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NUCLEAR REGULATORY COMMISSION

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IN THE MATTER OF:  
THREE MILE ISLAND

INTERVIEW OF TERRY HARPSTER

Place - Bethesda, Maryland

Date - Thursday, August 30, 1979

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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In the Matter of:       :  
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THREE MILE ISLAND       :  
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INTERVIEW OF TERRY HARPSTER

Room 426  
Arlington Road Building  
6935 Arlington Road  
Bethesda, Maryland

Thursday, August 30, 1979

BEFORE:

FRED HEBDON, NRC  
FRED FULSOM, ESQ., Special Inquiry Group Staff

C O N T E N T S

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INTERVIEW OF:

EXAMINATION

Terry L. Harpster

3

MM mte 1

## P R O C E E D I N G S

2 Whereupon,

3

TERRY L. HARPSTER

4 was called as a witness and, having been first duly sworn,  
5 was examined and testified as follows:

6

## EXAMINATION

7

BY MR. HEBDON:

8

Q Have you read and do you understand the letter  
9 from Mr. Rogovin concerning your rights as a witness in and  
10 participation in this interview?

11

A Yes, I do.

12

Q Do you have any questions or comments about that?

13

A No.

14

Q All right. Would you please state your name.

15

A Terry Harpster.

16

Q What is your current occupation?

17

A Reactor inspector, Region III, Office of  
18 Inspection & Enforcement.

19

Q What was your position in late 1977?

20

A I was a reactor inspector in the technical support  
21 group in the Region III office.

22

Q How many people reported to you at that time?

23

A At that time, no one.

24

Q To whom did you report?

25

A At that time, I reported to Bill Little, who was



MM mte 1

2 Q We have a copy of your professional  
3 qualifications, and I would like to have that included in  
4 the record at this point. But just as a summary, could you  
5 briefly describe your employment history, including  
6 positions held at the NRC.

7 A Okay. Most recently, I have been a reactor  
8 inspector, a principal reactor inspector in the reactor  
9 projects sections in Region III. I am currently responsible  
10 for an operating BWR and a BWR in startup and tests.

11 In the past I've been responsible for both  
12 pressurized water reactors and research reactors. Prior to  
13 that -- and that goes back about two years -- I was in the  
14 nuclear support section, where I had various  
15 responsibilities. I maintained expertise in things like  
16 refueling instrumentation, control of electrical systems. I  
17 was used to respond to many branches, Davis-Besse, Brown's  
18 Ferry, design occurrences, things like that. We were a  
19 technical support section.

20 That pretty much concludes my history back through  
21 1974, when I came to the Commission. Prior to that I  
22 worked at the University of Michigan at the Ford Nuclear  
23 Reactor at the Phoenix Project. I was a supervisor of  
24 reactor operators there. We had a 2-megawatt swimming pool  
25 research reactor.

MM mte 1

Prior to that I was at the Wilson Laboratory of Nuclear Studies, Cornell University. And prior to that I was in the United States Naval Nuclear Program for six years.

(The resume of Mr. Harpster follows:)

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, ILLINOIS 60137

Professional Qualifications - T. L. Harpster

Experience

I am a Reactor Inspector (10/74 to Present) with the Office of Inspection & Enforcement, Region III, USNRC.

As a reactor inspector, I plan, perform & document inspections of reactor facilities during the testing, startup, & operational phases to: ascertain conformity with design & other criteria; evaluate the adequacy of controls & provisions for reactor safety; evaluate management, organizational controls, procedures & practices; & to determine the status of compliance with regulations of the commission. I am presently both the principal inspector for an operating BWR & the startup & test inspector for a BWR under construction. I have previously been responsible for the inspection of both PWR's & research reactors. Prior to my assignment as a project inspector, I served in a technical support function with such diverse responsibilities as maintaining the regional expertise in reactor instrumentation, control & electrical systems; refueling operations; startup & testing & responding to unusual events.

Prior to the USNRC, I was employed (9/69-10/74) by the Ford Nuclear Reactor, University of Michigan. As supervisor of Reactor Operators, my responsibilities were to oversee proper operation of the reactor; schedule maintenance and calibration of reactor equipment; supervise the performance of reactor modifications; work with the reactor support staff in the design and implementation of facility modifications; coordinate experiment irradiations and transfers; and respond to off shift reactor problems.

In 1969, I was employed as an Operator/Technician at the 10 GEV Alternating Gradient Synchrotron, Wilson Laboratory of Nuclear Studies, Cornell University.

From 1963-69, I served in various positions in the US Naval Nuclear Program. I was a qualified reactor operator/technician on both the S3G and S5W reactors.

Education

I was graduated MagnaCum Laude, University of Michigan, 1974, BS-Industrial & Operations Engineering.

I attended various USNRC & Naval schools related to the design & operation of reactors.

MM mte 1

Q What is your educational background?

2

A Educational background. I have a bachelor of

3

science degree in industrial and operation engineering from

4

the University of Michigan. I have quite a bit of other

5

schooling, various schooling, going back to 1960 in other

6

subjects. I have attended several naval schools in the

7

nuclear power program and various NRC schools.

8

Q What I would like to do is ask you some questions

9

concerning an incident that occurred on September 24, 1977,

10

at Davis-Besse. What I'm particularly interested in is what

11

you knew or what you understood prior to the accident at

12

TMI.

13

Specifically, prior to March 28, 1979, what

14

knowledge did you have concerning the incident that occurred

15

at Davis-Besse on September 24th, 1977?

16

A Let me ask you: How specific information do you

17

want here when you say "what knowledge"? Do you want my

18

involvement in that particular transient, what my function

19

was?

20

Q What was your function, when did you learn various

21

bits of information, what did you learn, when did you learn

22

it? Just a chronology of the whole process, and then we'll

23

go back over any specific details that we need to fill in.

24

A Okay, fine. I was asked shortly after the

25

transient took place to go over and ascertain what the

MM mte 1 state of the reactor currently was, what safety problems  
2 existed, and try and define what needed to be done prior to  
3 any further operation of the reactor.

4 Q Now who asked you to go?

5 A I was asked to go by the section chief, Dick Knop,  
6 the branch chief, Gaston Fiorelli, and my section chief,  
7 Bill Little.

8 Q Why were you chosen to go?

9 A I don't specifically know that, other than I had  
10 quite a bit of background in instrumentation and control. I  
11 was familiar with the site from the startup program, the  
12 preoperational test program. I had been used to respond to  
13 many of the transients that had occurred in the region in  
14 the past, and I had experience in that area.

15 Q Would it have been a normal function of your job  
16 to go and look into an incident such as this?

17 A Yes, it would have.

18 Q All right. Go ahead.

19 A When I arrived at the site the reactor had shut  
20 down and they were in essentially a small outage, trying to  
21 ascertain what really had caused the transient. The first  
22 day or two it was merely data gathering at that time. We  
23 got the data out of the reactimeter and I worked with the  
24 startup engineers from B&W, the site rep, and other people  
25 in trying to put the data together and understand what had

MM mte 1 caused the transient, what the effects on the reactor were,  
2 and in general just what the state of the machine had been  
3 throughout the transient.

4 I was there I think roughly four days. I can't  
5 recall the total time. At the end of that period, I went  
6 back to the region, presented the information to regional  
7 management. I think I made one return trip after that for a  
8 meeting.

9 But at some time in the future, and I don't recall  
10 the exact time, the project inspector, Tom Tambling, came  
11 back and I turned most of it over to him.

12 Q Now, this briefing you gave to the management, was  
13 that before Mr. Tambling returned?

14 A Yes, it was, as far as I remember.

15 Q When did you arrive at the site? Do you remember  
16 what day of the week it was? I believe the incident  
17 occurred on Saturday night and I&E region was informed  
18 Sunday morning. Did you go there immediately on Monday or  
19 was it later in the week?

20 A I could find that out for you. I think I probably  
21 went on a Monday, if that was the case. But I really can't  
22 recall off the top of my head..

23 Q But it was very shortly after you found out about  
24 it?

25 A It was almost immediately after I found out.



MM mte 1

Q You recall that you were there about four days, so that would be through about Thursday or Friday of that week?

2

A I think I probably returned to the region on Friday.

3

4

Q All right. And then you briefed your management, and then you turned the issue over to Mr. Tambling?

5

6

A Now, I think there was at least one more involvement in there. I can't give you the date. I could by going back to the report. But Bill Little and myself returned to Davis-Besse for a meeting with Toledo Edison, Babcock & Wilcox, some of the equipment vendors, to have them present some technical information regarding questions I had about the transient. That was in early October. That was my last involvement with it.

7

8

9

10

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Q Did you prepare a summary of that meeting?

16

17

A As is presented in the inspection report, yes. Not a particular trip report specific to the meeting, because it was part of the inspection activity. So it was reported in the inspection report. It's also contained in the notes which I have given to you.

18

19

20

21

BY MR. FULSON:

22

Q Would you identify Bill Little?

23

A Bill Little was my immediate superior at the region. He was the section chief for the nuclear support section.

24

25

MM mte 1

BY MR. HEBDON:

2 Q What significance did you attribute to the  
3 incident?

4 A Well, it was a rather severe transient on the  
5 primary and secondary systems. I certainly didn't attribute  
6 the significance to it at the time that we do today, because  
7 it was unreasonable in my mind at the time to conclude that  
8 a similar transient could occur because of the mechanical  
9 failures involved.

10 There was a failure of the Woodward governor on  
11 the aux feed pump, which was one mechanical failure. There  
12 was a separate mechanical failure of bistable missing,  
13 which led to the failure of the power-operated relief valve, so  
14 you had a set of circumstances which led to a rapid  
15 depressurization of the plant, prevented full capacity of  
16 the heat sink in the steam generators.

17 It was an unusual set of circumstances, which I  
18 really didn't think had generic implications at the time  
19 from the standpoint of this type of thing could happen again  
20 in the same set of circumstances. So I really considered it  
21 a unique transient at the time. It was a feedwater  
22 transient. The initiation by the steam feed rupture control  
23 system, which was a unique system -- it was one designed and  
24 added on after the fact of the licensing of Davis-Besse.  
25 That, again, was another quirk in the thing, in the



MIA mte 1 monitoring system that caused it.

2 So it was an entirely unique set of circumstances  
3 at the time. My logic didn't extend to today's thinking.

4 Q What concern did you have as far as the transient  
5 was involved?

6 A My major concerns at the time were equipment  
7 damage, the condition of the core, which was somewhat  
8 mitigated by the fact that they had perhaps one effective  
9 full power day and had been operating at 9 percent exposure.

10 I was more concerned with the stresses across the  
11 fuel at the time from the rapid depressurization. I had  
12 concerns with the mechanical equipment failures, the  
13 malfunctioning of the governor on the Terry turbine, the aux  
14 feed pump.

15 I was concerned with the reason the bistable was  
16 missing, how they got to this point that allowed the  
17 power-operated relief valve to cycle rapidly. I had  
18 concerns over the equipment damage as a result of the  
19 wetting of things outside the quench tank when the rupture  
20 disc blew.

21 I had other concerns about the amount of data that  
22 would have been available had we not had a reactimeter. We  
23 had quite a bit of data from this. It still was a difficult  
24 transient to try to understand fully.

25 In general, I had several concerns like this, but

MM mte 1 no concerns that this was the type of event that would turn  
2 into a Three Mile Island. At the time I didn't see that  
3 far.

4 Q What did you do about your concern about the  
5 amount of data that was available or the amount of data that  
6 would have been available?

7 A I don't think anything was ever put in writing  
8 over that. I think this was a subject that had been pursued  
9 by other people. The general state of control room design  
10 is an ongoing subject. My main concerns were the lack of  
11 information available to the operator.

12 A lot of it was indirect. The feedwater valve  
13 position, I think, which initiated the transient and he was  
14 unaware of, was the demand signal and not a directly  
15 indicated signal.

16 In general, the lack of instrumentation in the  
17 control room, the logical presentation -- I felt at the time  
18 that the operators really performed well in identifying that  
19 the power-operated relief valve was stuck open after 15  
20 minutes. It was in a time frame, 15 to 20 minutes, that  
21 when you go back and look at the information they had to  
22 work from, I was very impressed that they were able to  
23 isolate it, the stuck-open power-operated relief valve,  
24 because it was just a coincidental set of circumstances that  
25 there was a containment humidity monitor in the vicinity and

MM mte 1 they were able to put two or three things together to  
2 conclude that.

3 I don't necessarily think adequate information was  
4 available that other people would conclude that. You  
5 wouldn't expect an operator to be able to conclude that from  
6 the information they had.

7 Q As I understand it, you're saying your concern was  
8 with the information that was available to the operator  
9 during the transient or the information that was available  
10 to you after the transient for purposes of reconstruction?

11 A Well, that was one of the concerns. Let me go  
12 back to a summary sheet I had made up at the time of the  
13 transient. This was a summary sheet I presented to you -- I  
14 used for my briefing with regional management. What I did  
15 was break down or there --

16 MR. HEBDON: Just a moment, if you could. For the  
17 record, this is a single sheet that lists five items under a  
18 heading of "Transient" and eight items under a heading of  
19 "Problem Areas."

20 MR. FULSOM: And we'll put this in the record at  
21 this time.

22 (The document referred to follows:)

23

24

25

Laying 2 P.S. ( )  
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Transient

1. Time/event chronology
  - a. Auxiliary FW operator
  - b. Quench Tank Operator
  - c. Delta P Indication on S/G water level indication
  - d. Auxiliary FW cross connection
  - e. T/S limits exceeded
2. Operator ~~resistance~~ RESPONSE.
3. Safety Committee Action
4. Noncompliance
5. Licensee corrective actions

Problem Areas

1. Cause of initiation SFRCS
2. Evaluation of cooldown rate
3. Evaluation press excursion on primary including blown effects on core and effects of boiling on primary system fuel
4. Steam generator going dry (evaluation)
5. Primary/secondary delta P limits exceeded - thermal shock
6. Relief valve malfunction (causes, etc.)
7. HP injection problem
8. Containment annulus delta P

MM mte

1 THE WITNESS: What I really did in trying to  
2 analyze this thing, at the time I broke it down into two  
3 areas: transient conditions, which is really the chronology  
4 of the transient and the things that had a direct effect on  
5 the chronology of the transient, how the operators respond  
6 to it, the subsequent actions the plant took in reviewing  
7 it. Then I identified specific problem areas which I felt  
8 needed to be pursued. These were the cause of the  
9 initiation of the event, the evaluation of the rapid  
10 cooldown rate, what the effects were in the plant from this.

11 BY MR. HEBDON:

12 Q That was from the thermal stress?

13 A You will see in subsequent items there are several  
14 items that get involved in there. You had a rapid excursion  
15 on the primary plant, rapid decrease in temperature. You  
16 also had a subsequent rapid depressurization of the primary  
17 system, which put a thermal hydraulic transient on the fuel.

18 Q All right.

19 A You had the blowdown effects on the core. There  
20 were indications of boiling in the primary system. I had  
21 concern with what that effect was on the fuel. There was  
22 indications of the steam generator going dry, so I needed an  
23 evaluation of the effects of blowing down that steam  
24 generator. Thermal shock considerations from the primary to  
25 secondary delta P limits; the relief valve malfunctioning,

MM mte 1 what had caused this.

2 There was a problem with high pressure injection.  
3 The operators were not sure if high pressure injection had  
4 gone in or not. Obviously, that's a major concern.

5 Q Now, is this problem with high pressure injection  
6 related to the fact, I believe, that one of the legs of the  
7 high pressure injection didn't come up to pressure when they  
8 first initiated it, or is this a different problem?

9 A I think that what you're thinking about, that is  
10 the aux feed pump problem with the governor, the Woodward  
11 governor, binding on the aux feed pump. It did not come up  
12 to rated speed. With the boiler pressure higher, it was  
13 unable to inject initially in the drum. That's a separate  
14 problem from the high pressure injection pumps.

15 The problem with the high pressure injection pumps  
16 wasn't something that was immediately apparent. As part of  
17 my inspection, I requested that they hold a critique of the  
18 entire event. I had to be taken through it. And that's our  
19 utility's routine action, is they go through and interview  
20 everybody.

21 During this critique I made a note in these notes  
22 you'll see here that the operators did not feel that high  
23 pressure injection was going in at the time. I had nothing  
24 in the data which would suggest that initially. However,  
25 this was a comment made by the operator. He could not



MM mte 1 ascertain whether or not he had high pressure injection  
2 flow. It was thought at the time it may have been blocked  
3 by the higher head makeup pumps.

4 Q Was this in all four high pressure injection paths  
5 or just one path?

6 A Well, it goes to a common path. I would have to  
7 go back and look at the plant prints to tell you that  
8 answer. I don't know which pumps were running at the time.

9 Q I believe Mr. Creswell raised an issue later on  
10 concerning the fact that the pressure or the flow had not  
11 come up in one of the high pressure injection legs, but that  
12 was one out of the four. And I wonder if that's the same  
13 concern we're talking about here.

14 A I believe that is. Mr. Creswell was given my  
15 notes and I think this was where the concern came from. If  
16 you see on a subsequent page of my notes here, in a  
17 reconstruction there is an annotation in the margin which I  
18 made at the time of the critique: Was there a time when  
19 high pressure injection didn't go in due to makeup to the  
20 borated water storage tank?

21 Q Okay. So this was the problem of the makeup  
22 possibly blocking high pressure injection?

23 A That is correct.

24 Q What was the basis of the operators saying they  
25 didn't think it was going in?

MM mte

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A I don't know how accurate this is. I'm depending on my memory. But I think there is in-line flow instrumentation in that particular channel. I don't believe they saw flow. Now, that's entirely off the top of my memory. I can't really tell you that at this particular point without doing some homework.

*Handwritten mark*

*Handwritten mark*

*Handwritten mark*



MM mte 1 Q Okay. Now, we have gotten down now through Item  
2 No. 7 of the problem areas on the high pressure injection  
3 pump. The last one was No. 8 on containment annulus delta  
4 P. Now, what was the concern there?

5 A I think the concern simply was over whether or not  
6 a tech spec limit may have been exceeded. I believe the  
7 subsequent investigation showed there wasn't.

8 Q Okay. Under the transient section of this  
9 particular document, you have a list of several items. One  
10 of them is Item No. 2, operator resistance.

11 A That should be "response." That is a misspelling.

12 Q Okay. What was the concern with operator  
13 response?

14 A Well, I think it was a multifaceted concern. The  
15 operators did not have adequate training to recognize the  
16 problem that was initiated by the steam feed rupture control  
17 system. The system by its nature was an add-on system, and  
18 so the initiating event was completely foreign to them,  
19 this half-trip that initiated the thing.

20 They were trying to respond to a transient which  
21 they didn't have adequate indication for.

22 Q Again, the problem with the steam and feedwater  
23 rupture control system, or some other part of the transient?

24 A Well, there were several problems. I can't recall  
25 them all off the top of my head, but some of the major ones

MM mte 1 that come to mind are the problem of trying to determine  
2 that they had an inventory loss. The quench tank rupture  
3 disk was gone. They were losing inventory, and it was only  
4 by happenstance that they put it together.

5 Q So it was only by happenstance that they figured  
6 out that they had a loss of coolant accident going on?

7 A That's correct.

8 Q Okay.

9 A Although I'm not sure my logic was that consistent  
10 at the time, because I was more concerned about the fact  
11 that they had no way to tell that the relief valve was open  
12 at the time.

13 Q You noted on — one of the items on your list is  
14 noncompliance. Did you identify any noncompliances?

15 A I think at the point where I was relieved I had  
16 possibly identified a potential noncompliance and then  
17 turned it over for further inspection. I don't recall. I  
18 can refer to the inspection report to see if noncompliance  
19 was issued.

20 Q What was the subject of the noncompliance that  
21 you had identified?

22 A I really don't recall. I must have had a list of  
23 something, because I identified it in my notes.

24 Q Okay. You mentioned that you talked with  
25 representatives of the utility. What concerns were raised

MM mte 1

2           These were the type of discussions I had. I had  
3 discussions regarding the design of the steam feed rupture  
4 control system, what they could do to provide better  
5 instrumentation for the operators. We had discussions  
6 regarding providing additional training.

7           Most of these subjects resulted in an immediate  
8 action letter being issued to the utility requiring them to  
9 do certain things prior to going back up to operation.

10          Q     Did your concerns about operator training and  
11 indication available to the operators extend to areas other  
12 than concerns about the steam and feedwater rupture control  
13 system? Were there any other areas that you felt that the  
14 operators needed additional training?

15          A     I really can't recall. I think there probably  
16 were, but I can't recall at this time specifically what they  
17 were. There was a fairly broad discussion.

18          Q     Did you talk with or meet with any representatives  
19 of NRR?

20          A     Yes. During the meeting we had -- and let me get  
21 the date for you from the inspection report here -- with the  
22 vendor and utility representatives -- and I'll have to  
23 correct myself. It was on September 30th, not early October  
24 -- several members of NRR came to the site -- I believe  
25 there were five -- and attended that meeting. They were  
present throughout the entire discussion of the transient

MIA mte

1 chronology, the effects, and in fact they participated in  
2 the discussion at several points with regard to what took  
3 place and what the effects were.

4 Q Do you know why they were there?

5 A No. I was informed that they would be there at  
6 the meeting and that was my only contact throughout this  
7 whole thing with NRR, is that they were at that one meeting.

8 Q What concerns did they raise during the meeting?

9 A I don't really recall any concerns being raised by  
10 them. I think they mainly gathered information and took it  
11 back. There was some discussion about the design logic of  
12 the steam feed rupture control system. But other than that,  
13 I don't really recall any concerns being raised by them.

14 Q What feedback did you receive from them concerning  
15 their visit to the site?

16 A None. I was never contacted by anyone.

17 Q Did you ever talk with Leon Engle, who was the  
18 project manager for Davis-Besse?

19 A I had talked with him routinely as part of other  
20 inspections. I did not talk to him subsequent to the  
21 transient with regard to anything in the transient. I  
22 assume Tom Tambling did, as he relieved me.

23 Q Other than the comment about the meeting in your  
24 inspection report, did you prepare any notes as a result of  
25 the meeting or did you prepare any meeting summary?

MM mte 1 A Just what would be present in these notes I have  
2 given you.

3 Q In the rough notes that you provided to us?

4 A In the rough notes that I provided to you, yes.

5 Q All right. Did you give a copy of these notes to  
6 Tom Tambling?

7 A Yes, I did.

8 Q When, at the time that he relieved you and he  
9 returned?

10 A Yes, I did.

11 Q Did you talk or meet with anyone else concerning  
12 this event?

13 A I subsequently presented two training sessions in  
14 the Region III office to the office inspectors where we  
15 discussed the transient. But that's the only contact  
16 outside the normal inspection where the information was  
17 presented to anyone.

18 Q What aspects of the transient did you discuss in  
19 those training sessions?

20 A The general chronology of the event, the  
21 initiating sequence, the response of the operators and the  
22 equipment malfunctions, and the inspection methodology, how  
23 you would handle this type of transient, how you go through  
24 and deal with the problems.

25 Q Why was this transient selected for a training

MM mte 1 session?

2 A It's a fairly routine practice in our office, when  
3 they would have a unique event like this, to have a  
4 training session so that everyone can benefit from the  
5 experience.

6 Q When were these training sessions?

7 A I don't know the exact dates. They would be in  
8 our office training records.

9 Q Approximately?

10 A They were shortly after the transient.

11 Q Before the first of the year?

12 A Oh, yes. They were probably within a week or two  
13 following the transient.

14 Q Okay. In discussing the operators' response at  
15 these meetings -- I'm going to get ahead of myself a little  
16 bit here, but I want to make sure we cover it -- the  
17 operators secured high pressure injection before they had  
18 isolated the leak. Do you agree with that statement?

19 A I would have to go back and look at the computer  
20 printout. I don't recall the exact time frames when some of  
21 these things were done.

22 MR. HEBDON: Let's go off the record for a minute.

23 (Discussion off the record.)

24

25



gsh

1 MR. HEBDON: Let's go back on the record.

2 BY MR. HEBDON:

3 Q What I wanted to get at was this training session.  
4 Now this particular document (indicating), is a large graph  
5 that was prepared by Leon Engle from the reaclimeter data  
6 and a few other sources.

7 He prepared it shortly following the incident. If  
8 you will notice here on the graph, he points out that at  
9 about 4-1/2 minutes, the high pressure injection pumps were  
10 turned off and the blocked valve was closed on the PORV at  
11 about 20 minutes.

12 Now in the course of your training sessions, what  
13 significance was assigned to the fact that the high pressure  
14 injection was shut while the PORV remained open?

15 A I really can't recall. I'm having trouble trying  
16 not to confuse Three Mile Island and Davis-Besse. But I  
17 don't recall the particular significance that was attached  
18 to that at the time.

19 I think the significance that was attached to  
20 most of these actions was the operator's response to  
21 pressurizer level.

22 Q Was it felt that his response was appropriate?

23 A I think what it was felt was that he responded as  
24 we had trained him to respond to the level, and he probably  
25 didn't realize at the time exactly what was going on in the

gsh 1 system. But that's strictly my conjecture.

2 I can't really recall what I said two years ago.

3 Q Would it have been your perception that the  
4 operators would have been trained to follow or to rely that  
5 heavily on pressurizer level?

6 A Yes. That's a problem that we have introduced in  
7 the training over the years. They believe their indication.  
8 There has been a concern that probably was fostered in the  
9 old naval program and was carried forth ever since over  
10 going to a solid system. And they were -- I'm sure once the  
11 reactor was shut down and your decay heat is your only heat  
12 generation problem, I'm sure their next concern was the  
13 primary boundary integrity.

14 And they saw the level going up, which would make  
15 them believe that they were going to go solid. That was  
16 probably their response.

17 That doesn't necessarily agree with this chart  
18 because it would look like the level was rapidly falling off  
19 at that time.

20 Q Well, it was falling off until about 2-1/2 minutes,  
21 at which point it did start coming back up again. And so  
22 at the point --

23 A And they probably thought that they had control of  
24 it at that time. I think as I recall now, as it's coming back,  
25 when they saw level coming back, they were locked on level and



gsh 1 they felt they had control of level again.

2 So they went back off the high pressure injection,  
3 as my memory recalls it here. I don't think they necessarily  
4 looked at anything else to make that determination, but I  
5 don't remember it.

6 Q Okay. Now further on in the transient, after they  
7 turn off the high pressure injection, the pressurized level  
8 starts going back down again.

9 A That's right.

10 Q Which is about what you would expect. Then here  
11 at about six minutes, pressurized level turns around and  
12 goes back up extremely sharply.

13 Do you recall anyone raising the issue of what  
14 caused pressurizer level to go up at that point?

15 A No. I don't think anyone ever raised the issue.  
16 I think at the time we felt that because of the -- at this  
17 point -- I don't know what your time reference was here.

18 Q These are minutes.

19 A What's zero?

20 Q Zero is the reactor trip.

21 A At 6 minutes into the transient is roughly where  
22 I believe you begin to get some steam formation in the  
23 primary system. And if I can keep myself from thinking about  
24 what I know today, I think at that time the reasoning was you

25

gsh 1 didn't have your full heat sink capacity because the aux  
2 feed wasn't going into both generators.

3 And so you had the decay heat going into the system,  
4 but not being fully removed and the primary system started  
5 expanding as a result of that.

6 Now that's not consistent with what we believe now,  
7 but I think at the time that's --

8 Q But at the time the temperature was still coming  
9 down.

10 A The temperature was still coming down. But you  
11 have a tremendous amount of latent heat stored in the metal,  
12 the mass of metal in that system. And those were loop wide  
13 range temperatures.

14 Q Well, then, would it have been your understanding  
15 at the time at this 6-minute point steam was starting to  
16 form in the primary and that's what was causing the  
17 pressurizer level to go back up?

18 A If I can refer to my notes --

19 Q Certainly.

20 A I made some notes about that in a section labelled  
21 "Pressure Excursion and Transient." I have noted from a  
22 reconstruction of the data filled with steam formation for  
23 approximately 6 minutes. I think that should be "at about  
24 6 minutes in the reactor coolant system." Most likely, in the  
25 reactor coolant pump suction, the heat input was from decay

gsh 1 heat, the pressurizer heaters, the metal reactor coolant  
2 pumps. And I noted that the pump problem started at about  
3 6 minutes and about 16 minutes. And then, parenthetically,  
4 that steam formation was also likely along the heated  
5 surfaces.

6 And looking at this curve, that's really where you  
7 start to get down below the saturation.

8 Q At about 6 minutes.

9 A Continuing pressure. So I believe -- and again, I'm  
10 trying to reconstruct what was in my mind at that time and  
11 from my notes. But I believe at that point that was my  
12 concern.

13 Q In the course of the training sessions, did anybody  
14 bring up this issue, the pressurizer level went up?

15 A No.

16 Q And stayed up?

17 A No one at that time ever had a problem with that.

18 Q Now out here at about time 35, the pressurizer  
19 level suddenly shoots back down again.

20 Do you recall at the time how you explained that  
21 particular part of the transient, or did you even address  
22 that particular issue?

23 A I can't recall if we went that far out in the  
24 transient. I don't know what we did. But I can't recall off  
25 the top of my head how I would have explained that, either.

gsh 1 Q With the benefit of hindsight, and having spent  
2 some additional time looking at this on Three Mile Island and  
3 all the rest of it, what would you now give as an explanation  
4 for that sudden decrease in pressurizer level?

5 A Well, from the benefit of all the information we  
6 have had available since, the erroneous indication, as I  
7 understand it, is due to the steam formation forcing the water  
8 back up into the pressurizer. And then as it cools the  
9 water coming back out --

10 I can't remember on a Davis-Besse plant how it  
11 differs from Three Mile Island with regard to the menometer  
12 effect in the loop seal under the pressurizer, if that's still  
13 the same problem or not.

14 So I really can't compare the two. And I'm really  
15 not prepared to, since I'm working on Three Mile Island all  
16 summer. I'm not sure I can keep the two separate in my  
17 mind.

18 I don't know that I can really tell you what I  
19 think about that versus what I think about Three Mile Island.

20 Q All right. You talked about the fact that it was  
21 your perception that the operators were very strongly  
22 influenced by pressurizer level.

23 Did it concern you at all that pressurizer level  
24 responded in what would appear to be a rather anomalous  
25 fashion during this particular incident, a parameter that you

gsh 1 recognize to be very significant in how the operators run  
2 the plant?

3 A No. I think the concern at the time was that they  
4 relied solely on pressurizer level. But I really can't  
5 recall.

6 I think the concern was that they really didn't  
7 integrate all the parameters.

8 Again, it's hard for me to separate this two years  
9 distant from what happened at Three Mile Island. But  
10 pressurizer level, traditionally, has been one of the things  
11 operators key very heavily on.

12 Q Did you raise this concern about the failure of  
13 the operators to integrate all the different parameters in  
14 any formal manner?

15 Did you write anyone a memo about it or anything in  
16 that respect?

17 A No. No, I don't think so. My major concerns at  
18 the time were the plant physical problems. I would have to  
19 go back to the report and see what I said exactly about  
20 operator response.

21 But I don't know that I felt that it was a major  
22 problem at that time.

23 Q Okay. Were you involved in the preparation of an  
24 immediate action letter concerning this event?

25 A Indirectly, yes.

gsh 1 Q Would you describe your involvement?

2 A I provided information to the region which formed  
3 the basis for what should be put in the immediate action  
4 letter.

5 Q Would you describe the concerns that you felt should  
6 be incorporated in that immediate action letter?

7 A I really can't tell you how that determination was  
8 made. It was made from the information which was contained  
9 in my briefing and on this sheet which gave an evaluation  
10 of what the problems were.

11 Q But you didn't actually prepare the immediate  
12 action letter?

13 A No, I did not.

14 Q Do you know who did?

15 A I really don't.

16 Q All right.

17 A It would have been the responsibility of the  
18 inspector and in his absence, the section chief.

19 So I would conjecture that the responsible section  
20 chief of that plant prepared it.

21 BY MR. FULSOM:

22 Q May I ask a question? Would your lack of concern  
23 about operator response be due to your view that the  
24 operators lacked information from the control board, lacked  
25 adequate information?

gsh 1 A Well, it's probably due to several things. You  
2 have to understand that unlike Three Mile Island, where 200  
3 people went, I was the only person out here with all this  
4 data for four days.

5 So in trying to identify concerns, you prioritize  
6 from the information you have available.

7 In collating this information and going through it,  
8 I identified the problems as I saw them to be, problems  
9 related to safety and things, as I have put down on this  
10 sheet.

11 Obviously, at that time, I did not feel operator  
12 response was nearly as significant a short-term problem as  
13 was the physical problems presented by the transient across  
14 the fuel, the effects on the steam generator, things like  
15 this.

16 This is the way I had prioritized the concerns at  
17 that time. I felt the rapid depressurization and cool down  
18 on the primary system was much more important.

19 You can see from these notes and my logic at the  
20 time operator response wasn't nearly the major consideration  
21 that some of these physical problems were.

22 BY MR. HEBDON:

23 Q Do you recall ever receiving or seeing a copy of  
24 a note that was prepared by a Mr. Denwood Ross of NRR to  
25 Karl Seyfrit of I&E headquarters?



gsn 1 A No.

2 Q For the record, this is a memo from D.F. Ross to  
3 Karl Seyfrit, dated October 20th, 1977. The subject is  
4 Davis-Besse 1, abnormal occurrence, 9/24/77.

5 Do you recall ever seeing that document (hands  
6 document to Witness)?

7 A No, I have never seen this document.

8 Q Could you take a minute and read through it? It's  
9 only about one page.

10 (Witness reads document.)

11 A Okay.

12 Q Do you recall anyone ever discussing those concerns  
13 with you that are raised in that document?

14 A No, although we did cover some of the concerns.  
15 For instance, one of the concerns which I haven't discussed  
16 here because it really doesn't have the significance after  
17 you look at it was the ability of the containment sump to be  
18 blocked by the mere insulation which was blown off the steam  
19 generator.

20 I assume that that's what they're referring to in  
21 Item No. 1. It was a raised sump with raised screens, and  
22 that wasn't a problem with Davis-Besse. But I did look  
23 into that.

24 Q What about Item no. 2, which concerns operator  
25 action?



gsh 1 A Okay. The operator action with regard to the  
2 control of the level in the steam generator. I looked at  
3 the operator's decision to secure HPI flow based on  
4 pressurizer level.

5 In retrospect, everyone should have considered,  
6 but I'm afraid that I never considered that. At least I don't  
7 recall ever considering that.

8 Probably in looking at this thing subsequent to  
9 Three Mile Island, that's the one thing that, you know, should  
10 have stood out. But certainly, in the four days that I  
11 was there, my concern wasn't with that. As I explained the  
12 way that I prioritized things at the time -- had to do  
13 with the actual effects on the plant itself, which I think  
14 was my job, was to determine what the condition of the  
15 plant was.

16 I'm sure in the long term we probably should have  
17 caught that. But I don't know that that concern was ever  
18 raised. And I have never seen any of these concerns in  
19 writing before.

20 Q How about the third one?

21 A Yes. This was discussed at the meeting. I dealt  
22 with these concerns at the meeting with both B&W and the  
23 pump manufacturer.

24 I was concerned about the effects of the vapor  
25 formation. As you will see in these notes, there are several

gsh 1 sections of notes which deal with this.

2 Q Do you recall who raised those concerns?

3 A I raised those concerns.

4 Q All right. So that's similar to the concerns that  
5 you had identified separately?

6 A Yes.

7 Q Item No. 4.

8 A Again, Item No. 4 is one I address, as you will  
9 see in my notes. All these items, with the exception of  
10 the operator's decision to secure HPI flow, are items which  
11 are in my notes from the original transient items, which I  
12 covered there.

13 Q All right. I would like to have this particular  
14 document included in the record for reference.

15 (The document follows:)

16

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

DAVIS BESSE  
9/27/77

RL715

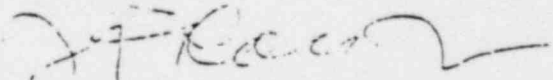
OCT 20 1977

Note to: Karl V. Seyfrit, Assistant Director, Division of Reactor Operations  
Inspection, IE

Subject: DAVIS-BESSE 1 ABNORMAL OCCURRENCE (9/24/77)

Some areas of interest to us that are appropriate for the TE formal report are:

1. Potential for, and core cooling consequences of, insulation debris inside containment after a LOCA. If large pieces could break off, could they get to, and block the sump?
2. ~~The operator's role in participating in the event should be related.~~ For example, the manual actions associated with the control of level in SG #2 should be described. ~~The operator's decision to secure HPI flow based on pressurizer level indication should be explained.~~
3. ~~The dynamic effects of vapor formation in the reactor coolant system during the transient (where and when it occurred, RC pump cavitation effects, RC pump seal effects, etc.) should be described.~~
4. ~~Adequacy of AFW capacity~~ with regard to this transient are of interest. For example, evaluate the observed primary side heatup against the design capability of one AFW train. Also, the adequacy of the AFW actuation setpoint (SG level) should be examined against the number of cyclic stresses allowed over the life of the plant.

  
D. F. Ross, Jr., Assistant Director  
for Reactor Safety  
Division of Systems Safety

cc: G. Mazetis ✓  
T. Novak

Contact  
G. Mazetis, NRR  
Ext. 27341

POOR ORIGINAL

gsh

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A It may be the reason I am unfamiliar with that document was because after my initial involvement and I was relieved, there would be no reason to have any further feedback to me.

That's not normal procedure, to have any further involvement once a project inspector comes back, unless it's requested.

1-3

MELTZER/mm 1 But all of these concerns -- I'd like to point  
2 that out, if you look through my notes at the time -- all  
3 of these concerns were covered with the exception of  
4 questioning why the operators turned off the high-pressure  
5 injection.

6 Q But they were covered coincidentally, they  
7 weren't covered as a result of your having been given those  
8 concerns?

9 A No, that was part of my concerns as the result  
10 of the investigation of the transient.

11 Q But they were concerns that you arrived at on your  
12 own. They weren't concerns that you addressed, because of  
13 that memo or because of the fact that the person that wrote  
14 that memo raised those concerns?

15 A No.

16 In fact, looking at the date of that letter, that  
17 was long after I had been relieved by Tom Tambling.

18 Q All right.

19 Did you receive any reports from Toledo Edison  
20 concerning this incident?

21 A There were reports submitted to the region subsequently.  
22 I didn't receive any reports because again, my involvement  
23 ended when Mr. Tambling came back.

24 Q Okay.

25 So you didn't review any of the reports that were

1 prepared?

2 A No.

3 Q All right.

4 Were you aware at any time that a Mr. McDermott  
5 of the Quality Assurance branch of NRR was conducting an  
6 investigation of the QA implications of the incident?

7 A No, I wasn't.

8 Q No one from the QA branch in NRR contacted you  
9 concerning the QA implications of the missing relay?

10 A No, they didn't.

11 Q Do you know of any other investigations or  
12 analyses of the incidents that were performed?

13 A No, I don't.

14 Q We have this one list that we have included in  
15 the document of problem areas.

16 Was that the list that you used to brief  
17 Mr. Tambling when he took the investigation over?

18 A This list was originally constructed to brief  
19 the Regional management.

20 Now I am sure I also used this list with Mr. Tambling  
21 because I turned over all of the information to him.  
22 However that list is rather sketchy and we probably went  
23 into much greater detail than that list would indicate.

24 Q Can you summarize the documents that you provided  
25 to him?

mte 1           A     Yes, I can take an attempt at that. First, I  
2 provided him with all my notes from the investigation for  
3 the date I was there. That includes not just the notes of  
4 my investigation, but the notes of the meeting that we had.

5           I also provided him with the computer printout of  
6 the events, with my notes and the analysis of the chronology  
7 of the event; several drawings which were reconstructed from  
8 reactimeter data and plant recorders, which explain the  
9 behavior of parameters of the plant during the event;  
10 diagrams of the logic for the steam rupture control system;  
11 diagrams of the governor on the aux feed pumps to explain  
12 its failure.

13           And there is other things which were provided, for  
14 instance, the procedure for the Crosby relief valve which  
15 failed. I believe that's the procedure for adjustment of  
16 it. Also, drawings to demonstrate how the pilot valve  
17 failed.

18           In general, that's typical of the information that  
19 was provided.

20           Q     All right.

21           A     I also provided him with all of the material from  
22 the training sessions that I had given.

23           Q     Did you feel that the lines of authority in  
24 conducting the investigation of the incident were clear and  
25 well-defined?



MM mte 1

A Yes.

2 Q We've discussed the fact that NRR sent some people  
3 out to the site and the Quality Assurance Branch at NRR was  
4 doing some work on this particular incident you were  
5 involved with.

6 Did you feel that the review of this incident was  
7 at all fragmented and disjointed?

8 A No, I didn't, because you have to understand from  
9 my perspective as an IE inspector, I understood my  
10 relationship entirely with my management and what my  
11 responsibilities were. I was unaware of the NRR  
12 involvement, other than their participation as observers in  
13 the one meeting. I was completely unaware of their  
14 investigation at all, so I had no problems with the lines of  
15 authority or anything.

16 Q When this particular incident was finally  
17 resolved, were there any outstanding issues or any concerns  
18 that you had identified earlier on that were not ultimately  
19 resolved to your satisfaction?

20 A I have no way of knowing. As a member of the  
21 nuclear support group, it was routine for me not to be  
22 involved in the resolution of things which I had worked on.  
23 That wasn't part of my job necessarily.

24 Q Did you review the inspection report that was  
25 eventually prepared as a result of the analysis of this

MM mte 1 incident?

2 A I reviewed a draft of the inspection report and  
3 probably the final report, but only those portions which I  
4 was responsible for. The inspection report was prepared by  
5 both myself and Tom Tambling. I think there are sections in  
6 there which I prepared which related to the chronology of  
7 the event and some of the follow-up which I was responsible  
8 for. There are also sections in there which related to his  
9 general involvement after I was relieved.

10 Q Did you consider the generic implications of this  
11 incident at all?

12 A Yes, I did. That's a routine part of  
13 investigating an incident like this. At the time I did not  
14 consider the potential for the relief valve failure to be  
15 generic, because you would not expect a bistable relay to be  
16 missing in a plant. So there was no reason to suspect that  
17 this would occur again at another plant.

18 I was concerned over the aux feed pump governor as  
19 a generic problem, and I think you'll find that identified  
20 in the notes. I felt this was a potential generic problem.  
21 However, that was currently being worked on at a facility in  
22 Colorado, modifications to determine that, and we did ask  
23 the utility -- I asked Lowell Roe, the vice president of the  
24 utility, to submit a generic report, a Part 21 report. I  
25 don't know if we called them Part 21 reports back then.  
He did submit a report, I believe, subsequently, that

MM mte 1 identified it as a generic problem. I can't be entirely sure  
2 that that's an accurate statement, but I think he did. But  
3 that was the extent of a generic application of the event.

4 I felt at the time this was a very unique event,  
5 because of the multiple equipment failures which caused it  
6 to happen: the power-operated relief valve failure as you recall,  
7 the result of the relay being missing; the aux feed pump  
8 problem as a result of the governor not working problem; the  
9 binding in the speed control.

10 Also, the initiating event in itself was unique in  
11 the logic and the enunciation of the logic for the speed  
12 feed rupture control system, which again is a plant-unique  
13 system that only existed at Davis-Besse, and it only had to  
14 do with the enunciation of this half trip. It actually, because of  
15 the way it was scanned by the computer, the operator  
16 wouldn't necessarily know what caused that trip. The trip  
17 time was much faster than the scanning time. So it could  
18 get lost in there and the operator wouldn't know.

19 So when you combine all these things in your mind,  
20 that led to the initiation of this event and the severity of  
21 it, you wouldn't logically conclude at that time that that  
22 many things, the multiple failures associated with that,  
23 would be a generic problem that would cause this to happen  
24 again at another plant.

25

MM mte 1

2 Q You did decide to have a training session to  
3 familiarize the other inspectors at Region III about this  
4 particular incident?

5 A That's correct.

6 Q Did you give any consideration to the need for  
7 providing similar training to inspectors at other regions?

8 A No. That wasn't my job to consider that. I was  
9 asked by the region strictly to prepare a training session  
10 for the region, and that's a fairly routine thing in I&E.  
11 You know, everyone has to keep up to speed on a lot of these  
12 things, and it's hard to do and to benefit from other  
13 people's experience, unless you have some mechanism built in  
14 like these training sessions, so that we all know what's  
15 going on at the plants.

16 Q Did you attend any briefings or meetings in  
17 Bethesda concerning this particular incident?

18 A No, I didn't.

19 Q I would like to ask you some specific questions  
20 about how the incident actually progressed, and some of  
21 these we've already talked about. You mentioned that you  
22 did realize that steam formed in the reactor coolant system  
23 during the transient.

24 A Yes, I did.

25 Q What significance did you assign to that fact?

A The significance that I attached to it then was

MM mte 1 equipment degradation, for instance, the concern over the  
2 main coolant pumps, the seals in the main coolant pumps,  
3 largely because there was not sufficient power history, nor  
4 was the power high enough at the time, that I was concerned  
5 over major decay heat problems, which you would worry about,  
6 the fuel heat transfer problems, then.

7 The steam that was formed, I felt at the time,  
8 because of the relatively small exposure, was local problems  
9 as far as the reactor coolant pumps, the excessive vibration  
10 from cavitation of the impeller, perhaps the bearing  
11 damage. I really didn't have a concern about major voiding  
12 in the primary system.

13 There was one other thing. I felt there was some  
14 boiling in the core and I was able to support this somewhat  
15 by the erratic neutron instrumentation. But again, I felt  
16 this was on a small scale, near large metal surfaces, and  
17 not a major problem. I didn't envision major boiling in the  
18 coolant system.

19 Q Looking back on it, particularly looking at the  
20 response of pressurizer level, do you now feel that there  
21 was considerable boiling taking place during this transient?

22 A Well, I have a hard time defining "considerable."  
23 I wish I had looked at it that way during that event. I  
24 certainly didn't.

25 In speculation, perhaps it would have been wiser

MM mte 1 at the time to extrapolate and say, well, if there had been  
2 a greater exposure and more power history, it would have  
3 been more of a problem. But again, because of the 9 percent  
4 power and less than one full effective power day, no, my  
5 mind just didn't go that far.

6 Q Did you make any attempt to extrapolate this  
7 transient to more severe initial conditions?

8 A No, because again I felt it was such a unique  
9 transient because of all the failures involved. I really  
10 didn't know, nor did anyone else ever question, whether or  
11 not that was appropriate at the time.

12 Q Now, we've talked about the fact that there seems  
13 to be indication that the boiling in reactor coolant system  
14 caused the pressurizer level to increase. Did you realize  
15 that at the time?

16 A No, I did not.

17 Q If you had realized that at the time, what  
18 significance would you have assigned to that fact?

19 A Well, that's a hard one to answer, because I've  
20 got the benefit of everyone else looking at it since Three  
21 Mile Island, and I'm not sure that I have a unique  
22 conclusion from anybody else. I certainly would conclude  
23 now that if you have major voiding in the reactor coolant  
24 system with that plant design, you can force water up into  
25 the pressurizer. And since we depend on pressurizer level



MM mte 1 indication as a direct indication of your core cooling  
2 capability, because the core would be covered, that's an  
3 erroneous indication. You could uncover the reactor core  
4 and still appear to have a good cooling system there.  
5 That's very misleading.

6 I did not realize that at the time. I did not  
7 feel there was sufficient boiling present in the Davis-Besse  
8 incident to be that concerned with that. Perhaps it was an  
9 erroneous conclusion.

10 Certainly, after Three Mile Island, I would change  
11 my way of thinking with regard to that.

12 Q Do you know what assumptions are made in the  
13 accident analyses for a plant such as Davis-Besse concerning  
14 such things as bulk boiling in the reactor coolant system?

15 A In general, yes. The safety analyses don't  
16 consider bulk boiling, I believe. Typically, pressurized  
17 water reactors to my knowledge -- and again, I've been doing  
18 boiling water reactors the last couple of years, so let me  
19 try to sort things out in my mind. But you consider film  
20 boiling, but you never get to the point of bulk boiling.  
21 You know you would have some localized boiling on certain  
22 transients, I believe.

23 Q If the safety analysis report assumes that there  
24 isn't any bulk boiling, did it concern you, then, that you  
25 did have bulk boiling during this transient? Did that



MM mte 1 inconsistency with the safety analysis report bother you at  
2 ail?

3 A I did not feel we had bulk boiling at the time, so  
4 I didn't consider that.

5 Q Did you feel, then, that the boiling that took  
6 place was just film boiling?

7 A Well, I felt it was localized boiling and I felt  
8 it was next to major areas of metal. It was more or less  
9 latent heat being released into the system and pump heat  
10 being put in from the main coolant pumps. I really did not  
11 consider that there was major boiling in the Davis-Besse  
12 incident.

13 I have no reason, even looking back on it now, had  
14 I not known about Three Mile Island, I wouldn't conclude  
15 that now from the data that I had.

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gsh 1 Q We discussed this fact that the operator secured the  
2 high pressure injection before they identified and isolated  
3 the leak.

4 I believe you mentioned that you didn't focus in  
5 on that particular issue. If you had focused in on that  
6 issue, what conclusions do you think you would have reached?

7 A Let me answer that question by stating that knowing  
8 what I know now about both transients, I would reach the  
9 conclusion that they violated the entire intent of providing  
10 that system, which is to keep the core covered and you never  
11 remove one of those features unless you are absolutely sure  
12 of the integrity of those cooling systems.

13 At the time I did not conclude that. I'm not sure  
14 that I identified that as a problem at the time. I don't  
15 believe that I did.

16 BY MR. FULSON:

17 Q You stated earlier that you were concerned with the  
18 plant going solid.

19 A No. I stated what I thought the operators were  
20 concerned with the plant going solid. That's why the  
21 security.

22 Q Was that a valid concern of the operator's?

23 A No. It is a valid concern based on the training.  
24 Let me rephrase that.

25 Yes, that is a valid concern of the operator because

gsh 1 they look at it slightly different than an engineer does.

2 I don't know whether it's reasonable to conclude in  
3 a situation where things are happening very fast an operator  
4 would necessarily conclude in his mind that a relief is  
5 qualified to pass to phase flow.

6 We have trained operators over the years to worry  
7 about primary boundary integrity. For a long time, solid  
8 plant conditions were a major concern to operators. You  
9 have rapid pressure fluctuations with very small volume  
10 changes.

11 And operators have been trained over the years to  
12 be very concerned about taking of plant solid. A large  
13 percentage of operators and utilities today are ex-Navy  
14 operators. That's a very hard design requirement to get out  
15 of people's minds.

16 As it turns out in further analysis, the plant  
17 probably would not have gone solid. If it did, it wouldn't  
18 be of concern. But I'm not sure the operators are aware of  
19 that or would they go through that logic path in their mind  
20 in a transient like this?

21 I think our training was deficient in those areas.

22 Q Should they be aware of it?

23 A Oh, they certainly should. But that's in retrospect,  
24 again.

25 Q Yes, I understand.

gsh 1

BY MR. HEBDON:

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Q Along this line of the operators being concerned about going solid, do you know if the operators were aware that the high pressure injection pumps at Davis-Besse were fairly low shut off head and probably couldn't have taken the plant solid if they had left them running?

A I cannot recall if they are or aren't. I think those pumps, off the top of my head, are like 1600-pound pumps.

But I don't know that. The operator should certainly be aware of that.

Q The reason they might not be aware of that is the fact that Davis-Besse is the only plant that has such low shut off head pumps.

And so if they were trained at B&W on a generalized B&W plant, they probably would have been told that they were very high head pumps.

Did you address that issue at all? Do you know if they knew one way or the other whether those pumps were high head or low head?

A I'm certain that they knew what they were. I don't recall addressing that issue.

Q Okay. Were you aware that a Mr. James Creswell of I&E region 3 subsequently raised a concern about the possibility that the operators had prematurely secured the

gsh 1 high pressure injection pumps?

2 A Yes, I was.

3 Q When did you become aware of this concern?

4 A I can't honestly answer that. It was sometime in  
5 the course of his review of these problems in the region.

6 I think that we may have had some discussions  
7 regarding it, but I can't honestly put a time-frame on it  
8 for you.

9 Q Would it have been before Three Mile Island?

10 A Yes, it would have.

11 Q Do you know how he became involved with that  
12 particular issue?

13 A He was involved in the start-up program as a member  
14 of the nuclear support group at Davis-Besse. I don't know  
15 how he specifically became involved in the feedwater  
16 transients, no.

17 Q Would it have been a normal function of his job to  
18 get involved with an issue associated with an incident that  
19 occurred at this particular time in the plant's development?

20 A It depends how he got there. He may have been  
21 reviewing some testing which he questioned certain things  
22 which went back to the test program or directly affected by  
23 conclusions from this transient.

24 I don't know how he got back to that point.

25 Q Do you know what finally happened as a result of his

gsh 1 concerns?

2 A On, I think it's probably pretty well known from  
3 the newspapers and such that he was unhappy with the way his  
4 concerns were processed.

5 I don't know what the final resolution of his  
6 concerns are now.

7 Q Were you aware that the procedures at Davis-Besse  
8 were changed to incorporate a warning to the operators not  
9 to secure the high pressure injection pumps prematurely?

10 A No, I had no involvement after my last involvement  
11 on that transient.

12 Q Okay. As a normal practice of your review of  
13 incidents such as this, what consideration do you usually  
14 give or what the operators will see and what they may or may  
15 not do with that information?

16 A Would you repeat that, please?

17 Q In the course of reviewing incidents such as this,  
18 or reviewing plants in general, do you normally give any  
19 consideration to what the operators are going to see and  
20 what they may or may not do as a result of the indication  
21 that they get?

22 A Yes, sir. It's a very important part of looking  
23 at a transient to determine if their response is adequate,  
24 and also, is the design adequate? Were they presented  
25 sufficient information to do what they had to, because we make

gsh 1 certain assumptions in the safety analysis that they take  
2 actions or take no actions.

3 You have to have a basis for the actions that they  
4 take to understand what was done.

5 So to go through the chronology of events, you  
6 certainly try to independently arrive at the same  
7 conclusions they did to decide if their action was appropriate.

8 Q I guess that's what's causing me a lot of  
9 confusion. We've talked now about the fact that you looked  
10 at this incident. You held a training session where,  
11 apparently, a large number of other inspectors looked at this  
12 particular incident.

13 You had two points: One, the fact that the  
14 operators secured the high pressure injection system while  
15 they still had a LOCA in process; and secondly, the fact that  
16 the pressurizer level, which was a key indication to the  
17 operators of what was going on in the plant during a loss  
18 of coolant accident, responded in a very anomalous fashion.  
19 It went up to the high level in the pressurizer and pegged  
20 high and stayed there for a period of about 20 minutes,  
21 during which the plant was cooling down and there was a  
22 valve stuck open relieving water out of the primary with no  
23 input going in.

24 I don't understand why these issues didn't seem to  
25 bother anyone. They didn't seem to come up as a concern to



gsh 1 anyone.

2 A Well, in retrospect, that's a very good question.

3 Q Do you have any feel for why they weren't a  
4 concern?

5 A No. I can only speak for myself. At the time I did  
6 not see it as a generic problem. I can't go back in my  
7 memory and tell you exactly how I explained that particular  
8 part of it, although I'm sure that all of us, in retrospect,  
9 would take a hard look at what we concluded from that.

10 But no, I can't tell you why we didn't identify  
11 that.

12 However, a lot of people looked at that and no one  
13 seemed to have identified it as a problem.

14 The other thing that you have to understand, in  
15 the course of our routine business, you know, we have X-days  
16 to devote to something, and then you're given another job and  
17 you move on.

18 My involvement with this thing ended after I was  
19 relieved by Mr. Tambling, except for the training sessions.

20 Q I would assume in the course of the training  
21 session you had a graph somewhat similar to this one prepared  
22 by Mr. Engle, where you showed the people who the transient  
23 progressed.

24 A We certainly did. We covered that transient.

25 Q And all of these inspectors looked at this particular

gsh 1 transient and I would assume noted on there somewhere is a  
2 note that the high pressure injection pumps were secured.  
3 Somewhere on there is a note that about 15 minutes later,  
4 they finally isolated the LOCA, and I would assume pressurizer  
5 levels on there, too.

6 A It certainly is. Now I can tell you if it went out  
7 that far in our training session. I'm sure that we covered  
8 it.

9 (Witness refers to slides.)

10 A We certainly did. We got out to about 8 minutes  
11 into the transient. But I'm sure that we discussed what took  
12 place there.

13 I can't tell you why no one identified that. I  
14 have become aware subsequently through the newspapers and  
15 other things that the B&W people were concerned about it.  
16 They gave no indication to us that they were concerned about  
17 it at the time.

18 Q All right. Do you know why the relay that caused  
19 the PORV to cycle eventually fail was missing?

20 A We were never able to determine that.

21 Q Do you have any theories on what happened to it?

22 A None whatsoever.

23 Q Do you know if any effort was made to find out what  
24 happened to it?

25 A Again, this went back to the long-term follow up

gsh 1 done by Mr. Tambling.

2 But I believe that they went back and checked all  
3 of the recods, the yellow line construction drawings, to  
4 indicate that it was originally there. I think they went  
5 back to see if it was there during the pre-operational testing.

6 I'm sure that they did all of those types of things.  
7 But I don't think they determined why it was missing. I  
8 think they did find that there were other relays missing.

9 I don't know.

10 Q Okay. Were you involved at all with any concern  
11 about the availability of indication of the PORV position  
12 during the incident?

13 A No, because that has been a concern over a number  
14 of years on all relief valves, that there is not positive  
15 indication of them either being open or closed, but normally,  
16 just a downstream temperature indicated by a thermocouple  
17 which tells you that they are leaking.

18 But it is not a positive indication that that's  
19 been a concern of everyone, I think. I don't think it's ever  
20 been a major concern in the past.

21 Q Do you know if that concern has ever been documented  
22 in any way?

23 A Oh, I'm sure that it has somewhere, but I wouldn't  
24 speculate.

25 Q You don't know of any specific examples, though?

gsh

1 A No.

2 Q Did you initiate any actions to try to change the  
3 position indication available in the PORV?

4 A No.

5 Q Did you consider the possibility that the  
6 administrative procedure should be changed to minimize the  
7 possibility of removing parts such as the PORV relay?

8 A That would have been part of the follow-up  
9 investigation as to what was done through the administrative  
10 program.

11 Just off the top of my head, had I been involved  
12 in that, I probably would not have considered that because  
13 you're treating a very specific problem. You don't write a  
14 procedure to deal with a relay being removed from a cabinet.  
15 If, in fact, you have people taking things like that, you have  
16 a more serious problem than can be dealt with necessarily  
17 with administrative procedures.

18 I don't know what their conclusions were with regard  
19 to the QA program that allowed that to happen. But I wouldn't  
20 have specifically addressed that.

21 You know a part being taken like that, I would have  
22 been more concerned about how it was allowed to happen rather  
23 than the specifics to this event.

24 Q Did you raise this issue about how it was allowed  
25 to happen?

gsh 1 A No, because I wasn't involved in it.

2 Q Wasn't involved with what?

3 A Any of the follow-up activities. My activities  
4 ended after my initial investigation into the condition of  
5 the plant.

6 Q Well, as part of the issues that you turned over  
7 to Mr. Tamblin, did you raise to him an issue that we ought  
8 to look into how a relay such as this could be missing and  
9 why relays are being removed?

10 A I think that's listed on that sheet. I believe. It  
11 certainly is in my notes. You know, we had a discussion of  
12 it in the meeting that we had with the utility, although at  
13 that time, they were unable to tell us how the relay was  
14 missing. And they were going further into it.

15 We certainly were interested in how that happened.

16 If I can go back to my notes here for a minute, I  
17 am sure --

18 (Witness refers to documents.)

19 A Yes, I have notes here that would indicate that  
20 we discussed that. The utility stated that the relay was  
21 scheme checked and in place during the pre-op and tested  
22 with simulated pressures.

23 The cause of removal is unknown now.

24 So the fact that we were concerned with it, it's not  
25 that I wasn't concerned with it -- you have to understand that

gsh 1 as a support person, my responsibilities of immediate concern  
2 were to identify the condition of the plant.

3 The project inspector normally follows up on all  
4 of the administrative things.

5 When you are prioritizing things like this, that  
6 wasn't one of the immediate concerns. The investigation,  
7 those types of things, and the administrative program are  
8 more of a long-term problem than the immediate problem of  
9 assessing the condition of the plant.

10 This may also be why I didn't dwell that much on  
11 the operator response at the time of the HPI function. I  
12 was really devoting my attention to the physical condition  
13 of the plant.

14 That's not an excuse, but that certainly is the  
15 rationale that goes through your mind. You have a limited  
16 amount of time to get a certain amount of things done. And  
17 that's where my attentions were devoted.

18 Q Okay.

19 MR. HEBDON: Let's take about a 10-minute break.

20 (Recess.)

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1 MR. HEBDON: Okay. Let's go back on the record.  
2 You mentioned while we were taking a break, and you had  
3 looked through your notes, and there were some points you  
4 thought you could clarify as a result of that review. Do  
5 you want to go ahead and take care of that now.

6 THE WITNESS: Yes. First with regard to the power  
7 operated relief valve, we were concerned with the lack of  
8 direct indication. In my notes, there are statements I  
9 think you will find to the effect that that was one of the  
10 items in the 9/28 critique. There is no positive indication  
11 of electromagnetic relief valve position. That was  
12 certainly one of our concerns at the time. Also --

13 BY MR. HEBDON:

14 Q What indication was available? Do you recall?

15 A To the best of my knowledge, downstream  
16 thermocouple temperature. I cannot recall anything else.

17 Q Was there indication on powers to the solenoid?

18 A I would hate to hazard a guess two years down the  
19 road. I would say yes, there's probably indication, but  
20 it's strictly a conjecture. I'm not sure.

21 Q All right. I would like to ask you some questions  
22 on the operators' abilities and knowledge of what was going  
23 on during this particular transient. What was your  
24 impression of the overall knowledge and ability of the  
25 operators?



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1           A           I felt the operators did a very good job, given  
2 the confusion that existed, the lack of information that  
3 they had. Their ability to find that the power operator  
4 relief valve failed to open, given the small amount of  
5 information they had, I thought they did a real good job at  
6 the time.

7           Q           Do you know if the operators were aware that  
8 reactor coolant pressure had approached the saturation  
9 pressure during the transient? Were they aware during the  
10 transient that that happened?

11          A           I really can't answer that. I'm sure that in  
12 their training down the road that had to be a subject of the  
13 discussion. I don't know if they were aware of that during  
14 the transient.

15          Q           Do you know if they were aware that boiling was  
16 occurring in the reactor coolant system?

17          A           I would think in trying to reconstruct the  
18 transient they would become aware of it due to the spiking  
19 in the neutron indicators and due to the coolant pump  
20 noise. I would be surprised if they concluded during the  
21 transient, although they may have from the coolant pump  
22 problems. It would be logical to conclude that they had cavi-  
23 tation or steam formation in the coolant pump impellers. I  
24 can't speak for in the heat of the battle if they would  
25 realize that at the time. Certainly after they got out,

mgcMM 1 after some extended time they would. At six minutes into  
2 the transient, it may have been a little ~~rapid~~ for them  
3 to realize that. Perhaps further out, they may have in  
4 their minds reconstructed what they had. I don't know  
5 necessarily they would have done it that fast.

6 BY MR. FULSON:

7 Q This is an opinion that you're giving us now?

8 A Yes. That's what you asked me. That's my  
9 understanding of what you asked me.

10 BY MR. HEBDON:

11 Q Well, it's your opinion plus -- I would expect  
12 that opinion to be somewhat tempered by the discussions that  
13 you had with the people there at the site following the  
14 incident. For example, do you recall any ever of the  
15 operators mentioning that they knew there was boiling going  
16 on in the core or that the pressurizer level had gone out  
17 because of the boiling in the core or any of those issues.

18 A There was conjecture when we reconstructed the  
19 data initially that there was some boiling in the core.

20 BY MR. FULSON:

21 Q Now, wait a minute. When you say "we  
22 reconstructed", you mean you and the operators?

23 A No, myself and the B&W personnel.

24 Q But his question went strictly to the operators  
25 now.

mgcMM 1 A I cannot speak for the operators. I don't know  
2 what they thought. In analyzing the transient and the  
3 condition of the plant, I had very little involvement with  
4 the operators. Most of my involvement was with the  
5 engineering staff.

6 Q Do you know if anybody had much involvement with  
7 the operators?

8 A Oh, I'm sure the people who follow it up may  
9 have. I certainly didn't.

10 Q Which people? NRC people or B&W people?

11 A Yes. Tom Tambling.

12 Q But you didn't specifically interview any of the  
13 operators to try and get a feeling for what they felt was  
14 going on, what they saw, and what they thought?.

15 A No. I attended a critique at which this was  
16 discussed, and I listened to their reactions during the  
17 critique.

18 Q Now, during this critique, did the operators give  
19 any indication that they realized that boiling had been  
20 taking place during the transient. And more specifically,  
21 did they give any indication --

22 A Let me refer to my notes at that time, because off  
23 the top of my head, I can't tell you that answer.

24 (The witness read the documents referred to.)

25 I do not believe so. I do not believe that was discussed

mgcMM 1 in the critique.

2 Q So as far as you can recall, you don't remember  
3 the operators giving any indication or discussing that they  
4 knew during the transient that boiling was taking place and  
5 that some things resulted from that boiling?

6 A That's correct. There's nothing in my notes that  
7 would indicate that, other than that the reactor coolant  
8 pump cavitation, and no one used the words "boiling" with  
9 that.

10 Q Do you recall if the operators gave you any  
11 indication of why they secured high pressure injection?

12 A No, I do not.

13 Q Do you know if operators at B&W plants ever secure  
14 auxiliary feedwater to limit cooldown immediately following  
15 a transient such as this?

16 A I have heard as part of our investigation of Three  
17 Mile Island that operators have routinely done this. I do  
18 not know whether that is correct or not. I understand in  
19 order to limit the transient on the primary side of the  
20 plant and try to keep the primary side on the line after a  
21 trip, that they have done this. I do not know if that is  
22 true or not.

23 Q Did you have any information concerning that  
24 possibility prior to the accident at TMI?

25 A No. In fact, that rumor, I understand, came out

mgcMM 1 of TMI investigations, which had to do with the interviewws  
2 of some of the simulator instructors at B&W after —  
3 subsequent to the accident. I was not aware of any of this.

4 Q All right. No one had ever said anything to you  
5 about doing that sort of thing?

6 A No.

7 Q Do you know how the operators identify that the  
8 PORV was open?

9 A Yes. It had to do the containment humidity  
10 monitor. There were several equipment indications in a  
11 physical location in containment. The various things that  
12 happened added up to a set of conclusions which was verified  
13 by the containment humidity monitor going off, that they  
14 must have blown the rupture disc. And the reason they did  
15 this was because the PORV was stuck open.

16 Q Did you feel their indication that the PORV was  
17 stuck open was fairly straightforward, or did it require a  
18 lot of intuition?

19 A I feel it required a lot of luck.

20 Q Did you give any consideration to the fact that  
21 sticking or PORV failing open and having a fairly tenuous  
22 indication that it is failed open had any generic  
23 implications?

24 A I would like to think probably I did, but in this  
25 particular event, again, the relay was missing, and my

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1 concern was with Davis-Besse and why that one failed open.  
2 And I probably didn't think of it in terms of a generic  
3 problem. I seriously doubt that I did.

4 Q Were you aware at the time that PORVs had stuck  
5 open on other B&W plants?

6 A No, I wasn't. It's a fairly common occurrence on  
7 boiling water reactors, though.

8 Q Were you aware at the time that it was a common  
9 occurrence on boiling water reactors?

10 A Yes.

11 Q Did you extrapolate the fact that it's not that  
12 uncommon for PORVs to fail open in the B&W design?

13 A Not to fail open, but to fail to close.

14 Q All right.

15 A Now in this case I had no reason to believe that  
16 this particular relief valve -- that's a different type of  
17 relief valve. In this case I had no knowledge of these  
18 types of relief valves having a failure to close, and, in  
19 fact, you wouldn't conclude that from the mode of failure of  
20 this particular one, because the relay was missing. So it  
21 chattered rapidly about its setpoint until it bent the pilot  
22 stem. You would not conclude this was a generic problem, a  
23 relay being missing causing this to happen. If, in fact, it  
24 failed with everything working properly, then you would look  
25 at the generic possibilities. But under the unique



mgcMM 1 circumstances of a relay being missing, I don't know what  
2 would make your logic go that direction.

3 Q What would you consider the fact that there's a  
4 reasonable probability that a relief valve would fail, that  
5 that particular PORV would fail for whatever initiating  
6 reason and will fail in the open position. And if it fails  
7 in the open position, there is a rather shaky indication to  
8 the operator that, in fact, it's failed open? Was that sort  
9 of analysis part of the analysis you would do of an incident  
10 of this type?

11 A Had the relay failed under normal conditions, yes,  
12 then you would say, "Gee, this is strange; this is a very  
13 low probability event." You know, is this a generic event?  
14 Does this have generic implications? Under these  
15 conditions, with it being a hardware problem, I had no  
16 reason to ask that question. In retrospect, I probably  
17 should have, but I didn't.

18 Q Did you consider failure of the PORV to be a very  
19 low probability event?

20 A Yes, sir.

21 Q Why?

22 A I had no history of it to my knowledge -- that  
23 type of particular Crosby PORV being a problem.

24 Q Did you ever discuss this incident or any of the  
25 issues associated with this incident with a Mr. Kelly or a



mgcMM 1 Mr. Dunn or any other employee of B&W?

2 A The only employees of B&W I had contact with were  
3 during the Davis-Besse investigation. At the time, my major  
4 contact was with a Mr. Fred Faist, although I did have  
5 contact with Joe Kelly.

6 Q You did talk with Mr. Kelly at the site?

7 A Yes, but that was during the initial four days I  
8 was there.

9 Q Did he raise any concerns to you about this issue  
10 of the operators securing high pressure injection?

11 A No. He did not.

12 Q Did he ever talk to you subsequently about that  
13 issue?

14 A No. However I think he got there after I did, and  
15 I think we had perhaps a day overlap. So my involvement  
16 with Joe Kelly was minimal.

17 Q Who was the person that worked with you the most  
18 as far as trying to reconstruct the incident and analyzing  
19 the incident?

20 A Fred Faist from B&W.

21 Q Do you recall his name is spelled.

22 A F-A-I-S-T, I believe.

23 Q What was his position with B&W?

24 A He was the B&W site rep.

25 Q So he was assigned to the Davis-Besse site. He

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1 wasn't someone who came out from B&W Lynchburg?

2 A I believe that's correct. He was the site rep.  
3 That may be incorrect, but that's the way I remember it. He  
4 was the site rep.

5 Q I would like to find out what you know about an  
6 incident that occurred on November 29, 1977, which was at  
7 Davis-Besse. Prior to March 28, 1979, what knowledge did  
8 you have concerning an incident that occurred at Davis-Besse  
9 on November 29, 1977?

10 A Other than that a similar event occurred, I'm not  
11 sure of the date -- I know one did occur -- but that's about  
12 it.

13 Q Do you know any of the details associated with the  
14 November 29 incident?

15 A No.

16 Q Were you involved with it at all?

17 A No.

18 Q Are you aware of Mr. Creswell's concerns  
19 associated with the September 24, 1977, incident at  
20 Davis-Besse?

21 A Some of them, yes.

22 Q Would you describe what you know to be his  
23 concerns?

24 A Well, I can't really do that, because although we  
25 have had informal discussions on it, I can't separate his

mgcMM 1 concerns regarding that event from other concerns he had  
2 from the startup program. One concern that does stick in my  
3 mind is the concerns over voiding in the pressurizer -- not  
4 the reactor coolant system. His concern was over voiding in  
5 the pressurizer, and he also had a concern over the HPI  
6 injection being secured. There was an additional concern  
7 which I think was from the startup program over a core left  
8 at low viscosities of reactor coolant. But I think he had  
9 many additional concerns to those that I recall.

10 Q With respect to the concerns about high pressure  
11 injection and voiding of the pressurizer, did he ever give  
12 any indication to you that those two concerns were related  
13 in any way?

14 A I think in the general sense of the transient,  
15 perhaps. I don't recall that. But those concerns were  
16 voiced at our discussion of the initial transient.

17 Q Were both of those concerns associated with the  
18 September 24, 1977, transient?

19 A I really can't tell you that. I don't know.

20 Q Do you consider any of the concerns raised by  
21 Mr. Creswell to be relevant to the accident at TMI?

22 A None of his concerns that I'm familiar with --  
23 what prohibited the initiating event.

24 Q What do you mean by the initiating event?

25 A The loss of aux feedwater.

mgcMM

1 Q All right.

2 A What I think is pertinent is the similarity  
3 between the transients. Certainly the chronology of events  
4 is very similar with just a few exceptions at Davis-Besse  
5 and the transient that I was familiar with. They only  
6 secured two pumps, two coolant pumps, as opposed to Three  
7 Mile Island where they secured four. The very similarities  
8 between the way they responded to the level indication --  
9 unfortunately they didn't have -- or fortunately they didn't  
10 have the same power exposure, so you didn't have the same  
11 results, although you did get aux feed flow from one pump  
12 and later on from the second at Davis-Besse, which they  
13 didn't have for a much longer time at Three Mile Island.

14 His concern -- I'm not sure -- his concern as I recall it  
15 was over voiding in the pressurizer. Now I had never heard  
16 a concern expressed or had I heard anyone prior to Three  
17 Mile Island express a concern that you would have steam  
18 formation in the reactor coolant system which would force  
19 the water up into the pressurizer. I think those were two  
20 separate concerns. I think his concern was over the actual  
21 voiding in the pressurizer, not that the bubble perhaps,  
22 shifting down to the cooling system.

23 Never in my discussions had I heard him voice a concern  
24 that you would have a bubble in the primary system forcing  
25 the water back up into the pressurizer, giving erroneous

mgCMM 1 indication.

2 Q All right.

3 A And that's an important distinction because I  
4 don't know that any of us realized that.

5 Q Mr. Creswell didn't give you any indication that  
6 he included that in his concerns?

7 A Well, I was not in the same group with him, so our  
8 discussions were informal. I had no reason to know other  
9 than hall talk what his concerns were.

10 Q Okay. Were you aware that Mr. Creswell discussed  
11 his concerns with Commissioners Bradford and Ahearne and  
12 their staffs?

13 A Not until recently.

14 Q Until after TMI?

15 A I'm not sure if it was before TMI or after TMI.

16 Q How did you find out about that?

17 A I'm not sure. I may have read it in the newspaper  
18 like everybody else. I'm not really sure how I found out.

19

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mgc/ML

1 Q Were you aware that Mr. Creswell requested a Board  
2 Notification regarding these issues?

3 A Yes, I was.

4 Q How did you become aware of that?

5 A I think through hall talk in the region.

6 Q But you were not specifically involved with those  
7 issues at all or those matters?

8 A And I have never had any initial involvement from  
9 the initial transient, with the exception of informal  
10 discussions with people who have asked questions just out of  
11 general information.

12 Q Were you aware that Mr. Creswell recommended that  
13 Davis-Besse be shut down because of poor performance of  
14 Toledo Edison's management?

15 A I was aware of that.

16 Q When did you become aware of that?

17 A I have no idea.

18 Q Before or after TMI?

19 A I think before TMI.

20 Q How did you become aware of that?

21 A Just through general office talk again.

22 Q What is your opinion of the abilities and  
23 competence and attitude of the Toledo Edison management and  
24 the Davis-Besse staff.

25 A Well, I'm really not in an objective position to



mgcMM 1 evaluate that because I haven't been to the plant since  
2 1977. At the time, they were a small utility with a minimum  
3 staff, minimum experience, minimum qualifications, and their  
4 performance at the time reflected that. They had a very  
5 poor performance. I had generic concerns about the  
6 qualifications of staffs at nuclear plants unrelated to  
7 Davis-Besse, which is a current thing I'm involved in. It's  
8 entirely subjective, but I don't think the regulations are  
9 adequate. I have expressed those concerns, and that's an  
10 on-going matter.

11 Q In what form did you express those concerns?

12 A As part of my involvement in the Lessons Learned  
13 Task Force, and also as part of my involvement as the  
14 inspector, startup and test inspector : the Zimmer nuclear  
15 station.

16 Q Did you document those concerns?

17 A No, but they have been discussed with both mv  
18 management and the lawyers and the NRR staff. In fact, I  
19 hesitate -- I'm sure they're documented somewhere, but they  
20 have been discussed with both NRR management and I&E  
21 management that I feel the regulations are inadequate and  
22 that conformance to their current guides which are  
23 appropriate. initial station manning is meaningless.

24 Q Could you elaborate on that concern a little more?

25 A The basis for the concern is, I have expressed a



mgc/mm

1 reluctance to express my satisfaction with the licensing of  
 2 the Zimmer facility, even though they meet the regulations,  
 3 because I feel that initial station manning is very  
 4 important. And regardless of whether they meet the  
 5 regulations or not, I feel their staff is inadequate to  
 6 operate this station, or was at my last involvement back in  
 7 March. And I felt this was a problem with Davis-Besse and  
 8 other plants.

9 Unfortunately that's a very subjective opinion. That's  
 10 strictly a personal opinion.

11 BY MR. FULSOM:

12 Q What part of the staff are you including in this?

13 A I am talking about all of Region III's management  
 14 up through the Director. I am talking about NRR management  
 15 up through the --

16 Q Now you're talking about the staff at the --

17 A Oh, I'm sorry. You're talking about -- I thought  
 18 you asked who I've expressed these concerns to.

19 Q No. I want to know what part of the staff of the  
 20 plant you feel is inadequate.

21 A Well, it's not that easy to answer. What you have  
 22 to look at is the total experience of the people running the  
 23 plant. Current guides which are ANSI 18.1, which plants are  
 24 required to commit to as part of their licensing process,  
 25 are very vague, and you can have minimal nuclear experience.

mgcMM

1 You can essentially go out and hire kids right out of  
2 college, put them on that site several years before it's  
3 licensed, and they will meet all the experience requirements  
4 with the exception of one or two positions, like the Reactor  
5 Engineer or the Plant Manager. They'll meet all the  
6 requirements to run that plant, even though they have no  
7 nuclear experience. It's my opinion that's not sufficient.

8 You have to have some prior nuclear experience. You also  
9 have to have a minimum competent management staff. It's not  
10 sufficient to say this is all gain while sitting there on the  
11 site under construction, you have to have some prior  
12 operations experience. You have to have some maintenance  
13 experience -- how to take care of that plant, how to care  
14 for the equipment. And you just don't get that sitting on  
15 the site while it's being built.

16 So I have taken issue with the regulations in this area,  
17 and I think that was very appropriate with Mr. Creswell's  
18 concerns at Davis-Besse, perhaps. But again this is a very  
19 subjective area. I have an opinion, and other people have  
20 an opinion.

21 Q Have you ever expressed a concern that Zimmer  
22 should not be allowed to operate because of the weakness of  
23 the staff?

24 A Yes, sir.

25 Q To whom did you express that concern?

mgcMM

1 A To my management and the lawyers involved in the  
2 licensing area.

3 Q Could you name some people specifically?

4 A Yes. I've also expressed it to the Lessons  
5 Learned Task Force as an example of my concern over  
6 staffing. I have expressed it to my immediate supervisor.

7 Q Is this in the region?

8 A Yes, in the region. Bor Warnick.

9 Q When was this?

10 A I have lost all sense of time since the beginning  
11 of this Three Mile Island, but it has been many months ago.

12 Q Before or after Three Mile Island?

13 A This was before Three Mile Island.

14 Q All right.

15 A It's documented in reports going back for two  
16 years. Now my concern over the adequacy of their staffing,  
17 I was concerned over them initially issuing and SER, when,  
18 in fact, they did not meet their minimum requirements of the  
19 regulatory guides. I have had a continuing concern over  
20 their staffing.

21 Q How far up in the I&E organization have you raised  
22 this concern. Is Mr. Keppler aware of it?

23 A Mr. Keppler is aware of my concerns, and he's very  
24 supportive of them.

25 Q Now as I understand it, you said that you have

mgc/RA

1 recommended that Zimmer not be allowed to operate because of  
2 the weakness of their staff?

3 A What I said was, with their current existing staff  
4 at my last involvement, I could not recommend that a license  
5 be issued for that plant. Now, it's my understanding that  
6 they have taken several steps to improve the staffing since  
7 then. I really have no say in whether or not they can be  
8 licensed if they meet the regulations. My concern is that  
9 the regulations are inadequate. My only vehicle for  
10 expressing that is through this particular facility which I  
11 am involved with.

12 Q Do you recall ever saying in that many words in  
13 any document that on OL should not be granted for Zimmer  
14 because of the fact that you do not feel that their staff is  
15 acceptable?

16 A I've never been asked formally if I would do  
17 that. I have informally had many discussions with people  
18 both in NRR and I&E as to what my opinion is and what my  
19 answer would have to be if I were asked that.

20 Q But you were never asked?

21 A No.

22 Q Do you know why you were never asked?

23 A Well, there has been no need to ask me. There's  
24 nothing in the procedural aspects to this point that would  
25 require anyone to ask me. At some point, we would have to

mgcMM

1 write something -- we, being I&E, myself, saying that we are  
2 satisfied that they meet all the requirements. We have  
3 inspected them against all the requirements, and they meet  
4 them all, that licensing of the plant could proceed. At  
5 that point, I would formally express that concern if those  
6 conditions still existed.

7 Q But they had not gotten to that point while you  
8 were still associated with that case?

9 A Not to where I would have to address it formally,  
10 no. I have addressed it in several inspection reports.

11 Q Do you know if they have subsequently gotten to  
12 the point in the licensing process where you would have to  
13 write such a -- where the inspector assigned would have to  
14 write such a memo?

15 A No. They just deferred their licensing until next  
16 spring.

17 Q So they are still not to the point where that  
18 issue would come to a head?

19 A That's correct.

20 Q Do you know if they are in the process of making  
21 improvements in their staff?

22 A I would hope so. I don't know that. They have  
23 made some changes since my initial visits. Those were very  
24 constructive changes. However, they certainly were far from  
25 what I think should be minimum requirements.

mgcMM

1 Q Was the I&E management in the region supportive of  
2 your concerns?

3 A Yes, they were. The problem is that if you --  
4 there is little management can do, if, in fact, they meet  
5 the minimum regulatory requirements. My subjective opinion  
6 is strictly my opinion.

7 Now the I&E management -- and I'm sure it's documented --  
8 has expressed a concern, which is my concern expressed to  
9 them over their staffing and the resulting performance. But  
10 the fact is that the staff can still get licensed in that  
11 condition because they meet the regulatory requirements.

12 Q Have you or has anyone else informed anyone of  
13 this concern about the weakness of the regulatory basis in  
14 this area?

15 A Yes. I expressed a lot of concerns on it as part  
16 of the Lessons Learned Task Force. The ANS-3 Committee,  
17 which is responsible for the particular guides, subsequently  
18 had a meeting to upgrade qualifications, particularly after  
19 Three Mile Island where it was recognized that this was a  
20 real problem. And unfortunately, I don't think it went near  
21 far enough, nor will it until the NRC has a direct effect on  
22 minimum staffing requirements.

23 Q Did you raise this generic concern formally prior  
24 to the Three Mile accident?

25 A Yes.



mgcMM

1 Q In what format?

2 A In discussions with my management and people in  
3 NRR over the adequacy of the regulations with regard to the  
4 licensing of Zimmer.

5 Q In writing?

6 A No, I don't think I've questioned regulations in  
7 writing.

8 Q But you have questioned the regulations in  
9 discussions?

10 A Yes.

11 Q With whom within NRR did you have these  
12 discussions?

13 A With members of the Quality Assurance Staff,  
14 Quality Assurance Branch; with Mr. Don Schovalt, the AD for  
15 that branch; for operator licensing and quality assurance,  
16 with Walter Haass; the branch chief and other members of the  
17 staff; with various people on the Lessons Learned Task Force  
18 during the meetings, Roger Mattson and others; with all of  
19 my management in Region III.

20 Q Prior to the accident at TMI —

21 A This is prior to the accident at TMI.

22 Q The Lessons Learned Task Force wasn't until after  
23 TMI.

24 A That's right. The discussions with Lessons  
25 Learned was subsequent, but I think you'll find



mgcMM 1 documentation in the inspection reports. My concerns go  
2 back for a period of a couple of years, and there were  
3 meetings as a result of that with regard to Zimmer.

4 Q What was the reaction or the response of NRR prior  
5 to TMI with respect to your concerns about the weakness of  
6 the regulations in this area?

7 A I would say they probably share those concerns.  
8 Some people do and some don't.

9 Q Was any indication given that any actions were  
10 going to be taken to change the regulations?

11 A No.

12 Q Do you know why changes were not going to be made?

13 A Well, I'm not sure that people are going to run  
14 out and change the regulations on the basis of my personal  
15 opinion.

16 Q Well you indicated that they share -- some of them  
17 at least shared your opinion.

18 A Yes, I think they shared the opinion. And people  
19 are very supportive now that Three Mile Island has occurred,  
20 that the regulations are very weak in this area, and I think  
21 there will be changes as a result of Three Mile Island. I  
22 don't think there will be changes as a result of my concern.

23 Q Would there have been changes as a result of your  
24 concern, if Three Mile Island had never happened?

25 A No.

mgcMM

1 Q Do you think there should have been?

2 A Yes, I do. It's an industry written standard.  
3 Spokesmen for the industry, you know, have said -- plant  
4 managers have said they would never set up a plant meeting  
5 the minimum requirements of those types of guides.

6 Q If all these people recognized that this was a  
7 problem, and assuming that Three Mile Island had never  
8 happened, why wasn't there any move to fix the regulations?

9 A Because it's a commitment to an industry guide  
10 which has no teeth. You see, if -- it's fairly subjective  
11 or arbitrary on my part. How do you set a minimum level of  
12 competence? Well, I have a concern. It's very hard for me  
13 to say what the actual experience should be, and the  
14 standard that embodies these requirements, the ANS-3  
15 standards, they are written by an industry group, and they  
16 certainly have shown no initiative to make them realistic.

17 Q With respect to your specific concerns on Zimmer,  
18 you said, if I understood you correctly, you said that if it  
19 ever came to the point of having to say that Zimmer was  
20 ready to get their OL, that you would have indicated that  
21 you didn't feel they were ready with the management they had  
22 at the time. If you had been placed in a position of having  
23 to make that statement, do you think they would have gotten  
24 their OL anyway?

25 A Yes, because they met the regulations. You see,

mgcMM 1 they met the regulations, and that's the problem. They are  
2 certainly not going to hold up a billion dollar facility, if  
3 it meets what we call accepted requirements. You have to  
4 deal with changing the regulation itself.

5 Q I would like to get back to Mr. Creswell's  
6 concerns. What is your opinion of the abilities and  
7 competence and maturity of Mr. Creswell?

8 A Well, that's strictly a subjective opinion. His  
9 abilities are considerable. He's a very good engineer. I  
10 think his maturity is in question from his relationships  
11 with all the people he has interacted with. But you know  
12 that's certainly not an evaluation I'm in any position to  
13 make.

14 Q I realize this is just a subjective opinion. Did  
15 you consider Mr. Creswell to be a troublemaker?

16 A No. He's not a troublemaker.

17 Q Do you recall anyone ever referring to him as a  
18 troublemaker?

19 A I really can't say, because, you know, that's not  
20 something I would be aware of other than people, the normal  
21 office talk about, you know, a person pushing their own  
22 problems. I think if that's a basis for being a  
23 troublemaker, we're all troublemakers. I really can't say  
24 that.

25

gsh 1 Q I would like to ask you some general questions  
2 concerning the functioning of I&E and NRC in general.

3 What is your perception of the relationship  
4 between I&E headquarters and the I&E regions?

5 A The perception of the relationship?

6 Q Is it an adversary relationship, a cooperative  
7 relationship?

8 A Oh, I think there's elements of both in there.  
9 There has been over the years a variant relationship. It has  
10 not necessarily always been the most cooperative, but it's  
11 certainly not an adversary relationship.

12 Q All things taken together, would you feel that  
13 they enhance your efforts or they hinder your efforts?

14 A Theoretically, they enhance our efforts. It hasn't  
15 necessarily always worked that way. It's a cumbersome  
16 process at times to get certain issues resolved.

17 Q Why is it a cumbersome process? What's cumbersome  
18 about it?

19 A Well, it's very bureaucratic by nature. You have  
20 to go through so many boxes of different block diagrams.  
21 It is very difficult at times to get timely actions on  
22 things because of the administrative channels you have to  
23 go through to do it.

24 I don't think that there is any intention on anyone's  
25 part not to do something. It's just a cumbersome process to

gsh 1 get it accomplished.

2 Q Have you ever been discouraged from using strongly  
3 worded statements from describing deficiencies that you have  
4 found?

5 A I've been discouraged from being too subjective  
6 in my opinions. I've never been discouraged from using  
7 strongly worded statements.

8 Q What do you mean by being too subjective?

9 A I think there is a tendency on all of our parts at  
10 times to dwell further from the regulation and closer to  
11 perhaps what our subjective opinion of what adequate  
12 resolution of a problem is.

13 There is a lot of times resolution of a problem  
14 meets a regulatory requirement, but it doesn't necessarily  
15 make you feel warm and comfortable.

16 Q Could you freely contact technical reviewers and  
17 other offices to discuss technical concerns?

18 A No.

19 Q Why?

20 A We were instructed formally not to. We were to  
21 go through our I&E management. We were not to call people in  
22 NRR.

23 Q Who told you that?

24 A I believe that's in a -- that's in our written  
25 guidance within the region.

gsh 1 Q Do you have a copy of that available?

2 A No, I don't.

3 Q Is there a copy available back at the region?

4 A I'm certain somewhere there is.

5 Q Could you provide a copy to us at some later date?

6 A I certainly could.

7 Q I would appreciate that.

8 A I don't think that was necessarily done to

9 prohibit us talking to NRR, but it was done to ensure that

10 the people in I&E were at least aware of our problems, as

11 well as the people in NRR because there was a tendency at times

12 to call people up directly at NRR, who would then call back

13 I&E and say, what is this?

14 Again, you get back to this cumbersome administrative

15 chain where you probably should have the ability to talk

16 directly to NRR. But it also raises the bureaucratic problems

17 of who is responsible and who should be dealing with the

18 problems?

19 Q Does I&E review plant procedures?

20 A Yes.

21 Q What is the purpose of that review?

22 A Well, there are several purposes to the review. One,

23 to make sure that the procedure format and content is

24 consistent with regulatory standards. The second purpose is

25 to make sure that the procedures have adequate technical

gsh 1 content. You have to ensure that, in fact, they don't do  
2 something other than -- you know, that their content is  
3 sufficient to keep the plant within safety analysis of the  
4 intended guidelines.

5 You also have to ensure that there's adequate  
6 procedures to cover all of the necessary elements.

7 Q Considering just the operating and emergency  
8 procedures, what percentage of those procedures do you review  
9 in detail?

10 A Well, that varies from inspector to inspector. You  
11 have a certain percentage required by the program and it's  
12 not expressed as a percentage, but as so many out of a total.

13 But I think over a course of time you end up  
14 reviewing the majority of them.

15 Q Do you ever review the procedures from the  
16 perspective of what the operator will see and what he may or  
17 may not do as a result of what he sees?

18 A Not directly. I think if you are a good inspector,  
19 you include that in your review. You try to, anyhow. I'm  
20 not sure that you get that narrow to go through the  
21 procedure to say, oh, here's what he's going to see, so  
22 here's the step.

23 You try to reflect on your own operations background.  
24 Not all inspectors have operating backgrounds. So that's not  
25 necessarily a reasonable question.



gsh 1 Q Is there a method in I&E to exchange information  
2 among inspectors of similar plants in different regions?

3 A No.

4 Q Should there be?

5 A Yes.

6 Q Why isn't there?

7 A I have no idea.

8 Q Do you know if anyone has ever proposed it?

9 A I have no idea.

10 Q Is there a difference in your review philosophy and  
11 your inspection procedures for safety-related versus non-safety  
12 related systems?

13 A Excuse me. Let me back you up on system. I may  
14 have answered a question in my mind as opposed to the question  
15 that you asked me.

16 There is a mechanism, formal mechanisms, for the  
17 distribution of information of our problems. We have IE  
18 bulletin circulars and information notices. There is also  
19 daily reports and there is also other preliminary notifications  
20 and things.

21 As these things are written, if they, in fact,  
22 affect you and you're at a similar plant, then you have some  
23 obligation to call and get more details.

24 But there are information dissemination mechanisms.  
25 What I was suggesting is that there is no direct mechanism if

gsh 1 a B&W plant has a particular glitch that doesn't meet the  
2 threshold of these things, which generally are of a higher  
3 threshold, or have been in the past.

4 Then, no, there isn't that mechanism.

5 Q Would it also be true that most of these things  
6 like preliminary notifications and some of the various  
7 reports that are circulated from region to region are rather  
8 lacking in detail concerning a particular incident?

9 A That's true.

10 Q So then, for example, some of the more detailed  
11 concerns that you and some of the other inspectors in Region  
12 3 had concerning the Davis-Besse incident, is there a  
13 reasonable expectation that those concerns ever got to the  
14 inspectors for TMI, for example?

15 A I doubt that they were aware of them.

16 Q Let's go back, then, to the question on safety  
17 related versus non-safety-related. I'll repeat the question  
18 for you.

19 Is there a difference in your review procedures or  
20 your inspection procedures and philosophy for safety-related  
21 versus non-safety-related systems?

22 A Yes.

23 Q What's the difference?

24 A Well, it's the difference in philosophy for the  
25 whole program. Our first level of attention is given to things

gsh 1 which are safety-related or have safety significance, or  
2 whatever the magic set of words are this week.

3 It's very difficult, in fact, to get action out of  
4 a licensee unless he's very responsible, and some of them are,  
5 and unless -- you know, on things which are non-safety-related  
6 which have no -- by our current definition, no direct  
7 safety significance.

8 Now that's not to say that most people don't give  
9 those attention, this strict enforcement action or regulatory  
10 action with regard to non-safety systems is pretty sparse.

11 Q What is the basis for deciding that a system is or  
12 is not safety-related?

13 A Well, I don't think anyone has a good definition,  
14 including the regulations of what safety-related means. It's  
15 usually decided early in plant life during the construction  
16 of the station QA program through various mechanisms.

17 There is a definition of what is safety-related  
18 and usually related to integrity of the primary boundary for  
19 systems which are used to mitigate the consequences of an  
20 off-site release.

21 There is then usually a list drawn up of systems  
22 or components which are considered to be Q or N or safety-  
23 related, or whatever the particular magic set of words is.  
24 But that's not a consistent regulatory process. And we have  
25 had arguments for years over whether something is

gsh 1 safety-related or not safety-related.

2 If it turns up in the FSAR, there is a picture of  
3 a pump, the pump may be considered safety-related because it  
4 doesn't list a bearing or something. It may be considered  
5 not to be safety-related.

6 And you get into, is the procedure safety-related,  
7 a maintenance procedure? Well, it certainly can affect the  
8 safety of the plant because it could prevent a component from  
9 performing its function.

10 But by our classification system, it might, in fact,  
11 not be safety-related. It's a very difficult and a very  
12 arbitrary system. There's no really consistent method for  
13 arriving at what is safety-related and what's non-safety-  
14 related.

15 Take the main coolant pumps at Three Mile Island.  
16 How you can call those non-safety-related is beyond me, but  
17 they were, in fact, non-safety-related.

18 Q The entire reactor coolant pump?

19 A That's my understanding. That was considered a  
20 non-safety-related component. That might be erroneous, but  
21 I believe that's the case.

22 Q Then as I understand what you're saying is you don't  
23 feel that the definition of safety-related versus non-safety  
24 related is applied in a consistent, rational manner?

25 A That's correct. There is not a consistent definition

gsh 1 of what is safety-related and what is not, nor is it applied  
2 uniformly when there is a definition.

3 It is not a definition which is applied and reviewed  
4 by us. It is something a utility develops and we accept or  
5 reject on a case-by-case basis.

6 Q If you as an inspector are working on a plant that  
7 was somewhat along in the licensing process -- let's say that  
8 they already had their OL and you decided that you felt that  
9 particular system ought to be safety-related.

10 Is there any mechanism for having it added or  
11 reclassified as safety-related?

12 A It depends on your relationship with the facility  
13 and how good an argument you can construct. If you are  
14 a reasonable inspector and you can provide an adequate  
15 technical basis for classifying something as safety-related,  
16 or you can show that there is some degradation or lack of  
17 performance as a result of it not being safety-related, well,  
18 usually, you can get something reclassified.

19 Q Who would do the reclassifying?

20 A The utility.

21 Q Would there be any mechanism for forcing a utility  
22 to reclassify a system?

23 A Only if you can show that it's directly  
24 safety-related by the definition or one of our definitions.

25 Q Is there any way that you could go to NRR or to I&E

gsh 1 management and have them make the decision that this should  
2 be safety-related and impose that decision on the utility?

3 A Yes, you can ratchet them into it. There are  
4 several mechanisms. You know, if you have a conflict with  
5 the management, you can't convince them, then we can go back  
6 to our management and if they are supportive of your  
7 particular decision, then, in fact, they will support your  
8 conclusions, first on the inspection report, which they  
9 concur in, and second, in the enforcement correspondence and  
10 any subsequent correspondence.

11 You know, they may decide a particular letter is  
12 required or may require a decision on the part of the reviewer  
13 and NRR and you have a different route to go there.

14 You know, you may say, I think the system is very  
15 important to safety or to the safety analysis as it was  
16 performed.

17 So there's a lot of different ways to get there.  
18 It's whether or not you can really construct an adequate  
19 technical basis for concluding that, in fact, it is  
20 significant to safety.

21 Q What would you estimate to be your chances for  
22 success for the utility that was not particularly enthusiastic  
23 about accepting your argument?

24 A Oh, not very good.

25 Q Why is that?

ysh 1 A Well, because there's been no consistent  
2 definition or application. Both the utility and the people  
3 within the NRC are reluctant to try and make ad hoc changes  
4 on something which isn't that clear-cut.

5 You know, it's pretty hard to argue — for one  
6 utility, something is non-safety-related, and another, it  
7 should be on an inspection-by-inspection basis.

8 Q Is there any way that you could raise it as a  
9 generic concern, this particular system should be safety-  
10 related on all B&W plants?

11 A Yes. And there's a mechanism, you know. You  
12 would write back through our management, our I&E headquarters,  
13 that there is a concern that this system is being treated  
14 on a generic basis as non-safety-related, and for the  
15 following reasons, we think, in fact, that it should be  
16 considered safety-related, and that the programs at these  
17 utilities should be reflected to modify that.

18 Q Do you know if anyone has ever proposed that a  
19 system be reclassified as safety-related?

20 A Oh, certainly. But I don't think necessarily  
21 going that route — they usually fight it out with the  
22 utility and probably win, if, in fact, they have a strong  
23 enough argument.

24 Q Of the people who were unable to convince the  
25 utility, did any of them try to go through any of these other



gsh 1 routes?

2 A Oh, I'm sure they have. I don't know. I can't  
3 give you a specific case.

4 Q Do you know if any of them were successful?

5 A Oh, I'm sure. You have a whole spectrum. In some  
6 cases, they were successful; in some, they weren't. I would  
7 tend to think that they would be unsuccessful.

8 Q Why is that?

9 A Well, because you get in -- when you don't have  
10 a precise and consistent definition of what's this magic  
11 safety-related, it's very hard to apply that rule  
12 uniformly.

13 You know, it's not a good break-down to say  
14 everything on this side of the fence is safety-related and  
15 everything here isn't because it's a little ludicrous to say  
16 all this stuff which can affect this stuff doesn't have  
17 an effect on safety just because it's on this side of the  
18 fence. In fact, it does. It just we had to have an arbitrary  
19 threshold.

20 And I think what we're finding out is that's not  
21 such a good decision to have that arbitrary threshold in  
22 there.

23 Now how we change the regulatory process to reflect  
24 that, that's another matter.

25 Q All right. Did the fact that the PORV at Davis-Besse

gsh 1 was not safety-related contribute to the incident?

2 A Well, you can argue either side of that question.  
3 You can say, well, the fact that it wasn't safety-related,  
4 the relay could be missing because it didn't have the same  
5 QA standards. Somebody else could say, well, no, it didn't  
6 affect it at all because, you know, who in their right mind  
7 would take the relay out of the thing? These are responsible  
8 people.

9 I don't know. I guess by the strict way we look  
10 at things, yes, if it had had stricter quality assurance  
11 standards, how could that really be missing? But again, I  
12 don't know that because, you know, that's strictly an opinion  
13 on my part.

14 I can't imagine whether it was safety-related or  
15 not that that relay could be missing, that somebody would  
16 allow that relay to be missing.

17 So I don't want to make that decision because I  
18 don't believe that strictly things that are safety-related  
19 are important. There are a lot of very important non-safety  
20 related things.

21 But I wouldn't want to see us making everything  
22 safety-related and put all the standards on that basis.

23 That's a decision that other people have to make,  
24 how you decide what standards apply to what.

25 Q Do you know of any other pre-cursor events that are

gsh 1 relevant to the accident at TMI?

2 A Only through my reading of the NUREG on feedwater  
3 transients, not direct knowledge, no.

4 Q Which of those transients that are discussed in  
5 that particular NUREG do you feel are relevant precursors of  
6 TMI?

7 A Off the top of my head, I couldn't tell you. I  
8 have read so much in the past couple of months on this task  
9 force --

10 Q There's no particular one that raises your  
11 consciousness, particularly?

12 A Not that I could discuss off the top of my head.  
13 I remember in reading it, I think there were a couple. It's  
14 hard for me to conclude that there were any other than  
15 Davis-Besse, which perhaps I dwelt on more because I was  
16 perhaps more familiar with that.

17 But I couldn't say.

18 Q All right. Do you have any additional information  
19 that might be relevant to our inquiry into the events  
20 surrounding the accident at TMI?

21 A Nothing that I haven't offered you here, no.

22 MR. HEBDON: Okay. Do you have anything additional?

23 MR. FULSON: I can't think of anything. You have  
24 covered things very extensively.

25 BY MR. HEBDON:

Q Do you have anything else to add?

gsh 1 A The only thing I would add is,  
2 it is very necessary that people understand who are a lot  
3 smarter about Davis-Besse because of hindsight. Gee, a lot  
4 of people looked at that at the time and didn't arrive at a  
5 conclusion any different than anyone else.

6 There's also been a lot of attention given to the  
7 fact that, you know, we would have prevented Three Mile  
8 Island.

9 I see nothing in the Davis-Besse -- at least the  
10 concerns that I'm familiar with -- that would have prevented  
11 Three Mile Island from happening. And I'm firmly convinced  
12 of that.

13 I think some of the consequences may have been  
14 different, at least in anything raised by the NRC.

15 I have heard about the B&W concerns with regard to  
16 the procedures which may have changed things drastically. But  
17 I'm not aware of anything that has been raised within the  
18 NRC that I was familiar with that would have changed that  
19 initiating event.

20 Certainly, the decision to secure the HPI pumps,  
21 in retrospect, would have been different. That would have  
22 changed the outcome of the event. You would have still had  
23 the initiation of the event. It's just that the sequence  
24 would have been different.

25 Q There is a procedure that Davis-Besse has the loss

gsh 1 of coolant accident as a result of Mr. Creswell's concerns  
2 with the fact that the operator secured high pressure  
3 injection.

4 There is a precaution in that procedure that warns  
5 the operator not to secure high pressure injection as long  
6 as the pressure is still down and to be aware of the fact  
7 that it's possible the pressurizer level could come up because  
8 of a stuck open relief valve or safety valve.

9 In your opinion, if that precaution had been  
10 included in the procedures at Three Mile Island, and if the  
11 operators had recognized that precaution and followed it,  
12 would the accident at Three Mile Island have been as severe  
13 as it eventually was?

14 A Assuming they had recognized it and followed it,  
15 I don't think it would. But again, I don't think that that  
16 would have prevented Three Mile Island; nor do I think it  
17 would have made — think it would have necessarily made the  
18 outcome that much less drastic because I'm not sure that  
19 they would have recognized it.

20 I think that they would have had the same concerns.  
21 We've trained them that way.

22 You see, part of the problem you see in the training  
23 built into the program, that has to be changed. Their concern  
24 with the capability to cool the core has to be re-emphasized.

25 These are things that people are learning now. And

gsh 1 I'm not sure you can key in and say, you know, the fact that  
2 had he turned off the high pressure injection, noted that  
3 back then, that would have changed anything.

4 There's a lot more concerns than just that and  
5 people have to be careful not to lock in on just one thing  
6 because there's a lot more to be learned from this than just  
7 the fact that high pressure injection was turned off two  
8 years ago.

9 We could have prevented this. I think there's a  
10 lot more information there. We're learning that our training  
11 is inadequate. Perhaps there is questions about our ability  
12 to use all the information in the control rooms, you know.  
13 Is it presented in a manner that can really assimilate it,  
14 integrate it, and make reasonable decisions?

15 Maybe we have to change our level of automation.  
16 Maybe we're expecting too much out of the operators. You know,  
17 is our licensing process adequate?

18 There's a lot of other questions, not just that  
19 one thing.

20 So I would caution everybody not to just focus all  
21 their attention on the one thing. There's a lot more  
22 information there.

23 Our whole regulatory process needs a lot of scrutiny  
24 right now. I think it's a very constructive atmosphere if  
25 people do it that way.

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All right. Do you have anything else to add?

No.

MR. HEBDON: Do you have anything else?

MR. FULSON: Nothing.

MR. HEBDON: That completes the interview. Thank  
you.

MR. FULSON: Thank you. You've been very helpful.

(Whereupon, at 11:35 a.m., the hearing was  
concluded.)

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