I will be monitoring the interview.
10 Mr. Ross was previously interviewed as part of this investigation on April
11 25, 1979. At that time Mr. Ross signed the Advisement Document. Mr. Ross
12 let me ask you again would you like a copy of the tape of this interview?

13
14 ROSS: Yes, I would.

15
16 FOSTER: Fine. At this point, I will turn the interview over to Mr. Hunter
17 and Mr. Martin.

18
19 HUNTER: Okay. Mike I'd like to cover a couple of general areas just to
20 get started and get ourselves thinking back on the 28th of March again...
21 this year. We had in some interviews we picked up some information concern-
22 ing the core... tank valves and it appears that early in the morning the
23 core flood tank valves were closed. The breakers had been... which... the
24 breakers are normally open and locked. Early in the morning the breakers
25 had been... the locks removed and the breakers closed and the core flood

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1 tank valve was closed. Were you are you aware of that condition existing
2 either when you came to the plant that morning or during the day, do you
3 recall the core flood tank valves being reopened?
4

5 ROSS: No, I don't. I remember discussions to let core flood tank valve...
6 or let the core flood tanks go in on top of the core later in the day.
7 That was somewhere around noon, I guess. I don't recall shutting the
8 valves or the reason for doing that. What time were they shut?
9

10 HUNTER: Okay. Mike, it was relatively early in the morning. It would
11 have been after 4:00 when the..., apparently when the pressure initially
12 had come down. The next question Mike is when you came on shift you actually
13 came over from Unit I upon request from Bill Zewe?
14

15 ROSS: That is correct.
16

17 HUNTER: Do you recall looking at the core flood tank valves at that time
18 as part of your catching up on information?
19

20 ROSS: No, I really didn't. There was an awful lot to be done at the time.
21

22 HUNTER: Okay.
23

24 ROSS: I did not specifically look at them.
25

1 HUNTER: All right. Let us pick up another general item as we go along.
2 In the afternoon at approximately,... after 12, 1300, there was a pressure
3 spike in the containment. Were you present and recall that particular
4 event?

5
6 ROSS: Yes.

7
8 HUNTER: Now can you give us your location at that time and what you recall
9 seeing or hearing or discussing at that time?

10
11 ROSS: Yes. I was near the console at that time and if we are talking
12 about the same time was around 2:00, sometime in that area. And at that
13 time we got a an ES signal and some of the components restarted, decay
14 heat, what have you. We got building isolation again and we took care of
15 that and we looked back and the control room operator said "Jeese the spray
16 pumps are running" and we looked back at the charts at that time. We saw a
17 fairly large spike on the chart and the exact pressure at this time I don't
18 know, ...it was around 30 pounds. My thought at the time and Miller was
19 out there with us and he questioned he said, "jeese you know I thought I
20 heard something, too." We are moving down the road there 100 miles an hour
21 and we looked at it and we said "Jeese the spike was so short it must have
22 been an instrument." That was our reasoning at the time. We reached over
23 and we said you can shut the spray pumps off now because the pressure came
24 right back to 0,... almost very, very rapid return and we shut the spray
25 pumps off. I now know the spray pumps were on about five minutes when

1 looking back because I did look back on that particular one. I personally
2 didn't associate it at the moment with any kind of explosion in the building.
3 I associated it with an instrument problem perhaps and I think so did
4 Miller at the time because we just went on to something else. It wasn't
5 until the next day that we thought about anything like that and started
6 looking back.

7
8 HUNTER: Mike, apparently during this specific period of time, Bill Zewe
9 was directing Fred Scheimann to open the EMOV block valve and at that
10 instant Bill was watching the containment pressure because that was the
11 controlling limit for opening the EMOV, watching building pressure, trying
12 to keep it below 4 pounds and let the cooling systems work. When he saw
13 the building pressure spike, did he turn to you or how did you,... did he
14 indicate to you that you had the spike or did you just pick it up?

15
16 ROSS: Well, the way we picked it up, we got ES actuation which isolated
17 the building again. At the time we did not have it.

18
19 HUNTER: Right. Okay.

20
21 ROSS: So everything, actually we knew we had something go up in pressure.

22
23 HUNTER: Did you and Bill talk at that time about that?
24
25

1 ROSS: Pretty much the same type of discussion that Gary and I had at the
2 time, Gary Miller. We kind of wrote it off. We said yeah, we had a spike,
3 but it disappeared awful rapidly, probably was an instrument. We just kind
4 of went on. You know, like I said we were going down the road 100 miles an
5 hour.

6
7 HUNTER: By passing by the particular event of building sprays and the
8 spikes, was that something that you definitely would not expect in this
9 plant or had never given any thought?

10
11 ROSS: Well, I had never seen this particular condition in a plant. I
12 don't think anybody has.

13
14 HUNTER: Did you, as you are in fact let's say, I want to ask you particu-
15 larly if during the use of the EMOV block valve specifically to control
16 pressure earlier in the day around noon, then it was decided to depressurize,
17 was there any discussion as far as any gases in the containment at that
18 time or were your thoughts that you were venting steamed and no hydrogen or
19 was hydrogen ever mentioned?

20
21 ROSS: No. The hydrogen really wasn't. Our main line of thought at that
22 time was to establish some sort of cooling. That is what we were really
23 concentrating on. Our goal was to get some kind of cooling to the core,
24 preferably some kind of forced cooling. Hydrogen? ,wwe never really thought
25 too much about to tell you the truth. We thought when we open that valve

1 we are going to lower the pressure, perhaps let the core flood tanks come
2 in and guarantee ourselves the core was covered here. We were concerned
3 the core wasn't covered. You really don't have a lot of instrumentation to
4 look at. We knew we were injecting. We knew that the cold legs were cold
5 and we knew the hot legs were hot, but there is no level instrument that
6 says hey, the core is covered. So our concern at that time was one to get
7 down to get some kind of forced circulation on that particular core, perhaps
8 let the core flood tanks go in and verifying that it was covered. That
9 kind of was our thinking. A hydrogen thought really never came to us, I
10 don't think, until the next day or even a day later maybe before we really
11 thought about it.

12
13 HUNTER: Mike, was the intent to get the core flood tanks and additionally
14 get decay heat on or was the thought to get the core flood tanks on and on
15 the way to getting decay heat on? I am trying to get a feel for... was the
16 original intent really to go to decay heat if you could, or actually...
17 core floods were in the plan getting to decay heat? Or was the thought
18 actually just to go down and get the core flood tanks on and like then go
19 to decay heat in that order?

20
21 ROSS: Well our thoughts in our discussions was one which would do both.
22 We had planned long term to end up on decay heat. That's where we were
23 headed and we thought on the way down we wanted to make sure we gave the
24 core a good shot of water and make sure it was in fact covered. There was
25 some concern in our mind that maybe high pressure injection was not going

1 through the core. I feel it did go through the core based on the tempera-
2 ture indications I have now seen and when we started the pump, but at that
3 time we weren't sure it was all going to the core.

4
5 HUNTER: Mike, the difference in the flow path for core flood and high
6 pressure injection, is that a different flow path?

7
8 ROSS: Yes, sir. High pressure injection taps into the reactor coolant
9 pump discharge piping. Core flood enters through a separate nozzle that is
10 shared with the decay heat removal into the core directly.

11
12 HUNTER: Mike, Hunter speaking. The core floods and the decay heat removal
13 are... would be your low pressure type injection system?

14
15 ROSS: Yes, sir. That is correct.

16
17 HUNTER: Another area that I would like, well, I'd like to start through
18 the events, and I hope that I am in order now so that as we go through, we
19 will try to move from time 0 working our way through that first day and
20 then I've keyed a couple issues that we could talk about. Okay?

21
22 ROSS: Okay.

23
24 HUNTER: In the morning when you came over there... the comment previously
25 was that the EMOV indication on the control board which... on the control

1 board you have indication and you indicated that the valve itself indicated
2 shut and that you had looked at that at the time. Would you go through the
3 indications again for me on what what you actually saw?

4
5 ROSS: Well, what you have on the console, you have a light and a brilliant
6 light indicates it has a signal that will open the valve. Okay, that light
7 was in fact in the "off" position. That was the indication we saw. So to
8 us, even though that it is not an actual position indication it is a signal
9 indication if you want to look at it from that standpoint. To me it indi-
10 cated shut.

11
12 HUNTER: You indicated that the reactor coolant drain tank is on the control
13 room board upright, but the indications and alarms are behind the control
14 board around the corner from the operators and that they can't see that
15 particular instrument, tanks, pumps and alarms. It is my understanding
16 that if they get an alarm on that board that it will flash and sound. They
17 will hear the sound, but they would have an annunciator that they couldn't
18 clear or that they had an annunciator that wasn't clear. The way they know
19 that that board is in enunciation, then is that they would have to go
20 around and see that that alarm was the one that they they weren't able
21 to... that that was giving an alarm they would have to clear.

22
23 ROSS: That's correct. And that same type of thing is also common in the
24 heating and ventilating panels which are around the back also.
25

1 HUNTER: Okay. Thank you Mike. On your way into Unit 2 control room, what
2 was your... did your path to enter the control room coming across from
3 Unit 1 to Unit 2, did you pass that... through as behind that... behind the
4 control board or did you come through across the turbine floor or in another
5 direction?

6
7 ROSS: I came from Unit 1 through the corridor and up the stairs into the
8 control room and I entered the eastmost door. I came directly across... I
9 never passed.... Even if you did come in the other door you would have to
10 deliberately kind of come around behind the panel to see that, but I didn't
11 take that path.

12
13 HUNTER: And that during that time frame you did not in fact go back and
14 look at it?

15
16 ROSS: Yes, sir. I never did look at it.

17
18 HUNTER: Okay. There were some readings taken on the reactor coolant drain
19 tank, on the power operated and the relief valve discharge temperatures by
20 a number of people, Ken Bryan was one, and he took readings that were in
21 the range of 2000 and the readings that he took on the computer indicated
22 that they were fairly close, a few degrees apart, but nothing gross or
23 nothing exceptional. Do you recall a look here, or having those readings
24 reported to you or do you recall discussing that?
25

1 ROSS: No. I really don't. Bill had said that about the time I got there
2 they had just closed the valve. That Ken had looked at some readings and
3 decided they ought to close the valve or close the block valve for the
4 valve really, and but he said it never indicated... at that time he said
5 that it to me that it never to him indicated open, but evidently it was in
6 fact, open.

7
8 HUNTER: Okay let me now try to clear up the jog job your memory a little
9 bit. Ken Bryan ended up going back to Unit 1.

10
11 ROSS: Sometime later he did

12
13 HUNTER: And Brian Mehler came in also, and Brian ended up staying on
14 Unit 2 and Ken ended up going on Unit 1.

15
16 ROSS: Right.

17
18 HUNTER: Brian was also involved by the way in those temperatures, I want
19 to make sure I don't want to --

20
21 ROSS: One time there was three guys. Mehler was there, Bryan was there
22 and as far as shift supervisors, Zewe was there. They were all there at
23 one time.
24
25

1 HUNTER: Okay.

2
3 ROSS: At that time we I kind of decided that we kind of left Unit 1 hanging
4 with a problem going so we ought to have someone go back up. So we sent
5 Brian back up in that he had the shift up there prior to this starting and
6 he was most current on information.

7
8 HUNTER: Did the readings... does readings on the power operated relief
9 valve and the safety valve discharges in the range of 200 to 230 even as
10 high as maybe 250? Was that unusual if you have a leaking valve?

11
12 ROSS: No, I don't think they're unusual if you have a leaking valve. I
13 think readings on the order of 2200 would indicate a leaking valve.

14
15 HUNTER: But not a valve that was discharging for instance.?

16
17 ROSS: That is correct.

18
19 HUNTER: The valve was apparently looked at that temperature and even
20 though they were above 200 in some cases. By looking at the computer data,
21 they finally ended up with, well Brian Mehler ended up, picking the tempera-
22 tures off at a specific time. I don't have any reason why it changed right
23 now, but it was like 260 above the relief valve so he... somebody said,
24 close the power failure relief valve, block valve and it was closed and it
25 turned out that was in fact the problem. In the previous tape and I want

1 to clarify something. At the time the power operated relief valve, block
2 valve was closed, okay, which occurs at 2.2 hours in that range, do you
3 recall the pressure transient or the events that occurred or the things
4 that you do recall seeing when the valve was closed?

5
6 ROSS: Yeah I basically just got there when that particular thing happened.
7 I was still trying to digest what was going on around me. A pretty fright-
8 tening sight walking into something like this. I am sure you can understand.
9 Right after it was closed, Zewe turned around and said, "Geeze, that was
10 it, the reactor building pressure is going down." So he figured he had
11 found where it was going at that time.

12
13 HUNTER: Okay, do you recall looking at the reactor coolant pressure at
14 that time yourself or was...?

15
16 ROSS: Yeah, it was when I first got there it was like oh, well, I don't
17 know 1,300 or 1,400 pounds maybe in that area. It was not high. It was
18 not extremely low. It was lower than we would like to see it, of course.

19
20 HUNTER: Okay. And in your previous statement we had gone through you did
21 not note the steam generator primaries you were actually concentrating to
22 the left side of the control board and you had discussions concerning
23 getting a reactor coolant pump started. Can you characterize those discus-
24 sions, the reason for getting the pump back on?

1 ROSS: Well, again I was looking for forced cooling any way we could get it
2 at the time. And I think throughout the next couple hours we have...
3 admittedly this is kind of vague but... We attempted to start various
4 reactor coolant pumps throughout the next period of time and throughout the
5 day we had worked on a reactor coolant pump interlocks the whole day. We
6 did get a pump started. I now know it started. There was some discussion
7 whether or not it was actually running at the time. It was one of the B
8 loop pumps. The time, 7:00 or 7:15. I don't know, but of course it ran at
9 100 amps.

10
11 HUNTER: Okay, and we, in fact, looking at the pressure curve that for wide
12 range pressure we, in fact, can in fact, key on to the point where the pump
13 started, and realize now that it was the 2B pump I think.

14
15 ROSS: 2B loop pump, that's it.

16
17 HUNTER: But you had at that time to start the A pumps first?

18
19 ROSS: We were trying all along to start the pumps.

20
21 HUNTER: There is a point though on the pressure curve where you indicated
22 that you were increasing and the chronology that you were increasing pressure
23 and still bleeding through the EMOV. Was that the EMOV block valve? From
24 here to here pressure is increasing, and the attempt was apparently to
25 increase pressure?

1 ROSS: The intent was to increase pressure as high as we could get. We
2 were still trying to get a reactor coolant pump, trying to suction of the
3 pump. That was what we were trying to do at the time.

4
5 HUNTER: And let us go back and talk about the EMOV block valve a moment.
6 During this time a couple of things we need to touch on, was was the EMOV
7 block valve the mechanism that you are using to open and close or to open
8 to maintain pressure and/or to bleed the reactor coolant system and high
9 pressure injection flow to the reactor building? Were you actually going
10 through using the EMOV for that purpose?

11
12 ROSS: I believe it was shut.

13
14 HUNTER: Blocked like?

15
16 ROSS: Yeah I think believe it was shut during the initial pressurization.
17 Then we opened and then we had some control problem and that prompted us to
18 go to electromatic relief control which is very coarse as you see there,
19 very coarse.

20
21 HUNTER: All right let me ask you, the electromatic relief control and you
22 are saying electromatic. Were you then using not the block... the MOV
23 block valve is a motor operated valve that pull open, pull closed is not a
24 throttled. It is just opened and closed.
25

1 ROSS: Yes, that is correct.

2
3 HUNTER: Now looking at the electromatic relief valve the EMOV, the RB2
4 valve, did you use that during the day? Or was it still failed?

5
6 ROSS: We actually opened and closed that during the day and used that
7 valve to my knowledge. Now I could be wrong on that, but I'm almost positive
8 that this whole period here that we were using.

9
10 HUNTER: It was actually working?

11
12 ROSS: Let me think on that a minute.

13
14 HUNTER: I'm trying to

15
16 ROSS: I know what you are trying. I am trying to remember it too, to tell
17 you the truth.

18
19 HUNTER: Well, I guess the question comes back, was the RB2, the electro-
20 matic relief valve actually failed in the open position and did it stay in
21 the open, or did it actually become operable at some time?

22
23 ROSS: And I'm not sure Dorwin to tell you the truth. My recollection is
24 that we cycled that valve.

1 HUNTER: Do you know who was actually performing that activity?

2
3 ROSS: Yeah.

4
5 HUNTER: As for cycling the valve on the panel was it like a Ed Fredrick
6 was on the panel? Fred Scheimann was on the panel? Bill Zewe, of course,
7 probably was close to the panel.

8
9 ROSS: Close to the panel. Bill didn't actually do any of the valve cycling,
10 I don't believe. It would either have been Fred or Ed to my knowledge and
11 they would know which one they opened.

12
13 MARTIN: Could that be Don Olson?

14
15 ROSS: Denny Olson.

16
17 MARTIN: Denny Olson?

18
19 ROSS: After 7:30 or so it could have been. Yes, sir.

20
21 MARTIN: Maybe I can help jog your memory. You were controlling pressure
22 in a fairly tight band initially at this pressure and it appears that near
23 the end of it we opened up the band.

1 ROSS: Right.

2
3 MARTIN: There was some overt decision made because of a possible concern
4 maybe that will help you.

5
6 ROSS: We were concerned that we were going to fail the valve we were using
7 and then have a real problem. We would have no control.

8
9 MARTIN: Which valve were you using?

10
11 ROSS: I am saying that it is the electromatic relief valve.

12
13 MARTIN: Okay.

14
15 ROSS: What do they say? I never thought about it.

16
17 HUNTER: No. We have had different

18
19 ROSS: Admittedly I was looking, you know, to put in the proper perspective
20 from a distance and I could not tell knowing where the controls are. They
21 are both within inches and I never really verified when a guy goes to
22 operate which one it was. I assumed it was electromatic. I never questioned
23 it to tell you the truth.

24
25
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1 MARTIN: Tim Martin again. To your knowledge was the pressurizer vent
2 valve ever used?

3
4 ROSS: The pressurizer vent valve was used.

5
6 MARTIN: Do you know when in the sequence of events it was used?

7
8 ROSS: It was used early, but what time, I can't. It was used, yes.

9
10 HUNTER: Another question. Hunter speaking Mike. Was the spray valve used
11 to your knowledge for any purpose either during the day or without reactor
12 coolant pumps realizing that the spray valve would maybe not have provided
13 specific control as it did with the reactor coolant pump on, but was that
14 tried at any time just to provide a flow path?

15
16 ROSS: Yes, that was tried. We discussed... and timing is awful hard...
17 We discussed possibly getting a flow path somehow through that valve maybe
18 trying to get some circulation. We were looking for any kind of thermal
19 circulation that we could get at the time.

20
21 HUNTER: Would you describe, Mike, the flow path of the spray valve, the
22 flow path that you were looking for?

23
24 ROSS: This flow path is from the discharge of the reactor coolant pump to
25 the top of the pressurizer. That's some of the discussions we had if we

1 get any kind of circulation at all in the loop it would help to break up
2 any voids we had and I don't remember what time that was on my part. I
3 thought it was later in the day, and then earlier, and that's what we were
4 looking for anything we could get, get any kind of a path.

5
6 HUNTER: By opening the spray valve then what would the actual flow path
7 be?

8
9 ROSS: Discharge to the pump or even backwards. It didn't make any difference
10 to us. Discharge of the reactor coolant pump to the top of the pressurizer.

11
12 HUNTER: And then out the power operated relief valve or the block valve?
13 Flow path through that?

14
15 ROSS: Okay, then we touched base already... This is Hunter speaking
16 again. Initially, after the pressure at approximately 9:30 to 10:00, the
17 pressure was in fact increased to a band of around 2,000 to 2,100 pounds.
18 The pressure band was, in fact, fairly tight. The fellows were maintaining
19 like 2,000, 2,100 and then later on the pressure band was expanded to say
20 cycling the valve whichever valve it was. Okay? At this time with the
21 pressure, the cycling of the valve was very apparent. Does the cycling of
22 the valve indicate that high pressure injection flow was in fact substantial
23 during this period of time?
24
25

1 ROSS: Well, I would like to think it does. Yes.

2
3 HUNTER: Do you recall high pressure injection flow during this particular
4 period of time?

5
6 ROSS: Yes. High pressure injection flow was never purposely secured at
7 all throughout this day for more than... there was a discussion point of a
8 couple of minutes where it may have been off, but throughout the rest of
9 the day, Miller would not allow it to be secured.

10
11 HUNTER: Mike can you go back to the earlier morning and characterize the
12 thoughts about high pressure injection in the time frame of when you came
13 into the control room approximately, 7:00, 6:30 you came to Unit 1 and at
14 6:30 they called you. So around 6:45 or so in that range. You were in the
15 control room and you were getting the status. What was the posture at that
16 time in relating to high pressure injection?

17
18 ROSS: Well after I come in as I previously stated, I was not real sure
19 what high pressure injection was, but I did see some things on a source
20 range that bothered me. Things that bothered me was that counts were a lot
21 higher than they should have been. And I asked Zewe about emergency bora-
22 tion and he said, "yeah, he was," and I asked him was he injecting and he
23 said, "yeah, he was," and I looked up they were in fact injecting. Now
24 there was movement on the panel at the same time. I can't guarantee that
25 they didn't just start, but I think they started boration pumps at the same
time.

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1 HUNTER: You indicated

2
3 ROSS: Boration

4
5 HUNTER: Right. Okay. Hunter. You indicated earlier they looked like
6 about 200 gallons per leg at the time.

7
8 ROSS: Right and then shortly thereafter they cut back some.

9
10 HUNTER: All right 200 gallons per leg and that would be for four legs is
11 that true?

12
13 ROSS: Right.

14
15 HUNTER: And they did in fact throttle back after th

16
17 ROSS: Yes, sir.

18
19 HUNTER: Okay. What was the positive force throttling back? Would whould
20 they throttle back to a specific number or a general amount of high pressure
21 injection?

22
23 ROSS: Well, there is no specific number. Okay, at that time we didn't
24 know how much high pressure injection we needed. The intent, the point
25 there was to keep from taking the plant up all the way through the code

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1 safety valves, so, they would have some high pressure injection all the
2 time. Later on we did discuss, I don't know if we've told you exactly how
3 the discussions were held, but most of our discussions were held in the
4 shift supervisor's office and closed rooms so we didn't have any noise. We
5 discussed whether or not we wanted to pump water through the code safeties.
6 At that time we decided it wouldn't really benefit us and we weren't real,
7 real sure how the code safeties would respond to water through them or how
8 they would remain after we put water through them. So, at that point we
9 decided we wouldn't purposely, at this time, put water through them. B&W
10 was advised and by that time they were onsite.

11
12 HUNTER: Mike? At that time did you fellows establish a minimum amount of
13 high pressure injection that you would accept at all times? Gary's decision..
14 here a note that the decision was based on some fact. Do you recall what
15 that was?

16
17 ROSS: Yeah, he... our guidelines is a point... there was... we were trying
18 to keep some high pressure injection going all the time and we gave him a
19 number of around 400 gallons with a minimum of 4 to 6 and where that number
20 came from we don't know. Later on in the day, we did get a numbers from
21 B&W says keep the 400 gallons on. We did not have that number that early
22 in the morning.

23
24 HUNTER: But are... is it your understanding that they maintained in this
25 range of 100 gallons per minute per leg or if it they have one pump on, the
pump will put out 500 gallons a minute.

1 ROSS: That's that's correct.

2
3 HUNTER: But if what would your impression be for injection if they had one
4 pump on?

5
6 ROSS: Well, we initially started out injecting all high pressure injection
7 legs. Later on in the day we discussed whether or not we were shore circling
8 some of the high pressure injection. Our concern being that maybe we were
9 going back through the letdown line, maybe we had a leak in a letdown line,
10 you know... unknown. We wanted to ensure that the injection was going
11 through the core. At that time we started to inject just two legs at a
12 higher flow rate. That is what I remember.

13
14 HUNTER: Thanks, but the with the total flow would it be equal to that
15 which you are injecting previous to that one?

16
17 ROSS: Yes, sir.

18
19 HUNTER: Okay. There is a comment that... changing the subject a little
20 bit at this time... that still... sometimes the time sequence... I think
21 your comment earlier Mike was that when you came in and during this time
22 period basically you really weren't steaming much out of the A steam gener-
23 ator. In other words you really weren't having to feed the generator. You
24 really weren't steaming. Decay heat wasn't being released through that
25 path. If I recall your...

1 ROSS: Yeah, I thought it was.

2
3 HUNTER: But, okay that was your feeling?

4
5 ROSS: Yeah.

6
7 HUNTER: During this time also, you comment that you had lost the auxiliary
8 boilers and lost vacuum. Can you recall in the time frame... apparently
9 they had lost the auxiliary boilers and lost the vacuum on Unit 2, once,
10 maybe twice. Can you... do you recall that particular sequence of how many
11 times you had problems with vacuums, for instance?

12
13 ROSS: Well, we had problems with boilers on and off. Okay, early in the
14 morning we didn't have boilers at all and some time before noon, we actually
15 broke vacuum or much before noon probably 10:00. I don't know. We broke
16 vacuum on Unit 2. We actually secured seals and what have you. There
17 was no way of maintaining a vacuum because we could not get sealant steam
18 over from Unit 1. At that time our removal path would have been steaming
19 the A generator directly to the atmosphere. There was some concern about
20 that and we did take some samples and some monitoring up there. And later
21 on we were ordered to close that particular path off for fear that maybe we
22 were putting something out although we knew the A generator was intact by
23 then and we knew that whatever we were putting out of the atmospheric dump
24 on the A side was in fact clean steam, and not contaminated or radioactive.
25 We knew that from the samples up there and from flyovers up there.

1 HUNTER: Do you recall then when you regained the vacuum back?
2

3 ROSS: Well, Gary left for the Governor's Office and one of the last things
4 he told me prior to leaving was not to open the atmospheric relief valve
5 any more. Which I did and so with not being able to open it we pursued
6 rapidly getting a vacuums. So sometime in that area we reestablished the
7 vacuum from Unit 1's auxiliary boilers. Then we went back steam in the
8 condenser shortly thereafter with the A generator, keeping the B generator
9 bottled up.
10

11 HUNTER: Okay. We would like to get your comment in an area that B&W
12 was... in the person I believe Rodgers who was in actually, there early in
13 the morning and was a member of your group in the shift supervisor's office...
14 You indicated that you were, in fact, receiving advice or including him in
15 the decisions. Do you recall the advice path that was the advice that you
16 were taking through Lee Rodgers or do you recall who Lee was actually in
17 contact with or was he in contact with anyone?
18

19 ROSS: Lee did talk personally I think maybe once, but normally he was not
20 at the black phone talking to B&W. I am not sure who he had talking
21 to B&W either John Flint or Greig Shadell one of the two guys that probably
22 communicate with B&W. He was trying to get the phone and he did establish
23 phone communication with them sometime that morning. Time unknown.
24
25

1 HUNTER: There was a decision and again a group decision to go from a high
2 pressure to a low pressure condition as we discussed. That you indicated
3 was a difficult decision and B&W was involved, they had all kinds of people
4 helping it. Can you characterize that decision and give us an idea of the
5 things that you fellows were concerned about and what made it difficult?
6

7 ROSS: Well, it was difficult in our mind that, one, we were purposely
8 going to let an awful lot of steam to be produced in boiling,... We, you
9 know, we had to do some boiling at the time. Maybe that is good and maybe
10 that is bad. It is particular where you are sitting I guess. We knew we
11 were going to dump a lot of something to the reactor building. The reason
12 we felt at least I felt that that was the path to go at the time, was based
13 on a couple of things. One, we were running out of water in BWST and we
14 hadn't gained an inch. I mean we hadn't gained any headway in where we
15 were trying to go our goal being one to establish some mode of cooling a
16 reliable mode of cooling to the core. Two, we, at least I wasn't sure that
17 we purposely or we in fact had the core covered and all high pressure
18 injection was going through the core. I was not totally convinced. I
19 didn't have anything to tell me. Hey, high pressure injection is in fact
20 going through the core. So based on that, we discussed going down with the
21 goal being one, to let the core flood tanks come in and verify that yeah,
22 the reactor was in fact covered, two, give it a drink of water. That is a
23 little coarse I know, but give it a drink of water if it wasn't getting it,
24 and maybe go on decay heat removal which is a forced mode of cooling. That
25 is what we were trying to do at that time.

1 HUNTER: The decision being difficult. Was there... was it a heated discus-
2 sion?

3
4 ROSS: No. I --

5
6 HUNTER: Very well, I don't....I'm not looking for any arguments or anything,
7 I understand, was it very completely batted around, everybody involved?

8
9 ROSS: Yes it was batted around, in fact there were NRC people in the room
10 during this discussion.

11
12 HUNTER: Do you recall the fellows who were there at that particular time.

13
14 ROSS: They just kinda of drifted in and out through the day. You know the
15 faces, but I think Jim Higgins was there and..., I don't know all the
16 fellows, I do know our normal team, I'm pretty sure Jim was there or running
17 around at that time.

18
19 HUNTER: Alright, Mike. In this time frame was there discussions... the
20 pressure was high, it was solid, the system was somewhat... indicated
21 solid, at least you were having to control pressure, meaning that you
22 probably had an adequate amount inventory back in the coolant system, you
23 had charged an enormous amount of water back in there. Was there discussions
24 during this time for starting the reactor coolant pump? Do you recall any
25 discussions like that, or was it considered I guess is what I'm trying to
say?

1 ROSS: Yes it was considered, and there were negotiations going on as to
2 what pump to start... all day we talked about pumps and at interlocks and
3 things. Then we talked to B&W about what pump would be best to start and
4 we finally did get one.

5
6 HUNTER: There is two ways to have forced cooling right? Latter on in the
7 evening, of course the pump lost away then to. What about in this time
8 frame when you also had pressure... there is a significant difference...
9 and I think with it there's no problem... the difference is in this case
10 you are having to control primary system pressure and temperature with the
11 power operated relief valve. It makes it apparent that you in fact have no
12 natural connection established for the steam generator because you could
13 not use the steam generator to control the saturation temperature and
14 pressure. At this time it became obvious that the A generator in fact was
15 doing its job to some degree.

16
17 ROSS: It became obvious slightly before that time, we saw indications that
18 we were in fact getting some temperature change across the loops.

19
20 HUNTER: Ok, I,... go ahead just a second. Let me pursue this one step
21 further, I think..don't want to leave you either, but what I'm interested
22 in is that your indication was that you had in fact started the pump,
23 bumped the pump, and then there seemed to be a continuing effort to get the
24 pumps on, out in here you were sitting at a condition that you might have
25 been able to start a pump, but what was the problem with the pumps, was it

1 the interlocks or did somebody indicate that you really had rather go to
2 core flood and decay heat rather than trying start the reactor coolant
3 pumps.

4
5 ROSS: I think our at least my feelings were and I never pursued, it... we
6 had pursued it with B&W to get pumps ready to run but at that point we
7 still had no indication that we had any water on the loops. T^h hadn't
8 changed, T^c had not done anything. I'm saying that there was no real
9 indication to us that its loops were filled and I don't think that they
10 were full at that time.

11
12 HUNTER: An then are you saying that the overall discussion at that time
13 would have been to not start a pump or go to decay heat rather than start a
14 pump?

15
16 ROSS: Yes, at that particular time I would say the reason, at least I
17 felt, you know, there was a lot of people involved and a lot of people
18 thinking different things, six to eight people involved... what I thought
19 triggered me that the next step was a reactor coolant pump was the fact
20 that they all had seen temperature change in the loop, now I know it had
21 water in that loop at least some kind of circulation in that loop, at least
22 pumping, I could make it start pumping and that happen somewhere down the
23 stream after we lowered the pressure and we did in fact see a temperature
24 change.
25

1 FOSTER: Let's take a break and change the tape, the time is 1:49 pm.

2
3 FOSTER: This is Foster were going to continue with the interview of Mr. Ross,
4 the time is 1:57 p.m.

5
6 HUNTER: Okay, Mike we had discussed the decision to depressurize and go on
7 core flood and decay heat as a forced, as a core flood to put water into
8 the core to assure that the core had water and the decay heat to provide a
9 forced cooling mechanism. Okay. During the time period that we had depres-
10 surized to a lower pressure and we were sitting at 500 lbs in the afternoon
11 and you were apparently alternating the water through two legs and then
12 through the other two legs in an attempt to vary the core flow, the flowpath
13 through the core from the high-pressure injection system. Was there any
14 other reasons that you are aware of that you were actually alternating the
15 legs?

16
17 ROSS: One time we got indication that yeah, we were in fact lowering the
18 temperature on T_h and raising the temperature on T_c . The thoughts then it
19 would do the same thing with the other loop. That was later in the after-
20 noon. That would be the only reason to change our mode of what we were
21 doing. We did in fact keep high-pressure injection going throughout all
22 times even though we alternated legs. The idea of being we were removing
23 the steam, we were putting water in the core and our hopes being that yeah,
24 it was in fact going through the core. I still feel it did go through the
25 core based on the temperatures of the loops and the reactor when we started

1 the pumps up. Till this day I still figure most of the flow or a good
2 percentage of the injection flow did in fact go through the core. I based
3 that on the fact of what the T_c temperature was when we started to pump.

4
5 HUNTER: Okay. Later in the afternoon Mike, you had set on core flood you
6 were not able to get down decay heat apparently. Would you,... can you
7 clarify your meetings, discussion and the reason that you fellows, decided
8 then you would have to depressurize rather than go on decay heat?

9
10 ROSS: We were discussing repressurization based on the fact that now we
11 did see some temperature change and the goal all day was to get a forced
12 mechanism flow and those discussions were never finished before Mr. Herbein
13 call us and told us to take it solid. That helped that decision a lot,
14 made it easier and we started to take her solid.

15
16 HUNTER: Can you characterized his,... I assumed that Gary Miller, Mike,
17 talked to you specifically since you were his operations representative.
18 Can you characterize what Gary,... the order or the discussion that Gary
19 gave to you concerning going back to the solid?

20
21 ROSS: Gary told me quite simply take it solid. He said Jack wanted it
22 solid and he wanted it now. Please to do it. So I did it.

23
24 HUNTER: At this time you indicated two makeup pumps, maximum high-pressure
25 injection and taking the system back solid. Again my understanding through-

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I think then as I said

1 out the afternoon is that the high-pressure injection system had... the
2 high-pressure injection flow had been maintained. Do you fellows at that
3 time feel like you were cooling the core or were you still attempting to
4 get down to the decay heat removal system?

5
6 ROSS: Well, I think then as I saw the temperature, I felt that we were in
7 fact cooling the core. I think our discussion was cut short by Jack's
8 order to take the plant solid, really is what happened there. I believe
9 that our goal would have been the same as his in the end, to go back based
10 on that and take her solid and start a pump, based on the fact that it
11 looked like we had something going through the loops now.

12
13 HUNTER: Did you in fact, were you in fact, able to get down to a pressure
14 where you might consider going on decay heat?

15
16 ROSS: No I,... we had discussed making a mad dash and trying to open
17 valves but we felt that it was really irresponsible maybe to do that, the
18 possibility of lifting a relief valve or doing something other and put us
19 in a worst condition. Decay heat pressure has to be less than 400 lbs, you
20 know were talking like a 340, 350 lbs, we never really got below 400 lbs I
21 don't think.

22
23 HUNTER: Mike, we, through the interviews we,... it was revealed that
24 someone went down and opened up, closed a electrical breaker, the electrical
25 breaker on.. Carl Defley went down and closed the electrical breaker on the

1 decay heat suction I think, DH108 valve or whatever the number it is, were
2 you.. do you recall him being directed to do that?

3
4 ROSS: We had directed people to make sure that if we got down to decay
5 heat we did in fact have everything powered and everything ready to go. So
6 it could have been out of a result of that. Their thoughts being, you
7 know, you get down there in decay heat and you are ready to go and now a
8 valve won't open because the breaker is open so ..

9
10 HUNTER: I'm going to get you some... the interviews revealed that Carl
11 went down there 9:00 in the morning, it was early, and that he in fact
12 ended up contaminated, not because he walked in water, but he indicated
13 that he was in a 1R field and closed the breaker and he left, he wasn't
14 there ten minutes, he indicated he only received like 60 mR on his pencil
15 reading dosimeter. The thoughts were that early in the morning to go on
16 decay heat or align so it would be ...?

17
18 ROSS: Our thoughts were to make sure the decay heat would work, I believe
19 that early in the morning I don't remember it at 9:00, but the thoughts
20 were that the... we are going to need this system lets make sure its ready.
21 That was a least our thinking along those lines.

22
23 HUNTER: Okay. Lets talk about,... Ken you have any comments you'll like
24 to cover, I'll like to go to letdown flow, I'd like to go to the letdown
25 flow system, if you have any question you'd like to get involved with
first?

1 MARTIN: Tim Martin might? I understand that you weren't in the Control
2 Room till about 6:30, 6:45, but...

3
4 ROSS: I'm not sure of the exact time.

5
6 MARTIN: You might be aware of some discussions or explanations of things
7 that occurred prior to that time, specifically I'm interested in what was
8 done after tripping the last reactor cooling pump in the loop at approxi-
9 mately 100 minutes into the event? I'm trying to find out why pressure
10 dropped very drastically at that point. Do you have any ideas?

11
12 ROSS: Not at all, couldn't even begin to come up with a postulation.

13
14 MARTIN: After you arrived, a pump was started, I believe in the B-loop, it
15 was run for approximately 19 minutes and during this period we went to the
16 site emergency and we had all sorts of radiation alarms. I think we did a
17 lot of things but at the end of that time we tripped that reactor coolant
18 pump. What actions were taken? Do you remember any specific actions that
19 were taken when the reactor coolant pump was tripped around 7:13, 7:14 in
20 the morning?

21
22 ROSS: Specific actions? None to specific we had quite a discussion worrying
23 about whether the pump actually ran. First of all the discussion, some
24 people said the pump didn't run, and we were pretty well convinced that it
25 pumped steam, I think. At that point, we decided to keep injection going

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1 and increase pressure and try to cool through the high-pressure injection
2 mode. It was kind of our goal line, I really don't know what your looking
3 for ... I don't remember anything specifically.

4
5 MARTIN: During the next three hours pressure shows the general downward
6 trend until the decision was made to repressurize and go on the EMOVs. Do
7 you remember any activities that occurred during that period of time, from
8 the time the reactor coolant pump was tripped, until you decided to pressur-
9 ize and operate off the some vent mechanism?

10
11 ROSS: There was a lot of things about generator level, during that time we
12 were trying to get some sort of actually circulation, I think we had changed
13 generator levels a couple of times, we've gone to 95%. We pretty much
14 tried everything on the secondary side to get something going for us. On
15 the primary side I don't remember anything specific other than letdown.

16
17 MARTIN: Another period of time which is of interest to us is after the
18 reactor building spray pumps started. There is a period of a very general
19 increase in pressure until the decision was made to take the plant and
20 start a reactor coolant pump. Can you give me an explanation of what was
21 occurring during that period of time?

22
23 ROSS: No, I really can't. We had talked about core flood tank pressures
24 during that time. We had talked about even the possibility of increasing
25 those pressures slightly. Then we decided that maybe that wasn't the best,

1 the total best thing and that you could possibly get nitrogen into the
2 system. We had discussed with B&W whether or not we ought to increase core
3 flood tank pressure all day; but you did trigger something there. I do
4 remember something. We had talked about increased nitrogen pressure back
5 some point in between there, and I don't know exactly why right now, to
6 tell you the truth sitting here, but we had talked about it and talked with
7 B&W.

8
9 MARTIN: Was this for the purpose of possibly causing more core flood tank
10 injection?

11
12 ROSS: Yeah. Some of the thoughts were to insure that we kept good... we
13 had to keep water going in. We knew the core, at least we felt the core
14 was totally covered. So then we felt we couldn't be in too bad of shape as
15 far as uncovering of core. We still felt we had to cool it, but keep it
16 covered while we were cooling it.

17
18 MARTIN: Following the decision to depressurize, at around noon, you dropped
19 down and pressure finally bottoms out, on this chart slightly under 500.
20 We believe this is a little high. It probably is around 450.

21
22 ROSS: It probably is.

23
24 MARTIN: An hour later, pressure has been fairly stable, we're told that
25 the EMOV, the electromatic relief valve, was opened. Do you know why it

1 would be opened at that point? Are we now trying to get down on to decay
2 heat; is that the attempt here?
3

4 ROSS: Well, the way we got all the way down, was by opening a release path
5 on out.
6

7 MARTIN: We've been sitting now for at least thirty minutes though with
8 pressure fairly stable. The fact that the EMOV could be opened if it had
9 to be shut at that point. So we've made another overt decision. Are we
10 trying to do something different, are we trying to make this quick run down
11 to decay heat? Is that the potential--is that what we are doing?
12

13 ROSS: I'm not sure exactly what that is, Tim. We always had the goal at
14 one time to get on decay heat. That didn't change. I'm not aware of
15 anything there. We may have opened a vent on a pressurizer to try to
16 depressurize, but I'm not sure of that. I don't have any recollection of
17 that.
18

19 MARTIN: Let me not deceive you. As you recognize, reactor pressure is a
20 gauge device. This happens to also correspond to the increased pressure in
21 the primary system or in the reactor building. If you measure that spike,
22 it exactly corresponds to what the reactor building did in the opposite
23 direction. So this is simply the gauge reflection of that device. But we
24 also have reports that the EMOV was operated at that point.
25

1 ROSS: I don't have any recollection. I'm sorry. I wouldn't know what
2 that would be.

3
4 MARTIN: What widely used T_h instrumentation do you have available to you
5 normally in that control room?

6
7 ROSS: Wide range T_h --really none. When you say wide range T_h ...

8
9 MARTIN: Is there not a multipoint recorder on the back panel that goes all
10 the way up to 800° , and did anyone ever try to use that to see where T_h
11 went when, in fact, the local recorder went off-scale?

12
13 ROSS: I don't have any recollection of every looking at that. We did have
14 Ivan Porter in. I reported looking at alternate instrument modes. I don't
15 remember him looking at that either.

16
17 MARTIN: At any time during this event, did anyone examine a steam tables?

18
19 ROSS: Yes. Steam tables are placed on the table--at times hard to recog-
20 nize--but they laid on the CRO's desk on and off, and what time we put them
21 out I don't know. We did get steam tables.

22
23 MARTIN: At any time did the information from the steam tables become part
24 of the decisions that were being made?
25

1 ROSS: Yeah. But I don't think that happened until some time later. Once
2 we pressurized up and we looked at some other things, we actually used them
3 to determine what we were going to do with the parts pressurizer level
4 later on in the night. I don't recollect we looked at temperatures vs.
5 pressures. That was discussed and we knew that we'd have to have an awful
6 lot of pressure to fill everything back up based on what temperatures we
7 felt we had at that time. They were discussed. Lee Rogers had looked at
8 them and he kicked them around. I can't put a finger mark on the time.

9
10 MARTIN: Do you know maybe a reason why the control room ventilation would
11 not shift automatically to a recirc mode on high radiation level, high in
12 particulate?

13
14 ROSS: High particulate? No, I don't know of any reason why not.

15
16 MARTIN: Should it not, in fact, shift automatically?

17
18 ROSS: I'd have to look. My recollection is that once you do get on it, it
19 will, in fact, do it totally automatic on Unit 2.

20
21 MARTIN: We believe that the system had to be put in manual. Did anyone
22 verify when people were forced into respirators, that the system, did in
23 fact, trigger into a recirc mode, and if it did, how did the high activity
24 come to exist in that control room?
25

1 ROSS: That I'm not sure of, and yeah, as soon as we had to go into masks,
2 the ventilation system was checked. One of the shift foreman was sent to
3 check that. I'm not sure right now who that was, but someone was sent. We
4 were told that she was in full recirc. The only thing we could figure is
5 possibly just due to some air exchange--maybe pumping something in from the
6 turbine building. We then later dropped the turbine building ventilation
7 to help with that problem. We thought maybe the turbine building was
8 sucking air in, and we had a zero outside wind speed, so air we were putting
9 out was virtually on top of us. We felt maybe we were sucking it right
10 back in our turbine building ventilation and getting some exchange possibly.

11
12 MARTIN: At approximately 2:30, Mr. Miller, Mr. Herbein, Mr. Kunder went to
13 the Governor's Office and who was in charge at that time?

14
15 ROSS: Joe Logan is the superintendent. He should have been in charge. He
16 was in charge at that time.

17
18 MARTIN: Who was in charge of operations in the plant?

19
20 ROSS: I still ought to be there. I was still there.

21
22 MARTIN: Okay. Did you receive any communication, approximately 4:00,
23 while these gentlemen were still gone from Mr. Hitz, who was in Unit 1
24 control room at the time, relative to an NRC concern that the T_h , RTDs, the
25 in-core thermacouples, could, in fact, be correct that they indicated a
super-heat condition and that there was need to get the core recovered.

1 ROSS: No. I recollect nothing on that.

2
3 MARTIN: Who would have received that communication over the so-called hot-
4 line. If I remember correctly, it's a multi-colored phone, black and
5 white, or something like that?

6
7 ROSS: Well, it could have been either a shift foreman, a shift supervisor
8 or one of the control room operators. They would be the only ones, normally,
9 who would answer that particular phone, normally.

10
11 MARTIN: Do you remember anyone utilizing that phone around 1600 that day?

12
13 ROSS: No. It was used on and off all day.

14
15 HUNTER: You had mentioned earlier that the high pressure injection flow
16 had been dictated by Gary Miller to be maintained. Your comment earlier, I
17 think, was that later on some word came from B&W or somewhere to maintain
18 400 gallons per minute or greater. Where did you get that information
19 from?

20
21 ROSS: I'm not sure. That information kind of showed up. You know how
22 things were, but we were told that there was,... at least I heard that said
23 and I don't even know where it came from,... 400 gallons was the minimum in
24 the cooling pump.

1 HUNTER: Mike, during the daytime, Ivan Porter was in, I think the inter-
2 views have shown at this time that Ivan was looking at some RTD data,
3 resistance, and showing temperatures in the range of 725, 700. Also, if my
4 understanding is correct, that John Flynt was there and Ivan Porter was
5 looking at some thermocouple data also.

6
7 ROSS: John Flynt was there. I know Ivan was looking at some data--exactly
8 what he was looking at for John Flynt, I'm not sure.

9
10 HUNTER: Okay. Do you recall in the discussions, think tank discussions,
11 that the thermocouple temperatures were, in fact, brought up in the discus-
12 sions?

13
14 ROSS: Thermocouple temperatures were brought up to Gary Miller, and I
15 guess the bottom line they got out of that, was that they were not conclu-
16 sive. It showed the core was hot, basically. I was going to say his range
17 varied, very scattered. He had like... He was saying he had various
18 temperatures scattered throughout. So, well, Gary and he discussed it, and
19 basically I think the bottom line was yeah, the core is hot, or it is at
20 least hot.

21
22 HUNTER: Okay. Can you give me a rundown of your understanding of the
23 natural circulation requirements on the B&W once through generators? What
24 are the requirements to establish natural circulation?
25

1 ROSS: Well, as far as requirements, we have a setpoint already programmed
2 into our control systems that takes the steam generator levels to 50% in
3 both units in loss of reactor coolant pumps; so our training had indicated
4 that a man should have 50% level to go into natural circulation. As far as
5 whether or not you can get natural circulation with a void in the primary
6 system, in honest, I don't think we've ever really sat down and discussed
7 that problem in great detail. I don't think anybody in the industry has.

8
9 HUNTER: Mike, in a number of procedures, there is a minimum temperature
10 and pressurization curve, and it has a number of points on it. Part of it
11 is the buildup to transition temperature pressure relationship; also, it
12 has a saturation pump operability curve. Did you fellows have that out
13 during the daytime during the, in the think tank or were you looking at
14 that particular MPT curve?

15
16 ROSS: We looked at it later in the day. During the early part of the day,
17 the control room operators had it on constantly. Specific discussions on
18 that were later in the day as I remember. We talked about the possibility
19 of possibly being outside of that curve later on.

20
21 HUNTER: Okay, Mike. I'd like to clarify a couple of things concerning
22 letdown flow. We discussed this earlier and one of the comments is that
23 early in the morning the letdown flow became low and you started having
24 problems with it. One of the things that you commented on is that you had
25 isolated the letdown flow and had noted the relief valve lifting flow

1 spikes and also noted water being dumped into the bleed tanks, so that you
2 apparently were fairly certain that you were getting water down to the
3 relief valve at that point. You indicate isolating letdown flow. Would
4 that have been a manual operation--do you recall?

5
6 ROSS: Well, letdown flow can be isolated automatically on building pressure--
7 the major valves--but the valves that were shut later on during the day
8 were manual valves like the inlet demineralizers, that type of thing.

9
10 HUNTER: Okay. Isolating the letdown flow downstream of the relief valve
11 in your system, would appear to be a manual operation..

12
13 ROSS: It is a manual operation.

14
15 HUNTER: Would I understand that the isolation that occurred at that time
16 would have been a manual operation?

17
18 ROSS: It would have been manual from the control room--pushbutton.

19
20 HUNTER: Which valve would you have then closed?

21
22 ROSS: It should be the inlet to the demineralizers.

23
24 HUNTER: Okay. The inlet to the demineralizers being closed now to replace
25 the relief valve on the reactor cooling system, basically with the orifice
opened or the bypass opened.

1 ROSS: Yes.

2
3 HUNTER: And you,... and at that time it was letdown flow you recall actually
4 on zero and was moving off zero?

5
6 ROSS: Yeah. Letdown flow was one of our problems throughout the day. We
7 had indication, then we didn't have indication, then we pulsating indication
8 after being isolated. Yeah, we saw some indication throughout the day of
9 it.

10
11 HUNTER: Alright. Let me go one step further, Mike. You indicated that
12 you saw pulsating flow. Was the pulsating flow then after you reopened the
13 demineralizers, and had a flow path down through the first set of filters
14 through a demineralizer, and was the flow path through the makeup filters
15 and into the makeup tank? Would you recall... Allow me to continue.
16 During the day you, in fact, bypassed the system. Can you clarify what you
17 actually bypassed? There's a bypass totally around the demineralizers.
18 There's a bypass around the filters and do you not have two sets of filters
19 like an inlet to the demineralizers and then also the makeup filters. Do
20 you recall which of these you bypassed?

21
22 ROSS: Well, we tried to establish letdown flow by bypass. There was some
23 confusion there because all these valves have remote operators on them.
24 There was some question about whether or not the valves had actually opened.
25 Some thought being that the remote, when I say remote operators, a handle
going through a shielded wall..

1 HUNTER: Excuse me. Hunter speaking. Question whether or not the valves
2 had opened to bypass the filter or the...

3
4 ROSS: Yes.

5
6 HUNTER: Okay. Go ahead.

7
8 ROSS: We're questioning whether or not the valves actually turned. That's
9 kind of the question. The idea was to try to get some letdown flow, and
10 yet we thought we had bypassed a lot of things from the early hours. I
11 think we later found that that was not totally true.

12
13 HUNTER: Did you find out that you did not, in fact, bypass something you
14 thought you had bypassed?

15
16 ROSS: I think that was later on when we found out that when we pulled the
17 handle, it was disconnected.

18
19 HUNTER: Okay. Did you ever discover which one was disconnected?

20
21 ROSS: Yes, we did. I think that was about Friday, but I don't remember
22 which one it was.

23
24 HUNTER: Would it be a handle of, again, around, like the makeup filter
25 bypass--that type of thing?

1 ROSS: Yes, it would have been...

2
3 HUNTER: Who can I talk to to find out which, what that particular valve
4 was? Apparently, you had to send somebody in to reconnect the handle
5 and/or to open the valve locally?

6
7 ROSS: I don't believe we ever sent anybody inside the shield; the radiation
8 levels were very high.

9
10 HUNTER: It has never been bypassed now, to this time?

11
12 ROSS: Not to my knowledge.

13
14 HUNTER: I have been in the control room, Mike, and the letdown flow itself
15 still is down on the scale...

16
17 ROSS: That's true

18
19 HUNTER: And the minimum amount of makeup is being added to Unit 2 to
20 maintain pressurizer level, indicating, the fact is the reactor coolant
21 pump still is about the only thing we have going, and the problem with this
22 is because you can't letdown.

23
24 ROSS: Yeah, that's correct. If you go to take the plant into a solid mode
25 which we are doing periodically over there, you got to be able to let down

1 what you put in or your pressure goes up; so really we are limited by our
2 letdown, as far as what we can make up to the system. As far as who could
3 tell you exactly, from that day

4
5 FOSTER: Mike, I'm trying to remember a name for you here.

6
7 HUNTER: Okay. I'd appreciate it.

8
9 ROSS: Possibly Chwastyk.

10
11 FOSTER: Okay. We have him on to interview shortly, so we'll get him.

12
13 HUNTER: One question, Mike. You did various valving and various deminera-
14 lizers bypasses, various filter bypasses. You indicated that one of the
15 particular sets of filters you were not able to bypass, and you, in fact,
16 still have not been able to bypass due to the ...

17
18 ROSS: My understanding is something isn't bypassed right now. We tried to
19 bypass everything. There's one valve you can bypass demineralizer and
20 filter. To my knowledge, that valve is still shut.

21
22 HUNTER: Okay. A question then, on the drawings that I have, shows a
23 letdown relief valve going to the bleed tank. I think during the last
24 interview, I think we fairly well established the fact that that relief
25 valve, when it lifted did fill the bleed tank.

1 ROSS: That's hard pipe to the bleed tank.

2
3 HUNTER: That, and again I'm going on the fact that when you did this
4 evolution you saw the bleed tank level change, which is what you expected.
5 We are never 100% sure, but that's my understanding.

6
7 ROSS: Its a big tank, but we thought we saw it.

8
9 HUNTER: Okay, now the next thing, there are also some more relief valves
10 on that system, on the discharge side of the demineralizers, and these
11 indicate that they discharge to the floor side, to the WDL system and not
12 to the bleed tank; and looking at the flow path to the makeup tank, even if
13 it's a minimal flow, if a letdown has been lined up on and off--I don't
14 know if it's lined up today--do you recall the relief valves, or do you
15 recall the set functions of those relief valves?

16
17 ROSS: No, I don't.

18
19 HUNTER: They are in there to protect the demineralizers. They weren't on
20 the original plant design and now they're in there, a subsequent modifica-
21 tion apparently.

22
23 ROSS: I do not recall it.

24
25
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1 HUNTER: You never heard those relief valves being discussed as a source of
2 water to the auxiliary building, sump, I should say.

3
4 ROSS: I did not, no.

5
6 HUNTER: Okay, I just want to make sure. Are you still having some activity
7 release to the auxiliary building at times?

8
9 ROSS: I don't know. I believe they are seeing some occasionally. I
10 haven't been over there in a week. I've returned home.

11
12 HUNTER: Okay. Alright, Tim, do you have any further questions?

13
14 MARTIN: No.

15
16 HUNTER: Min , I think you just got me through my list. Again, I would
17 like to say thank you for your time and your patience; would also indicate
18 that if you have any comments, please feel free to make them. This tape
19 will, in fact, be listened to by a number of people. Also, if you think of
20 something later, make sure you get back with us. We are available.
21 Something that clicks and you really feel like, yeah, we need that informa-
22 tion, feel free to get a hold of us; we request you to get a hold of us, so
23 that we can understand this particular event.
24
25

1 ROSS: Okay, I'll do that.

2
3 FOSTER: Mike, I also thank you. We are going to conclude this interview
4 at 2:30 p.m.
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