

BEFORE THE FACT FINDING TASK FORCE
OF THE NUCLEAR REGULATORY COMMISSION

* * *

Re:

Davis-Besse event :
of June 9, 1985 :

* * *

P R O C E E D I N G S

* * *

Proceedings before the Nuclear Regulatory
Commission Fact Finding Task Force in regard to the
aforementioned event, held at Conference Room 210,
Davis-Besse Nuclear Plant, Oak Harbor, Ohio,
commencing on Tuesday, June 18, 1985, at 4:26
o'clock p.m.

* * *

BEFORE THE FACT FINDING TASK FORCE
OF THE NUCLEAR REGULATORY COMMISSION

* * *

Re:

Davis-Besse event :
of June 9, 1985 :

* * *

P R O C E E D I N G S

* * *

Proceedings before the Nuclear Regulatory
Commission Fact Finding Task Force in regard to the
aforementioned event, held at Conference Room 210,
Davis-Besse Nuclear Plant, Oak Harbor, Ohio,
commencing on Tuesday, June 18, 1985, at 4:26
o'clock p.m.

* * *

1 Tuesday Afternoon Session

2 June 18, 1985

3 4:26 o'clock p.m.

4
5 MR. ROSSI: We are ready to start. This is
6 going to be a discussion of the sequence of
7 events that the fact finding team has put together.

8 And this should be considered our
9 preliminary draft that we put together, and Wayne
10 will give the transcriber a copy of it so we will
11 have it for the record.

12 And the purpose of the meeting is to
13 discuss the factual information in the sequence of
14 events and comments that people may have on it.

15 If there are things that are incorrect, we
16 would like to find that out now and reasons why you
17 believe they are incorrect.

18 Also this meeting it is our understanding
19 that you people have had discussions with IMPO's
20 office and B and W and so you have had the benefit
21 of their input and presumably when we finish here
22 and agree on the sequence of events or where we can
23 agree at least know where those items are that will
24 cover any disagreements or inconsistencies that

Tuesday Afternoon Session

June 18, 1985

4:26 o'clock p.m.

MR. ROSSI: We are ready to start. This is going to be a discussion of the sequence of events that the fact finding team has put together.

And this should be considered our preliminary draft that we put together, and Wayne will give the transcriber a copy of it so we will have it for the record.

And the purpose of the meeting is to discuss the factual information in the sequence of events and comments that people may have on it.

If there are things that are incorrect, we would like to find that out now and reasons why you believe they are incorrect.

Also this meeting it is our understanding that you people have had discussions with IMPO's office and B and W and so you have had the benefit of their input and presumably when we finish here and agree on the sequence of events or where we can agree at least know where those items are that will cover any disagreements or inconsistencies that

BEFORE THE FACT FINDING TASK FORCE
OF THE NUCLEAR REGULATORY COMMISSION

* * *

Re:

Davis-Besse event :
of June 9, 1985 :

* * *

P R O C E E D I N G S

* * *

Proceedings before the Nuclear Regulatory
Commission Fact Finding Task Force in regard to the
aforementioned event, held at Conference Room 210,
Davis-Besse Nuclear Plant, Oak Harbor, Ohio,
commencing on Tuesday, June 18, 1985, at 4:26
o'clock p.m.

* * *

1 PRESENT:

2 Wayne Lanning (NRC)

3 J. T. Beard (NRC)

4 Larry Bell (USNRC)

5 Ernie Rossi (USNRC)

6 David Lewis (Attorney)

7 Bill Rowles (TED)

8 Terry Murray (TED-Assistant Vice-President
9 Nuclear Operations)

10 Pete Wohliv (Region III)

11 Ned Choules (Region III)

12 Jim Marley (Associate Engineer)

13 Stan Batch (Technical Project Supervisor)

14 Jacque Lingenfelter (Technical Superintendant)

15 Walt Rogers (Region III)

16 Don Kosloff (Region III)

17 Nick Jackiw (Region III)

18

19

20

21

22

23

24

Tuesday Afternoon Session

June 18, 1985

4:26 o'clock p.m.

MR. ROSSI: We are ready to start. This is going to be a discussion of the sequence of events that the fact finding team has put together.

And this should be considered our preliminary draft that we put together, and Wayne will give the transcriber a copy of it so we will have it for the record.

And the purpose of the meeting is to discuss the factual information in the sequence of events and comments that people may have on it.

If there are things that are incorrect, we would like to find that out now and reasons why you believe they are incorrect.

Also this meeting it is our understanding that you people have had discussions with IMPO's office and B and W and so you have had the benefit of their input and presumably when we finish here and agree on the sequence of events or where we can agree at least know where those items are that will cover any disagreements or inconsistencies that

1 might exist with what's come from IMPO's office and
2 B and W.

3 Okay. Why don't you people start and also
4 Region III, this is the first time you have seen
5 this too, well, first time being everybody was given
6 a copy of this sequence of events approximately an
7 hour or so to review and get ready for this meeting
8 so everybody has had it for about an hour but that
9 includes Region III also.

10 So any of you people from Region III that
11 have comments on the way things are said or times or
12 the way things are described, that ought to come out
13 in this meeting too. So why don't we start with the
14 licensee's comments on the sequence of events.

15 MR. BEARD: Who is going to be your chief
16 spokesman, Stan?

17 MR. BATCH: All three of us will volunteer
18 information as needed.

19 MR. ROSSI: Try to talk one at a time to
20 make these easy on the stenographer.

21 MR. BATCH: I have had the benefit of
22 working with the tap team and IMPO when they were
23 here so I probably have the best knowledge of the
24 group in going over sequence of events.

1 In general I would like to say I think
2 there is no significant differences between any of
3 the findings from any of the people. Lots of minor
4 comments that everyone -- if you have ten different
5 people watching the same thing happen, all ten will
6 come away with a slightly different version with the
7 sequence or exactly what was or wasn't important.

8 So we have a few findings on your sequence
9 of events which we probably should go over in detail.
10 This time now you would like to do that.

11 MR. ROSSI: Yeah, might as well go through
12 them.

13 MR. BATCH: Does everyone have a copy of
14 the sequence of events?

15 I guess the first --

16 MR. BELL: Stan, as you are going through
17 these are you going to call out a page number and a
18 time to make it easier. If you would, that would be
19 helpful.

20 MR. BATCH: The first comment I really
21 had was on page four, and it was time 1:51:42. This
22 is worded that presently the pressurizer PORV block
23 valve closed by operator at 2140 PSIG.

24 We would like to change that to or suggest

1 PORV block valve started to close, started to be
2 closed by the operator. This is just a point where
3 it left itself full open seat and wasn't fully
4 closed at that time.

5 MR. BEARD: While we are on that --

6 MR. ROSSI: That's because of a
7 misunderstanding of what the input into the sequence
8 of events recorder -- we didn't have a lot of detail
9 on where the signals come, but you are saying that
10 the sequence of events information comes from when
11 the valve leaves the open position rather than when
12 it goes all the way closed?

13 MR. LINGENFELTER: That's correct.

14 MR. BEARD: So if we inserted the words
15 "started to close" that would make this particularly
16 more accurate.

17 MR. BATCH: Yes.

18 MR. ROSSI: We may edit the words, but we
19 understand the comment.

20 MR. BATCH: The next comment we have is at
21 1:53:22. It is actually on the paragraph of
22 description following that.

23 1:53:22 where it is worded there now it
24 says the number -- the aux feed pump number two was

1 returned to service, and it says the control room
2 operator controlled the pump in manual rather than
3 returning it to automatic.

4 We have had some discussions with the
5 operators and that would be better worded to be said
6 the pump would not control in automatic. The
7 control room operator controlled the pump in manual.

8 The way it is presently worded it sounds
9 like he didn't try to put it -- return it in
10 automatic when, in fact, he tried to return it to
11 automatic, but it would not control in automatic.

12 MR. ROSSI: Yes, that's consistent with
13 what we have learned from talking to the operators
14 also.

15 MR. BATCH: Now, this whole comment also
16 we would like to move -- this comment really
17 applies to later in the incident. It is, as we
18 worded it, it is now an accurate statement, but it
19 is shown just a little bit too early in the sequence
20 of events.

21 It really applies to 2:01:13 as modified.
22 Originally the flow was cutback by the operators
23 locally. He didn't do it in the control room.

24 The local operators cutback that first

1 burst of flow.

2 MR. BEARD: Why do you say that, Stan?
3 Help me understand the source of that occurrence.

4 MR. BATCH: The operator we just had
5 additional discussions with him now just to make
6 sure we were absolutely correct.

7 He did not control from the control room
8 the speed -- he did not back the speed down the
9 first time it occurred. It was done locally.

10 MR. BEARD: What about operation of valves
11 which would reduce the flow?

12 MR. BATCH: He did not reduce the flow by
13 using valves. Not to my knowledge.

14 MR. ROSSI: Well, let me ask you this at
15 time 53:22 where it says aux feed water number two
16 has significant flow, I gather there should be a
17 comment there that flow was controlled locally with
18 the --

19 MR. LINGENFELTER: Trip throttle valve.

20 MR. ROSSI: That's correct.

21 MR. BEARD: On number two?

22 LINGENFELTER: That's correct.

23 MR. ROSSI: We can check the transcripts
24 on that, but I believe that that's what we were told.

1 MR. BELL: The purpose of our entry there
2 is to show us where we are re-establishing feed
3 water flow into the number two OTSG not and that the
4 sentence below that is just amplification.

5 MR. LINGENFELTER: We understand that and,
6 indeed, this is where flow started into the steam
7 generators at this time. We just wanted to make
8 everybody aware that the operator locally was still
9 controlling the trip throttle valve until about 2:01,
10 2:01 give or take a little bit.

11 MR. BELL: It is very confusing in the
12 sequence of events review the switch goes from
13 manual -- auto essential to manual to auto essential
14 to manual?

15 MR. LINGENFELTER: He was attempting to
16 regain some control of it, but we believe that the
17 trip throttle valve was sufficiently closed that it
18 essentially had all the control on the trip throttle
19 valve and was not allowing the governor to take any
20 control.

21 So it wasn't until some time later that
22 the trip throttle valve was open sufficiently to let
23 the governor take control and that was about, we
24 think, 2:01.

1 MR. BELL: So the comment or the
2 amplifying comment needs to be moved rather than the
3 significant flow of auxiliary feed water train
4 number two?

5 MR. LINGENFELTER: That's correct.

6 MR. BEARD: Let me make sure I understand
7 what you are saying because I am not sure I do.

8 Are you saying that at this point in time,
9 01:53:22 where you got two flow that at this time it
10 would not control in automatic, would not control in
11 control room manual and was being controlled locally
12 by equipment operator using the trip throttle valve
13 at this point in time and then later he still was
14 not able to control it in automatic but he was able
15 to control it manually from the control room?

16 Is that what you are saying?

17 MR. ROSSI: I see nodding.

18 MR. BEARD: In the affirmative.

19 MR. LINGENFELTER: He probably could have
20 controlled it in automatic. Once he gained manual
21 control of it, we are pretty certain that automatic
22 would have taken control of it as well, but he did
23 not at that time try it.

24 MR. BEARD: But it was later when he got

1 manual control in the control room?

2 MR. LINGENFELTER: That's correct. I
3 think we correct that thought and make it reflect
4 those comments now that I understand it.

5 MR. BATCH: The next comment we had was at
6 1:54:46. This is the paragraph following that time
7 entry. The same comment applies that we had
8 essentially to the number two auxiliary feed pump.

9 We would like to eliminate that first
10 sentence where it talks about the auxiliary feed
11 pump could not be regained by the control room
12 operator in either automatic or with the manual
13 operation.

14 Control of the turbine was maintained
15 locally by an operator via the turbine steam trip
16 valve. And control room operator left the control
17 of the number one auxiliary feed pump turbine to the
18 local operators. It is the thought that we would
19 like to have in that one also.

20 MR. BEARD: Let me bring up a point there
21 because I think it relates to this paragraph and the
22 previous paragraph.

23 One of the intents of having this
24 paragraph is that we have already said earlier that

1 the aux feed pumps had tripped out and that people
2 had gone down to try to get them operable again or
3 available again.

4 And the intent of this paragraph really is
5 to say you are in an intermediate phase in the
6 recovery of this particular piece of equipment where
7 you had gotten to the point where you could get
8 through or local control, but the point we are
9 trying to make at this point in time you do not have
10 automatic control in the control room. You do not
11 have manual control in the control room or have
12 elected not to use it for one reason or another.

13 That's part of the story we are trying to
14 convey, to what degree you had recovered that
15 availability of that pump.

16 MR. LINGENFELTER: I understand that.

17 MR. BEARD: I wouldn't like to leave the
18 thought in that at this point in time you had not
19 regained control in the control room.

20 MR. ROSSI: Well, what you are suggesting
21 at 54:46 is that you strike out the first sentence.

22 MR. BEARD: That's what I read the last
23 suggestion is.

24 MR. ROSSI: Then you say control of the

1 turbine was maintained locally by an operator via
2 the turbine steam trip valve.

3 The control room operator left the control
4 locally control basically. That's what you are
5 saying.

6 MR. LINGENFELTER: That's essentially what
7 happened there.

8 MR. ROSSI: That one I understand your
9 comment, and we will record the comments. We will
10 check with what we learned from the equipment
11 operators who were there because in some of these
12 cases they did tell us that they had conversations
13 with the control room and there may have been
14 difficulty doing it from the control room, but we
15 will try to look at that again consistency also.

16 MR. LINGENFELTER: Don't confuse -- he, I
17 believe, had he tried to assume manual control or
18 automatic control at this time it would not have
19 been available. It simply I did not attempt to do
20 it.

21 MR. ROSSI: That may be a little different
22 than what we were told and that, again, we can check,
23 but do we understand the comments well enough to
24 check it now? J. T.?

1 MR. BEARD: I believe I do.

2 MR. ROSSI: And I think we have --

3 MR. BEARD: We will have to consider how
4 we want to end up with the final wording.

5 MR. LINGENFELTER: Try to make it
6 understood that they had the problem they were
7 having was the trip throttle valve was cranked down
8 so tight there wasn't any control left for the
9 governor. All the additional pressure was across
10 the trip throttle and until they opened it up far
11 enough to get the control there was nothing they
12 could do. It was just a fine point.

13 MR. BELL: What you just described now
14 concerns number two aux feed pump?

15 MR. LINGENFELTER: Both of them.

16 MR. ROSSI: What we were talking about was
17 number one.

18 MR. LINGENFELTER: The case was true on
19 both of them, but on number two they managed to open
20 it up far enough to allow them to get manual control
21 in the control room a little while later is what
22 happened.

23 MR. BELL: Did you see our entry under on
24 page 3 under 01:44 to 01:52? The last sentence

1 under entry number one we referred to the manual
2 speed control by the operator.

3 MR. LINGENFELTER: Right.

4 MR. BELL: You agree with that comment?

5 MR. LINGENFELTER: No problem what so ever.

6 MR. BELL: This statement on page four is
7 somewhat redundant to that.

8 MR. BATCH: It could appear in conflict
9 with the way it was written.

10 MR. ROSSI: Okay. J. P., any questions on
11 that?

12 MR. BEARD: I think I understand your
13 comment.

14 MR. ROSSI: Fine.

15 MR. BATCH: Page five we had one last
16 comment. In the third paragraph of additional
17 complications there we are talking about the desuper-
18 heating spray for the auxiliary steam system allowed
19 water into the main steam piping.

20 And then it says the water slug damaged
21 one of the main turbine bypass valves. I would like
22 to add the sentence to that part of this. It is
23 believed. We are not sure. We are less positive on
24 that at this point in time.

1 MR. ROSSI: How about if we say when
2 vacuum was restored and the MSIV's opened, the water
3 slug apparently damaged the main turbine bypass
4 valves.

5 MR. ROWLES: Or one of the main turbine
6 bypass valves was damaged.

7 MR. ROSSI: Well --

8 MR. BEARD: We can take care of the
9 thought and try to get something in there that this
10 is, as I understand your comments, is that this is
11 the best available information today we believe, but
12 it is subject to clarification and changes when more
13 information is available.

14 MR. LINGENFELTER: Very good.

15 MR. BEARD: It is not our intent that the
16 preliminary sequence of events that nothing could
17 ever change. It is preliminary.

18 MR. ROSSI: Yeah, one of the things that
19 we intend eventually to do, we are going to do this
20 revision here and call it revision one whatever we
21 do with your comments and then we are going to let
22 it go back to headquarters people in Washington as
23 our revision one preliminary sequence of events.

24 And then over some time period we will be

1 going through mostly transcripts and records and
2 trying to fine tune it from here, but that's what we
3 intend to do with it, but we do intend to do some
4 more fine tuning by reading things and that kind of
5 thing. And at the time we send it to headquarters,
6 we will give copies to the licensee and to Region
7 III also.

8 Now, do you have any other comments?

9 MR. LINGENFELTER: I don't think we do.

10 MR. ROSSI: I gather that we are
11 reasonably consistent with what IMPO's office found
12 when they were here? There is no glaring
13 inconsistency?

14 MR. LINGENFELTER: Nothing we have noticed.

15 MR. ROSSI: Okay. You want to show on the
16 record, they nodded their heads here in the
17 affirmative.

18 Okay, now, Region III, do you have any
19 comments that you want to make?

20 MR. ROGERS: Yeah, I guess under the 1:35:31
21 entry.

22 MR. BEARD: What page are you on?

23 MR. ROGERS: First page. The first
24 actuation, channel two actuation, I guess right now,

1 you all are pretty much in the main steam isolation
2 valve to the full actuation of number two?

3 MR. ROSSI: No, it is not our intent to
4 attribute the MSIV closure to anything right now.
5 In our mind, that's totally not understood yet.

6 That's one of the things to be determined
7 in the trouble shooting. And all this is a sequence
8 of events of what happened in the best order that we
9 can give them from operator descriptions and
10 computer print-out. We don't claim to know the
11 causes of many things in here.

12 MR. ROGERS: I would guess I just suggest
13 that by this it infers that the actuation channel
14 two did actuate.

15 I think right now that you can say that
16 the computer noted a full actuation channel two that
17 it had a signal that the computer saw not
18 necessarily that the logic saw.

19 I know this is kind of a fine point on
20 what's saying here that the computer annotated that
21 an actuation channel two trip.

22 MR. BELL: Well, could we solve that
23 problem by making that a separate entry under the
24 01:35:31 time frame so it doesn't read --

1 MR. ROGERS: That might help.

2 MR. BELL: In your connotation.

3 MR. BEARD: Only two comments, I think,
4 Walt.

5 MR. ROGERS: You don't want to leave
6 credence, you don't want to leave the idea that you
7 are saying that the MSIV's went closed because of
8 actuation channel number two because I think there
9 is still some trouble shooting that everybody wants
10 to do to satisfy themselves that's what it was.

11 MR. ROSSI: We may know less in the room
12 about that because we have concentrated on a
13 sequence of events at this time and only discussed
14 the procedure aspects of how people are going to do
15 the trouble shooting.

16 And we don't pretended at this point in
17 time to know anything about the causes of most of
18 this stuff, and we are holding off any conclusions
19 on that. So with that change needs to be made, I
20 believe.

21 MR. BEARD: It is, at least my
22 understanding though, Walt, that if there had been
23 an actuation of the steam feed rupture control
24 system on low level in the steam generators that at

1 least one of the MSIV's would have been signalled to
2 close?

3 MR. ROGERS: Both of them would have been
4 signalled to close if one full actuation --

5 MR. BEARD: The real issue seems to be not
6 that did the actuation cause the MSIV's to close as
7 much as was there really an actuation because if
8 there has been an actuation, this would be the
9 expected result, the MSIV's would start closing; is
10 that correct?

11 MR. ROGERS: Yes, plus a number of other
12 equipment that would also move. The main thing is
13 whether there was a full actuation of that channel
14 or whether there was just a half actuation and
15 something else caused the MSIV's to close.

16 MR. ROSSI: Tell me, I gather the computer
17 print-out a full actuation at 35:31 and clearing at
18 35:34?

19 MR. BEARD: Let me clarify that, with the
20 benefit of the licensee's explanation of how we
21 should interpret their print-outs, it is my
22 understanding that the sequence of events recorder
23 printed out full actuation of one of the logic
24 actuation channels of the steam feed rupture control

1 system.

2 MR. ROSSI: Channel two.

3 MR. BEARD: Yeah. The alarm printer
4 printed out at the same time that for this channel
5 it is a half trip/full trip. So it is a little
6 ambiguous.

7 Now, the explanation that we were given on
8 how the system works, the print-outs and whatnot, is
9 that we should interpret those two entries as mostly
10 being a full actuation as indicated by the sequence
11 of events.

12 And that's the reason this thing is
13 written the way it is. In other words, last time I
14 guess we had some technical discussion how to
15 interpret the alarm print-outs and the sequence of
16 events print-out.

17 And I think that it was pointed out to us
18 that initially this may have been believed to have
19 been a spurious entry, and it was only a partial
20 trip rather than a full trip, but now there is some
21 information that you folks have arrived at to cause
22 you to believe the most actually two partial versus
23 full leads you to believe it is a full trip of one
24 of the two logic actuation channels.

1 And based on that understanding this is
2 written that way. Now, is my understanding correct
3 or am I all wet?

4 MR. LINGENFELTER: That is correct when
5 you use emphasize the word "we believe" that's the
6 best.

7 MR. BEARD: That's right.

8 MR. LINGENFELTER: Again, given the -- if
9 we were to assume that the alarms as indicated
10 functioned correctly then full trip is indicated.

11 MR. BEARD: This is the best information
12 available at this time.

13 MR. ROSSI: Maybe what you could do is
14 move that both MSIV's start to close down as a
15 separate item. That's one thing.

16 And the other thing that could be done is
17 just put in some parenthesis after that steam and
18 feed water rupture control system trip on steam low
19 level to give the flavor that this is one of the
20 things that's more in question than a lot of other
21 things.

22 What about that, J. T.?

23 MR. BEARD: I certainly agree that it
24 would be a clarification essentially on the point

1 that walt brought up, that one is not a direct cause
2 of the other necessarily. To make it a separate
3 entry and some way we need to clarify this entry
4 about the actuation I believe.

5 We can talk about the exact words, but I
6 think it is a good thing to clarify it.

7 MR. ROSSI: Fine. Anything else?

8 MR. ROGERS: I would just -- some points
9 that maybe this will help me out that when they
10 started the start-up feed pump, it may be
11 appropriate to put what the water source was. It is
12 my understanding that that was the dearators and not
13 the CST.

14 MR. BATCH: That's correct.

15 MR. BEARD: Do you remember where that was?

16 MR. ROGERS: That would be at page 4,
17 1:51:23. In terms of thermal shock to the feed
18 water nozzles, the water source at that point does
19 make a difference.

20 MR. ROSSI: Is it possible to tell that
21 from the computer print-outs on the source of the
22 water?

23 MR. BEARD: I don't believe those valves
24 are instrumented. This is one of the areas where

1 because of lack of print-outs on the computer we had
2 to rely more heavily on operator interviews.

3 MR. ROGERS: Because I don't know what the
4 water source was, but if it was the dearators --

5 MR. BEARD: I believe that's consistent,
6 Ernie, with what the individual had indicated to us.

7 MR. ROSSI: what I suggest we do on this
8 one if it is more or less unknown, that's a detail
9 that we don't have to put in here.

10 And that's a detail that has to be
11 resolved in terms of the steam generator thermal
12 shock, and we can leave it out now. And then as we
13 go back and do more fine tuning and learn more, we
14 may add it to a later revision once we are more sure
15 of it. That's what my suggestion would be.

16 MR. ROGERS: About the only other real
17 major one I have is on page 4 at 1:53:56, the PORV
18 block valve is being reopened by the operator.

19 I might suggest you put an annotation
20 there that the PORV was closed at that point in time
21 since it is apparent because there is no
22 depressurization of the reactor coolant system when
23 the block valve is open.

24 You do show that it did not close at

1 1:51:18, but it doesn't show that it actually got
2 closed. I do agree that in the sequence of events
3 if it was, in fact, still open there would be a lot
4 of other things happening, but just for the sake of
5 clarification for people reviewing the sequence of
6 events, I think it might be appropriate.

7 NR. BELL: I think the reason we didn't
8 include that was we wanted time to examine some data
9 from the quench tank levels and pressures to make it
10 clear in our own minds that the valve was leaking
11 back.

12 MR. ROGERS: It might have been weeping.

13 MR. BEARD: We considered adding that
14 because we thought it was pertinent information, but
15 we weren't in the position to say that was the case.

16 MR. ROSSI: That falls in the category of
17 source of the water in start-up feed pump. That's
18 something we may add later on as we get into the
19 finer details.

20 MR. ROGERS: I guess there is one thing,
21 it is our understanding that there was a failure of
22 one of the start-up feed pump valves to open at some
23 point in this sequence of events.

24 I am not sure when this was supposed to

1 happen or they found out it wouldn't go open when
2 they tried to get it open.

3 MR. ROSSI: That was my understanding too,
4 and I thought that we were told that the start-up
5 feed water valve -- what is it SP7A that there was
6 some kind of problem with that to steam generator
7 two.

8 MR. LINGENFELTER: There was originally
9 some confusion in the operators' minds when they
10 went to reset the block as far as trip on that valve.

11 I don't know all the details myself, but
12 there was some light bulbs that burned out
13 apparently. The valve itself functioned as required
14 once it was blocked and, in fact, the print-out show
15 that the valve actually did come open when the
16 operator tried to move it.

17 MR. BEARD: So it is an indication anomaly
18 rather than a valve performance.

19 MR. LINGENFELTER: That's correct.

20 MR. ROSSI: What I would suggest we do on
21 that one is make an annotation in here that at this
22 time there is a question on the operation of that.

23 That has to be resolved and then, you know,
24 so we can get ourselves out tomorrow and then just

1 make an annotation that there is a question as to
2 whether the valve worked properly.

3 And that's something we will try to resolve
4 in a later revision, but I think that at some point
5 we have been told that, there was some -- so we will
6 just put it as a sequence.

7 MR. LINGENFELTER: We have any indication
8 of L position and actual flow through that that we
9 know it opened.

10 MR. BEARD: What source?

11 MR. LINGENFELTER: Computer print-out.
12 You have got the charts.

13 MR. BEARD: Wait a minute. I have got the
14 alarm print-out, and I have got the dad's.

15 MR. LINGENFELTER: The dad's.

16 MR. BEARD: The dad's has it?

17 MR. LINGENFELTER: Yes.

18 MR. BEARD: May I ask a question.

19 MR. ROSSI: Go ahead.

20 MR. BEARD: For the sake of being
21 technically perfect, there is one local term that
22 you have here on page 3 the second entry the time is
23 01:43:55. There has been a lot of discussion on the
24 particular term as to what its proper name is.

1 This is the rupture control systems
2 initial reset and bypass is what we believe to be
3 the correct term and just to make sure we haven't
4 made a mistake, I would like to ask if anybody
5 remembers it being different than that with
6 certainty?

7 MR. ROSSI: We will leave it the way it is,
8 and that's a detail that we can correct later on. I
9 had another one since you brought that up in the one
10 just above on the controls for AF 599 and AF 608, we
11 indicate that's from the main control panel and it
12 is that vertical panel behind.

13 And is main control panel used for that
14 also, for the vertical panel?

15 MR. LINGENFELTER: Yeah, I don't think
16 there is --

17 MR. BATCH: There is no problem with that.

18 MR. BEARD: The sense of those words since
19 it was main is to make the distinction it is a panel
20 in the main control room versus a panel outside the
21 normal operator's --

22 MR. BATCH: This isn't in the control room.
23 So if you want to reword that to say from a panel in
24 the control room that would be fine.

1 MR. KOSLOFF: Isn't that sometimes
2 referred to as a SFAS panel?

3 MR. ROSSI: Or back panel.

4 MR. KOSLOFF: Since that's where all the
5 SFAS --

6 MR. BEARD: Most presently as the back
7 panel, but there is a connotation, a strong
8 potential for confusion of readers away from this
9 plant site that if you say back panel, you are
10 talking about something in the backside of some
11 control building and that's. I was just wanting to
12 make sure we realize that the operator were in the
13 main control room here.

14 MR. ROSSI: Fine. Then we will leave it
15 that way. Anything else, Walt?

16 MR. ROGERS: Last point, and I guess it is
17 on page 3. It is between your 1:44 and 1:52 time
18 entry.

19 And that's I get from this that you had
20 trouble with both auxiliary feed pump controls in
21 the speed on those or the governor controls. Maybe
22 I am using an assumption.

23 It says that you had to take manual
24 control of the turbine trip throttle valve was

1 required to bring the turbine up to speed.

2 I think you are talking about that was
3 number two at that point in time so there was some
4 problem with both auxiliary feed pumps, and I don't
5 know if I am allowed to go any further with that at
6 this time --

7 MR. ROSSI: There was at least a problem
8 where they had to use pipe wrenches, as I understand
9 it, to open the trip throttle valves and there was
10 some question as to when they were and weren't open
11 from what we have been able to determine that you
12 could take the hand wheel and turn it until it
13 wouldn't turn it any more by hand and that might
14 only be because you were taking up the slack until
15 it was hold close by the pressure and then they
16 needed a wrench to open it further.

17 Now, I guess there is a question of
18 whether some of this should say manual control or
19 manual operation of the trip throttle valve was
20 required to bring the turbine up to speed and maybe
21 there is no difference. I don't know.

22 MR. MURRAY: Both phrases sounded the same
23 to me. It would sound the same to me --

24 MR. BEARD: If they are that close I would

1 suggest for expediency purposes we not make changes.
2 A lot of people are anxious to get these.

3 MR. ROSSI: Now, for the purposes of
4 Region III doing their normal job with the licensee,
5 you know, you people have this sequence of events
6 now, it is in the transcript and, you know, we are
7 going to make some modifications to it. And it will
8 be called revision one but, you know, please feel
9 free to discuss it between you on anything you need
10 to do or go about your normal job.

11 MR. ROGERS: Thank you.

12 MR. ROSSI: We are going to try to refine
13 it as necessary. In our report will have a
14 narrative description of what we have learned from
15 talking with the operators about what they did and,
16 of course, all of that will be available.

17 MR. BEARD: I think we ought to add, Ernie,
18 there are still some individuals that we have not
19 interviewed, and there are some other individuals
20 that we need to call back and either ask some
21 additional clarification questions or whatnot.

22 So this may be refined in terms of new
23 information as we learn more.

24 MR. ROSSI: That's fairly unlikely because

1 most of the interviews that we have left will be on
2 subjects that are not related to the sequence of
3 events other than perhaps Walt, and he is here to
4 comment now.

5 MR. ROGERS: Other than that, just looking
6 through it, it essentially balances with what we see
7 in the computer print-out. We consider what's
8 presented as sequence of events is a logical
9 statement of what the computer print-outs show.

10 Realizing you all have had the benefit of
11 doing a full interview of the operating shift, you
12 all had more information than we do.

13 MR. BELL: In summary then I have listed
14 three items that may need some further examination.
15 First item I have listed is the source of suction to
16 the start-up feed pump.

17 The second item I have listed is the
18 operability of SP7A; and finally, the question
19 concerning the position of the PORV itself after the
20 block valve was opened, reopened.

21 Any disagreement on those three items?

22 MR. ROSSI: You mean items that are still
23 in question?

24 MR. BELL: Yes.

1 MR. BEARD: I get the general impression
2 that we are really fine tuning here and that we are
3 at Ivory soap level of being consistent here.

4 MR. LANNING: Let me ask the question, are
5 there any significant omissions from the sequence of
6 events that you think should be added?

7 MR. BATCH: No, we see no additional ones.

8 MR. LINGENFELTER: Not that we are aware.

9 MR. ROSSI: You listed the things to be
10 looked at. Well, is there any reason that we need
11 to -- let me ask one other question then.

12 In the times that are on here, maybe Larry
13 and J. T. can mention where you got most of the
14 times and just see if people in the room feel that
15 that's the way we should have gotten it.

16 J. T., can you summarize how you got the
17 times.

18 MR. BEARD: What we did is based on the
19 information provided by you folks that the times on
20 the sequence of events print-outs are the most
21 accurate source when contrasted or compared to the
22 alarm print-out.

23 We did an upgrade of all these times, went
24 back to the sequence of events print-out and for

1 those items which there was an entry we used that
2 time rounded to the nearest second.

3 We did not carry this to the milli second
4 although there was some items like, you know, 34
5 seconds and 7 milli seconds.

6 We just rounded to the nearest second.
7 And then for those items that are not on the
8 sequence of events print-out, we used the values
9 from the alarm print-out.

10 MR. BATCH: That's fine too.

11 MR. ROSSI: Okay. Well, anybody have
12 anything else they want to say on this subject?
13 Okay. Then why don't we call the meeting to a close
14 then. We are off the record.

15 - - - - -

16 Thereupon, the meeting was
17 concluded at 5:06 o'clock p.m.

18 - - - - -

19

20

21

22

23

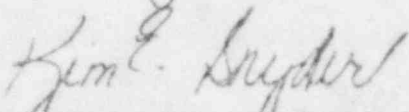
24

CERTIFICATE

I, Kim E. Snyder, a Registered Professional Reporter and Notary Public in and for the State of Ohio, do hereby certify that I took the proceedings and that the foregoing transcript of such proceedings is a full, true and correct transcript of my stenotypy notes as so taken.

I do further certify that I was called there in the capacity of a Registered Professional Reporter, and am not otherwise interested in this proceeding.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office at Columbus, Ohio, on this 19th day of June, 1985.


KIM E. SNYDER, Registered
Professional Reporter, Notary Public
in and for the State of Ohio.

My Commission expires January 12, 1989.

DIRECTIONS FOR MAKING CORRECTIONS

If you have any corrections that you wish to make on your transcript, please do so on the following page in the following fashion:

Indicate the page of the correction, the line number, and then the change to be made and the reason for making the change. Date and sign all correction pages that correspond with your transcript.

SEQUENCE OF EVENTS

Davis-Besse
Complete Loss of Feedwater Event
June 9, 1985

NRC Fact Finding Team

Status: Preliminary (Rev. 0)

3:00 PM
~~11:00 AM~~ June 18, 1985

*Unexpected or off-normal response

Initial Conditions

- Unit operating at 90%
- Number One Main Feedpump (MFP) in automatic control
- Number Two Main Feedpump in manual
- One Source Range Nuclear Instrumentation Channel inoperable
- Safety Parameter Display System (SPDS) inoperable

Transient Initiator

- *01:35:00 #1 MFP Trips
MFP flow increases; MFP turbine trips on overspeed.

Systems Response/Operator Actions to Partial Loss of Main Feedwater

- 01:35:01 Unit runback toward 55% at 50%/min initiated.
- 01:35:21 Operator increases the speed of #2 MFP turbine. Pressurizer spray valve manually opened to 100%.
- 01:35:30 Reactor Trip + Turbine Trip - RCS High Pressure (2300 psig) from 80% power.
- *01:35:31 Steam & Feedwater Rupture Control System (SFRCS), trip on S/G low level, actuation Channel 2. Both MSIVs start to close.
- 01:35:34 SFRCS actuation signal clears.
- *01:35:36 Main Steam Isolation Valve (MSIV) #2 has closed.
- *01:35:37 MSIV #1 has closed.
With both MSIVs closed, the source of steam for #2 MFP turbine is isolated. Steam from main steam piping and moisture separator reheaters continued to drive #2 MFP for a while.
- 01:35:45 Pressurizer spray valve closed.

SEQUENCE OF EVENTS

01:35:⁵⁶~~36~~ Once Through Steam Generator (OTSG) levels at normal post-trip level (35 inches).

*01:40:00 OTSG levels begin to fall from the normal post-trip level.

System Response/Operator Actions to Complete Loss of Main Feedwater

01:41:04 SFRCS low OTSG level (26.5 in.) Actuation Channel 1 actuates; this actuation causes Auxiliary Feedwater Pump (AFP) #1 to be aligned to feed OTSG #1.

*01:41:08 The control room operator attempted to manually initiate SFRCS; however, he incorrectly actuated the SFRCS on low steam pressure instead of the desired low steam generator level. He performed the manual actuation by depressing the top switch in both strings of manual actuation switches for the respective SFRCS actuation channels. Therefore, each SFRCS actuation channel sensed that its respective steam generator was inoperable. SFRCS actuation Channel 1 then attempted to align AFP 1 to feed steam generator 2 and SFRCS actuation Channel 2 attempted to align AFP 2 to feed SG 1; both actuation channels, however, closed their respective steam generator containment isolation valves (AF-599, AF-608), which prevented any auxiliary feed flow from reaching the steam generators.

Per the SFRCS design, valves positioned by the low level trip on SFRCS Channel 1 were repositioned by the higher priority pressure trip. The AFP 1 steam supply valve from SG 1, MS 106 had started open in response to the SFRCS actuation Channel 1 low level trip. Following the manual initiation of the low pressure trip, the valve should have continued opening to its full open position before it cycled closed. The entire open/close stroke time should have been about 50-60 seconds. *The valve however returned to its closed position in about 18 seconds. This indicates that the open command to the valve did not seal in as designed.

01:41:13 SFRCS actuation Channel 2 tripped on low steam generator level. Since the low pressure trip already present had priority, no change in component actuation occurred.

*01:41:31 AFP 1 tripped on overspeed.

*01:41:44 AFP 2 tripped on overspeed.

SEQUENCE OF EVENTS

All

System Response/Operator Actions to Complete Loss of Feedwater

01:42:00 Manual reset of SFRCS low OTSG pressure actuation.

*AF-599, AF-608 should re-open automatically, but did not.

*An attempt was made to re-open AF-599 and AF-608 from the main control panel, but the valves did not respond.

01:43:55 Assistant Shift Supervisor went to SFRCS cabinets (behind the control room area), opened the doors, and operated the SFRCS "Initial Reset and Bypass" function in an attempt to reset any automatic safety signals to AF-599 and AF-608.

*The valves remained closed.

*01:44 - 01:52 The Shift Supervisor dispatched Equipment Operators into the plant to operate the following equipment:

- (1) Two Equipment Operators were sent to the Auxiliary Feedwater Pump turbines to manually restore the AFW pumps to service. No. 2 AFW turbine overspeed trip was reset at 01:45:50. Manual control of the turbine trip throttle valve was required to bring the turbine up to speed. No. 1 AFW turbine was reset and speed was controlled locally throughout the recovery.
- (2) The Assistant Shift Supervisor left the control room to place the startup feed pump in service. This evolution required opening the pump suction valve, the pump discharge valve, and two cooling water valves. In addition, the control fuses for the pump circuit breaker were required to be installed. The startup feed pump was started at 01:51:23.
- (3) Two equipment operators were sent to open OTSG Auxiliary Feed Isolation Valves AF-599 and AF-608. These valves are the containment isolations for the AFW system. The operators moved the valves from the closed position, and the motor operators opened the valves. Computer printouts indicate that the #2 OTSG Valve AF-599 was open at 01:47:48, and the #1 OTSG Valve AF-608 was open at 01:49:28.

01:47:33 OTSG #1 below 960 psig and decreasing.

01:48:49 Pzr. PORV opens first time at 2433 psig (2425 setpoint).

*01:48:51 OTSG #2 below 960 psig and decreasing.

SEQUENCE OF EVENTS

01:48:52 Pzr. PORV has closed at 2377 psig (2375 setpoint).
01:50:09 Pzr. PORV opens second time at 2434 psig.
01:50:12 Pzr. PORV has closed at 2369 psig.
01:51:17 OTSG SG #1 level falls below eight inches.
*01:51:18 Pzr. PORV opens third time at 2435 psig; did not close.
01:51:23 Startup feed pump motor on.
01:51:42 Pz^r_q. PORV block valve closed by operator at 2140 psig.
01:51:42 RCS Loop #1 reaches a minimum pressure of 2081 psig.
Loop #1 T-hot = 588.6°F; Tave = 587.5°F.
01:51:49 Accoustic monitor indicates no flow thru PORV/block valve.
01:53:00 RCS loop #1 T-hot reaches peak value of 593.5°F.
01:53:22 AFW #2 has significant flow.

When AFP 2 was returned to service, the control room operator controlled the pump in manual rather than returning it to ~~the~~ Automatic.
01:53:25 RCS Tave reaches peak value of 592.3°F.
01:53:35 SG #2 returns to above 960 psig.
01:53:56 PORV Block Valve reopened by operator.
01:54:45 SG #1 return to above 960 psig.
01:54:46 AFW #1 has significant flow.

Operation of AFP 1 turbine could not be regained by the control room operator in either the Automatic or the manual mode of operations. Control of the turbine was maintained locally by an operator via the turbine steam trip valve.

01:56:58 SG #2 below 960 psig and decreasing due to return of feedwater.
01:57:05 SG #1 below 960 psig and decreasing.

SEQUENCE OF EVENTS

01:58 Tave restored to normal post-trip temperature. The cooldown had lowered RCS pressure to about 1720 psig. Operators manually started the HPI pump #1 in the piggy-back mode (LPI pump 1 supplying the suction to the HPI pump 1). A slight amount of water (about 50 gallons) was injected.

01:58:08 RCS loop #1 reaches a minimum pressure of 1716 psig. Loop #1 T-hot = 546.6°F; Tave = 546.2°F.

01:58:33 AFW #1 flow reduced to control OTSG level.

02:01:13 AFW #2 flow reduced.

02:02:27 SG #1 returns to above 960 psig.

02:02:30 SG #2 returns to above 960 psig.

02:04 Plant conditions essentially stable.

Additional Complications

*When the only operable source range nuclear instrumentation channel was energized, it failed to an offscale low value. This left no nuclear instrumentation on scale. All control rods were re-verified to be fully inserted. The operator initiated emergency boration.

*AFP #1 suction automatically transferred from the condensate storage tank (CST) to the service water system. The operator realigned ~~to~~ to CST.

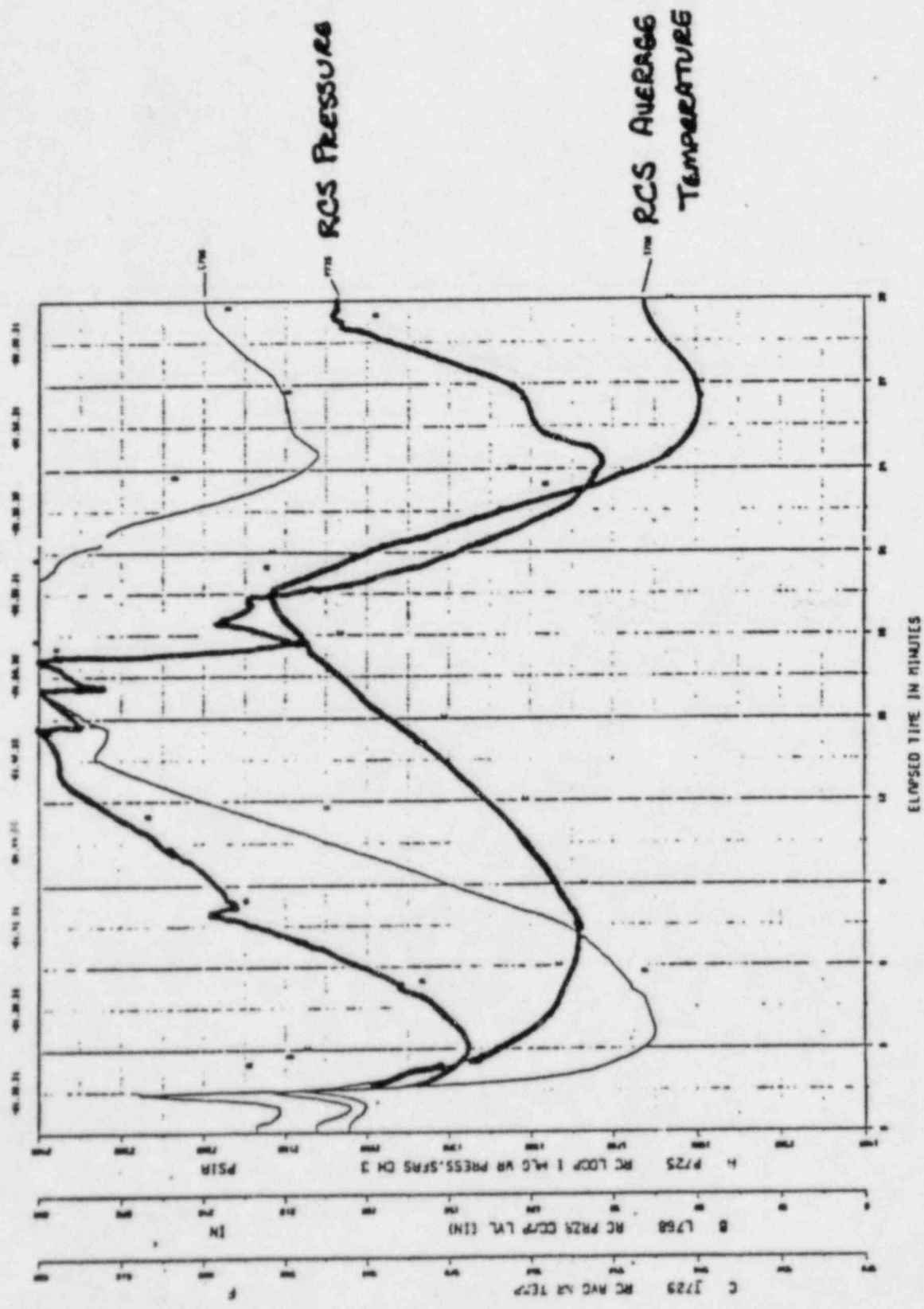
*The desuperheating spray ~~regulator~~ for the auxiliary steam system ~~had been bypassed prior to the transient. This~~ allowed water into the main steam piping. When vacuum was restored and the MSIVs opened, the water slug damaged one of the main turbine bypass valves.

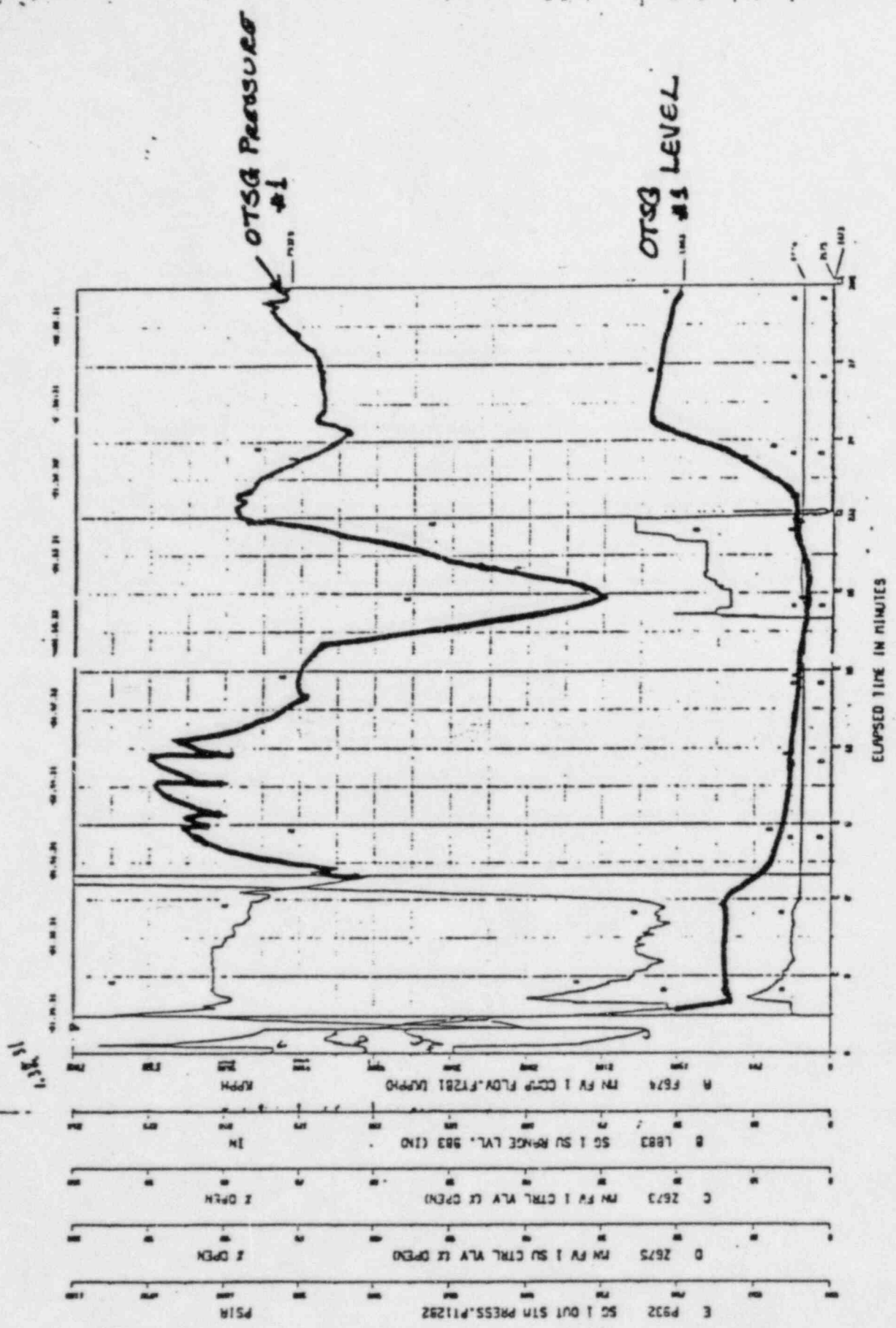
Notes

1. Adequate subcooled margin was available throughout the transient. The Reactor Coolant Pumps remained in operation. The Quench Tank contained the discharges from the PORV. ~~Makeup/High Pressure Injection cooling of the RCS was available as a method of core cooling at all times.~~

SEQUENCE OF EVENTS

2. The above sequence of events is based upon combining information obtained from plant computer printouts and operator interviews. Due to time responses of instruments providing input to plant computer systems and the inability to obtain the precise time of events from the operator interviews, there is some potential ambiguity in the exact times; however, such ambiguity is not considered to be significant in understanding the event.





[illegible]

4	22	"IMPO" SHOULD BE "INPO" (TYPOGRAPHICAL ERROR)
6	3 ITSELF ... , SHOULD READ "...IT LEFT ITS FULL OPEN SEAT..." (THE WORDS "ITSELF" WERE NOT THE CORRECT WORDS STATED)
8	15	53:22 SHOULD BE 1:53:22 (THE COMPLETE TIME WAS APPARENTLY NOT FULLY STATED)
12	21	54:46 SHOULD BE 1:54:46 (COMPLETE TIME APPARENTLY NOT REFERENCED)
13	19	"IT SIMPLY I DID NOT ATTEMPT", SHOULD BE "IT IS SIMPLY THAT HE DID NOT ATTEMPT....." (THE REVISED WORDS REFLECT HOW I RECALL THE PHRASE TO BE STATED)
17	11	"IMPO" SHOULD BE "INPO" (PROBABLY MISUNDERSTOOD BY STENOGRAPHER)
20	17	35:31 SHOULD BE 1:35:31 (COMPLETE TIME APPARENTLY NOT FULLY STATED)
20	18	35:34 SHOULD BE 1:35:34 (COMPLETE TIME APPARENTLY NOT FULLY STATED)
27	7-9	"WE HAVE ANY INDICATION OF L POSITION AND ACTUAL FLOW THROUGH THAT THAT WE KNOW IT OPENED", SHOULD READ "WE HAVE INDICATION OF VALVE POSITION AND ACTUAL FLOW THROUGH THAT, THEREFORE WE KNOW IT OPENED" (APPARENTLY MISUNDERSTOOD BY STENOGRAPHER, THE REVISED WORDING IS TO THE BEST OF MY RECOLLECTION CORRECT)
28	22	"THIS ISN'T IN THE CONTROL ROOM" SHOULD READ "THIS IS IN THE CONTROL ROOM" (THE REVISED WORDING IS RECALLED AS WHAT WAS STATED. THE FOLLOWING SENTENCE, LINES 23-24, SUPPORT THE REVISED WORDING OF LINE 22.)