

PDR

UNITED STATES NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

DOCKET NO: 50-346

DAVIS BESSE INCIDENT

(INTERVIEW & MEETING)

(CLOSED)

SFRCS Actuated Equipment and Operations.

LOCATION: OAK HARBOR, OH

PAGES: 1 thru 37

DATE: July 10, 1985

ACE-FEDERAL REPORTERS, INC.

Official Reporters
444 North Capitol Street
Washington, D.C. 20001
(202) 347-3700

8507290063 850710
PDR ADOCK 05000346
T PDR

NATIONWIDE COVERAGE

Sim -1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

- - -

WEDNESDAY, JULY 10, 1985

- - -

MEETING BETWEEN THE NRC FACT-FINDING TEAM AND TOLEDO EDISON

ON

SFRCS ACTUATED EQUIPMENT AND OPERATIONS

- - -

NRC FACT-FINDING MEMBERS PRESENT:

ERNEST ROSSI

J. T. BEARD

LARRY BELL

TOLEDO EDISON MEMBERS PRESENT:

V. MacDONALD

LARRY STALTER

SUSMIL JAIN

KENT YARGER

- - -

Sim 1-1

P R O C E E D I N G S

(9:10 a.m.)

MR. BEARD: This is another meeting of the fact-finding team with Toledo Edison for the purpose of having some technical discussions on the equipment that is actuated by the steam feed rupture control system.

The real purpose that we are trying to accomplish here is to make sure that our understanding of how the system and associated equipment work is technically accurate.

Last night, or sometime yesterday we were given copies of some drawings that related to the control schemes for -- and correct me if I am wrong on this -- the main steam isolation valve, and I believe we had control drawings for the valve MS-107, which is the steam admission valve for the No. 2 aux feedwater turbine from the No. 2 steam generator, and I believe we had some motor operated valves that included for Valve AF-608, which is the isolation valve between the No. 1 steam generator and the No. 1 and No. 2 aux feedwaters. It would isolate both.

MR. JAIN: Right.

MR. BEARD: In other words, it isolates the No. 1 steam generator from all aux feedwater.

MR. JAIN: Correct. I believe you also had a drawing for MS-106, which is a DC motor operated valve for the steam inlet to aux feed pump turbine one and generator

Sim' 1-2

No. 1.

MR. BEARD: I think we did, but I had some problem in understanding which drawings went with which valves. But we have got 106?

MR. JAIN: Yes.

MR. BEARD: Let me ask you, can you just tell me which drawing number, that is E-46-B, sheet, whatever it is, is the appropriate one for 106?

MR. JAIN: Well now, E-46-B, Sheet 54A is for MS-106.

MR. BEARD: MS-106.

MR. JAIN: And E-46-B, Sheets 46-A and 46-B ---

MR. BEARD: Are for what?

MR. JAIN: Are for MS-107 and 107-A.

MR. BEARD: 46-A and B are 107?

MR. JAIN: It really is for 106-A and 107-A.

MR. STALTER: 106-A and 107-A.

MR. BEARD: Wait a minute. I am confused again.

46-A is ---

MS. MacDONALD: 106-A.

MR. BEARD: 46-A is MS-106-A ---

MR. JAIN: And 107-A.

MR. BEARD: --- and MS-107-A. Okay. That is why I was confused because I thought 107 was on a different drawing.

So the total of all of the valves that we have got

Si 1-3 1 here would be the MSIVs, 608, 107, 106-A and 107-A?

2 MR. JAIN: And also E-46-B, Sheet 4-A and 4-B is
3 for 107.

4 MR. BEARD: That is right. 107 is Sheet 4-A and
5 B.

6 MR. JAIN: Right.

7 MR. BEARD: Now Sheet 4-C and D, that is AF-608. Is
8 it also for 599?

9 MR. JAIN: Yes. That is E-44-B.

10 MR. BEARD: E-44-B, Sheet 4-C.

11 MR. JAIN: Right.

12 MR. BEARD: And that is for both 608 and 599?

13 MR. JAIN: Correct.

14 MR. BEARD: All right. At least we know all the
15 valves that we have got the drawings for.

16 MR. JAIN: The way we normally do it here, JT, is
17 normally speaking, one drawing would show valves in what
18 loops. The one in parentheses would correspond to the second
19 loop.

20 MR. BEARD: What threw me for a loop was the 107
21 drawing. All right. At least we have a good understanding
22 of it.

23 What I have done, and I want to give you a copy
24 right now, and I want to put it on the record also, so if
25 I can ask that this be exhibit, whatever it is.

Sim 1-4

(The documents referred to (three pages of diagrams) was marked Exhibit No. 1 and submitted for the record.)

XXXXXXXXXXXX

MR. BEARD: I took the drawings for MS-107 and tried to simplify them to show only the active components, and by that I mean I tried to make it from a wiring diagram into a schematic and eliminating where the wire went from one terminal to the next terminal to the next terminal and to the next terminal. I just did not cover that in this sketch, this cartoon.

What I would like to do is give you a copy of that and use that as the basis for the discussion because if the simple schematics are correct, then I understand how this valve works.

Do you see what I am trying to do?

MR. JAIN: Yes.

MR. BEARD: If that is okay with you, that is what I would like to do.

Now what I have done is I have done that for the 107 valve and I have done it for the 608 valve, but let's hold that one for a moment.

MR. JAIN: Okay.

MR. BEARD: There is a copy we can talk from and I have a copy.

Sim 1-5

1 Now on the 107 valve I understand that that
2 corresponds to drawings E-46-B, Sheet 4-A and 4-B; is that
3 correct?

4 MR. JAIN: Correct. The first one you have on top
5 here, the first one is marked 4-B.

6 MR. BEARD: That is right. The way I happened to
7 put it is page 4-B had the details that in my mind seemed to
8 come up front rather than at the end, but six of one and half
9 a dozen of the other.

10 Now 4-B, if we start with that one, as I understand
11 it, 4-B has basically three parts. Now let me see if I can
12 tell you my part, and I am referring to my sketch here. So
13 if I am wrong, you can tell me, but the first part on the
14 sketch is basically the left half of the diagram.

15 As I understand it, there is a contact to limit
16 switch, an AOS contact, which means that as soon as the valve
17 is fully opened, I will then energize a 25 second time delay
18 relay, which is 33X.

19 MR. JAIN: Right.

20 MR. BEARD: Now once that is energized, it will then
21 apply power to four pressure switches, PS-107, A, B, C and D.

22 MR. JAIN: Correct.

23 MR. BEARD: And then those pressure switches would
24 close if I have low steam pressure, and I assume this is on
25 the inlet side of the turbine.

Sim 1-6

1 MR. JAIN: Correct.

2 MR. BEARD: Okay. If the A and C contacts flows,
3 that would cause relays R-1 and R-2 to pull in. If the B and
4 D switches close, that would cause R-3 and R-4 to pull in,
5 and then there is a seal-in circuit that is connected up
6 through a reset switch for the relays R-1, 2, 3 and 4.

7 MR. JAIN: Right.

8 MR. STALTER: Yes, that is right.

9 MR. BEARD: So all of that has to do with low steam
10 pressure on the inlet to the turbine?

11 MR. JAIN: Correct.

12 MR. STALTER: Right.

13 MR. BEARD: Now that is I guess functionally the
14 first half of the drawing.

15 The second half is a very simple one which has a
16 pressure switch low limit switch labeled PSL-4931-A, which I
17 understand opens if we have low suction pressure on the
18 pump, the aux feed pump.

19 MR. STALTER: That is low suction pressure.

20 MR. BEARD: Low suction pressure, and when that
21 opens that causes a two-and-a-half second time delay relay
22 to drop out, and apparently it is delay on opening. In other
23 words, the time delay would be such that the relay would
24 change states two-and-a-half seconds after the low suction
25 pressure signal was detected. That is my understanding.

Sim 1-7

1 MR. JAIN: That is correct.

2 MR. STALTER: Correct.

3 MR. BEARD: Okay. If that is correct, then I guess
4 I really only had one question. This low suction pressure
5 switch, which pressure switch is that on the PNID type space?

6 MR. JAIN: That will be on MOO-6B on the suction
7 of the aux feed pump.

8 MR. YARGER: They are reflected in the upper right.

9 MR. BEARD: But aren't there a number of low suction
10 switches in each suction line?

11 MR. JAIN: There are two sets of low pressure switches.
12 One will be upstream of the isolation valve from the CST,
13 the condensate storage tank, and another set is downstream
14 of the isolation valve from the CST.

15 Now these here are the ones downstream of the
16 isolation valve CST.

17 MR. BEARD: All right. Let me see if I get this
18 right. I have got a valve that draws suction from the
19 condensate storage tank.

20 MR. JAIN: Correct.

21 MR. BEARD: And I have got a motor operated valve
22 and it comes in, right?

23 MR. JAIN: Right.

24 MR. BEARD: And then there is another motor operated
25 valve from a different source.

Sim 1-8

1 MR. JAIN: From service water.

2 MR. BEARD: All right, and it has a parallel path.

3 Now how do these two lines join together? Aren't there
4 strainers and DPs and things like that?

5 MR. JAIN: Yes. There is a strainer in the line.

6 MR. BEARD: Is the strainer common?

7 MR. JAIN: After the service water.

8 MR. BEARD: Right here?

9 MR. JAIN: Well, after the lines join together ---

10 MR. BEARD: After they join together.

11 MR. JAIN: --- there is a strainer before it goes
12 to the aux feed pump.

13 MR. BEARD: Now this is the aux feed pump suction?

14 MR. JAIN: Correct.

15 MR. BEARD: Now where are these DP switches we are
16 talking about, or pressure switches?

17 MR. JAIN: There is a set of low pressure switches
18 right here which essentially sends a break in the line from
19 the CST or a low level.

20 MR. BEARD: That is upstream of the isolation valve?

21 MR. JAIN: Correct. Once that senses low pressure,
22 you transfer suction to service water, you close this valve
23 and open that valve and you get water.

24 MR. BEARD: Right.

25 MR. JAIN: The ones that sense the suction pressure

Si 1-9 1 at the pump, I believe they are downstream of the strainer.

2 MR. STALTER: They are downstream of the strainer.

3 MR. YARGER: Correct.

4 MR. BEARD: So here is where some pressure switches
5 are.

6 MR. STALTER: Right.

7 MR. JAIN: Those are the ones that are being torqued
8 here.

9 MR. BEARD: So this would correspond to this,
10 PSL-4931-A. Now I assume that there is probably more than that
11 one in that location, but that is where that one is.

12 MR. JAIN: Right.

13 MR. BEARD: If I lose pressure from the condensate
14 storage tank, or at least sense that I do, then I am going
15 to start these valves cycling, correct?

16 MR. JAIN: Correct.

17 MR. BEARD: Now to what extent will that low pressure
18 be sensed by the one that is right at the suction downstream
19 of the strainer?

20 MR. JAIN: Okay. The ones from the CST are at
21 2 psi.

22 MR. BEARD: 2 psi.

23 MR. JAIN: And the ones here near the pump are set
24 at 1 psi.

25 MR. BEARD: Okay. So the one right at the suction,

Sim 1-10 1 which is on this cartoon, is really the more sensitive, if
2 you will, in terms of setting. It will go at a lower pressure.

3 MR. STALTER: At a lower pressure.

4 MR. BEARD: Well, I guess you would have to lose
5 suction worse is really what that amounts to, doesn't it?

6 MR. JAIN: Right.

7 MR. STALTER: Yes.

8 MR. BEARD: You would have to have a worse loss of
9 suction.

10 MR. JAIN: Yes, and what it essentially does, this
11 pressure switch right at the suction, it essentially trips
12 the turbine by closing the steam inlet valve to it.

13 MR. BEARD: I understand that. Now what I am trying
14 to understand though is can I get, you know, part of the event
15 was an inadvertent switchover.

16 MR. JAIN: Correct.

17 MR. BEARD: If I sense low pressure on the conden-
18 sate storage line that has gotten down to 2 psi, and it can
19 be even spurious, but assume for a moment the pressure really
20 did go low, what is the likelihood or probability that I will
21 also see it on this one psi switch right at the suction, the
22 common point and therefore cause the turbine to get tripped?

23 MR. JAIN: It really depends on so many things that
24 may have been happening at the time if it is a genuine large
25 suction pressure dip, it may be sensed by this turbine switch

Sim 1-11

1 here. However there is a time delay.

2 MR. BEARD: That is what I was trying to get to.
3 Does two-and-a-half seconds cover that? That I guess is
4 based on the experience, isn't it?

5 MR. JAIN: Yes. There is nothing analytical there.
6 It is basically some number.

7 MR. BEARD: I think the three dollar word is it is
8 empirically determined.

9 MR. JAIN: Right.

10 MR. BEARD: All right. That takes care of I think
11 the special features on the first page here that I tried to
12 talk to, and you are saying this agrees with your understanding?

13 MR. JAIN: Correct. Could you leave the option open
14 to look at it and if we find anything to call you?

15 MR. BEARD: Oh, absolutely. I only did these so that
16 I could try to convince myself did I understand it or not, and
17 the main purpose is to find out whether my understanding is
18 right or wrong. So take what time you need.

19 MR. JAIN: Okay.

20 end Sim
21 Sue fols

21

22

23

24

25

#2-1-SueWalsh1

2 MR. BEARD: Okay. Now, the second page related
3 to MS-107 is more, as you noted earlier, related to Sheet
4 4-A, I guess it is. And what I did in the cartoon was again
5 to convert from a wiring diagram to a simplified schematic.

6 And I only included the automatic opening loop
7 and the automatic closing loop. I did not include any of
8 the indicator circuits, and I did not include any of the
9 manual operation circuits, because I wasn't that interested
10 in those. All right.

11 Now, as you are looking over, would it be helpful
12 for me to go through this? Or, how would you prefer to do
13 it?

14 MR. JAIN: I guess the manual --

15 MR. BEARD: I'm not interested in manual right
16 now.

17 MR. STALTER: Oh, okay.

18 MR. BEARD: Just the auto open and auto close.
19 Now, recognize that it was late last night when I did this.
20 And I make mistakes as much as anybody. So, if there is
21 an error that's what we want to find.

22 (Pause.)

23 Okay. Now, with your having taken a moment to
24 look at the cartoon and the drawings, what did you find
25 out?

MR. JAIN: You just had a small typo here on the

#2-2-SueWalsh torque switch on the right side. It should be 33/TC versus
2 TO.

3 MR. BEARD: This is in the auto close circuit?

4 MR. JAIN: Correct.

5 MR. BEARD: TC?

6 MR. JAIN: Right.

7 MR. STALTER: 33 over TC.

8 MR. BEARD: Thank you.

9 MR. JAIN: And then --

10 MR. BEARD: I had the words right. I just left
11 the letter off, didn't I? Yeah.

12 MR. STALTER: You left out the sealing circuit
13 on the 42 over C. Do you want to --

14 MR. BEARD: Is this -- are we talking on the
15 closing side?

16 MR. STALTER: Yeah, the closing side.

17 MR. BEARD: There is a seal in there?

18 MR. STALTER: Yes.

19 MR. JAIN: Right. 42AC.

20 MR. BEARD: All right. My understanding was that
21 did not affect automatic at all?

22 MR. STALTER: Well, it seals in. When it closes
23 up it seals in.

24 MR. BEARD: Well, let me ask you. Do you see the
25 line that I was tracing down through?

#2-3-SueWalsh

MR. STALTER: Yeah. It goes through the stop --

2 MR. BEARD: Wait a minute. See, what I was tracing
3 down was through this way. Yeah. Okay. And it looked like
4 that this sealed in around here but didn't around here.

5 MR. STALTER: It seals in. As soon as this picks
6 up it seals it in through here.

7 MR. BEARD: Oh, I see. So, that what we need to
8 show on here is I guess a seal in from this point --

9 MR. STALTER: From right here to here.

10 MR. BEARD: Right. And the only thing that is in
11 there that is of any significance is the stop and the open
12 switch, right? So, if I come across here there is your stop
13 and then there is an open contact, the control switch I guess
14 they call it.

15 MR. STALTER: Right.

16 MR. BEARD: All right. Now, does that make it
17 accurate?

18 MR. STALTER: Yeah. 42A over C.

19 MR. BEARD: Wait a minute. I copied that the wrong --

20 MR. STALTER: You've got it on the wrong one.

21 MR. BEARD: This is on the closed side, not the
22 open side.

23 MR. STALTER: You've got it over here on the open
24 side.

25 MR. BEARD: This one I missed, because it went up

#2-4-SueWalsh the wrong place. If it had tied back here, I would have picked
2 it up.

3 MR. STALTER: Yeah.

4 MR. BEARD: But this is not the open switch; it's
5 the closed.

6 MR. STALTER: Right here.

7 MR. BEARD: Right there, right?

8 MR. STALTER: No, you've got it --

9 MR. BEARD: Wait a minute.

10 MR. STALTER: This one here you want.

11 MR. BEARD: You are right. I'm sorry. 42A over C.

12 MR. STALTER: Right.

13 MR. BEARD: And the closed switch is really the
14 parallel --

15 MR. STALTER: It's in parallel. Do you want to leave
16 that out?

17 MR. BEARD: Yeah. So, the only thing that would stop
18 it is the stop switch itself?

19 MR. STALTER: Right.

20 MR. BEARD: Okay. Very good. So we are all in
21 agreement with this typo, if you could call it that, and the
22 seal in circuit which I have now added, that we are right?

23 MR. JAIN: Okay.

24 MR. BEARD: Okay. Now, let me then discuss it. If
25 I neglect the limit switches at the top and the torque switches

#2-5-SueWalsh

and their by-pass contacts, it seems like that to open the valve what I have to do is not have any low suction at the pressure, or low pressure at the suction. I have to have appropriate steam pressure coming into the valve -- well, initially I don't.

MR. JAIN: Twenty-five seconds.

MR. BEARD: Right. Because the time doesn't start until after I get it open.

MR. JAIN: Correct.

MR. BEARD: So that really doesn't have a play on the initial opening in the valve. Okay.

And, then I get basically two safety-related inputs and those are both from actuation of Channel 2 of the SFRCS.

MR. JAIN: That's correct.

MR. BEARD: K-302 and K-304. My understanding is that those contacts would be activated in the case of low level on steam generator Number 1 or Number 2, or if I have low pressure in steam generator Number 1 but not low pressure in steam generator Number 2.

MR. JAIN: Correct.

MR. BEARD: And the two train -- logic channels, if you will, Number 2 which is K-302 and Number 4 which is K-304, are configured in an And circuit so that both of those have to be tripped in order to get this valve to

#2-6-SueWalsh 1 open.

2 MR. JAIN: Correct.

3 MR. BEARD: And that's where this And is in the
4 earlier --

5 MR. JAIN: Correct.

6 MR. BEARD: -- cartoons that we have talked about,
7 and this is the field wiring.

8 MR. JAIN: Correct.

9 MR. BEARD: Okay. So, that is the And configura-
10 tion. And then you get a seal in on that once you pull it
11 all together. Okay.

12 Now, on the closing side, here again you have an
13 And configuration for the safety-related inputs. They are
14 both from actuation of Channel Number 2, logics 2 and 4
15 again. And as I understand it, the only thing that would
16 cause those two to close would be low pressure in steam
17 generator Number 2, because they come from K-202 and L-204.

18 MR. JAIN: That's correct.

19 MR. BEARD: Okay. I think I understand the
20 circuit.

21 Now, let's go from here and say during the event,
22 MS-107, now that we understand how this valve control scheme
23 works; all right, during the event -- let me refer back to
24 the sequence of events so I don't screw this up.

25 I don't think I brought my copy with me. Do we

#2-7-SueWalsh 1 have a copy of the sequence of events handy?

2 MS. MAC DONALD: Here they are.

3 MR. BEARD: All right. Good. All I want to do is
4 refer to it for a minute.

5 Okay. Referring to the sequence of events -- and
6 the one I'm referring to is the one the Team put out, Revision
7 2 -- the first thing that happened that I understand would
8 have involved this would have been the start signals for the
9 aux feedwater, be it for level or pressure, because both of
10 them would have wanted to start one or the other of the
11 pumps, aux feed pumps.

12 Now, the first thing that happens is I get at
13 014104 an SFRCS actuation of Channel 1, which would be
14 associated with aux feed train Number 1. And this is not
15 in that train. So, nothing would have happened for 107 at
16 that point, correct?

17 MR. JAIN: Is that the one low level?

18 MR. BEARD: That was the low level, right.

19 MR. JAIN: Okay.

20 MR. BEARD: That was the low level on Channel 1.

21 And the sequence of events also says this actuation causes
22 aux feed pump Number 1 to be aligned to feed steam generator
23 Number 1.

24 MR. JAIN: Correct.

25 MR. BEARD: So that would not be related to this

#2-8-SueWalsh 1

valve?

2

MR. JAIN: Not to MS-107.

3

MR. BEARD: Right. Now, the second actuation was

4

the manual actuation on low pressure. So, now on manual

5

actuation on low pressure, referring back to what this valve

6

would have done, it looks like that it would have gotten --

7

here is where I get questions.

8

MR. JAIN: Yeah.

9

MR. BEARD: Whether I would have gotten both of

10

these auto close signals or one of them. I don't know.

11

MR. JAIN: The 202s?

12

MR. BEARD: 202 and 204. If you pushed the top

13

right button in the column of the two fives.

14

MR. JAIN: Okay. Pushing the top right button in

15

that column tells the SFRCS that it has got a Number 2

16

generator that is bad on actuation Channel 2.

17

MR. BEARD: That would, therefore, be logic

18

Channels 2 and 4?

19

MR. JAIN: Correct.

20

MR. BEARD: So manual goes to both?

21

MR. JAIN: Correct. And that would have told this

22

valve to go closed.

23

MR. BEARD: Okay. So, the first thing is that --

24

I will call it the inadvertent actuation causes MS-107 to

25

close.

#2-9-SueWalsh 1

MR. JAIN: Correct.

2

MR. BEARD: Okay.

3

MR. JAIN: At the same time -- you may not want to
4 discuss it right now -- but MS-106 would have got a closed
5 signal, too.

6

MR. BEARD: Yeah. Okay. Now, the time on that was
7 014108. Okay.

8

Now, the next thing that would have happened,
9 as I understand it, would have been some five seconds later
10 at 014113 -- now, this is when we got that second low level
11 actuation --

12

MR. JAIN: Uh-huh.

13

MR. BEARD: -- and this was Channel 2, actuation
14 Channel 2.

15

MR. JAIN: Uh-huh.

16

MR. BEARD: So, now at this one I get, let's see,
17 Channel 2 low level. Now, on low level, does that then tell
18 K-302 and K-304 that they are to trip and, therefore, I would
19 now try to open the valve?

20

MR. JAIN: No. It wouldn't have happened because --

21

MR. BEARD: Now, neglecting the interlock about
22 full stroke.

23

MR. JAIN: Yeah.

24

MR. BEARD: Okay.

25

MR. JAIN: Yeah. I'm assuming here that he had not

#2-10-SueWalsh

yet reset the spurious manual actuation.

2

MR. BEARD: He had not reset yet.

3

MR. JAIN: So, the low pressure on Number 2

4

generator, on actuation Channel 2 was still in place. That

5

would have overridden in the SFRCS logic. It would have pre-

6

vented the 302 signal to come on.

7

MR. BEARD: I hear what you are saying, and I

8

think you are right. I hope you are right.

9

But what I'm trying to find is the drawing that

10

shows where that takes place.

11

MR. JAIN: That would be kind of shown on E-18.

12

That's the logic drawing.

13

MR. BEARD: E-18. That's the one you've got

14

here?

15

MR. JAIN: Yeah. And if you want to go in detail

16

that would be Instrument and Control analog for the logic

17

drawings which shows all the inputs and And gates and every-

18

thing.

19

Those are CCC drawings.

end #2
JoeWal flws

20

21

22

23

24

25

1 MR. BEARD: All right. I need some CCC
2 drawings.

3 But -- let me ask it this way. What you are
4 saying is the contacts on the open circuit that are on this
5 cartoon that I developed last night would not be tripped
6 because of some intermediate relays and logics that, in
7 effect, implement the prioritization of low pressure
8 actuation over low level actuation?

9 MR. JAIN: That is correct. The philosophy
10 of the SFRCS is that the prioritization of low pressure
11 overriding is conducted all within the SFRCS logic.

12 MR. BEARD: All within the SFRCS logic. So,
13 it would all be on E-18 then?

14 MR. JAIN: E-18 is oversimplified logic
15 diagram.

16 MR. BEARD: E-18 is a simple version.

17 MR. JAIN: We have another set of CCC drawings
18 which show And Gates, and And Gates and amplifiers, and
19 all those things.

20 MR. BEARD: All right. Low pressure priority --
21 so, no action for 107, that is what you are saying?

22 MR. JAIN: Correct.

23 MR. BEARD: And this short story version is
24 K-302-C and 304-C do not trip?

25 MR. JAIN: Correct.

1 MR. BEARD: Okay. Do you remember offhand
2 whether we ever got a copy of those CCC drawings, consolidated
3 control drawings that you are talking about?

4 MR. JAIN: Whether the NRC got it?

5 MR. BEARD: Yeah.

6 MR. JAIN: I don't believe so.

7 MR. BEARD: I know we got some consolidated
8 drawings, but I don't know if we got the one that you are
9 referring to.

10 MR. STALTER: Recently? Since this event?

11 MR. BEARD: Since the event, yes.

12 MR. JAIN: We did send you some CCC drawings.

13 MR. YARGER: The only drawing that I provided
14 was the steam generator low instrumentation.

15 MR. BEARD : Yes, that is right. I remember
16 seeing that one.

17 How much trouble would it be to get a copy of
18 that? Before I say do it, I am trying to say what would be
19 the impact of asking you?

20 MR. YARGER: No problem.

21 MR. BEARD: Why don't we do it this way, then.
22 If it is okay with you three -- you four, if we can just take
23 your word for it that that is the way it is, and then go on
24 with the understanding you would get us a drawing, say,
25 some time today? Is that reasonable?

1 MR. JAIN: If you wish, I could also show
2 it to you on E-18.

3 MR. BEARD: It is on E-18? Yes, if it is on
4 E-18, I would like to understand it there, but I would still
5 like to get the other drawing.

6 Why don't we come back and do that?

7 MR. JAIN: Okay.

8 MR. BEARD: Okay. Now, that takes us through
9 the first three actuations. In other words, there was a
10 low level on Channel 1. There was the manual pressure,
11 and then there was a low level on Channel 2.

12 MR. JAIN: Correct.

13 MR. BEARD: Okay. Now, I think the next thing
14 that happens is we get an overspeed trip on the two aux
15 feed pumps, or pump turbines, and I don't see anything in
16 the control circuits that would cause this to be changed,
17 do you?

18 MR. JAIN: No.

19 MR. BEARD: Okay. So, the next thing that
20 is really relevant would be the reset of that low pressure
21 tank. Now, that would be 0142, and this is the low pressure
22 is reset.

23 Now, I assume if that takes place, now the
24 priority that we were just discussing is cancelled, and now
25 we would get what I thought we might get earlier.

1 MR. JAIN: Yes.

2 MR. BEARD: Okay. So, K 302C and K 304C tripped,
3 okay? Now, we have been 52 seconds into this game, so the
4 valve has stroked, has it not, or do you know roughly what
5 the stroke time is on this valve?

6 MR. JAIN: It is about 30 seconds.

7 MR. BEARD: 30 second stroke? It seems like
8 I remember a 25 number, but I get these valves all mixed up,
9 but the point is it has had enough time to complete its
10 stroke.

11 MR. JAIN: Right.

12 MR. BEARD: Okay. So, now at this point the
13 valve is closed, and we now get the signal to open it over
14 here, and I guess basically it opens, and that is it, right?

15 MR. JAIN: Right.

16 MR. BEARD: So 107 opens -- or reopens. Now,
17 is there anything else that should have happened to that
18 valve?

19 MR. JAIN: We didn't have any indication of
20 suction pressure or low steam pressure.

21 MR. BEARD: To my knowledge, there was no
22 information on low pressure to the aux feed turbines. There
23 was some indication later that there was low pressure on the
24 pump suction.

25 MR. JAIN: I think it was No. 1.

1 MR. BEARD: Yeah, I believe you are right. That
2 was all related to No. 1.

3 Okay. So, MS 107 would not be affected?

4 MR. JAIN: Right.

5 REPORTER: Mr. Jain, could you keep your voice
6 up, please?

7 MR. JAIN: Okay, I will do that.

8 MR. BEARD: Could we put the microphone closer?
9 Would that help.

10 REPORTER: That is fine, sir. It is just that
11 he lowered his voice, that is all.

12 MR. BEARD: Okay. I think that takes care of
13 that one, don't you?

14 MR. JAIN: Yeah, I think so.

15 MR. BEARD: Let me ask you, is that a pretty
16 complete rundown of how this valve works, and how it was involved
17 in the event?

18 MR. JAIN: The only thing that we may have -- I am
19 not saying we missed it, but there is another feature to MS
20 106 and 107, in that they are interlocked with dedicated
21 drop line valves. DH-11 and 12.

22 The purpose of that interlock is that once you are
23 going to shutdown condition, and you want to trip all your
24 RCPs, you don't want to start the aux feed pumps because loss
25 of four RCPs trips SFRCS, and interlock is there which

1 prevents the opening of MS 106 and 107 once the DH-11 or 12
2 are opened.

3 MR. BEARD: All right. And the valves that
4 we are talking about are DH-11 and 12?

5 MR. JAIN: Right.

6 MR. BEARD: So what you are saying is that if
7 they are open, that blocks the actuation related to four
8 RCPs tripping?

9 MR. JAIN: That blocks the opening of steam
10 undercuts.

11 MR. BEARD: For this one? For this valve?

12 MR. JAIN: (Nods head affirmatively.)

13 MR. BEARD: Okay. That apparently was not
14 involved in the event at all. I didn't see where that
15 happens in terms of the actual valve control scheme.

16 That must be in the logic, or on the
17 consolidated drawings that you referred to earlier.

18 MR. JAIN: The 33 AC contact in series would
19 be 302, 304 --

20 MR. BEARD: Wait a minute. Are we in the
21 opening --

22 MR. JAIN: On the open circuit, on page 2 of
23 this drawing.

24 MR. BEARD: Right.

25 MR. JAIN: The 33 AC -- you see the two dots

1 around 33 AC contact on the bigger drawing.

2 MR. BEARD: You are on what page, 4-A?

3 MR. JAIN: Sheet 4-A, in the open circuitry.

4 MR. BEARD: Yes.

5 MR. JAIN: The 33 AC contact in series with the
6 SFRCS contacts?

7 MR. BEARD: Yes.

8 MR. JAIN: It says MX, MX?

9 MR. BEARD: Yes.

10 MR. JAIN: Okay. Sheet 4-B, if you look at
11 the legend, MX is related to DH-11 valve, at the very top.
12 On the table here.

13 MR. BEARD: Oh, in the table. DH-11, right.
14 I got it now.

15 All right. So that says that really my note
16 over here for this 33 AC contact is that this is closed when
17 DH 11 is closed.

18 MR. JAIN: Correct.

19 MR. BEARD: Okay. I didn't pick up that
20 subtlety. I thought it was on the valve we were working on.
21 I am glad you pointed that out.

22 Okay, very good. Okay. Is that pretty much
23 it?

24 MR. JAIN: This is the only thing I can think
25 of right now.

1 MR. BEARD: Okay. I think this is a good
2 logical stopping point, since we are here. Could we take
3 like a two or five minute break and come back?

4 MR. JAIN: Okay. Or we could go on.

5 MR. BEARD: I would like to take a very brief
6 break, and then leave at ten after, if that is all right with
7 you?

8 MR. JAIN: That is fine.

9 (Brief recess taken.)

10 MR. BEARD: Okay. What I would like to do,
11 if it is okay with you gentlemen, is jump and talk about the
12 control circuits for Valve AF-608, which is the isolation
13 valve between Steam Generator No. 1 and the aux feed water
14 trains.

15 Now, my understanding is that is on drawing
16 44-B, E-44-B, Sheet 4-C.

17 MR. JAIN: 4C and D.

18 MR. BEARD: 4C and D. I got more out of C than
19 I did out D, though. Just so we can dispense with it
20 easily, 4-D seems to be the open/close indicator circuits,
21 and some of the other wiring layouts, and not really of
22 functional importance to me right now, is that right?

23 Let's dispense with that drawing then.

Sim 4-1 1 MR. BEARD: Now again, this is the third page of the
2 exhibit. What I did was to try to draw in a schematic
3 simplified form the automatic open loop and the automatic
4 closed loop for this one as I understood it.

5 Now let me ask you, is this an AC valve?

6 MR. JAIN: Yes.

7 MR. BEARD: And you have two operators on it, two
8 open coils and two closed coils?

9 MR. JAIN: Correct.

10 MR. BEARD: And they both have to be energized to
11 make the coil move, or make the valve move?

12 MR. JAIN: Correct.

13 MR. BEARD: So we end up with four operating coils.

14 MR. JAIN: Right.

15 MR. BEARD: So in this sense this valve is unique
16 from a lot of them.

17 MR. JAIN: That is very true.

18 MR. BEARD: All right. Now did you want to take
19 a minute and see if this cartoon accurately reflects the
20 drawing?

21 MR. JAIN: Okay. Let's do that.

22 (Pause while the parties examine the drawings.)

23 MR. BEARD: Okay. Now that you have had a chance
24 to look at it, what did we find out?

25 MR. STALTER: Basically the only thing we found out

Sim 4-2

1 which we missed was the seal-in circuits.

2 MR. BEARD: Have you sketched those on yours?

3 MR. STALTER: Yes, I have sketched them on here.

4 MR. BEARD: Let me just make a copy of it then.

5 (Pause.)

6 MR. STALTER: Basically this contactor has a contact
7 over here and it also has a contact here, and then this
8 contactor has a contact there and one over there.

9 MR. BEARD: Okay. So let me do this with arrows.
10 This one goes to this one or here? It doesn't make any
11 difference I guess.

12 MR. STALTER: It doesn't make any difference.

13 MR. BEARD: Then the other one is like that.

14 MR. STALTER: Right.

15 MR. BEARD: So that in the closed holding circuit
16 you have got contacts from both of the control relay coils?

17 MR. STALTER: Right.

18 MR. BEARD: And once this thing gets pulled in, both
19 of them get pulled in, both sets are in series so they will
20 close up and the only thing that would interrupt the seal-in
21 would be the stop switch around both sides.

22 MR. STALTER: The key to this one is that you have
23 to have both of them pull up and seal in to get either one
24 to seal in.

25 MR. BEARD: To seal, but these signals should persist

Sim 4-3

1 long enough for that to take place, shouldn't they?

2 MR. STALTER: Right.

3 MR. BEARD: Now on the opening side you are saying --
4 I guess you have got it a little differently because I
5 assume that this seal-in is this one and this one is that
6 one, right?

7 MR. STALTER: Let me verify that. I think that
8 is the case. It almost has to be the case.

9 MR. BEARD: So the opening is a little different.

10 MR. STALTER: This seal-in is with that one. That
11 is correct. Yes, that is right.

12 MR. BEARD: Okay. So it is more associated rather
13 than criss-cross like in the closing circuit.

14 Can I keep this one or do I need to redraw it?

15 MR. JAIN: Well, I guess ---

16 MR. BEARD: Do you have a copy?

17 MR. JAIN: No, I ---

18 MR. BEARD: How about if I swap copies with you?

19 MR. JAIN: Okay. That is fine.

20 MR. BEARD: If we generally agree that this is
21 accurate with the corrections that you have pointed out, then
22 what I would like to do is discuss for a moment how it
23 functionally works, and it seems like if you talk about --
24 let's see now, this is the isolation valve. Let's talk about
25 the opening side first because that is simpler.

Sim4-4

1 If K-303 and 301-A both are tripped, then the valve
2 will be told to open?

3 MR. JAIN: Correct.

4 MR. BEARD: Now functionally to get those two, what
5 I have written down at the bottom of the page is I have to
6 have not low pressure in steam generator No. 1 and I have to
7 have either low level in either steam generator or low pressure
8 in No. 2.

9 MR. JAIN: Correct. To get the intent clear there,
10 a low pressure in No. 2 would close it.

11 MR. BEARD: So the primary purpose of this is for
12 that to cause it to interrupt the opening?

13 MR. JAIN: I don't see ---

14 MR. BEARD: I am only talking now about the auto
15 open circuit.

16 MR. JAIN: I wasn't sure where you were putting
17 your "or". Was the "or" between the low level ---

18 MR. BEARD: All right. Look at the way it is
19 written.

20 MR. JAIN: Okay.

21 MR. BEARD: At the bottom of the page the way I have
22 got it written is I have put brackets between the "and"
23 because that is the major subdivision, and then on the
24 second part of the "and" there is an "or." I think that
25 is correct. I spent a lot of time trying to get it correct.

Sim 4-5

1 MR. JAIN: Let me think for just a second.

2 (Pause.)

3 That is correct.

4 MR. BEARD: Okay. So what it really says that
5 if I have got low level any place, and I don't have low
6 pressure on No. 1, that will open this valve.

7 MR. JAIN: Yes.

8 MR. BEARD: And the contacts are "and'ed" together
9 in the sense that of actuation of channel one, I take logic
10 one and logic three sort of "and'ed" together. So that
11 is the field wiring we talked about yesterday.

12 MR. JAIN: Right.

13 MR. BEARD: Now the closing circuit. Okay. This
14 one is a little bit more complicated. Let's talk about just
15 one of the closing coils.

16 MR. JAIN: Okay.

17 MR. BEARD: And to get one of the closing coils
18 to close, I need to, I think, trip K-201-C, and I am right
19 hand, K-201-C and do something on K-301-B, and that will
20 make up the closing circuit to at least one of those closing
21 coils.

22 MR. JAIN: Right.

23 MR. BEARD: Now K-201-C I believe would be
24 tripped if I have low pressure in steam generator No. 1.

25 MR. JAIN: Correct.

Sim 4-6

1 MR. BEARD: Now where I get in real trouble is
2 K-301-B because I got very confused last night, this close
3 inhibit circuit.

4 Now maybe rather than my trying to tell you all
5 the agony I went through last night, it would be easier
6 if you tell me how it works.

7 MR. JAIN: I will give it an attempt. I was going
8 through it, too, last night because of the other thing I
9 was working on. Is it possible to defer that for a while
10 and when we come back we could give you ---

11 MR. BEARD: It is all right if we defer it, and then
12 what could we cover in the next three minutes. I mean I have
13 seven minutes after the hour and you said you had to leave
14 at ten after. You know, if you want to just recess now,
15 that is fine, too, because this is a big complex subject,
16 as I understand it; is that right?

17 MR. JAIN: That is true.

18 MR. STALTER: That is true.

19 MR. BEARD: And it is an important one because
20 of our discussion yesterday of the potential for single
21 failure problems.

22 MR. JAIN: Certainly.

23 MR. BEARD: So maybe it would be prudent to recess
24 at this point and try to get together later today.

25 MR. JAIN: That is what I was asking for.

Sim Sim 4-7

MR. BEARD: All right. Then why don't we consider

this meeting recessed.

(Whereupon, the meeting recessed at 10:10 a.m.)

end Sim

2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

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)

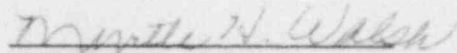
(CLOSED)

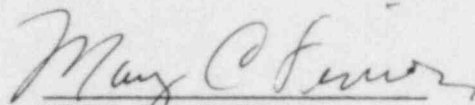
DOCKET NO.:

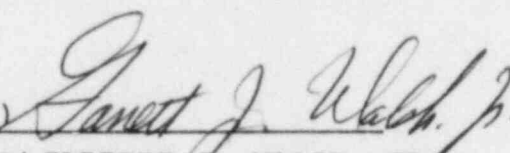
PLACE: OAK HARBOR, OH

DATE: WEDNESDAY, JULY 10, 1985

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


MYRTLE H. WALSH
Official Reporter
Ace Federal Reporters

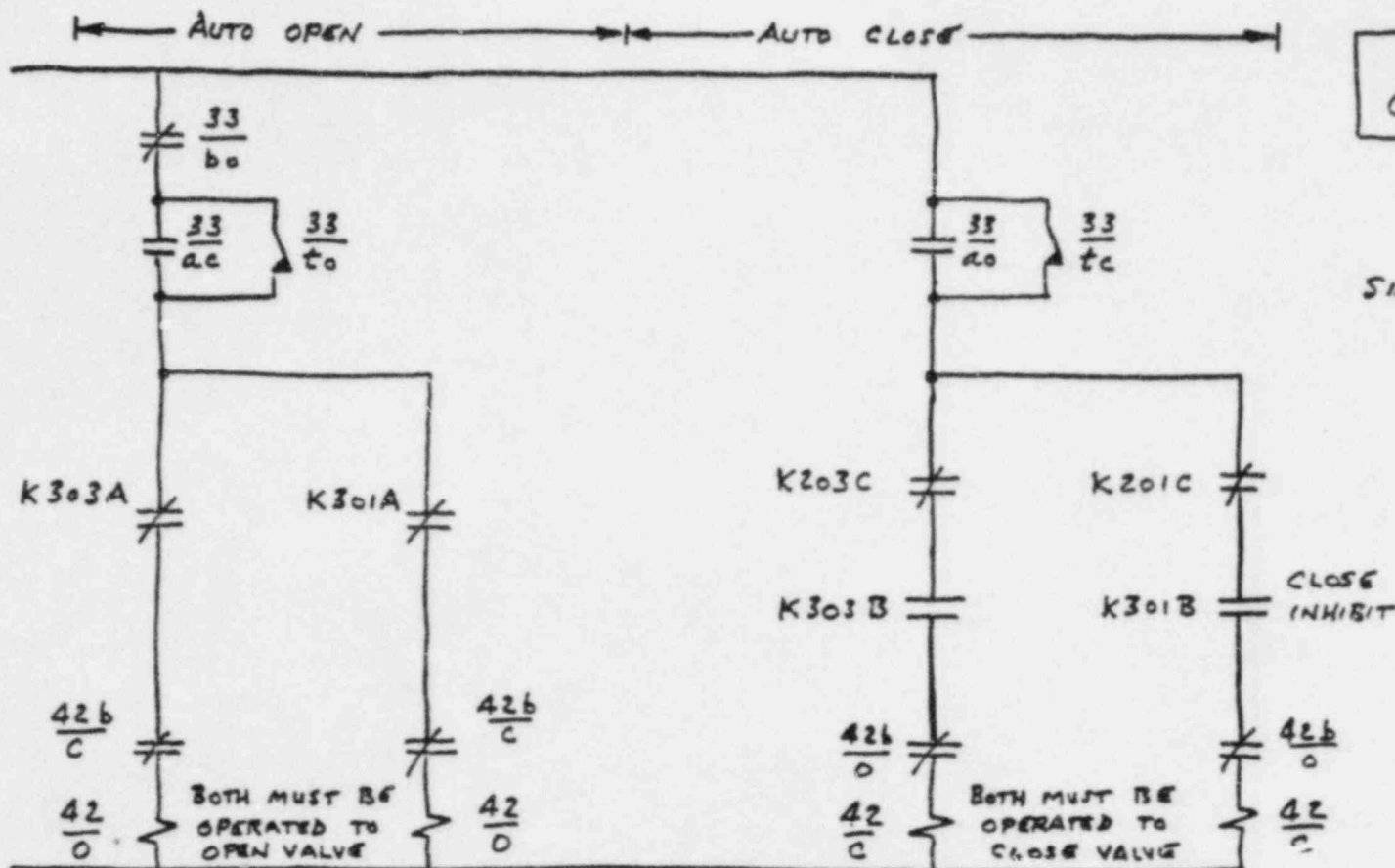

MARY C. SIMONS
Official Reporter
Ace Federal Reporters

(sig) 
(TYPED) GARRETT J. WALSH, JR.

Official Reporter

Reporter's Affiliation
Ace Federal Reporters

7/10/85 EX #1



CONTROL SCHEME FOR AF-608
(OTSG #1/AFW ISO VALVE)

J. T. Baand
7/09/85

SIMPLIFIED FROM:

DWG E-44B SH-4C REV 10

DWG E-18 REV. 12

K303 (ACT. CH. #1, LOGIC #3)

[OTSG #1 NOT LOW PRESS] AND

[LOW LEVEL (EITHER OTSG)
OR OTSG #2 LOW PRESS]

K301 (ACT. CH. #1, LOGIC #1)

[OTSG #1 NOT LOW PRESS] AND

[LOW LEVEL (EITHER OTSG)
OR OTSG #2 LOW PRESS.]

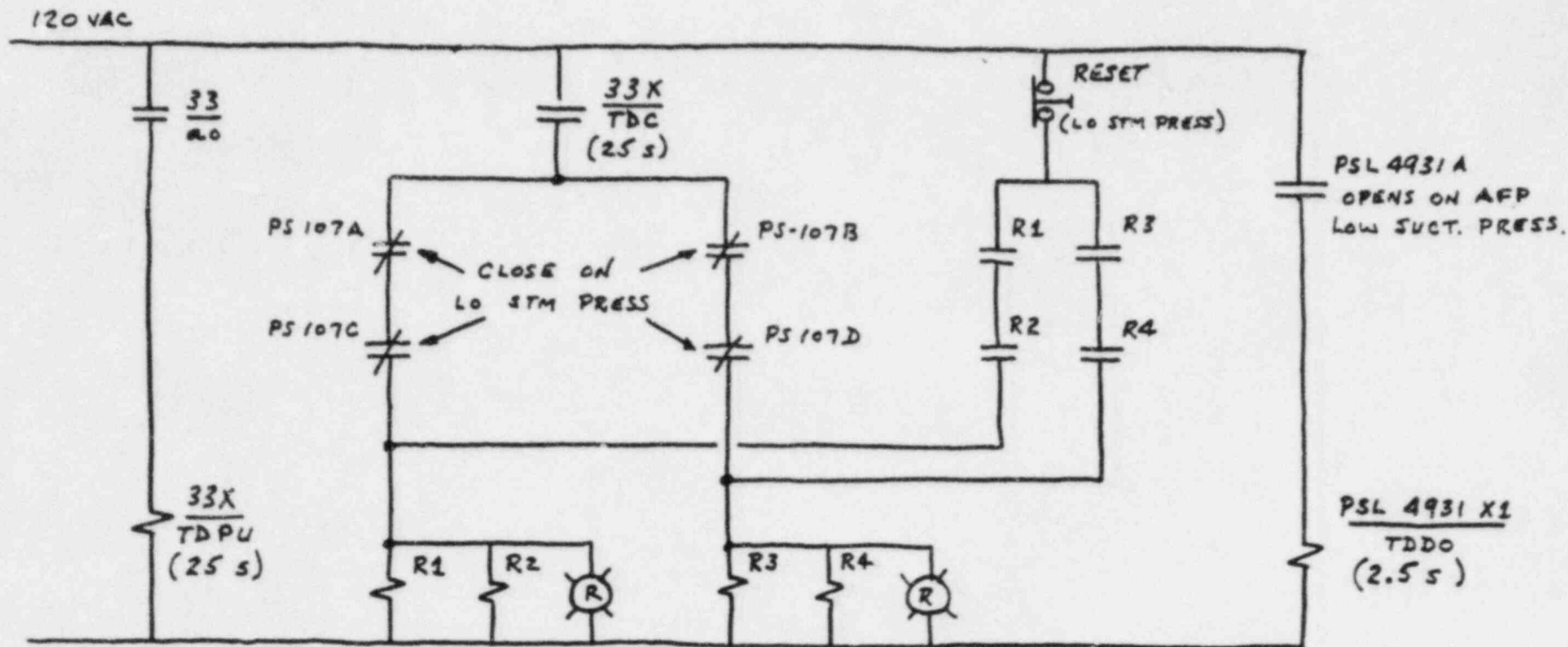
K203 (ACT. CH. #1, LOGIC #3)

OTSG #1 LOW PRESS.

K201 (ACT. CH. #1, LOGIC #1)

OTSG #1 LOW PRESS.

VALVE CLOSURE: K203 TRIPPED AND K303B ?

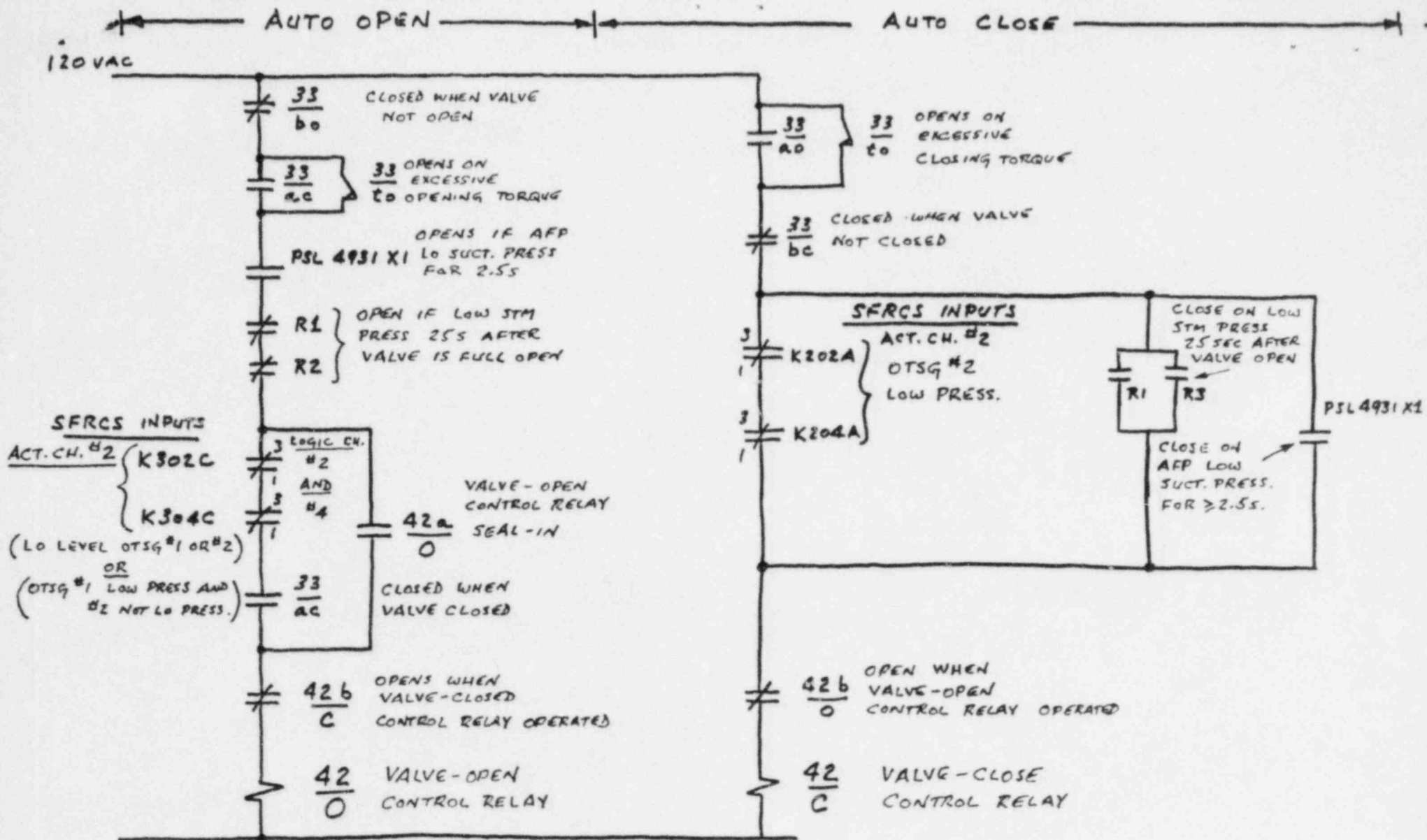


SIMPLIFIED FROM:
DWG. E-44B SH-4A,B REV.10

CONTROL SCHEME FOR VALVE MS-107
(MAIN STM ISO VALVE TO AFPT #2)

PAGE 1 OF 2

J.T. Beard
7/09/85



CONTROL SCHEME FOR VALVE MS-107
(MAIN STM ISO VALVE TO AFPT #2)

PAGE 2 OF 2

J.T. Beard
7/09/85