PDR

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NUCLEAR REGULATORY COMMISSION

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(CLOSED)

S FARCS Operations and Action Plan to Trouble Shoot the 6-9-85 Anomalies.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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TUESDAY, JULY 9, 1985

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MEETING BETWEEN THE NRC FACT-FINDING TEAM AND TOLEDO EDISON

ON

SFRCS OPERATION AND ACTION PLAN TO

TROUBLE SHOOT THE 6-9-85 ANOMALIES

- - -

NRC FACT-FINDING MEMBERS PRESENT:

ERNEST ROSSI
J. T. BEARD
LARRY BELL

OTHER NRC MEMBERS PRESENT:

MR. CHOULES, NRC, Region III
MR. HELLE, NRC, REGION III

TOLEDO EDISON MEMBERS PRESENT:

MR. GRIME
MR. JAIN
MR. STALTER
MR. MOMINEE
MR. HELLE
MS. MacDONALD

ALSO PRESENT:

MR. HILBEBRAND, MPR

P R O C E E D I N G S (9:30 a.m.)

MR. ROSSI: Okay. I guess we are ready to begin, and this is going to be a meeting to discuss the operation and design of the steam and feedwater rupture control system, and as a preliminary thing we have passed around some sketches and diagrams of the system operation, and these have been prepared primarily by J. T. Beard from information that has been provided to us from earlier meetings up here, and what we want to do is discuss these to make sure that we understand as much as possible about the operation of the steam and feedwater rupture control system.

So, with that, J. T., do you want to begin with your specific questions?

MR. BEARD: Well, what I would like to do is if we could just have sort of a discussion about it, and I don't have a lot of specific questions, but what I would like to do, I realize the rupture control system is a very complex logic system; extremely complex.

I went through it one time -- went through the logic diagrams and thought I understood it and made some simple drawings from it, and from that I wrote a system description on it, and found out later I had made some mistakes.

So, I went through it a second time and came

up with a different set of simplified charts which is the package that we handed out.

And It seems like that since we had to be coming out here anyway, that it was a very worthwhile thing to make sure that our understanding of the way the system is designed and functions is technically accurate.

So, that is the main thing I would like to accomplish, and it may be that what we will need to do is take these sketches, have you folks compare them against the logic diagrams, and what I would really like to do is get some concurrence from you folks that these are technically accurate.

MR. JAIN: You are not looking for the --

MR. BEARD: Sir.

MR. JAIN: You are not looking for that output at this meeting right now. Go back and compare it --

MR. BEARD: I would like to get it as close as we can.

MR. JAIN: Okay.

MR. BEARD: In other words, if we have to lay out a drawing and say does this box match that box, then maybe that is what we need to do.

I had envisioned more of a working meeting, not an administrative-type meeting.

And then, I think we had indicated to Bill Rolls

that after we feel like we have established a common understanding of the technical design and operation then if we wanted to discuss a little about the action plan associated with the steam feed rupture control system, then we could do that, and we previously indicated that we didn't think we had any comments that would force changes in the document.

So, it would be more of an understanding of the problems that may have been experienced during the event as contrasted to the place where we might want to talk about changes.

oes anybody have any questions before we start piling throu . this?

(No response.)

MR. HELLE: J. T., would it be appropriate for you to kind of explain and lead the people through what you have here, and maybe you can get some early feedback if they do agree with what you have on here, and make it the working session you worked out.

MR. BEARD: That is what I would prefer, is the technique which I use frequently, is if I can feedback to you the way I think it is designed and operates, if you people would be nice enough to correct me if I make a mistake, then I get a positive feedback, in that sense, rather than you telling me again how it operates.

One of the reasons that these cartoons were developed is that not only is the system complex, but the -- for the purposes of our team report, we need a simplier versions, and also for our own understanding.

Okay. The first picture here, labeled Figure 1, is a sort of pictorial schematic representation that I got from some of the material you had given earlier, which shows the two actuation channels, each of which consisting of two logic channels, and the most important thing that comes out of this is that the concept of a full trip, or full actuation of one channel, would be at the output which is where two logic channels have tripped and gone through some And Logic -type configuration, and then to an output.

That would be what I think is a full trip. And then the partial trip would be when you are upstream of the And gate, and one logic channel has tripped, but the other has not.

MR. JAIN: We call it a half trip.

MR. BEARD: Half trip.

MR. ROSSI: Now, when you are talking about redundancy and separation and that kind of thing, I gather that your separation is between the two actuation logics, is that correct?

MR. JAIN: There is also a separation between

the two logic halfs of an actuation channel.

MR. ROSSI: So the wiring and that sort of thing is actually separated -- I mean, a physical separation as well as electrical separation between the logic channels?

MR. JAIN: Within the cabinet.

MR. ROSSI: Within the cabinet. Okay.

MR. BEARD: Along that same line, each of these logic channels receive certain types of signal inputs. Was it intended that those signals be separated from each other? Electrically separate?

MR. JAIN: Channel inputs to the logic channels.

MR. ROSSI: Let me say something. Everybody is going to have to make a special effort to speak up, because I know that the people that are taking the record are having difficulty hearing, so please speak up as clearly as you can so that they can hear you.

If you have a problem hearing anything, just interrupt. Okay. Go ahead.

MR. BEARD: Okay. Another point that I think should be made clear on this first cartoon is that the And configuration, where the two logic channels are joined together to make an actuation channel, I believe is done with field wiring at the actuated equipment, and not really a part of that cabinet called the S-Sparse?

MR. JAIN: That is correct.

MR. BEARD: While we are on it, it is convenient, we had indicated to Bill Rolls that we wanted to look at three specific pieces of actuated equipment. He said he was going to have somebody prepared with drawings, and prepared to discuss that.

MR. JAIN: I have those drawings here.

MR. BEARD: I don't want to go into it right this minute, but that is so that we can understand how this And function really works.

MR. BELL: This relay actuation that is local here, is that component actuation? Those relays actuate components?

MR. JAIN: Yes. These relays have contacts wired out into the field for a particular -- for example, an MOV.

MR. BELL: So we really have an output here then?

MR. JAIN: Right. Correct.

MR. BELL: This output that is shown at the bottom of the End Gate.

MR. JAIN: That is the actual actuation.

MR. BELL: This cabinet should end up here.

MR. BEARD: Correct me if I am wrong --

MR. STALTER This cabinet should end up here,

MR. JAIN: Right.

MR. STALTER: And this should be taken outside the cabinet.

MR. BEARD: That is why I tried to show with the dotted line that the And function is made up of field wiring, it is not part of the cabinet.

MR. ROSSI: Now, on your logic channels, the inputs into the logic channel are completely redundant. Are those logic channels all identical to one another, or are there differences between logic channels 1, 2, 3, and 4?

MR. JAIN: The logic modules, per se, are identical. The things that are different are the actual equipment.

For example, we have some equipment which are actuated at half trip. A separation exists and the channelization exists where half a channel -- an actuation in Channel 1, for example, will trip the associated half channel equipment in loop 1.

Similarly, a half channel in loop -- in actuation channel 2 would actuate the associated trip in loop 2.

MR. ROSSI: Now, is that equipment where that is done safety-related equipment also?

MR. JAIN: Only half trip equipment that we have is the atmospheric vent valves, the MSIV bypass valves, and also the main steam line warm up drain lines.

MR. BEARD: Okay. There is a table that is the next page, which probably is covering that very subject, too. Maybe we should turn to that.

The next two pages in the handout are sheets 1 and 2 of Tables we obtained from you folks, which we believe to be the outputs of these things.

Page 1 is for actuation channel number 1, and page 2 is actuation channel number 2, and I call your attention on page 2, in the third column on the right half, there is an entry called half-trip. Okay?

Now, I don't know whether there is a typo in that half-trip word should be on the first page also. I think that is correct. That that was a typo.

So, there are half-trip outputs from both actuation channels.

And they seem to go to -- on three different parameters, and they actuated it looks like four different pieces of equipment, which was what we were talking about a second ago. See where we are?

What was the fourth piece?

MR. JAIN: The blow down lines, which is listed as MS 611 and 603 on the other page.

MR. ROSSI: Now, where these things are indicated as being actuated by half-trips, it seems to me that it should indicate which logic channel does that. Isn't

that another piece of information --

MR. BEARD: That is one of the things I wanted to make sure we understood.

As I understand it, either logic channel within an actuation channel can cause this to happen?

MR. JAIN: Exactly.

MR. BEARD: So it is an 'or' situation?

MR. JAIN: It is an 'or' for a full trip it is an, 'and.'

MR. BELL : So on page 1, this would be 1 or 3?

MR. JAIN: That is correct.

End 1.
SW fols.

#2-1-SueWalsh1

MR. BELL: And on Page 2 it would be two or four?

MR. JAIN: Correct.

MR. BEARD: And the rest of the outputs are Ands?

MR. STALTER: I don't know how you are going to handle that on this diagram on the front, because there are some Ors coming out of here.

MR. BEARD: Well, I hoped to have some text material that will point that the majority of the outputs are Anded at the end but there are a few exceptions which is the area we are talking about now and --

MR. STALTER: Right.

MR. BEARD: -- maybe not clutter up the figure.

One of the things that I noticed and that I wanted to ask you about is that in these two tables, if you look at Table Number 1, for example, it appears to me that the vast majority of the output signals from actuation of Channel 1 are associated with reactor coolant loop Number 1, Steam Loop Number 1. For example, in the middle column there it says "MSIV BYPASS 1, MS DRAIN, MSIV #1, MSIV #2." Now, the MSIVs is one area that is unique from the point I was making.

But the vast majority of this equipment seems to be related to Loop 1. So, actuation channel outputs seem -- seem to be oriented toward Loop 1; similarly, actuation of Channel 2 outputs are oriented toward Loop 2.

MR. JAIN: Okay. The only difference are in terms

#2-2-SueWalsh

of the MSIV is the startup control valve.

MR. BEARD: The only differences are MSIV and startup control valve?

MR. JAIN: Let me take -- there is another difference as for the feedwater control valves.

MR. BEARD: So, that's unique. The MSIVs are unique. And where on the table is the other one you are talking about?

MR. JAIN: SP-6A. I think it is labeled wrong there. It should be main feedwater control valve.

MR. BEARD: SP-6A is the startup valve. Are you on Page 1 or 2?

MR. JAIN: Page 1.

MR. STALTER: SP-6A is the main feedwater --

MR. BEARD: This says main feedwater block valve.

MR. JAIN: There is something wrong with this table here. SP-6A on the very left should be main feedwater control valve.

MR. STALTER: Right. On the left. The center column is correct.

MR. JAIN: The center column is okay.

MR. BELL: In summary then steam isolation and feed isolation are redundant.

MR. JAIN: We have single failure protection, different channels closing, isolating feedwater lines as well

#2-3-SueWalsh1 as main steam lines.

MR. BELL: That's what I was asking. The main feedwater receives Channel 1 and 2 signals and main steam isolation receives Channel 1 and 2.

MR. JAIN: You might want to qualify that somewhat, because not all the valves on the feedwater would get isolated,would get signals from both channels. For example, the main feedwater block valve on Number 1 loop would get signal only from Channel 1.

MR. BELL: Okay.

MR. BEARD: Would that be Valve FW-780 that's the main feedwater block valve?

MR. JAIN: Correct.

MR. BEARD: I think there is a typo there. It should be an "M" instead of an "N" --

MR. JAIN: Okay.

MR. BEARD: -- in the first column there. And it looks to be correct in the other one.

Well, it looks like Channel 1 gets the main feedwater block valve and control valve and startup valve; that's the three valves for isolation. What I was thinking is, we mentioned that actuation of Channel 1 seems to get the startup control valve --

MR. JAIN: Right.

MR. BEARD: -- the main feedwater block and main

#2-4-SueWalsh

feedwater control.

MR. JAIN: Correct.

MR. ROSSI: All in the same loop?

MR. JAIN: Channel 1 in the same loop, correct.

MR. BEARD: No, it -- the control valve is for the alternate loop, the opposite loop. In other words, actuation of Channel 1 will get the main control valve and its associated loop but the block valve in the opposite loop.

MR. ROSSI: Okay. So that --

MR. BEARD: Is that correct?

MR. JAIN: The control valve --

MR. BEARD: I got it backwards.

MR. JAIN: The control valve is the one that is getting signals from the opposite channel.

MR. BEARD: Right.

MR. JAIN: Everything else for the feedwater side is from the respective channel, the respective loop.

MR. ROSSI: Okay. And that's the way you meet the signal failure criterion for feedwater isolation?

MR. JAIN: Correct.

MR. ROSSI: Either the block valve closing or the control valve closing isolates feedwater, and that's true. The block valve will isolate the startup feed flow also.

MR. BEARD: No, I don't think that's correct. I think the block valve is within the loop for the main control

#2-5-SueWalsh1 valve and not common to both.

2 MR. ROSSI: Okay. Then, how do you get the single
3 failure for isolation for closing the startup valve?
4 MR. JAIN: The startup valve is closed by both
5 channels, 1 and 2.
6 MR. ROSSI: But there is only one valve there.
7 MR. JAIN: That is correct.
8 MR. ROSSI: And what if it fails to close, then
9 what's the backup to that?
10 MR. JAIN: Well, you still have the other generator
11 that would be isolated.
12 MR. BEARD: Is it part of the safety function for
13 the plant design that for some accident or accidents that
14 you have to isolate both steam generators, at least temporarily
15 if not permanently?
16 MR. JAIN: We only -- to answer that question, no.
17 The -- you would only want to isolate one generator at a
18 time given a main steamline break from that accident.
19 So, you don't need to isolate both generators at
20 a time for a design basis accident.
21 MR. BEARD: Not even temporarily?
22 MR. JAIN: I don't recall of any Chapter 15 analysis
23 which requires isolation of both generators.
24 MR. ROSSI: I think you worded the question to get

25 that answer. I think the answer is correct, that you've only

#2-6-SueWalsh

got to isolate one steam generator for any break. But your real question that you are asking I believe that you want to know the answer to is, aren't there steamline breaks in various locations which will temporarily result in the isolation of both steam generators until the good steam generator pressure recovers.

MR. JAIN: Yes, that is correct.

MR. ROSSI: And --

MR. JAIN: It's plausible that that would occur.

MR. ROSSI: And that's how you get them both isolated. Going back to one steam generator that has a problem, let's assume I got a steamline break in one of the two steam generators, I want to isolate the feedwater to that steam generator.

MR. JAIN: Correct.

MR. ROSSI: Okay. And that requires closing the startup control valve --

MR. JAIN: Correct.

MR. ROSSI: -- closing the main feedwater control valve --

MR. JAIN: Right.

MR. ROSSI: -- closing the block valve.

MR. JAIN: Correct.

MR. ROSSI: And what now is the redundancy to the closure of the startup valve?

#2-7-SueWalsh

MR. BELL: There is another valve that it's closed signal, and that's the main feedwater stop valve.

MR. JAIN: That's the thing that I was going to look at here. Feedwater 601 and 612 are the ones that are closed. I don't see that in here for some reason.

MR. BEARD: Well, where should they be?

MR. JAIN: Feedwater 601 -- I don't remember the numbers right, but one is Loop 1 and the other is Loop 2 and they are all channelized.

MR. BEARD: Feedwater 601 and what?

MR. JAIN: Okay. 601 appears to be the main feedwater stop valve, Number 2, which is listed on Sheet 2 of 2 here. Somehow it's not listed on -- in the first page.

MR. BEARD: It should be -- all right, what's the one that should be on the first page?

MR. JAIN: Feedwater 612.

MR. ROSSI: Okay. Now, that's a very important point in meeting single failure for isolation of feedwater. I assume that this stop valve -- correct me if I'm wrong -- gets the closure signal from one actuation signal --

MR. JAIN: That's correct.

MR. ROSSI: -- and the control valves, both the startup feedwater control valve and the main feedwater control valve, get an actuation signal from the other actuations?

MR. JAIN: That's correct. The startup feed getting

from both in this case.

MR. ROSSI: Okay.

MR. BELL: Okay. So, the main feedwater block and the main feedwater control valve, if we are talking about Number 1 steam generator, would get a signal from which channel now?

MR. JAIN: Okay. Let me write that down here. Okay. The startup control valve will be one or two. Okay. The control valve goes to the opposite channel.

MR. BELL: So, that would be, in my case, where I've got Number 1-OTSG that would be Number 2 --

MR. JAIN: The block valve will be Number 1 and the stop valve will be 1.

MR. BELL: Okay. So, now if we had a failure -- if we had a problem in Number 1-OTSG, it's the ruptured steam generator --

MR. JAIN: Correct.

MR. BELL: -- and let's assume that Channel 2 S FARCE fails to function, then Number 1-OTSG would be isolated by the closure of the stop valve --

MR. JAIN: That's one, right.

MR. BELL: -- by the closure of the startup valve from Channel 1 --

MR. JAIN: Correct.

MR. BELL: -- and by the closure of the main feed

#2-9-SueWalsh

block valve from Channel 1.

MR. JAIN: Correct.

MR. BELL: Okay. Let's take the same steam generator with a failure of S FARCE Channel 1 now --

MR. JAIN: Uh-huh.

MR. BELL: -- and the way the steam generator is isolated in this case is the closure of the startup valve --

MR. JAIN: Uh-huh.

MR. BELL: -- and the closure of the control valve.

MR. JAIN: Correct.

MR. ROSSI: Now, both of your actuation channels will detect that steam generator Number 1 in this case has had a break?

MR. JAIN: If you had a generator with low pressure condition it would go --

MR. ROSSI: To both actuation channels?

MR. JAIN: Well, at a level or pressure transmitters which are channelized, okay, channel -- for example, steam generator 1, if it had low pressure all the core channel pressure transmitters or pressure switches are going to send the trip signals, meaning that all four channels on that generator are going to trip on low pressure.

So, to answer that question, both actuation channels will sense that trip signal.

MR. ROSSI: Okay. Now, from that description -- and

#2-10-SueWalsh

let me ask both Larry and J.T., from that description, assuming it's correct, it sounds like the single failure criterion is met on the feedwater end with a single failure.

MR. BEARD: Feedwater isolation.

MR. ROSSI: Or for isolation. So, regardless of which steam generator I have a break in I wil' isolate feedwater to that steam generator redundantly.

MR. BELL: If you take credit for control grade equipment.

MR. ROSSI: The control grade equipment being the --

MR. BELL: The startup control valve and the feed drain valve. Those are control grade equipment. Those aren't safety grade pieces of equipment.

MR. ROSSI: Okay. What about the block valve? Is it safety grade?

MR. JAIN: The 601 and 612 are safety grade.

MR. ROSSI: They are the only two, and that's one per loop?

MR. BELL: The stop valve is safety grade but not the block valve.

MR. JAIN: That's what I mean, 601 and 612.

MR. ROSSI: Okay.

MR. BELL: But don't you call that the stop valve not the block valve?

MR. JAIN: Right. They use different terminology.

#2-11-SueWalsh1 MR. STALTER: The main feedwater block valve
2 that isolates the control valve is not safety grade.
3 MR. BEARD: Okay. So that out of these four valves
4 that we have been talking about, there are three of them that are
5 not safety grade and one that is?
6 MR. JAIN: That's correct.
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Sim 3-1

MR. BEARD: But the four all do get various signals.

MR. ROSSI: And there is enough redundancy there to meet the signals ---

MR. BEARD: It sounds like from what they are saying that that is probably the case.

The point that I really wanted to make was that it seems like that maybe feedwater -- well, I guess the point that I wanted to make is that if you just look at the table, it appears as though the vast preponderance of the actuated equipment associated with actuation channel one is related to loop one and vice versa.

MR. ROSSI: But they do have this cross-over where it is required to do things redundantly.

MR. JAIN: Cross-overs again would be associated with loop one equipment. For example 106-A is a cross-over valve that is associated with the FBT-1, which is loop one obviously. So it will be actuated by channel one.

MR. ROSSI: Okay. While we are on this single failure thing of valves, unless somebody has some more questions on the feedwater valves in isolation, I would like to clear steamline isolation.

MR. BEARD: Yes, let's go to the main steam system. We have done the main feed and let's go to the main steam.

MR. ROSSI: Now in the main steam system, assuming again, I have a break, a steamline break, can you explain

Sim 3-2

what is required for the isolation of the good steam generator from the break and how you meet single failure and redundancy for that?

MR. JAIN: The familiar equipment to be isolated on the steam side is obviously the MSIV, including the atmospheric vent valve, the MSIV by-pass valve, the main steamline drain valve and the steam generator blow-down valves.

MR. ROSSI: And that is all for the good steam generator now that you have to do that regularly?

MR. JAIN: Well, under low-pressure condition, let's say steam generator one has a low-pressure condition, it will isolate that particular steam generator by -- let me break this up a little bit. Isolation occurs on both loops, main steam isolation occurs on both loops. Isolation of aux feed-water occurs on the loop which is bad.

MR. ROSSI: Okay. Tell us about the steamlines first.

MR. JAIN: Okay. So for a low-steam pressure condition on No. 1 generator, for example, you would isolate both MSIVs, you would isolate all the other atmospheric vent valves, the MSIV by-pass valve, the main steamline drain valves and the blow-down valves.

MR. ROSSI: For both steam generators?

MR. JAIN: Both steam generators.

MR. ROSSI: Okay.

Sim 3-3

MR. JAIN: Mainly because you have got four channel pressure switches, which are sensing the same low-pressure condition and transmitting it to both actuation counts. That is the isolation on the steam side. Now it does other kinds of things for the aux feedwater side.

MR. BEARD: This system is very complex, and I can't handle jumping from system to system. We are talking about main steam, and let's just stay there.

Let me see if I can tell you what I think I heard. I think I heard you say that if either steam generator has low pressure, it is sensed by each of the four logic channels and the outputs of the various actuation channels are such that you will get MSIV closure on both steam generators, vent valve closure and all the other things.

What about the turbine trip valves, the stop valves?

MR. JAIN: SFRCS also sends a turbine trip signal on a low-pressure condition.

MR. BEARD: Now are the turbine trip valves downstream of a header that connects the steam generators or are they in line?

MR. JAIN: They are connected together.

MR. BEARD: But if I traced out one steam loop, I would got through from say OTSG No. 1, its MSIV, then come to a header and then ---

MR. STALTER: Well, you would come to a stop valve,

Sim 3-4

the turbine stop valve first.

MR. JAIN: Two stop valves.

MR. BEARD: Well, that is what I am trying to understand, is the header ---

MR. STALTER: And then the header and then the control valves.

MR. BEARD: So I would get a turbine stop and then a header.

MR. STALTER: The turbine stop valves are activated in MSIV, then the header and then they are connected together and then ---

MR. BELI: At the turbine steam chest.

MR. STALTER: Right, and then it goes through the control valves, the turbine control valves.

MR. JAIN: One thing we missed there is the NRV.

MR. STALTER: Yes, there is a non-return valve in there, too.

MR. ROSSI: Where is the none-return valve located with respect to the MSIV?

MR. JAIN: Downstream of the MSIV and upstream of the stop valves.

MR. BEARD: Now is the non-return valve a check valve or is it an operating valve?

MR. STALTER: A check valve.

MR. BEARD: It is just a check valve. It doesn't

really have any actuation other than the pressure?

MR. STALTER: Right.

MR. BEARD: On the diagram there was a little bonnet shown on it like it was air operated.

MR. JAIN: It is air operated for startup purposes, but you might want to hold it open, the steam flow is not enough to keep it open.

MR. BEARD: Okay. But as far as we are concerned for isolation purposes, it is just a simple check valve?

MR. JAIN: Just a check valve.

MR. STALTER: Right, just a check valve.

MR. BEARD: Now as I understand it, you were saying that each actuation channel will close the MSIVs and turbine stops; is that correct?

MR. JAIN: Correct.

MR. BEARD: Now what in your accident analysis is taken credit for to give you single failure type valve protection for main steam isolation?

MR. JAIN: I don't know the ---

MR. ROSSI: Well, let me go back and clarify a point because there is something that was said that I don't understand.

Did you say that either actuation channel one or actuation channel 2, either one of them would close both MSIVs?

Sim3-6

MR. JAIN: Correct.

MR. ROSSI: Okay. Now are we in agreement that that really occurs?

MR. BEARD: No.

MR. ROSSI: Okay. Why don't one of you straighten that out before you go any further.

MR. BEARD: One of the reasons that we asked, and remember earlier I said we want to talk about, we selected three pieces, and one of them was the MSIVs. My understanding, and I will just throw that out and get it all out on the table, too, is that as far as the steam feed rupture control system goes, and there is a separate part for the safety feature's actuation side, but as far as the rupture control system, there are three solenoids involved for each MSIV, and that all three have to be de-energized in order to have the valve go closed, and that the signals to those solenoids are a mixture between actuation channel A and actuation channel B in all cases.

MR. JAIN: I think that is true, but I don't recall if that ---

MR. BEARD: If that is the case, it would appear that if all three have to be de-energized, and the three signals driving those solenoids are a mixture ---

MR. JAIN: Let me clarify that somewhat. There are three solenoids, and we call then C, D and E solenoids.

Sim3-7

MR. BEARD: C, D and E solenoids?

MR. JAIN: Right. These are part of five, which are A, B, C, D and E. C and D are coupled together.

MR. BEARD: Coupled how, electrically or pneumatically or how?

MR. JAIN: They work in unison. I don't know how exactly they are coupled.

MR. STALTER: I am not sure, but they do work together.

MR. BEARD: An either or then?

MR. STALTER: They just act as one. If one trips, the other trips.

MR. BEARD: All right. They act as one. We can get into the details later, but I am trying the gist of it, which is that there are three but C and D act as one?

MR. JAIN: Correct.

MR. BEARD: Okay. Now go on.

MR. JAIN: So essentially you have got two sets, if you will, C-D and E, two pairs.

MR. BEARD: So you end up with C-D and E?

MR. JAIN: Right.

MR. BEARD: Now my understanding is, and I am not sure how it relates to the C-D and E part, but up to three solenoids, there are signals from both A & B actuation channels involved, and because of that, and that is the

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reason we are here today, my understanding was that it would require the trip of actuation channel A and the trip of actuation channel B to cause either MSIV to close.

MR. JAIN: That is not true. We could go through the drawings and make sure that that is not the case.

MR. BEARD: Well, that is a separate thing that we had on the agenda later. So why don't we just stop at that point, that there is this misunderstanding that we need to get clarified.

MR. ROSSI: Your statement is that either actuation channel A or actuation channel B will close both MSIVs on low steam generator pressure in either steam generator?

MR. JAIN: Right.

MR. ROSSI: Okay. And that we can verify from drawings later.

MR. BEARD: Is it that either will close both?

MR. JAIN: Any actuation channel, either one or two, will close both MSIVs.

MR. BEARD: We can come back to that later.

MR. STALTER: We proved that in surveillance testing.

MR. JAIN: Yes.

MR. ROSSI: I beg your pardon. Could you speak up?

MR. STALTER: We proved that in surveillance

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testing that that happened.

MR. JAIN: That is the way they are designed.

MR. BEARD: Okay. Why don't we just put that on the table and accept the statement for the time being and we can come back to the details of it later, if that is all right with everybody.

At any rate, getting back to the cartoons, and these other questions are going to come up later, I think we have probably said enough about the two charts here or tables about what the actuation signals are. The third page was just for convenience ---

MR. JAIN: Could I just interrupt for a second?

MR. BEARD: Sure.

MR. JAIN: I have no assurance right now that this table is complete or correct because I see lots of typos here and I would like to take the time to go through it with a fine tooth comb.

MR. BEARD: Fine. I would appreciate that, and maybe you can get that done sometime before we leave. I don't know whether it is today or whenever, but as soon as practical so that we can really make sure that our understanding is correct.

The third page, or the next page after that was a simple sketch showing the aux feedwater trains, the steam side and the water sides, just for convenience in reading

the table, and that is not really, I don't think, a part of the discusion.

The next page is where we start to get into a little more detail, and it shows that the interface between the sensing instrument channels and the output relays going to the actuated equipment is depicted, and there is a buffer on the input side and a relay driver type buffer apparently on the output side. And apparently the point here is to provide isolation between a 48 volt system on the input and a 48 volt system on the output with a 15 volt logic system in between.

Now if you go back and look at on this cartoon these input buffers, and I assume that this represents like a typical logic channel, or at least that is what I was led to believe, and the various inputs feed into -- well, there are four signals coming into each -- four types of signals coming into each logic, and the buffers there are actually, as I understand it, some number of buffers are physically on a printed circuit board, and then there are multipe printed circuit boards or multiple modules, if you will.

MR. JAIN: I am afraid I can't answer that.

MR. STALTER: (Nodding affirmatively.)

MR. BEARD: I see there is somebody nodding their head yes.

MR. STALTER: Yes.

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MR. BEARD: My understanding is that if you look at the schematic drawings, the electrical elementaries, or whatever you want to call them, that the signal ground common between these buffers are tied together so that within one logic channel the signal grounds on the input buffers I believe are tied together on like the 48 volt side, the input side.

Therefore, if that is true, one would say they are not totally independent electrically and therefore might be susceptible to power supply fluctuations such as have been experienced on the safety features actuation system here at this plant. I don't know to what degree that is the case, but certainly all the necessary ingredients seem to be there.

end Sim
Joe fols

MR. JAIN: One thing you have to keep in mind here, one of these channels is an AC channel. Another half of the actuation channel, AC.

MR. BEARD: Right. I am talking about within one logic channel now. I am not talking between logic channels within an actuation channel.

MR. JAIN: You can verify it with the drawings.

MR. BEARD: I have looked at the drawings, and I believe that is the case. Of course, the purpose of this meeting is to make sure my understanding is technically accurate, so I would like to ask you to do that.

MR. ROSSI: I would like to call a short break.

MR. BEARD: It is time for a cup of coffee anyway.

MR. ROSSI: Why don't we break for a few minutes.

(Short recess taken.)

MR. ROSSI: Why don't we begin again, and J. T., why don't you continue with your questions.

MR. BEARD: Okay. Now, we can move on to the more interesting aspects of this I think, and let me see if I can characterize the remaining pages in this document. I think there are four of them.

What I have done at this point in the set of

cartoons is to try to focus on the two parts that are related event, namely actuation of the system on steam generator low level, and there are two pages associated with that.

And the second part is actuation on low pressure, and there are two pages on that. Now, what I would like to do, just in terms of overview, is just generally describe these four pages and then we will get into it to some extent.

The next page that we get to is the one that shows the inputs from the various steam generator signals on low level. It goes through level instrumentation cabinet and then goes to the output relays and causes certain things to be done. That is a logic diagram, with or gates and in gates and what not, but at the beginning of that there is this thing called the steam generator instrumentation cabinet, and the next page is, I believe, to be a very simple version of what that amounts to, okay?

In other words, that is what is just in that sub-component, if you will.

MR. JAIN: I would like to clarify here on these two pages, that reference is made here only to the low level bisfables. You also have high level bisfables.

MR. BEARD: I understand that. But they were not involved in this event, therefore I did not focus on them.

MR. JAIN: Okay. What I was alluding to was that they are the same bisfable units contained in one. So the signal rarely comes out --

MR. BEARD: It is a high/low bisfable rather than a low.

MR. JAIN: Correct.

MR. BEARD: Okay. Just a quick overview of the last two pages. The next to the last page is a logic-type diagram showing the various pressure inputs and the logic and in the relay-type outputs, and the particular channel that I chose to do is Logic Channel 2, which is the first channel of Actuation Channel No. 2.

Now, one of the reasons for doing this was when the operator pushed the button, I believe he actuated this particular logic channel, okay? And we can get into that. It is just that there were four of them to pick from, and I just picked that one.

It should be typical of any of the four, basically, but --

MR. JAIN: Can I clarify that now, or maybe later?

MR. BEARD: Well, hold on for just a half a second. And then the fourth page is an accessory or auxiliary function related to low pressure, which is the initiate bypass and block circuitry as I understand it.

So, just in summary you have got a logic diagram for level, one for pressure, and a couple auxiliaries.

Okay? Now, you wanted to clarify something, didn't you?

MR. JAIN: I was going to mention something about -- you said manual actuation?

MR. BEARD: Yes.

MR. JAIN: If you were making reference to the manual actuation that he made by pushing two buttons, by pushing those two buttons what he did was to trip Actuation Channel 1 on steam generator 1 on low pressure, and also Actuation Channel 2, on steam generator 2 on low pressure.

MR. BEARD: And I believe that is Logic Channel No. 2.

MR. JAIN: I am not clear when you say that is Logic Channel 2.

MR. BEARD: Forget what he did on the first column of the buttons for a moment.

MR. JAIN: Okay.

MR. BEARD: Talk about the one in the second column. That is Actuation Channel 2.

MR. JAIN: Right.

MR. BEARD: He pushed the uppermost button in that column of buttons.

MR. JAIN: Right.

MR. BEARD: My understanding is that simulates a manual input for telling that Logic Channel that steam generator 2 has low pressure.

MR. JAIN: Telling that Actuation Channel.

MR. BEARD: Telling that actuation channel that steam generator 2 has low pressure.

MR. JAIN: Correct.

MR. BEARD: And those manual input contacts would provide that type of information into Logic Channel 2 and Logic Channel 4.

MR. JAIN: Correct.

MR. BEARD: So, Logic Channel 2 was primarily involved in this event. That is why I picked it -- it was -- so was four.

MR. JAIN: Two and four.

MR. BEARD: Yes, but at any rate -- okay. I guess what we would like to do is go through the cartoon here and see if this agrees with your understanding of the way the logics work, and I am back on the first of two pages associated with level, and it shows inputs from level transmitters, and it gives various numbers associated with steam generator 1 and number 2, and I don't know how you gentlemen perfer to do this, but what I would really like to do is at some point through some process, find out if this

diagram is a reasonable simplification of the way the logic in the system works.

How would you suggest we do that?

MR. JAIN: I would like to take the time to sit down, maybe alone or maybe with you, and go over our own drawings to make sure that it is reflected correctly here rather than sitting in a bigger group.

MR. ROSSI: I think to do that, that one thing that ought to be done is that they ought to be given some time to look at it.

MR. BEARD: That is fine, that is fine. No problem.

MR. ROSSI: And then when they think that they are ready to talk about it, we could reconvene and they could tell us what their results are.

MR. BEARD: I would just call your attention that this particular cartoon was developed from Bechtel Drawing E as in Echo 19.

MR. JAIN: E-18.

MR. BEARD: All right. E-18. I think that is the one I used.

Now, let me turn to the second page, having to do with level. As I understand the system, basically you have a level transmitter which has the power supply for the loop. Operate test inputs. And then you have a bisfables

device which will get you at least low level actuation, which consists basically of an amplifier with various input adjustments.

After the amplifier is a test trip input, and then it goes into a normal bias where your trip set point is adjusted, and the outputs are contact of a relay, which when the plant is normal this contact is closed. This is my understanding.

When there is something abnormal on level, this contact would open and that constitutes the trip input to the S Farce System.

Now, my question is: Back over on the left, this level transmitter that is the input, I was unable to determine whether this is a startup range level, operate level, or full range level, or something that is not indicated in the control room whatsoever, and it may be of the same range, okay?

MR. JAIN: Let me -- LT, SB 9A6 through 9A9 are the startup range level transmitters that feed the SFRCS for Steam Generator No. 2.

LT SB 9B6 through 9B9 are the startup range level transmitters that feed the SFRCS for Steam Generator 1.

They are not indicated in the control room.

MR. BEARD: Not indicated in the control room.

MR. JAIN: They are indicated on the SGLIC, the

steam generator level instrumentation cabinets.

MR. BEARD: So, if you go into the control room where it says startup range level, that is from a different but similar transmitter?

MR. JAIN: They are from a different model of the same Company's transmitter. Rosemont 1153 that is indicated in the control room, which is Rosemont 1152 that is fed into the SFRCS.

There is also a difference in the calibration ranges of the two. The ones in the control room being zero to 250 inches, and ones for the SFRCS zero to 388 inches.

MR. BEARD: Now, I take the startup range is hot calibrated? Calibrated for hot operating conditions?

MR. STALTER: It is calibrated cold, so it is compensated for hot operating conditions.

MR. BEARD: And I guess the set point -- is this where the 26 and a half inches is set for it?

MR. JAIN: 9A6, 9A9 --

MR. BEARD: The problem I had was lack of information. I didn't have anything that correlated between level transmitter designations, something that would tell me what range it is. And the meter back where the racks are indicated zero to four hundred inches, and that just added confusion to the problem. That is why I wanted to get it clarified.

MR. BELL: Only those level transmitters that supply inputs to the integrated come closest, and are displayed in the main control room?

MR. JAIN: ICS?

MR. BELL: Yes.

MR. JAIN: These --

MR. BELL: No. I say in the control room you have startup level and operating range level and full range level.

Only the startup range level and the operating range level that are displayed in the control room, those are the same transmitters that feed the ICS, is that correct?

MR. JAIN: I didn't think the startup range indicated in the control room fed the ICS.

MR. BELL: I told you on low level limits.

MR. JAIN: Is that the same one?

MR. BELL: No S Farce level instrumentation is available in the main control room.

ME. JAIN: That is correct.

MR. STALTER: The level indication is not available in the control room.

MR. BEARD: Again, you will notice at the bottom of the cartoon there is some lists, hopefully more correct, of the references from which I derived the simplification.

Okay. Now, the most interesting one is the logic cartoon for the pressure. Again, I guess the thing I am interested in is some review to determine the accuracy of this thing, but go back to your earlier statement about the manual actuation, this being Logic Channel 2, you can see over on the left it gets pressure inputs from Steam Generator 2 and Steam Generator 1, and my assumption is that with the particular button you pushed, this being Actuation Channel 2, Steam Generator 2 low pressure, it basically had the same effect as these two pressure switches tripping low.

They are at the top left of this cartoon. Because it would not have effected the input for Steam Generator No. 1 for this actuation channel, correct?

Now, that would also mean that in terms of outputs over here, there really -- all the ones that are grouped at the very top right, there is a set of four of them there, and those would all be tripped or actuated because one or the other of the steam generators has low pressure.

The middle one there, RCS 202, would be actuated because the manual input did say No. 2 was low.

MR. JAIN: Yes.

MR. BEARD: The next two, 302 and 902, would not be actuated, because they say that No. 1 is low. And the lower two, RCS 402 and 802, would have been actuated

during this event.

MR. JAIN: That appears to be correct, although I would like to have the time to go through it.

MR. BEARD: I understand. I just wanted to make sure that generally that is the kind of way I see it.

Okay? Now, what I did -- this may not be in the consolidated form on your drawings, but I tried to show that for example if I look at the output labeled RCS 402, there is a verbal description which says start the Number 2 aux feed pump, to -- and by that I mean to feed -- OTSG No. 1.

And the thing I have added is in parenthesis below that, it says Open, and gives a valve number.

So, I don't think you have got that all on one consolidated list, but I try to show it here.

And that is where -- I want to make sure we are right.

The point this leaves us at I think right now, is I would like to use this diagram, and presume it is accurate for a moment, if I may, and say let me postulate a situation, and I would like to understand how we meet single failure criteria with Freka System with regard to this, okay.

Now , the basic thing I would like to postulate has to do with, say, this Logic Channel No. 2 is one of them that is actuated, and like in the event, it was indicated

that steam generator No. 2 really has the low pressure, not No. 1, and I would like to understand how you get aux feed water to the good steam generator if you assume a single failure in Actuation Channel No. A, the alternate, or opposite, actuation channel.

And in particular, the outputs I guess would correspond to like RCS 301. If you take RCS 301, I believe, is the nomenclature for --

MR. JAIN: Channel 1.

MR. BEARD: -- Channel 1. And assume that 301, and I guess 303 would correspond to that, wouldn't it, something there or upstream of it, is the single failure. So that function doesn't occur, okay? Now, how can we get flow from aux feed water into the good steam generator?

MR. JAIN: Well, you have got two paths to the steam generator from the aux feed water, initially. One is the respective discharge valve, and the other is the cross-over discharge valve.

MR. ROSSI: There is a sketch. And you have marked this as an exhibit, this handout?

REPORTER: I don't know about the other reporters, whether they accepted it as an exhibit. Do you wish it accepted now?

MR. ROSSI: Just make sure it has been.

MR. JAIN: You want to hypothesize --

MR. BEARD: You want to hypothesize that steam generator No. 2 is bad, or broken, if you will, and I want to hypothesize single failure in the steam feed rupture control system actuation train A, or Channel A, and in particular a single failure that would be associated with the outputs labeled RCS 301 and 303.

So, basically, that that function doesn't occur, okay? The point is, that as a single failure, and then show how we can get aux feed water.

MR. JAIN: Okay. You realize that is somewhat different from what actually happened?

MR. BEARD: Yes.

MR. JAIN: Okay. Let's say steam generator No. 2 is bad, which means that you will have an Actuation Channel 1 and Actuation Channel 2 on steam generator No. 2, which will say that that generator is bad.

MR. BEARD: What will be the immediate response to the two actuation channels. What valves would close or open, or whatever?

MR. JAIN: Okay. Feed water would be isolated. Main steam line would be isolated. That will be the immediate action.

MR. BEARD: When you say feed water, do you mean to include main and auxiliary feed water?

MR. JAIN: Main.

MR. BEARD: Will auxiliary feed water be isolated?

MR. JAIN: While that is happening, the auxiliary feed pumps would be getting started. In this case, MS 107 -- excuse me. MS 106 is going to open, and also MS 107 A is going to open, which will start both aux feed pump turbines.

At the same time, MS 107 will receive a close signal, and MS 106 -- excuse me, MS 107 A will receive a close signal.

MR. BEARD: So that this alignment would give you steam from the first steam generator to both turbines, both aux feed turbines?

MR. JAIN: Correct.

MR. BEARD: And it would isolate both aux feed turbines from steam generator No. 2?

MR. JAIN: Did I mention the wrong valves here. Let me.

MR. BELL: Yeah, I think you did. At first you said MS 106 would open supply No. 1 turbine, and 107 A would open supply No. 2 turbine.

MR. JAIN: Correct.

MR. BELL: You said that first. But in -- and I hope that is right, because that is how I understood it, and 107 will close, and 106 A will receive a close signal.

MR. JAIN: Correct.

MR. BELL: All right. It is normally shut anyhow.

MR. JAIN: Yes. But it will receive a close signal.

MR. BELL: All right. Now I am squared away. Thank you.

MR. HELLE: Now, is that all correct with the single failure that has been postulated?

MR. BEARD: Now, what will happen with the initial signal that says one of the steam generators is bad?

MR. JAIN: Okay. 3870 is going to open. 608 is going to receive an open signal, although it is open.

MR. BEARD: Wait a minute. This is where the crux of the question comes in.

Initially, will the logic send an open signal to 608 or a close signal? In the first instant?

MR. JAIN: If you only had low pressure condition in No. 2 generator, 608 would receive an open signal.

MR. BEARD: I believe that is not -- let me say that differently. My understanding of the system design does not agree with that.

My understanding is that there is a one out of four logic, and there is also one that says -- well, my

understanding is different.

I thought that 608 would get a close signal.

MR. JAIN: No. 2 low pressure?

MR. BEARD: For the case I hypothesized.

MR. ROSSI: Was No. 2 had low steam line pressure. That was what you hypothesized. Do you still believe 608 gets a closed signal?

MR. JAIN: With nothing happening on No. 1?

MR. BEARD: That is what I want to talk about.

MR. JAIN: I believe it would receive an open signal. We could verify that with the drawings.

MR. BEARD: That, I think, is very important. Like I said, I think we need to let you look at it and see, because if the situation turns out that initially 608 and/or 599 get a close signal, and then subsequently they get an open signal -- one of them would get an open signal, then the scenario might be quite different from a different scenario.

I like that profound statement, that if it is different, it is different.

MR. ROSSI: Even aside from the fact that 608 may not go closed if I have low steam line pressure on the steam generator No. 2, there is another question and that is is there not steam line break location which early in the transient would result in low steam line pressure to both

steam generators?

MR. JAIN: Yes.

MR. ROSSI: From which 608 and 599 were both closed, and then one of those two has to open.

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MR. BEARD: I guess that's really where I am coming from.

MR. ROSSI: And that's the question that we have asked a couple of times. I guess our understanding at this point in time is still that there is a steam line break location somewhere in the piping gear where both 608 and 599 will get closed signals because both steam generators will have low pressure.

And then one of those steam generators will recover in pressure and either 608 or 599 at that point is expected to be open.

MR. JAIN: Correct.

MR. BEARD: And that's where I'm coming from.

MR. ROSSI: And that's the case that I think we are concerned about. And right now I guess we don't understand -- at least, I don't understand -- whether -- how you meet the single failure criterion for that case.

MR. JAIN: Oh. Is the question that do we or do we not send an open signal; or, is the question how do we meet the single failure if the valve fails to open?

MR. BEARD: Well, I'm -- let me break it up into little parts. I think Ernie has provided a good clarification of where I'm coming from. And I probably should have included that in the hypothesis, because the break location that I'm concerned about I think will cause both the generators

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to initially go low. And that was the basis why I was asking about what's the immediate response for the steam feed rupture control system, because I think that because the initial low pressure, 608 and 599, will go low, or go closed.

MR. JAIN: Uh-huh.

MR. BEARD: Okay. And then the pressure on the good steam generator will recover and with that physical scenario and the single failure that we were talking about, I would like to understand how we get aux feedwater into the good generator.

MR. JAIN: Okay.

MR. BEARD: And the central point obviously is what happens in this Valve 608.

MR. JAIN: Yeah. Okay. The first part of that is that -- and I guess I have to verify that further is that it does receive an open signal. That's the first part. Now --

MR. BEARD: But don't forget that the crux of the concern is that 608 initially would get a closed signal and then subsequently get an open signal.

MR. JAIN: Correct.

MR. BEARD: So, if you want to verify something, I would think it might be, does it really get a closed signal initially.

MR. ROSSI: Yeah. I think that's a very important

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point that ought to be checked, because we've been told I think in a couple of earlier meetings that that is the case, there is steam line break location where you will get closed signals on both 608 and 599. And one or the other is going to be expected to be open.

And if that understanding is correct, we ought to hear arguments as to why it's incorrect. Because that's what we believe --

MR. JAIN: Yeah. I don't think anybody here is saying that's incorrect.

MR.ROSSI: -- right now. Okay.

MR. BEARD: No. But I think what I do hear is that you want to check it out.

MR. JAIN: I do want to check out the question that you were asking, or you were suggesting, that was not correct, that if the valve does get an open signal on the low pressure condition on the opposite generator.

MR. BEARD: Well, let me state the question again. When you were going through the scenario of what happens in response to the low pressure condition that was postulated you went through the steam side of the valves and said what they would do.

Then you went to the water side valves and you said that 3870 would get an open signal, and then you said that 608 would get an open signal.

MR. JAIN: Right.

MR. BEARD: At that time, I stopped --

MR. JAIN: Correct.

MR. BEARD: -- and said: No, my understanding is -- and I will inject -- for certain break locations that 608 will initially get a closed signal and then subsequently get an open signal.

MR. JAIN: I agree with you. I was going through a mechanistic steam line break where only Number 2 is going back and nothing else is happening to Number 1.

In that case, AF-608, assuming it never went closed, would have received an open signal.

MR. BEARD: Well, the case that I would like to hypothesize is the one where because of the break location both generators initially depressurize and then the good one would repressurize --

MR. JAIN: Uh-huh.

MR. BEARD: But if you agree, why don't we just continue with the discussion and say that 608 initially gets a closed signal. I believe that you already said that 3870 gets an open signal.

MR. JAIN: We are paraphrasing here that both generators, at least for awhile, are going below 600 psi which is the set point. Then I would have to change some of the valve lineup on the other side, too.

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MR. BEARD: Okay.

MR. JAIN: Do you want to do that?

MR. BEARD: Sure. Whatever you think -- I'm trying to understand how the system is designed and works.

MR. JAIN: It's a complex kind of scenario and lots of valves have to move from this position to that and then re-position once the pressure recovers.

MR. BEARD: And I think some of these valves that have to move from one position to another also failed during this event we are looking into, so that's important.

MR. JAIN: Okay. Let's go back then and say that you have a break in the Number 2 line which depressurizes both generators for awhile. Let's just talk that for awhile.

In that case, let's see -- all the valves on the steam inlet side to the turbine would receive a closed signal. And that's 106, 107, 106 A, 107-A. All four will receive a closed signal. The MSIVs will be closed, the feedwater line will be isolated, the main feedwater line.

On the discharge, 3869, 3870, 3871, 3872 will all be closed. 599, 608, they will be closed. Now, this is assuming an instantaneous -- a low pressure condition which occurs at the same instant in both generators. Okay.

Once, let's say Number 1 recovers back to 600 psig within -- or, say half a minute, that will tell the SFRCS that it has got a good generator which is Number 1. What that

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will do is start --

MR. STALTER: Where is your postulated break that is causing this low pressure in both steam generators?

MR. ROSSI: Well, I will tell you one that I think does right now, and that's the one down near the turbine --

MR. STALTER: Okay. Now, if you are doing that, as soon as you close the MSIVs we recover pressure in both steam generators, not just one.

So, you were postulating only one recovery but as soon as you close the MSIVs both would recover, thus your postulated break location.

MR. BEARD: What about if it's an upstream break? Well, let me back up and tell you where we are coming from.

The first day we were here, Bill O'Connor explained how the system worked to us. And he said the way to understand it is to postulate a break at a certain location and then see how the system responds.

MR. STALTER: Right.

MR. BEARD: And the example he picked, I believe, was an upstream break which resulted in one steam generator with a break in it. Both steam generators, he said, initially depressurized; then, subsequent to the closure of the MSIV the good one would repressurize but the bad one would remain low pressure.

That's what we were told.

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MR. ROSSI: Yeah, let's take a break at the outlet of one, of the one steam generators at full power. Okay.

MR. BEARD: So, what we are really saying is an upstream break on Number 2.

MR. ROSSI: Yeah.

MR. JAIN: Upstream on the MSIV.

MR. STALTER: Upstream on the MSIV.

MR. ROSSI: Yeah, on Number 2 and I'm at full power. So the turbine is still at power.

MR. BEARD: Because for the upstream break, Number 2 steam generator will not recover, correct?

MR. STALTER: That's correct.

MR. BEARD: Okay.

MR. CHOULES: I'm not sure what would happen if this would depressurize the turbine.

MR. ROSSI: I had thought, J.T., that you had checked the FSAR yesterday on what is shown in there for one of the breaks, and didn't you find one where it went down to 250? I mean, that's the easiest thing if there is one in the FSAR tnat shows both steam generators going low on pressure. Then, you know, that's --

MR. BEARD: I believe that in your Chapter 15 analysis, Section 15.4, there is a postulated main steam line break that causes both steam generators to go very low in

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pressure, far below the 600 pound set points, something on the order of 250 pounds and then I think that maybe one of them recovers and the other one does not.

And that's the kind of situation that we are trying to hypothesize here. In other words, we -- do you understand where we are coming from?

MR. JAIN: Correct.

MR. STALTER: Okay.

MR. CHOULES: It seems to me to get the break you are talking about it has got to be downstream the MSIVs.

MR. ROSSI: No. I think the one upstream of the MSIVs where the turbine -- you know, if you have a break upstream of the MSIV in one steam generator then you lose all the flow to the turbine from that one --

MR. JAIN: And you also have the MRVs that --

MR. ROSSI: Then, the other steam generator I believe tries to keep the turbine load up --

MR. STALTER: Right.

MR. ROSSI: -- for a number of seconds until the trip signal is going.

MR. BEARD: Yeah. This is the way Mr. O'Connor explained it to us, and this is why we are trying to understand that situation better.

MR. ROSSI: I think somebody has gone to get the FSAR.

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MR. BEARD: Okay.

MR. JAIN: So, we are talking about an instantaneous low pressure condition occurring at the same time in both generators; nothing feeds nothing. Everything is isolated unless the pressure recovers.

Let's say pressure recovers in Number 1 generator, okay, when the pressure recovers in Number 1 generator it is going to tell thes FARCE that actuation of Channel 1 and actuation of Channel 2 on Number 1 generator are okay, they aren't tripped on low pressure anymore. You've got two actuation channels on that generator telling thes FARCE that I'm okay.

What that's going to do is, if you want to go through the valves here --

MR. BEARD: Yeah, this is the crucial part of the scenario.

MR. JAIN: Okay. It is going to -- actuation of Channel 1 is going to open MS-106 and actuation of Channel 2 is going to open MS-107-A which is going to start aux feed from Turbine Number 1 as well as Number 2.

On the feedwater side, actuation of Channel 1 is going to open AF-3870 and actuation of Channel 2 is going to open AF-3871.

MR. BEARD: Okay.

MR. JAIN: So, you've got two paths leading down to

AF-608.

MR. BEARD: Right. Now, what happens on 608 with the hypothesized single failure that I described?

MR. JAIN: The hypothesized single failure of 301,303.

MR. BEARD: The reason I picked those is obviously that's the output of the frequent system that tells 608 to reopen.

MR. JAIN: Yeah. I needed to -- I think you are right. I will have to go look at the drawing. I think that --

MR. BEARD: Well, let me refer you back to the cartoon that I've got on the simplified low pressure. And granted this is subject to verification.

But, if you will notice 301 which is the counterpart to 302, vice-versa, my information is that that's the one that provides the signal to open valve 608. And if that's taken as a failure, 608 never reopens.

MR. JAIN: I believe there are two signals going to it, and that's why we have two starters on that valve.

MR. BEARD: Okay. That's the part we need to understand.

MR. JAIN: We had to put two starters on that basically for single failure restoration, and that's why I want to look at the --

MR. ROSSI: Is it worthwhile to take a recess now

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while you people talk a few minutes on this?

MR. JAIN: That's the problem.

MR. BEARD: We think that's an area we are interested in. We are interested in the MSIVs, a valve like 608 or 599. And I think we also asked about one other actuated piece of equipment.

But I think you understand what we are trying to learn.

MR. JAIN: Yeah.

MR. BEARD: Ernie, at this point I think we have described the cartoons that I sketched up here, and I think we have probably gone as far as we ought to go -- could go productively as a group -- and I think they understand things.

MR. ROSSI: Okay. So, what I would suggest is that we meet again on this after you have had a chance to look at what we've said and look at his drawings. And maybe we can do that later this afternoon and try to hold that to just telling us, you know, what you found and whether there is any misunderstanding on our part on what the system does.

MR. BEARD: Now, there was another piece of this meeting where we were going to look at some actuated equipment, and maybe the best thing to do in terms of efficiency is if you have those drawings that we can have -- and I mean copies that we can keep, I don't want to get into that game again, but maybe while you are doing your checking we could be

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looking at that and doing a little more of our own thinking. That way, when we do get to that discussion it will go very quickly.

MR. JAIN: Sounds good.

MR. BEARD: And, then I guess --

MR. GRIME: The action plan as well.

MR. BEARD: Did we want to comment on the action plan?

MR. ROSSI: I think we ought to discuss that.

MR. BEARD: Why don't we defer that until we reconvene?

MR. ROSSI: Yeah. Now, I think we are to a point where we can finish this meeting and then we can talk about our schedule and what happens next.

So, let's complete this one. We will go off the record now.

MR. BEARD: Okay.

(The meeting was recessed at 11:00 a.m., to reconvene at 3:10 p.m., this same day.)

(3:10 p.m.)

MR. ROSSI: We are on the record now.

MR. BEARD: The stenographer said he is going to carry this as a continuation of this morning's meeting, which is really -- apply to the questions we were raising in this morning meeting on the steam feed rupture control system.

MR. ROSSI: Okay, that is fine.

MR. BEARD: So administratively, it will be bound as part of that meeting.

MR. ROSSI: Okay. The other meetings are being bound separately, is that correct?

REPORTER: (Nods affirmatively.)

MR. ROSSI: Okay, that is good.

MR. BEARD: Okay. I guess the question that was on the table was that we had postulated a scenario wherein the isolation valve between the steam generators and the auxiliary feed water, AF 599608, initially were closed by the initial low pressure transient, and a steam line break accident at some location.

And then we postulated a single failure in the steam feed rupture control system, on the opposite train, on the train associated with the good steam generator, and asked the question: Would that isolation valve get a signal to reopen?

Is that a clear statement of the question?

MR. JAIN: Yes.

MR. BEARD: Okay.

MR. JAIN: Now, the answer is that we have looked at the USAR analysis, and we have found the scenario to be an actual scenario as outlined in the USAR.

But we are presently looking at why that situation is there.

MR. BEARD: Okay. Let me interrupt you for a minute.

USAR is the Updated Safety Analysis Report for the facility?

End 10.
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MR. JAIN: Correct.

MR. BEARD: Okay.

MR. JAIN: So, we don't have a specific answer as to why do we or don't we meet the single failure criteria.

MR. BEARD: Let me ask a more specific question. As far as the signals that come out of the frequent system, the steam feed rupture control system, would a signal go or not go to reopen that valve under that postulated single failure?

MR. JAIN: The signal will go for the valve to open.

MR. BEARD: It will get a signal to open?

MR. JAIN: Yes.

MR. BEARD: Even with the failure of the output relay 301?

MR. JAIN: Oh, excuse me.

MR. BEARD: With the single failure, I'm talking about.

MR. JAIN: No, it won't.

MR. BEARD: So, for certain single failures within the SFRCS, the valve would not get a signal?

MR. JAIN: Correct.

MR. STALTER: There are a number of single failures that could occur.

MR. BEARD: Right. I realize there is more than

#11-2-SueWalsh1 one that could end up in the same place.

MR. STALTER: Right. The result being that the valve would not go open if the single failure occurred.

MR. BEARD: You wouldn't get a single to open. See, there is a separate question of whether the valve itself could fail.

What I'm trying to do is for the moment look at what signals would go to the valve.

MR. STALTER: There is a signal failure you could have on the steam feedwater rupture control system that could cause it not to go open. There are failures in the steam that controls that valve which could cause it not to go open.

MR. BEARD: Okay. All right. So then I guess the answer to the question we had this morning was, yes, you could get in some undesirable situation that through some of those failure mechanisms, and the real question is is that acceptable or not acceptable.

Is that what you are saying?

MR. STALTER: That's correct.

MR. ROSSI: While we are discussing the issue, it indicated that you have also -- and we checked this morning the USAR and there is one of the figures in there that indicates the pressure in both steam generators goes down to 250 psi -- I think they are a little different -- but

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why don't -- could we state which figure it is so that we will have that in the record?

MR. JAIN: Figure 15.4.4-7 of the Davis-Besse USAR.

MR. BEARD: Okay. You said you found this as one of the scenarios in Chapter 15. Is there a paragraph or section number you could refer us to?

MR. JAIN: I think there are several paragraphs in there that --

MR. BEARD: Okay.

MR.JAIN: -- talk about the whole scenario.

MR. BEARD: Okay. Are they all in Section 15.4?

MR. JAIN: Correct.

MR.BEARD: Okay. So, I guess where we stand, Ernie, at least as I see it is there are some single failures that are undesirable. And I presume that Toledo Edison is launching an investigation into where they want to go from here or doing something; I don't know what it is.

MR. ROSSI: Well, we just want to collect the information on this.

Now, the other one, you had a question on the MSIVs. Is that one now resolved between you and Toledo Edison?

MR. BEARD: We've had some other discussions and maybe the best way to handle it is, why don't you tell us what the answer is if you know just simple, you know, without

dragging out a whole bunch of drawings and see if that agrees with what I've heard. And then we will say it's resolved.

MR. ROSSI: Okay.

MR. BEARD: If you have an answer.

MR. ROSSI: You have rechecked on the MSIV closure signals as to whether one logic channel will close both of them?

MR. JAIN: I haven't gone back to relook at the drawings. I was thinking that maybe we will sit down together and do that. We could go back and look at it separately, either way.

MR. BEARD: All right. So, I guess that question is not totally resolved.

MR. ROSSI: Okay. We were told in the previous meeting with Bill O'Connor that he also believes that one actuation channel closes both valves.

MR. JAIN: Correct.

MR. ROSSI: That either of the two actuation channels, and that's your belief also. And I think the two of you could meet off the record and just demonstrate that.

If it turns out to be something else, then we will come back and discuss it with the stenographer. But if it's just a matter of looking at the drawing, let's just leave it at that.

MR. BEARD: I think also it was suggested, Ernie,

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that maybe basically on a one-on-one situation that we could look at the two simplified logic diagrams against their logic drawings, the former ones, and discuss that off the record.

MR. ROSSI: Okay.

MR. BEARD: If there were any substantial changes, we could talk about it on the record if that were decided to be necessary.

MR. ROSSI: Okay. And those logic diagrams are part of the exhibits?

MR. BEARD: In the previous record.

MR. ROSSI: Right. Is there anything else we need to talk about here?

MR. BEARD: I think that's it. Did you remember anything else that we need to talk about?

MR. STALTER: No, we didn't.

MR. ROSSI: Okay.

MR. JAIN: When would you like to do that?

MR. ROSSI: Let's end this meeting now at this point. I think we are done with this one.

(The meeting is adjourned at 3:17 p.m., Tuesday, July 9th, 1985.)

END #11

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the UNITED STATES NUCLEAR REGULATORY COMMISSION in the matter of:

NAME OF PROCEEDING: DAVIS BESSE INCIDENT
(Interview & Meeting)

(CLOSED)

DOCKET NO.: --

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DATE: TUESDAY, JULY 9, 1985

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission.

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