8/24/79 ltr - ce

Petition to be made on p. 55

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(FROM 120 X 6)

POOR ORIGINAL

IN THE

OF

RICHARD C. KNOP

Place - Glen Ellyn, Illinois

Date - August 23, 1979

Pages 1 - 80

Telephone:
(202) 347-3700

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Official Reporters

444 North Capitol Street
Washington, D.C. 20001

NATIONWIDE COVERAGE - DAILY

NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

THREE MILE ISLAND

SPECIAL INQUIRY GROUP

- - -

INTERVIEW

OF

RICHARD C. KNOP

Glen Ellyn, Illinois

August 23, 1979

The interview commenced at 9:00 a.m. on August 23, 1979, in Room 3, Building 4, 799 Roosevelt Avenue, Glen Ellyn, Illinois.

APPEARANCES:

FRED FOLSOM, Nuclear Regulatory Commission staff;

FRED HEBDON, Nuclear Regulatory Commission staff.

* * *

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P R O C E E D I N G S

(9:00 a.m.)

MR. HEBDON: Would you raise your right hand please? Do you swear and affirm that the testimony you are about to give shall be the truth, the whole truth, and nothing but the truth, so help you God?

MR. KNOP: I do.

Whereupon,

RICHARD C. KNOP

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

EXAMINATION

BY MR. HEBDON:

Q Have you read and do you understand the witness notification as attached to the memo sent to you concerning this interview?

A. Yes.

Q Do you have any comments or questions concerning that?

A. No, I don't.

Q Would you please state your name?

A. Richard C. Knop, K-N-O-P.

Q What is your current occupation?

A. I am a Section Chief in the Construction Branch.

Q What is your current position?

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A. That is my current position.

Q What was your position in late 1977?

A. I was Section Chief in the Operations Branch.

Q How many people reported to you at that time?

A. I think it was five.

Q. Did a Mr. R. N. Tambling work for you?

A. Yes, he did.

Q. Did a Mr. T. L. Harpster work for you?

A. No, he did not.

BY MR. FOLSOM:

Q What is the difference between those two men's assignments -- Mr. Tambling and Mr. Harpster?

A. Mr. Harpster was in a support group.

BY MR. BEBDON:

Q To whom did you report?

A. To Mr. Fiorelli.

Q Would you describe your employment history including positions held in the NRC, and this is just a brief summary.

A. How far do you want to go back?

Q As far back as you want to go, until you finished college.

A I finished college in 1952. From '52 -- let me make sure of these dates -- 1952 to 1954, I was at Hanford and worked for the General Electric Company. I was in the Army for two years in the Artillery School teaching electronics.

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I went back to Hanford, worked for the General Electric Company at that time, and I worked in various capacities as an engineer or in operations for General Electric. I believe it was 1967 at which time United Nuclear took over the same duties, and I just switched employers and had the same job and worked there until 1971, at which time I came to work for the Commission.

My first assignment was in the pre-operational testing program, reviewing the pre-op testing of various reactors. In 1973, I became Section Chief in the Construction Branch and was there approximately one year. And during the reorganization I moved to Operations as a Project Section Chief and was in that position until early February this year, at which time I went to the Construction Branch.

Q What is your educational background?

A. I have a BS in electrical engineering from Gonzaga University in Spokane.

Q Could you explain briefly the difference between an operations section and a support section?

A. The Operations Project Section has the overall responsibility for coordination of inspections to follow up on unresolved items and that type of thing, and the support groups generally consist of a group of specialists that follows either like pre-operational testing or like containment leak tests or some speciality.

Q. I would like to ask you some questions concerning an incident that occurred at Davis-Besse on September 24, 1977. What I would like to get at as much as possible is what you knew prior to the accident at TMI -- and I realize it is hard to separate what you knew then from what you know now -- but to the best of your ability, if you could try and answer these questions from the perspective of prior to TMI.

Prior to March 28, 1979, what knowledge did you have concerning the incident that occurred at Davis-Besse that occurred on September 24, 1977?

A. I don't recall the specific telephone calls that were made and precisely when they were made, but some time during the day on the 25th, which was a Sunday, -- that point was refreshed this morning by Mr. Tambling --

MR. FOLSOM: It's perfectly all right that you should have your memory refreshed. There's no need to apologize for that.

MR. HEBDON: In fact, we have been going on the assumption that the 24th was a Friday [illegible] told us different yesterday.

THE WITNESS: At any rate, they called and they notified us that they had a severe transient -- that they had -- and some of these facts are really hazy. I'm not sure how many things were known on Sunday and how many things were know on Monday. I can't separate them, so they may be mixed up. But

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that they had had a trip of the steam feedwater rupture control system, and during that trip the auxiliary feedwater pumps had only come up to half speed. This had caused a swell in the primary system to the point where the pressure relief valve had opened and a transient ensued of blowdown during which time -- I don't remember the exact numbers, but I think it was 10 or 15 minutes after the incident -- they realized that the relief valve was stuck open and closed the block valve. I don't know how much we notified headquarters on Sunday, and I'm not sure who did that. I can't recall specifically. Our log up there indicates we called a Mr. Schumacker, who was probably the Duty Officer, I'm not sure.

BY MR. HEBDON:

Q This is at I&E Headquarters in Washington?

A. Yes. That was on Sunday, and I don't have the time. And then on Monday we had discussed it with Kermit Witt. The record shows that we discussed it with him on Monday.

Q. Who is he?

A. He is at I&E Headquarters also, and I don't know where you want me to go from there.

Q. Why don't you just go ahead and go through just basically a discussion of the whole chronology, as much as you can remember it.

A. Do you want to go through the transient?

Q. No. More the chronology of the investigation and

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review of the incident, and we will get into some discussions of the specifics of the transient a little bit later.

A. Okay. Sometime during that day, we decided that we would dispatch an inspector to the site, and again it was refreshed this morning -- I could not remember that Tambling was not available -- but Mr. Harpster was selected to go, as the best, most competent person to go, and he was dispatched to the site and he arrived there on the 26th.

Q. Why was it decided that Mr. Tambling should go ahead and participate in the training he was scheduled for, rather than going to the site?

A. I can't recall. Like I said this morning, I didn't, until Tom reminded me I had forgotten that he went to school that week.

Q. What was your perception of the severity of the transient at that point?

A. I felt it was a very severe transient, and required follow up as far as dispatching somebody immediately there, if I remember correctly. The event had occurred on the previous day, and we were fairly certain that they were in a safe condition and that they weren't going to take any action that would require us to put somebody on a plane immediately and get over there, because the event had happened the day before really.

Q. Was there any concern in your mind about the fact

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that they did wait until the following morning to report the event?

A. I honestly can't recall.

Q. Just from your perspective now?

A. From a perspective now, definitely. The requirement is within 24 hours. It is possible that some of the [illegible] use that to get their house in order before they do notify us, to really understand and wait until the storm clears, until they do report it.

Q. Do you feel that is what they were doing in this case?

A. I don't recall.

Q. Now, one of the things that I have been trying to get a feel for is how severe people at the time felt that the [illegible] was. Now you've said a transient. Yet I find that a little bit inconsistent with the fact that you then let Mr. Tambling, who was the principal inspector go ahead and go to a training session rather than go to the site and investigate the incident.

Do you recall at all the though processes or the decisions that were made and the discussions that led to that?

A. No, I don't.

Q. Do you at all find that inconsistent?

A. Not totally. Mr. Harpster is a very competent inspector in his own right, and we did have telephone

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conversations back and forth between the Region and Mr. Harpster, and Bill Little, who was his Section Chief at that time, participated in the inspection on Friday. I don't recall if he was there more than a day during that week or not, but at least he was there during that time.

Q. Was Mr. Harpster familiar with the plant? Had he conducted inspections there before?

A. No, he had not. I don't recall if he had or not.

Q. But you don't think that he had?

A. I don't think so.

Q. Go ahead, if you would, with the chronology of events. I guess we are to the point now of Mr. Harpster going to the site.

A. Mr. Harpster determined that the auxiliary feedwater pump had not come up to speed due to a binding in the auxiliary feedwater pump. I think at that time they had discovered that the reason given for the failure of the relief valve was the fact that a reset relay had been left out of the control system, such that when the pressure relief valve tripped, instead of resetting -- whatever the reset band was -- I don't know, it's several hundred pounds -- instead of resetting on a fairly infrequent basis, as soon as it dropped down below a trip point, it would reactuate again and it recycled about that point about nine times, as the charts show. And that is about all I can recall. I do have

a list of things that we did discuss. I don't know at what point. He also determined that the quench tank had over-pressurized and caused the rupture relief valve to burst. The water from the quench tank had impacted upon a ventilation duct and insulation on a vessel, and sometime at the conclusion of Harpster's inspection, we had the following problem areas identified: determined the cause of the initiation of the steam feedwater rupture control system, spuriour trip, make an evaluation of the cool-down rate, review the pressure excursion on the primary system including the blowdown effects on the core and effects of boiling on the primary system fuel, a review of the stem generator going down, whether there was any problem with the primary,secondary delta P limits exceeded due to the thermal shock when the steam generator blew dry, the causes of the relief valve malfunction.

It was initially thought the high pressure injection pumps maybe did not inject at the proper point.

Q Could you elaborate on that particular [illegible] a little?

A. If I recall, the concern was that for some time after the actuation of the high pressure injection pumps, the high pressure injection pumps did not show flow.

Q Was this in all legs or just one leg?

A. I can't recall.

Q Okay.

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A. I think quite a bit substantially later Mr. Creswell brought up the concern, nearly a year later, on that particular incident.

Q Is the concern that Mr. Creswell brought up later the same concern that you are talking about here?

A. I am not sure it is exactly the same, but during this particular inspection, this particular problem was resolved to the satisfaction of whichever inspector looked at it. I can't recall that.

Q Okay.

A. And then there is an item here, containment annulus delta P. And this was kind of an action plan that we developed, and we subsequently sent the licensee and immediate action letter.

Q Excuse me. Before you go on, the document you were just reading from -- what is that?

A. That is just some notes that were made up. You are welcome to have them.

Q When were they made up?

A. It was that first week. I'm not exactly sure which day. Or maybe it was the week after Harpster's inspection.

Q But these were made up at the time frame of the indicent?

A Yes.

Q. This is just a single page of notes. There is no title. There are two columns, one headed "Transient" and one headed "Problem Areas."

A. This was decided in a meeting that we had between Mr. Fiorelli and myself, and I can't recall who the other participants were. I think it was Bill Little and Terry Harpster, but I'm not positive.

On Friday we sent an immediate action letter to Toledo Edison.

Q. I don't think there is a need to read the specific requirements.

A. We asked them if they would do certain things and complete them prior to restarting operations.

Q. Was that the end of your involvement in that particular incide. ?

A. Of course, I reviewed the inspection report that Mr. Tambling and others prepared. There was a meeting at the site on the 30th in which I believe Terry Harpster and Bill Little participated in, and a number of gentlemen from NRR. I have the list somewhere.

Q. All right. I would like to go back and ask you some specific questions.

Why did you feel that this particular incident was significant?

A. Because of the magnitude of blowdown to the point

where they essentially went down to the point where potential boiling could have occurred.

Q. Why did that cause a concern? Why did you feel that made the incident significant?

A. It is just an unusual transient that -- any blowdown of a vessel, whether it's BWR or PWR, we would follow up on.

BY MR. FOLSOM:

Q. I'm the layman in this operation. What is a blowdown?

A. A blowdown is the terminology we use whenever you have an open area due to a crack or valve being open and you are dropping pressure very rapidly.

Q. Okay. I want to ask one other question. Was there any relationship between the failure of the auxiliary feed pump and the PORV failure? These things were coincidental, relatively speaking. But did they have any relationship?

A. Well, the relationship was that the failure of the auxiliary feedwater pump to come up to speed caused the primary system to swell, increasing the pressure and bringing it up to the trip point. That is the relationship.

Q. And that tripped the PORV?

A. Right.

Q. Which then cycled nine times and failed, failed open?

A. Right.

BY MR. HEBDON:

Q. Okay. We discussed the fact that Mr. Harpster was

sent to the site and he conducted some work there. Could you tell us specifically what he was told to do?

A. I can't tell you in this particular case, but normally, if we know the licensee is going to be down a long time, the main response you want to do is: number one, see that the plant is in a safe shutdown condition; number two, try to determine as much as possible all of the parameters of the transient, make sure that they're recorded properly and the proper people looking at them.

But specifically what his instructions were, I can't remember.

Q. Did you talk with or meet with any representatives of the utility?

A. I talked -- I talked with them at various times during this incident, or I talked with Harpster --I can't recall -- on the weekend of the occurrence. I think the call came in to a duty officer, which is normal. I believe the record shows it was Mr. Heishman took the call.

Now, whether Mr. Heishman called me or called Tambling, I don't recall, first. Tom talked to, I believe it was Evans, but I'm not sure, of the utility.

The only conversation that I know for sure, and it is because it is in the immediate action letter, is because I talked to somebody on the 29th to get their concurrence in what this immediate action letter would be. And apparently

I talked to both Mr. Grant and Mr. Evans at that time. And Mr. Fiorelli and myself were on this end.

Q. They worked for Toledo Edison?

A. Yes.

Q. What concerns were raised by the utility as a result of this transient, as a result of these conversations that you had with them?

A. I don't know if I follow what you mean. You mean concerns with our demands or concerns with the transient?

Q. Either one.

A. The only concern that I can recall voiced during this time -- and there may have been others -- was that when they were getting ready to go back into operation, we asked that they test the pressure relief valve. And I don't remember the exact conversation, but [illegible] testing it at power because they were afraid that it would leak.

Relief valves have a history of leaking when they are actually at power. We felt it was important and they conceded to do it.

Q. So they did finally agree to test it at power?

A. Yes.

Q. What was the advantage of testing it at power, as opposed to just testing it hot?

A. I felt that it just gave a better test, that was

the situation in which it had failed before. I don't recall the exact situation, but they had tested it at lower pressure, I think around 600 pounds, some number of times, as we had agreed to, and it had failed once. They made an adjustment on the stem travel, tested it another number of times at 600 pounds and once at full pressure.

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

A. I didn't, but our people did at the site. I may have talked with -- I don't know if I directly talked with them or we talked indirectly through I&E. I can't recall.

Q. Do you recall what their concerns were or what problems they saw with this transient?

A. I don't recall any specific ones. They came out because it was deemed to be an unusual transient also, and the licensee gave them a presentation of the event on the 30th as well as our people.

Q. Do you know if anyone from I&E requested that NRR come to that meeting on the 30th?

A. I don't recall specifically, no.

Q. Would it have been normal for your people to ask that they send representatives?

A. It would not be a normal situation. It is fairly normal to inform the project manager, at least give him the opportunity to want to come.

Q. Do you recall any conversations that you might have had with Leon Engle, who was the licensing project manager at the time?

A. I don't recall any specific conversations, but I do recall as a normal practice we tried to keep him informed.

Q. Do you recall any discussions with him concerning the possibility that the missing relay in the PORV control system was sabotaged?

A. That point came up during the investigation and we can find no reason to believe that it was sabotaged, because we do know that the relay was installed during preoperational testing, as I recall, and it was felt that possibly one of the crafts people picked it out of this one --

But we did ask the licensee to do a thorough review of all of the cabinets. There were some other problems. But one of the problems involved is that the pressure relief valve was thought not to be safety-related at that time, of course. Technically, I guess it still is, but it's probably going to be changed.

Q. Prior to the accident at TMI, it remained non-safety-related?

A. Yes.

Q. Did you talk with --

A. Oh, we did also -- I recall we did send a PN in to headquarters, I believe it was on the 26th. I presume

everybody knows what a PN is.

Q. Was it normal to send in a PN on a transient such as this?

A. Yes.

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

A. Do you mean other than inspectors?

Q. Well, other than the people we've already talked about.

A. I don't recall. We met Mr. Creswell substantially after this period of time on some concerns that he had.

Q. I think we will get into those in a little while.

Did you receive a memo or a copy of a memo from a Mr. Denwood Ross of NRR to Carl Seyfrit of I&E headquarters concerning or describing some concerns that a Mr. Gerry Mazetis of NRR had?

A. I don't recall it.

Q. For the record, this is a memo from D.F. Ross to Carl Seyfrit, dated October 20th, 1977. The subject is "Davis-Besse 1, Abnormal Occurrence, 9/24/77."

Do you recall ever seeing that memo? If you want to take a moment to read it, please feel free.

(Pause.)

A. I don't specifically recall, but I do know that Mr. Tambling carried on a number of conversations with NRR.

I don't know if it was specifically this gentleman or not, and I may have seen that, but it doesn't ring a bell.

Q. Do you know if the concerns that were raised in this memo were addressed in the investigation that was cond. by Mr. Tambling and Mr. Harpster?

A. I can't say specifically, because I don't recall the memo.

Q. Well, if you want to, take a few minutes to look at the concerns that are discussed here and see if those raise any new issues or any issues that you don't recall having been considered in the investigation that was conducted.

A. I do know in item number two that that was a Creswell concern subsequent to this. I do not recall whether it was at the time. And whether specifically three and four were involved -- Mr. Tambling was the reviewer -- I don't know. I can say I do know that they were talking back and forth, and it was my understanding that at the end of it, based on these conversations, that there were no further questions by NRR at the conclusion of our investigation report.

MR. FOLSOM: Off the record, please.

(Discussion off the record.)

MR. HEBDON: Back on the record.

For the purposes of the record, we would like to have this document included in the record at this point for reference purposes.

(The document referred to follows:)

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

DAVIS Besse
SEPT 24, 1977

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

BY MR. HEBDON:

Q. Did you receive the Toledo Edison reports concerning this particular incident?

A. Yes, the region did.

Q. Did you personally receive them? Did you personally see them?

A. I personally saw them, yes.

Q. Did you review them?

A. Yes, I did.

Q. What were your conclusions after reading the reports?

A. Outside of what we covered in our inspection report, I don't recall any questions I had.

Q. So you felt that the issues that were discussed in the reports from Toledo Edison had already been adequately covered in the inspection that you conducted, that your people conducted?

A. Yes.

Q. Did you approve the inspection report prepared by Mr. Tambling and Harpster?

A. I would have to check, but it would be normal practice for me to. I have it here.

Yes, I did approve it.

Q. You mentioned that it is normal practice for you to approve inspection reports. What did your approval of that

report imply?

A. It implies that I have had an opportunity to read it and determine that there is enough information to adequately describe the inspection report from my vantage point.

Q. What did you do prior to approving the report?

A. I don't understand.

Q. Did you read it in detail? Did you glance through it? Did you discuss it with anyone?

A. I can't tell you on a specific case. I don't recall.

Q. Would it have been your normal practice to review the report in considerable detail, or was it normally something you would just give a cursory reading?

A. Normally I would review it in detail.

Q. What was done with the report after it was approved?

A. There is a standard distribution to which it is sent.

Q. So it was sent on a standard --- various and sundry people?

A. Yes.

Q. Do you know what those various people are supposed to do with the report once they receive it? Is there any subsequent analysis done by any groups or is it just taken and reviewed and then filed?

A. There is none that I am aware of. It is mainly a

record of the inspection.

Q. That would have gone to I&E headquarters also, wouldn't it? Or let me ask you that the other way around: Would that inspection report have gone to I&E headquarters?

A. I honestly don't know.

Q. Do you know if it would normally go to NRR?

A. I do know that Leon used to see a lot of our inspection reports. How he got them, I don't know.

Q. But you didn't make a point of sending them to anyone at NRR?

A. No.

Q. Did you see or discuss any reports produced as a result of investigations or analyses of this incident other than the ones we've already described?

A. Mr. Creswell had some concerns relative to this that I've read, at least. I don't know what my involvement was with them. I mean, I can't recall.

Q. We'll talk about Mr. Creswell's involvement a little bit later.

Were you aware that a Mr. McDermott of the Quality Assurance Branch in NRR conducted an investigation of the QA implications of this incident?

A. I can't remember specifically. Bob has done several reviews of this nature and I can't recall in this specific instance.

Q. Do you know of any other investigations or analyses of the incident that were performed?

A. I don't know if NRR wrote up something other than that memo as a result of this or not. I don't know.

Q. You don't recall seeing anything?

A. I do not recall seeing it.

Q. You don't recall anybody mentioning they had seen anything?

A. No.

Q. Who was responsible for coordinating the investigation of the incident at Davis-Besse?

A. Normally the project inspector would do it. In his absence, I would do it.

Q. So it would be an I&E region function to be in charge of the investigation?

A. Yes.

Q. Did you feel that there were clear lines of authority associated with the investigation of this incident?

A. Yes, I felt there were.

Q. Do you feel that the investigation of the incident was conducted in a coordinated and systematic manner?

A. Yes. Just knowing the expertise of the individuals involved, I would say yes.

Q. The reason I ask is that it strikes me as a little strange. I&E was conducting an investigation. DSS sent some

people out here to conduct some sort of an investigation. Mr. McDermott apparently was doing some work involved with this.

Does it seem to you that it is a little unusual that so many different people were working on this and apparently not bringing their concerns to you as the coordinator of the investigation?

A. When I say that I was the coordinator, I'm talking about the week that Mr. Tambling was absent. Mr. Tambling did have many conversations with NRR subsequent to his coming back from school.

Q. Did you feel then that he was aware of these various other investigations and analyses of the incident that were going on?

A. The only thing that I can specifically recall is that he did have discussions with NRR to make sure that before we closed out our inspection over there and allowed them to restart, that NRR did not have any outstanding questions that would preclude startup.

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

A. Yes. We wrote a proposed bulletin on the failure of the auxiliary feedwater pump, which eventually came out in a memo to the regional directors, because it was deemed to be too narrow of a problem to get the circular treatment.

As far as the event itself, the PN to some extent serves that function that, here is a problem occurring. The PN gets a wide distribution.

Q. But the PN is about, as I recall, about less than a one-page summary.

A. Yes.

Q. So it doesn't go into it in any great depth.

BY MR. FOLSOM:

e-2 Q. Did you dismiss the PORV failure as non-generic?

A. I can't recall the specific review that was made on that. At the time of the incident, it was felt that the failure of the PORV was due to the missing reset relay, which we felt was highly unusual and not apt to happen anywhere else again. Relief valves themselves, unfortunately, are not in that situation. And I don't know whether the fact that it was non-safety-related entered into the thing. I can't recall.

BY MR. HEBDON:

Q. I would like to ask you some questions about the specifics of the incident itself and the transient that occurred. Did you realize during the course of your review that steam formed in the reactor coolant system during the transient?

A. Before the inspection report was out we did. I don't know when I knew that.

Q. What significance did you assign to that fact?

A. My concern was to determine that neither the vessel nor the fuel elements sustained damage. Based on Mr. Tambling's review of the B&W information, that did not occur. And I don't know if NRR reviewed that same information or not. I can't recall.

Q. Did you realize that steam formation in the reactor coolant system caused pressurizer level to increase while the leak continued?

A. While pressures continued to drop, do you mean?

Q Yes.

A. Yes.

Q Did you realize that at the time?

A. Not as a specific incident, no.

Q I guess I'm a little bit confused. At the time of the incident, during the time of the investigation, did you -- were you aware of the fact that pressurizer level went up while the HPI pumps were shut off and while the leak was continuing from the PORV?

For purpose of reference, we have a graph here on the wall that was prepared by Mr. Leon Engle based on some reactimeter data that he collected at the site. If you'll notice here, one of the parameters that is plotted is presurizer level, and it comes [illegible] and then [illegible] system cools off. Then it starts to come back up, which I think most people attribute to the high pressure injection system.

At this point here, about four and a half minutes, they secure the high pressure injection system, and you see the pressurizer level start going back down, as you might expect. But then here, at about six minutes, with the leak continuing, the leak wasn't isolated until out here at 20 minutes, and with the high pressure injection system secured, you see pressurizer level turning and start to go back up again, and in fact increases over a matter of about a minute

and a half, to a point where the pressurizer is completely full. And it remains that way out until about 35 minutes into the transient, at which point the pressurizer level drops sharply.

Did you recognize this particular part of the transient from time 6 until about time 36 in the course of your review?

A. No, not in the terms of that presentation.

Q. You have not seen that particular graph?

A. No, not in terms of what you described there. I was aware of the graph. I was aware that they shut off the high pressure injection pumps. I did not tie those two factors together.

Q. When you looked at this graph, what explanation -- or did you have an explanation -- for why the pressurizer level was going up there, starting at about six minutes?

A. No.

Q. You just didn't focus in on that issue?

A. I did not focus in on that issue.

Q. Did you realize that the operators secured the high pressure injection system before they identified and isolated the leak?

A. I don't recall that I did at the time of the inspection. I know that Mr. Creswell identified it subsequently. I don't really remember if that was identified

during this inspection or not.

Q. If we could back up for just a moment, I missed a point here.

If at the time you conducted your review of this particular incident, if you had noticed this fact, that te pressurizer level went up starting at about six minutes, what significance do you think you would have assigned to that fact?

A. Well, the fact that in the light of, after Three Mile Island, of course, I would have suspected that possibly there could have been a bubble somewhere else.

Q. Prior to Three Mile Island, what do you think you would have surmised?

A. I don't know if I would have picked up on that or not.

Q. Did this particular incident raise any concerns in your mind concerning the analyses of postulated accidents?

A. The inspection was conducted to see that we felt that the licensee's analysis was bounded in this thing, and that was one of the determinations that we had at the end of this inspection, that it was bounded by a previous analysis.

Q. Did this event raise any concerns in your mind concerning operator training or the adequacy of plant procedures?

A. The main concern that I recall was that there was some confusion on the part of the operators in regards to the

steam feedwater rupture control system, that was identified by Mr. Harpster. And that was the only one that I can recall.

Q. Do you recall any of the specifics of those concerns?

A. No, I don't. I do know, I think, if I remember correctly, we asked him to do a reorientation of the operators prior to startup.

BY MR. FOLSOM:

Q. Did that reorientation include an admonition to the operators not to secure the HPI?

A. I don't believe it did. I can't recall if that was an issue at that point or not. I don't honestly remember.

BY MR. HEBDON:

Q. In the course of your review of incidents such as this, what consideration do you normally give to what the operators will see and what they may or may not do with the information?

A. Generally speaking, unless I'm on an inspection myself, unless the inspector brings up the specific concern, I'm not sure I would get involved in that.

Q. If you were on the inspection yourself, what consideration would you give to what the operators did?

A. Well, as I mentioned, one of the first things an inspector should do is, after he determines that the plant is safe, is review the transient, the actions by the people; if there was an operator error, to try to determine why the

operator error occurred, whether it is faulty information, faulty procedures or whatever.

Q. Do you know whether or not that type of analysis was done during this incident?

A. I do know that it was done in regard with the steam feedwater rupture control system. I don't recall whether it was done on the HPI or not.

Q. When you analyze incidents such as this, do you give any consideration to what would have happened if the plant had been at different initial conditions? For example, if the plant had been at a much higher power level?

A. We normally would. I don't recall if we did in this one or not.

Q. Is there a formal method or procedure that you use to analyze that type of what-if sort of analysis?

A. No, we don't.

Q. So it is just something that the inspector should do in the course of his review?

A. Yes.

Q. During your review of this particular incident, did you feel that the plant responded as you would have expected it to respond?

A. Are you talking about the plant, physical plant?

Q. The physical plant.

A. Well, I guess, given the events that occurred, I

felt that the plant responded the way it should have, yes.

Q. Did you feel that the operators responded as you would have expected them to respond?

A. It is my understanding that, again, we had a problem with the steam feedwater rupture control system. I don't recall the specifics on that.

As far as the HPI being shut off, that was at least not a big issue until about a year later.

BY MR. FOLSOM:

Q. May I back up to your answers about the analysis of the procedure on a what-if basis? Now, you recall that Mr. Hebdon asked, do you have an automatic procedure for precipitating what-if questions in the course of the inspection, and you said, no, that that was up to the individual inspector. So am I correct in stating that this what-if range of questions depends entirely on the imagination and initiative of the inspector?

A. And expertise. That doesn't mean that we don't say what-if in the region. Mr. Fiorelli and myself may have conducted some what-if things, but I don't recall, honestly.

BY MR. HEBDON:

Q. Did you consider any of the events that occurred to have generic implications to other plants?

A. We wrote a letter to headquarters requesting them to issue a bulletin on the failure of the governors, the

auxiliary feedwater pump. Other than that, I don't recall anything that we determined to be of a potential generic nature.

Q. Do you now consider that any of the events had generic implications other than the one bulletin that you prepared or proposed?

A. Well, obviously, the transient itself had generic applicability. We don't oftentimes document a transient such as that in a bulletin. We normally relate to hardware things. So, given the time now, I would probably have issued a bulletin on the PORV.

Q. Given the concerns that were raised by Mr. Creswell later on concerning the securing of the high pressure injection system, would you have felt that that had generic implications?

A. Given the review of that graph, in light of Mr. Creswell's concerns and a review of that graph in terms of the fact that there may be voiding similar to Three Mile Island, at this time I would, yes.

Q. Do you have any idea why these concerns were not considered to be generic at the time?

A. I don't recall, other than the fact that, at least in my case, the shutting off of the high pressure injection pumps and the possible voiding in the core did not come together until after Three Mile Island. That was never expressed to me by Mr. Creswell or anyone else.

Q What was your impression of the knowledge
ability of the operators?

A I'm not sure if it was this event or some
event, I think other than the steam [illegible] system, that the general opinion was that the operator
responded quite well at the time, other than the late
tioning of shifting off the high pressure injection p
which was somewhat later.

Q Was there any consideration given to the
possibility less qualified or less able operators might
respond as well?

A I don't know.

Q What is your assessment of the knowledge o
awareness of the operators concerning the implicatio
reactor [illegible] system pressure approaching saturatio
sure?

A I would think that they were aware of that at
of the [illegible] incident?

A I have no idea.

Q Do you know if they realized that boili
take[illegible] in the reactor coolant system?

A I don't recall.

Q Do you know what caused the operators
the[illegible] was given?

A I don't know if it was a process of
[illegible] Incorrectly, it was the tail pipe
If

Q What was your impression of the knowledge and ability of the operators?

A. I'm not sure if it was this event or some other event. I think other than the steam feedwater rupture control system, that the general opinion was that the operators responded quite well at the time, other than the later questioning of shutting off the high pressure injection pump, which was somewhat later.

Q. Was there any consideration given to the fact that possibly less qualified or less able operators might not have responded as well?

A. I don't know.

Q What is your assessment of the knowledge or awareness of the operators concerning the implications of the reactor coolant system pressure approaching saturation pressure? Do you think that they were aware of that at the time of the incident?

A. I have no idea.

Q. Do you know if they realized that boiling was taking place in the reactor coolant system?

A. I don't recall.

Q Do you know what caused the operators to realize that the PORV was open?

A. I don't know if it was a process of elimination. If I remember correctly, it was the tail pipe temperature's

going up, but I'm not positive of that.

Q Did you ever discuss this incident or any of the issues raised by this incident with a Mr. Joseph Kelly or a Mr. Burt Dunn or any other employee of B&W?

A I did. I, no.

Q Were you aware of their concerns about this incident?

A No, I was not.

MR. HEBDON: Could we go off the record for just a minute.

(Discussion off the record.)

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

BY MR. HEBDON:

Q Do you recall receiving a memo from Mr. Tambling concerning the adequacy of recorders in plants?

A No, I don't.

Q For the record, what I'm referring to is a memo from T.M. Tambling to R.C. Knop, dated April 5th, 1978. The subject is "Recording Instrumentations to Record Planned-Unplanned Reactor Transients, Davis-Besse 1."

Do you recall ever seeing that particular memo?

A I'm sure I did see it. I don't recall it. I think this has to do with -- yeah, Reg Guide 1.97 and the bulletin.

Q Do you recall at all what your assessment was of

the concerns that were raised?

A. It had primarily to do with -- I don't recall specifically, but the concerns were that they did not meet, fully meet Reg Guide 1.97.

Q. Do you recall what you thought should be done with the memo?

A. I don't recall if I subsequently passed it on to headquarters or not. I don't know.

Q. I have here two other memos. One is a memo from Mr. R.C. Knop to Mr. J.H. Sniezek, dated April 6th, 1978. The subject is "Recording Instruments, Davis-Besse." And the second one is a memo from G.R. Klinger to Mr. Knop, dated May 11th, 1978.

Do you recall either of those two memos?

A. Well, obviously I signed them, the one to Mr. Sniezek, so I did. I am sure I saw this one here also, but I don't recall.

Q. Do you recall if you had any concerns that these issues should be referred to NRR?

A. I believe the one memo states that it was referred to Mr. Engle.

Q. And do you recall --

A. It says "In conversation with Mr. Engle, generic applicability of 1.97 to operating plants being determined."

Q. Do you recall if you were satisfied with the

results of the response to the memo?

A. Backfitting of plants is an issue that we often get into and review in reviewing reg guides that have been applied to particular plants, and it is not uncommon that it goes to NRR for generic review when they get -- I don't remember what they call the group, but going back through and looking at all the plants on a backfit basis.

Q. Regulatory Review Requirements Committee, is that what you're thinking of, in NRR? It's also called the R^3C or the Ratchet Committee.

A. No. This is a group that is now looking at Dresden 1, 2.

Q. The Systematic Evaluation Program, SEP program?

A. Right. And it's my understanding that that type of thing, compliance to the later reg guides, will be addressed in that SEP.

Q. Do you have any feel for when the SEP group would get to Davis-Besse, for example?

A. I would assume it would be two to three years, at least.

Q. Do you know if the concerns raised in that memo ever reached the people in NRR that were working on backfitting Reg Guide 1.97?

A. No, I don't.

Q. Would you have expected that they would?

A Yes.

Q Did you discuss Mr. Tambling's memo or the response received from I&E headquarters with anyone?

A I don't recall.

Q I would like to call your attention to a January 8th, 1979, memo written by Mr. Creswell. I have a copy of the memo. For the record, it is a memo from J.S. Creswell to J.F. Streeter. The subject is "Conveying New Information to Licensing Boards, Davis-Besse Units 2 and 3 and Midland Units 1 and 2."

Are you familiar with that particular memo?

A Yes, I am.

Q Do you recall if you received a copy of it?

A Yes, I did receive a copy.

Q Do you know if Mr. Creswell raised similar concerns prior to the date of that particular memo?

A On item one, I don't recall that that was an issue before that time. It could have been. I don't recall the timing.

On item two, I think that did come up somewhat before that. It had been reviewed at one of the other sites and not determined to be a safety problem.

Item three has been a subject that first came out -- I was first aware that Mr. Creswell had a concern about shrink in pressurizer levels from where -- in that neighborhood of

April or May.

Q Of what year?

A Of '78.

Q What was the reason for your becoming aware of that concern?

A He -- what was the mechanism?

Q Yes.

A I believe I was told by Mr. Tambling, if I remember correctly.

Q That particular concern is one I would like to focus in on a little more than the others, because of the fact that it potentially is more closely related to the TMI accident than any of the others seem to be.

Do you recall what Mr. Tambling said to you concerning Mr. Creswell's concerns?

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

Q Do you remember why he brought it up?

A It is normal practice for him to bring any outstanding issue to me as a result of -- I mean, we just have a very close relationship. Tom is very conscientious and has a pretty low threshold for keeping me informed.

Q Do you recall what he said Mr. Creswell's concerns were?

A Not specifically, no. I don't know if you want generalities or not.

Q Generalities would be fine.

A The only thing I recall is that he had a question that the pressurizer level had either went off scale or was very near being off scale, as I recall, and that he wanted some information from Davis-Besse to further give him information to determine the significance of that.

Q Is that off scale high or off scale low?

A Off scale low.

Q Why was Mr. Creswell involved in this?

A My recollection is that on an event that occurred in November, a loss of off-site power --

Q This is November 1977?

A I'm not sure of the date. It is a 1977 date.

During the loss of off-site power, they had -- one of Mr. Creswell's duties was to revie the pre-op, pre-operational power ascension testing program for Davis-Besse.

Can I go off the record until I collect my thoughts?

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

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mac 4-1

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

THE WITNESS: Mr. Creswell's duties included review of pre-operational test results. The licensee wanted to use that November, '77, incident as the basis for not doing the natural circulation test, and his review of that, his test results caused him to have some concerns about pressurizer level.

BY MR. HEBDON:

Q Were his concerns about pressurizer level directly related to his review of the question of using the data in place of the natural circulation test or was this more of a peripheral issue that came up as part of his review of the data?

A I couldn't answer that question. I don't know. I would assume it was a peripheral issue, but I don't know.

Q Could you discuss briefly the chronology of events that took place from, I guess, April when he first raised this issue until January when he prepared a memorandum for a Board notification?

A I can't recall specific dates or anything.

Q That's quite all right. Whatever you can recall will be fine.

A Somewhere, I think it was in May, he -- and I believe it was Mr. Tambling, and I don't know if John Streeter was involved or not -- called Dav is-Besse and asked them for an

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analysis of the event. I think he looked at something again in August. I think there was some more discussion back and forth, but I'm not positive. When Davis-Besse wanted to establish a dual set point for steam generator level because of natural circulation considerations, we felt that was an NRR issue, and we asked NRR to get involved.

Now somewhere about that time in December in a conversation that Tambling, myself, and I don't remember who else was there -- had with, I believe it was Chuck Domeck of Davis-Besse -- he indicated that there may be possible situations in which the pressurizer would not only go off scale but would also go out of the pressurizer. We passed this on to NRR. I don't recall exactly who that was, and we got back an initial interpretation that -- I believe Mr. Creswell was at the site, if I recall, at this time; so was Mr. Streeter -- that if you required ECCS to alleviate a transient, an operational transient, like loss of feedwater, that that could be a potential safety question.

Q Now who was it that provided you with this conclusion?

A It was NRR. I'm not exactly sure of the name.

Q But somebody in NRR?

A I'm sure it is in Mr. Tambling's phone log.

Q Okay.

A This was passed on to Mr. Creswell at the site and

mgc 4-3

Mr. Streeter. We were supposed to have a conference call between Davis-Besse, NRR, and ourselves to discuss that. We were unable to get a hold of NRR that evening during normal working hours. I got a hold of Brian Grimes sometime during the evening, and we set up a conference call to be held the next morning -- Saturday morning, the 23rd.

At that point, Mr. Creswell and Mr. Streeter returned from the inspection and we met in my office to call NRR and Toledo Edison. At that time it was determined that the previous conclusion that you could not use ECCS for a transient such as this was not an unrelated safety problem, provided there was no vessel piping and fuel damage.

Q. So the conclusion was, then, that the possibility of draining the pressurizer -- let me rephrase that question. Was the conclusion that you reached that the pressurizer wouldn't empty?

A. No.

Q. Or was the conclusion that if the pressurizer emptied, it still was not an unreviewed safety issue.

A. The latter.

Q. So the conclusion reached as a result of that phone conversation was even if the pressurizer empties, it is still not an unreviewed safety issue?

A. Yes, because there was no fuel damage or primary system damage.

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Q Do you recall what Mr. Creswell's reaction was to that particular conversation?

A I don't recall his exact words. I don't even know if he expressed any exact words.

Q Do you recall, either based on that conversation or any subsequent conversations, what his reaction was?

A Obviously he wrote the memo subsequent to that, and still listing that as a concern, so it was still a concern in his mind. Now as to whether it was an unreviewed safety question or not, I'm not sure that the conversation with NRR satisfied him on that or not. I don't know.

Q The fact that he later raised the issue again, would that seem to indicate to you that the discussion with NRR did not alleviate his concerns?

A I'm trying to separate whether it was an unreviewed safety question or whether he had concerns.

Q Okay.

A I don't know whether he still considered it an unreviewed safety question after that point or not, but obviously he still had concerns relative to the transient.

Q If we take the assumption that he agreed that it was not an unreviewed safety issue, would it be reasonable for him to still have concerns about the transient?

A I think you can have concerns about many things that aren't unreviewed safety questions.

mgc 4-5

Q So it would not have been unreasonable then, for him to still be concerned, even if he agreed that it was not an unreviewed safety issue?

A Yes.

BY MR. FOLSOM:

Q We're still talking about the November, 1977, transient?

A I don't know if you can separate the September and the November incidents as far as Mr. Creswell is concerned.

MR. FOLSOM: Okay.

BY MR. FEBDON:

Q Well, how would the September --

A I think his concern was that the pressurizer was too small. I don't know. Specifically, I don't know.

Q Were you involved with the initiation of an investigation of Mr. Creswell's concerns by Mr. Foster and Mr. Kohler?

A I was, at least in the conversations, involved in those. Yes.

Q Could you describe what transpired?

A I think -- if I recall correctly, Mr. Creswell had some concerns that either Davis-Besse and/or B&W was not giving him the facts -- was withholding information from him.

Q Concerning what?

mac 4-6

A. On the pressurizer level problem.

Q Now is this the low pressurizer level problem that we have been discussing?

A. I think he had a lot of concerns beyond that particular one, but that was one of them certainly.

BY MR. FOLSOM:

Q And the timing of this is after NRR had resolved that it was no longer a safety issue?

A. Yes, I think so. I think it was after, but I'm not positive. I honestly can't say. I don't remember.

BY MR. HEBDON:

Q Do you recall why Mr. Foster and Mr. Kohler conducted their investigation? What caused it to be initiated?

A. Do you mean the two individuals or the investigation?

Q The investigation.

A. I'm missing something. I thought we discussed that. The reason was that Mr. Creswell had some concerns that, for whatever reasons B&W and/or Davis-Besse were witholding information.

Q Is it common practice for an inspector to have concerns such as this?

A. No, I don't think it is common. The time you would normally come to that assumption is when events occurred which would lead you to believe that no everything is on the up and up. I think a normal inspector has that in the back

mgc 4-7

of his mind. By the very nature, he has to ferret out information sometimes.

Q Would it have been common practice if an inspector had a concern such as this that possibly information was being withheld to conduct a formal investigation?

A As far as I'm concerned, it was a formal investigation.

Q Was that a normal practice, to conduct a formal investigation if an inspector had a concern such as the one Mr. Creswell raised?

A Sure. Yes.

Q If I understand you correctly, inspectors having concerns such as this was not a particularly normal or common occurrence?

A That's right.

Q Do you know why Mr. Creswell was not included in the group that investigated the allegations?

A Mr. Streeter felt that he wanted an outside look, and so he went to another person with the understanding that before Foster and Kohler went to see either the licensee or B&W that they would interrogate Creswell and others to get all of their concerns and get all of their background and that type of thing.

Q Did you have any feeling o any perception that one of the purposes of the investigation was to try and lay

mqc 4-8

to rest once and for all Mr. Creswell's concern?

A. I don't really recall specifically. I do know in general that John had some doubts in his own mind, and he wanted an outside look to determine whether there really, in fact, was a problem.

Q. John who?

A. John Streeter.

Q. Was it your feeling that prior to the investigation Mr. Street and the other people in Mr. Creswell's management did or did not have a firm feeling as to whether or not Mr. Creswell's concerns were valid?

A. As I just stated, I think there was some doubts as to whether some of the concerns were valid.

Q. Did you review the technical evaluation of Mr. Creswell's concerns that was prepared by I&E Headquarters?

THE WITNESS: Could we go off the record?

MR. HEBDON: Sure.

(Discussion off the record.)

MR. HEBDON: Let's go back on the record. What I have here is a memo from Norman C. Moseley to W. E. Thompson. The subject is "Notification of Licensing Boards."

mqs 4-9

And this concerns the issues that were raised by Mr. Creswell and includes an evaluation of each of the items.

BY MR. HEBDON:

Q. Do you recall seeing that?

A. No, I have not seen this. I was in the Construction Group at the time that this was generated.

Q. Were you aware that Mr. Creswell discussed his concerns with Commissioners Ahearne and Bradford and the staff?

A. Only obliquely. It was hearsay information.

Q. Hearsay from whom?

A. I don't remember. I had heard that he had been in communication with Commissioner Ahearne. I was not aware, I guess, of the other.

Q. Was this before or after the accident at TMI that you became aware of that?

A. I don't recall.

Q. Based upon the experience gained as a result of the TMI accident, what significance do you assign to the issue raised by Mr. Creswell?

A. Well, the pressurizer level thing -- I'm not aware of what has been done since February, but as far as the fact that under some conditions you could void the pressurizer, it is my understanding that that is still a potential and still not deemed to be an unreviewed safety question, so in that

mgc 4-10

specific instance, I don't know that anything has changed.

Q Would low pressurizer level or even voiding of the pressurizer, does that particular issue have an relevance to the accident at TMI, in your opinion?

A. The most significant issue involved, as far as Creswell was concerned, was the shutting off of the high pressure injection pumps, which I understand relates to the September 24 incident.

Q Was it your understanding that that concern was closely tied to Mr. Creswell's concern about low pressurizer level?

A. No.

Q Do I understand you, then, that you don't feel that those two issues were closely tied together?

A. They were never explained as being tied together.

Q So as far as you're concerned those are two separate issues?

A. Yes. They were at the time. Now, I think there is some relationship, of course.

Q Staying for the moment with the issue of the low pressurizer level, do I understand you that that particular issue doesn't really relate to the accident at TMI?

A. I don't know how to answer that question. Obviously there was a low pressurizer level that was induced by a transient, which involved a loss of feedwater to the secondary

mqc 4-11

system and low pressure occurred. I don't know enough about the Three Mile Island incident -- as I understand it from only hearsay -- that had the operators left the high pressure injection pump on at Three Mile Island, there probably would not have been a significant core damage.

Q But that is a different issue. I think we concluded a moment ago that the high pressure injection is one issue and the low pressurizer level, which was the issue that was discussed in this concern about B&W withholding information and the Board notification and all of the rest that we have been discussing here, is a separate issue.

A What I'm saying is that the loss of feedwater by itself, it's my understanding that the transient analysis shows that there would have been no fuel damage, and so from that standpoint, then, the low pressurizer level is still not an unreviewed safety question.

Q Okay. Let's go back, and I would like to talk about this concern that Mr. Creswell had about securing the high pressure injection. When did you first become aware of that concern?

A I don't recall. I think it was August of '78. I'm not sure.

Q How did you become aware of that concern?

A I don't recall. I don't know if it was reading the inspection report or discussions with Mr. Tambling or

mgc 4-12

Streeter.

Q What was your understanding of the concern?

A. The understanding was that the operators took an incorrect action in shutting off the high pressure injection pump when they were below 1600 pounds.

Q Did you agree at the time that that action was, in fact, improper?

A. I think my understanding at the time was that I didn't think it was proper, but given the transient -- I can't recall exactly, except that -- I just can't remember. I know I had a disagreement with Creswell, but I don't remember. On the technical issue involved, I don't remember.

Q Do you have anything in your files that might refresh your memory concerning what the disagreement was?

A. No, I don't. I'm sorry.

Q As I understand it, the operators --

A. As I recall, though, we did cite them and get them to agree they wouldn't do it again.

Q As I understand it, they in fact changed the procedure at Davis-Besse to include a step to warn the operator not to secure the high pressure injection?

A. Yes, that is my understanding.

Q Do you know when that change was made to the procedure?

A. No. It is documented in one of the inspection

reports, but I don't remember. I think it was in August or September or somewhere around there.

Q Did you give any consideration to whether the corrective action that the utility took as a result of Mr. Creswell's concerns about securing high pressure injection had generic implications?

A No, I did not.

Q Would it have been normal to consider the generic implications of such a corrective action, such a change in the procedures?

A I would have to answer, no, it would not be normal.

BY MR. FOLSOM:

Q Is that because operator actions are not considered procedures?

A Well, I think the whole situation of transients and operator response to them is one area that we need to re-do. I have just been assigned this week to a task force on lessons to be learned from Marble Hill and other things in construction, and this is one of the items on our agenda there -- that we have a better system for getting inspector experiences found at one site like Marble Hill to the other sites, particularly like if you have a problem with Bechtel, to get them to the other Bechtel sites. I think it is an area that needs to be strengthened.

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BY MR. HEBDON:

Q What is your overall impression of the abilities and attitude of Mr. Creswell?

A. I think he is very strong technically. He is very good at determining problems. He has had some problems with various utilities who consider him to be abrasive. And I don't know if this is a feeling felt by others or not, but I have had some problems in communicating with him and being able to understand what his problems are. I don't know if that is my failing or his failing.

BY MR. FOLSOM:

Q. Is he abrasive in your relationships with him?

A. No, I don't think so.

Q. Do utilities consider other of the inspectors to be abrasive at times?

A. I think every inspector is sometimes abrasive. But I think there is a magnitude rather than anything else.

BY MR. HERDON:

Q. Did you have any feeling Mr. Creswell is a troublemaker?

A. Not in those terms, no.

Q. Not in what terms?

A. Not in terms that he was a troublemaker. The feeling, I guess frustration, that I had sometimes was that he tried to handle too much from his office and not do enough site inspection, and that was partly mitigated by the fact that he was having some problems, [redacted] problems which I don't want to go into.

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

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

A I kind of view the regional I&E function to go out and do inspections and determine adequacy within the scope of their ability; and where they don't have the ability, to request either the I&E or NRR assistance. I feel the function of I&E is to inspect the requirements and those requirements are set by NRR.

I feel that I&E headquarters is the focal point of things that are happening around the country. They are the people who have specialists in certain areas, and during transients such as the ones we've been discussing, we normally would discuss it with them. In some cases we've even brought I&E headquarters people out to review transients also.

Q Backing up just a little, do you remember any discussions between I&E headquarters people and the regional people concerning the two incidents that occurred at Davis-Besse, the one in November and the one in September?

A Could you repeat the question?

Q Do you recall any discussions between I&E regional people and I&E headquarters people concerning either of the two transients that occurred at Davis-Besse, either the one in

September or the one in November of '77?

A Well, definitely, as I have mentioned before, we did notify headquarters on Sunday of the September 24th incident and subsequently discussed it with I&E headquarters on Monday, and I'm sure probably every day or two after that. That would be normal. Whenever there would be anything new that we would learn from the site, we would normally make it a practice to keep them informed.

Q Was this merely just for information purposes or was this to obtain some sort of an analysis from them?

A No, it is to keep them informed. And also, they quite often have some good ideas of things that we should look at.

Q Do you recall if they provided any good ideas in this particular case?

A I don't recall.

Q Have you ever been discouraged from using strongly worded statements to describe deficiencies that have been found during an investigation or inspection?

A No where I felt that they were warranted. I have had disagreements on proposed enforcement actions, not at Davis-Besse, but at other sites. I think that is normal.

BY MR. FOLSOM:

Q You haven't been told to rewrite anything because you used too much purple prose?

A. No, I have not been told that. I don't think it has been a problem, generally speaking. As long as you are restricting -- the special reports reflect facts and not opinions. As long as you stay within those confines, I don't see any problem.

BY MR. MERDON:

Q. Could you freely contact technical reviewers in other offices to discuss technical concerns?

A. Well, we have on a number of occasions. The thing we do have to do when we do do that is normally make another call to I&E headquarters, either before or after, and explain why we wanted to talk to them. But we do it on a fairly routine basis.

Q. Have you ever felt any pressure not to contact these people directly, but to work through I&E headquarters instead?

A. When we are talking about strictly technical matters, I don't think there is normally any problem. When we are talking policy or when we fail to keep I&E headquarters involved, then there is a problem.

Q. Does I&E review plant procedures?

A. Yes.

Q. What is the purpose of that review?

A. To determine that the format on a sampling basis, that the procedures are adequate.

do you mean by adequate?

A That they are adequate to operate the plant, given the training of the operators.

Q Who conducts that review?

A That review is done by various inspectors, depending upon -- it is a normal part of three or four different modules. In other words, if you're going out and doing a review of calibration, they review calibrations. If you go out to look at operating procedures, then they review the operating procedures.

Q Now what percentage of the operating and emergency procedures are actually reviewed by the inspector?

A During preoperational testing it is a very high number. During normal operation, I think it is a third of the procedures, operating procedures and emergency procedures, every year, if I remember correctly.

Q A third each year?

A I think so.

Q Is this a detailed review or is this just ensuring that the procedure exists?

A No. I think, if I remember correctly, the procedure -- there was a change some time in the last several years and the thrust is now more towards reviewing for technical adequacies in addition to making your review on just general grounds, as compared to commitments in the FSAR

and that type of thing.

Q Do you recall approximately when that type of change was made?

A. I'm not sure it has been made in the operating procedures yet, but I know it has been made in callibration and surveillance requirements. But the thrust -- the difference in the thrust is that we reviewed them in that period for adequacy and now we review and concur that they will do the job.

I don't know if that is a slight distinction or not.

Q I guess I don't understand the distinction. Could you explain that a little more?

A. Well, I guess maybe from an accountability standpoint, before we reviewed the procedure period and now we have to review them and determine that the information contained in them is technically adequate to perform the job. It is just a little bit different.

Q So before you would just review the procedure to see if it existed?

A. No, they reviewed it in detail. The thrust is that there is more accountability today, that you essentially have to say, yes, that procedure is adequate. Before you could have maybe reviewed a third of it and said, I reviewed that procedure, and maybe reviewed all of it.

I'm not saying that there has been any change in the

depth of inspection. I don't know if there has been or not.

Q Now, as I understand it, you're saying that the plant operating emergency procedures in the pre-op phase, a very high percentage of them are reviewed from the perspective of technical adequacy?

A There is a level given -- I don't recall what that is -- that is a minimum that is normal practice. Most of the inspectors do surpass that normal number.

Q And that is some fairly high number?

A Yes.

Q Do you have any feel for what the percentage is?

A It would vary with the inspector and the site, but above the minimum.

Q Just a rough estimate. Are we talking about ten percent, 50 percent?

A I would say normally you would probably be talking about 60 or 70 percent as a minimum, maybe even in some cases 100 percent.

Q Okay. And then once every three years, essentially, or on a three-year cycle, these procedures are reviewed again?

A Yes.

Q From this perspective of technical adequacy?

A Yes.

Q Now, when the inspectors review these procedures, do they review them from the perspective of what the operator

sees and what he may or may not do as a result of what he sees?

A. I don't recall that specific requirement of that procedure, no. I can get you a copy of the procedure manual.

Q. If you could, I would appreciate it.

Is it your understanding that when the inspectors review these procedures, that they look at the procedures from the perspective of what the operator sees?

A. I don't know. It is possible that at least in some cases the operator does not go out to the board and look at the board, if that is what you mean. Normally the review would be done in the office or at the site, but not a walk-down per se of the procedure.

Q. Well, I'm not even so much concerned about it from a walk-down perspective as I am from the idea of, would an inspector looking through a procedure come to a point and say: Here is a place where the operator might go astray; maybe we had better put in a precaution here to keep him headed in the right direction.

A. I know that the addition of precautions and that type of thing is a normal thing that the inspectors bring up. My point is, when you review a procedure, in your review it says, turn Switch B, and you see that Light XYZ lights up, if you perhaps do that procedure on a walk-down basis where you would simulate B and you would look up and see if XYZ is readily available to be seen -- I'm not sure that is done.

And so that might be a problem.

Q I'm looking at it from a little different perspective, and that is the type of thing where the operator would look at a procedure and maybe the procedure says that for A -- well, take the example of the Davis-Besse incident -- for a loss of coolant accident, you can expect -- or the operator should look at pressurizer level and pressurizer pressure. And if, say Mr. Creswell had been reviewing that procedure and without the benefit of that particular incident had come up to the conclusion that, well, gee, pressurizer level might not be a good indication, that might hang up -- an issue that has been brought up by a number of people -- might he say, well, gee, maybe we better put in a precaution here to warn the operator that, although normally pressurizer pressure and pressurizer level are good indications, be careful because pressurizer level might hang up?

A Yes, I would say normally speaking an inspector would do that. Whether or not he does it is based on his knowledge of that particular plant and his background and his knowledge of previous transients that happened at other places.

Q Okay. Now, this sort of review would be done by the principal inspectors or would it be done by the specialists, or both?

A It could be done by both.

Q Who would normally do them, the majority of it for

the operating and emergency procedures?

A. For the operating, the principal inspector would normally do that.

Could I go off the record for a minute?

MR. HEBDON: Sure.

e-5 (Discussion off the record.)

MR. HERON: Let's go back on the record.

BY MR. HERON:

Q So then it's my understanding on that, the particular module that includes most of the operating and emergency procedures could conceivably be assigned to either the support group or the operations group?

A Yes.

Q What module is that, do you recall?

A No, I would have to look it up.

Q What is your perception of the relative quality of procedures from one plant to another?

A I think there is a big difference in the way the procedures are coming from, and it depends to some extent on the training of the people. We have some licensees that use strictly a "cookbook" approach to the procedure in which it says, "You turn switch A; light B comes on, and this happens, this happens, this happens. The next step is you turn this switch, and these functions occur." And you go down through this whole thing to do the procedure.

You have another site where the procedure might say, "Turn switch and verify that the correct actions occur." And at some sites that appears to be adequate because of superior training of the operators. Some of them you have to go on the basis of what their past experience has been

BY MR. FOLSOM:

Q What is your feeling about whether your people reviewing plant emergency procedures should do a desk review or a walk-through review?

A I don't know. I didn't really think too much about this until I got involved in this other task force and the lessons learned kind of thing. There are arguments both ways. Some of the people who have the cookbook procedures find that they get lost in them; they are so detailed that they forget the steps that happened two or three pages before that. And as far as walk-throughs, I think the thing you could pick up on some occasions -- and I don't know whether it would be worthwhile or not -- would be the fact that maybe on the detailed procedures, just how confusing it is to ask a guy to look at a bunch of different parameters that may or may not be important in turning that switch.

I don't know. I really don't have a feel. I don't know of any licensee who has done a walk-through of all procedures. I think where there is any question in the licensee's setup, the inspector takes the procedure with him and goes and looks at it. It is not a normal thing, I don't believe.

BY MR. HERDON:

Q Do you know if the utilities do walk-throughs of all their procedures?

A. I know we have been advocating that substantially in the past year or so.

Q. Do you know if they do it?

A. In the case of some sites. I don't know necessarily in the case of Davis-Besse. I can't recall specifically.

Q. In the case of some sites they do?

A. Yes, they do. That is one of the strong points that we made with Commonwelath Edison during our meetings with them.

Q. But prior to, within the last year or so, the utilities did not do a walk-through of all their procedures?

A. I don't know. What I'm saying is that we have been putting more stress on walk-through procedures in the recent past, because in the case of Commonwelath Edison we found some procedures that they physically could not do, and a walk-through would have shown that.

Q. Would that have indicated to you, then, that they had not done a walk-through?

A. Not only that they had not done a walk-through, but they were probably not using the procedure as written.

Q. Do you ever discuss any issues that come up in the course of the review of procedures with the licensing reviewers in NRR.

A. I've never gotten involved with that since I've

been an inspector myself. We get involved quite a bit on preoperational test procedures in discussions with NRR. As far as operating procedures, we don't get into all that much. The inspectors themselves may.

Q. What is your perception of the relationship between I&E and NRR?

A. I view I&E Headquarters as kind of a focal point where we send information in and if it is within the scope of their capability, you probably will get the response out of I&E Headquarters. If they think your concerns are not valid, they're going to send them back and say they're not valid. If they feel it is a valid issue and that they don't have the expertise or the time to do it, then they send it to NRR. And this is normally done by a formal change in lead responsibility.

Q. In your opinion, how effectively does the current I&E/NRR relationship facilitate the feedback of operational experience into the licensing process?

A. I would say we have a problem. As I've discussed, that is one of the items we want to cover in this task force on construction enhancement -- is a better mechanism for defining problems at one site and relaying them to another site. And I would say the same is true for operating plants.

Q. What about as far as feeding back the information and the concerns that you identify on operating plants into

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the design review.

A. I'm sorry. I don't understand the question.

Q. What I'm trying to get at is, you're out here in the field, and you are seeing the plants operated, and you are seeing the plants as they're build and that sort of thing, and what I'm wondering is how effectively the concerns you are raising and the problems that you are seeing are getting fed back into the people who do the licensing review or the design of plants?

A. I don't have a feel for that. I'm sorry.

BY MR. FOLSOM:

Q. Let me give you an example, if I may. You just mentioned that Commonwealth Edison on a walk-through or was show to have operating procedures that the operator could not possibly accomplish. Well, obviously, the plant itself and the design of the plant caused this result, did it not?

A. No. I would say in most cases it was a poorly written procedure. In other words, I can't recall any specifics.

Q. Well, if it were not a poorly written procedure but a plant design where the valve was up here out of reach and the indication was down here where you could hardly see it, and you fed this back to your headquarters, would it get over to NRR and be operated on by them?

A. I doubt it, but there is another consideration.

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Essentially every plant you go into the chances of you having a situation where the valve is up there and the lights are down there where you can't see it, the odds are probably way up there that the other plants don't have that same configuration, even though they're all B&W plants or Westinghouse plants or GE plants. Each layout and each control board is dramatically different to begin with from plant to plant, like even from a Westinghouse plant to a Westinghouse plant or a GE plant to a GE plant.

I don't know if I answered your question.

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

(Discussion off the record.)

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

BY MR. HEBDON:

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

A. There is not a formal method. Where we think there is a problem that could be occurring at various sites, we do do that. I can't recall any specifics where we've done it, but I do know in individual cases we have called other project inspectors and asked them, "Hey, do you have this kind of problem at your site, or should you be looking at this?"

Q But as far as you know, there is no mechanism by which you get together all of the B&W inspectors for a day

and have them sit down and discuss what they are seeing and the concerns that are coming up and that sort of thing?

A No.

Q Is there any such meeting for supervisors, section leaders, or branch chiefs?

A No.

MR. HEBDON: Could we go off the record for a moment?

(Discussion off the record.)

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

BY MR. HEBDON:

Q You just mentioned that there were meetings where people involved with specific technical problems get together from time to time. I think leak rate testing was one you just mentioned?

A Yes.

Q Do you know if there are any periodic meetings for branch chiefs or section leaders where they get together discuss problems that they are experiencing?

A There are periodic branch chief meetings for all the branches. They discuss significant problems to some extent. They also go into a substantial number of administrative discussions -- not all technical.

Q Is this within the region or from region to region?

A It is -- the branch chiefs meet in a particular meeting at some periodic interval. I don't know what that

interval is.

Q So this would be all the branch chiefs from all the different regions?

A Or for a particular branch, like the Construction Branch.

Q So all the Construction Branch branch chiefs would meet somewhere?

A Right.

Q For all the different regions?

A Right.

Q So that would be the collection of all of the regional Construcion Branch branch chiefs?

A And I&E Headquarters would be represented also.

Q Approximately how often is that done? Do you know?

A I think it is three months.

Q So it is roughly once a quarter?

A Yes.

Q Do you feel that there is any need to have similar meetings at the inspector level?

A As I mentioned before, I think we need some kind of system -- whether it is meetings or whether it is an operating experience newsletter, whatever -- to better tell individual inspectors about specific problems at other sites.

Q What is your perception of the difference in review procedures or review philosophy for safety-related

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versus non-safety-related systems?

A. You're talking about operating procedures now?

Q No, your review procedures, inspection procedures.

A. Our inspection procedures are aimed at safety-related equipment and activities.

Q What sort of review do you do with respect to non-safety-related systems?

A. It depends upon the system that you're talking about. Rad waste facilities get a very significant amount of review. Condensate systems would receive practically nothing.

Q What about a system such as the PORV, which is non-safety-related?

A. Normally, you would find the actions for operating the PORV in the safety-related procedures, so I would say that that normally would be reviewed.

Q Would you normally review the control circuits of a safety-related system. Let me start that over; would you review the control circuits for a non-safety-related system such as the PORV?

A. Not normally.

Q What is the basis of deciding if the system is safety-related or not safety-related?

A. Each licensee is required by the regulations to submit a list of Q listed items, and that appears in the FSAR.

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Q Do you know what basis is used for deciding which systems are included on that list?

A. It is reviewed by NRR as part of the FSAR submittal. And it is any activity or hardware component that would mitigate or prevent an incident.

Q Any incident?

A. Any activity.

Q Is it your opinion that the designation of systems as safety-related versus non-safety-related is applied in a consistent and rational manner?

A. I think we have problems. You're talking about in utilities now?

Q Well the utilities propose the list, but is the NRC that approves it. And what I am really concerned about is the list as it finally appears. Do you know of cases where part of a system is safety-related and parts not safety-related, and there is no particularly clear reason why the differentiation is made?

A. Well, there are systems which are obviously safety-related and non-safety-related are intermixed. And an example I can think of offhand, if my recollection is right, is that the pump for BWRs is considered to be safety-related as far as the pressure retaining boundaries are concerned but that the motor is not considered to be safety-related.

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Q Well one example that somebody cited to me along the way is the fact that the diesel is a safety-related but the air start system for the diesel and the fuel to run it are not safety-related systems.

A. I would disagree with that interpretation.

Q What interpretation?

A. I would say that the air start system, as far as the air tanks to assure a minimum number of starts, would be safety-related, and I think we would normally treat it as such. As far as the fuel oil, I believe that the whole thing would be safety-related. There may be some point past like a day tank or something where there are some circumstances that might not be safety-related.

Q So then it is your understanding that in the cases you know of this differentiation of safety-related versus non-safety-related has been fairly consistent?

A. In most cases. There are exceptions. In the construction area is where you usually run into some of this because of installation of systems. We get into the area where we just had a discussion of the safety-related cable trays for electrical cables, and there is at least one AE who has taken a position that the trays themselves were not safety-related, and we came out with an information bulletin that states that they are.

Q Do you know of any instances where inspectors have

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raised a concern that a particular system should be safety-related?

A. I think it is a common feeling for a lot of inspectors that there are things that you have in a plant that by themselves are not safety-related. And I think most of them accept that, based on the definitions given. But they feel that to some extent, like operation of a feedwater pump in a BWR, has safety implications, and yet it is a gray zone when you get into that kind of an area.

Q. Is that sort of concern particularly common?

A. I think it is common in certain areas, like feedwater pumps is one; rad waste system is another. Those are the only ones that really stand out in my mind.

Q. I think to back up to a question concerning the incident that occurred at Davis-Besse in September that I forgot to ask earlier, did you give any consideration to the possibility of changing the administrative procedures to minimize the possibility of someone removing the relay that caused the PORV to cycle?

A. I don't recall that. The only thing I do recall is we asked them to make a rather thorough document search to make sure that there were not other problem areas. I don't recall that we asked them not to put in a procedure that you don't put in components. I would think something like that almost goes without saying. I don't know if we did or not.

Q. Well, did you have any concerns that it was that easy for someone to remove a relay that ultimately resulted in a loss of coolant accident?

A. I can't recall specifically whether we addressed the fact that they did or not.

Q. Do you know of any other precursor events that are relevant to the accident at TMI?

A. You're talking about other than the situations where other sites have had operator errors? I mean, not related to Three Mile Island?

Q Well, why don't you expand on that a little bit?

A Well, we have given civil penalties in cases where safeguard systems, emergency systems, have been invalidated by operator errors at Dresden and Zion and other sites.

Q Did you feel that operator error or operator violation of procedures was a widespread problem?

A In the case of Commonwealth Edison, it was a problem enough that we unrequested them for better than a year in all of our monthly meetings that we had with the utility, until they tightened up.

Is this a problem in other --

A Operator errors are a problem at all facilities. The thing you're discussing is the magnitude. Of the LERs we received, I think operator errors normally account for somewhere between 10 and 20 percent of all LERs.

Q Were most of these, were these concerns with the operators associated with the operators taking incorrect action as a result of possibly a lack of training or a lack of understanding of what was going on? Or was it associated with the operators deliberately taking actions that were contrary to approved procedures?

A There have been several cases where operators have taken actions to invalidate the safety system. Now, whether they did it intentionally in violation of the procedure or not is another matter.

Q Do you have any feeling for what percentage was intentional and what percentage was accidental?

A I don't know of any situations where an operator took an action to intentionally damage equipment. I don't know of that is the thrust of your question.

Q Well, what I'm wondering is, in a case where the operator invalidated a safety system due to a lack of understanding of the fact that he was doing it, or was it a matter of he knew that he was invalidating the system, but in order to save time or because he didn't think it was going to cause any problem, he went ahead and did it anyway?

A I don't think most of them would look at it as invalidating the system. We cited Quad Cities several years ago for turning off an ECCS pump because they felt that there were no safety concerns with doing that, and the pumps sitting there going against a dead head, they were afraid they could have problems with the pump similar to the PTI shutoffs at Davis-Besse.

Q This was at Quad Cities?

A Yes.

Q Do you recall when that was?

A No. It was two or three years ago.

Q Why did they secure the ECCS pump?

A They were involved in a transient. I recall the citation, but I don't recall the transient. And they argued

that the citation was not in order because they felt they had everything under control. It has been so long ago, I don't remember what the transient was.

Q. Would you have any more detailed information about that particular transient in the files?

A. I should be able to find it in the files.

Q. Could you find it for us and provide a copy, if you would?

A. Yes.

Q. Thank you.

Do you have any additional information that might be relevant to our inquiry into the events surrounding the accident at TMI?

A. I can't think of any that we didn't discuss.

MR. HEBDON: Do you have any additional questions?

MR. FOLSOM: I can't think of any.

MR. HEBDON: Do you have anything else to add?

THE WITNESS: No.

MR. HEBDON: Okay. Thank you very much.

(Whereupon, at 11:25 a.m., the interview was concluded.)