

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ORIGINAL

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IN THE MATTER OF:  
DAVIS BESSE INCIDENT

DOCKET NO:

(INTERVIEW & MEETING)

(CLOSED)

Status Report on Quarantine Equipment  
: (Continued from July 11, 1985)

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NATIONWIDE COVERAGE

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1 UNITED STATES OF AMERICA  
2 NUCLEAR REGULATORY COMMISSION

3 - - -  
4 FRIDAY, JULY 12, 1985  
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6  
7 MEETING BETWEEN THE NRC FACT-FINDING TEAM AND TOLEDO EDISON  
8 ON  
9 STATUS REPORT ON QUARANTINE EQUIPMENT  
10 (Continued from July 11, 1985)

11 NRC FACT-FINDING MEMBERS PRESENT:

12 ERNEST ROSSI  
13 J. T. BEARD MR. ROGERS  
LARRY BELL

14 TOLEDO EDISON MEMBERS PRESENT:

15 MR. CHARBONNEAU  
16 MR. BONNER  
MR. LONG  
17 MR. BAJESTANI  
MR. BARBAT  
18 MR. GRIME  
MR. GULVAS  
19 MR. RAYNES  
MS. MacDONALD  
20 MR. HUSTON  
MR. BLAY  
21 MR. MISSIG  
MR. RUPP  
22 MR. WILCZYNSKI  
MR. LAND

23 \* \* \* \* \*

24

25



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

(9:10 a.m.)

1  
2 MR. ROSSI: If we are all ready, why don't we  
3 begin.

4 You are going to treat this as a continuation of  
5 yesterday's meeting on the status of the trouble shooting  
6 of the equipment which malfunctioned during the June 9th  
7 event.

8 (The reporter nodded affirmatively.)

9 I believe we are going to follow this agenda  
10 up here (Indicating the written agenda on the blackboard). I  
11 don't know that we need to read it into the record because  
12 it will become what agenda we are following as we do it.

13 So the first one up is the auxiliary feed pump  
14 overspeed trip, Action Plan 1A and 1B, and you have given  
15 us information that the governor has been inspected by the  
16 vendor and they didn't find any problems. And basically  
17 now what you are doing is setting up to test the main  
18 hypothesis which remains of water slugs going through the  
19 turbine caused the overspeed.

20 MR. WILCZYNSKI: Yes, sir.

21 MR. ROSSI: And I see that you indicate that  
22 you are continuing analyses to test that hypothesis.

23 One thing we would be interested in knowing is  
24 have you gotten any more information from either the vendor  
25 or anywhere else that has strengthened your belief that

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1 this is the hypothesis?

2 MR. WILCZYNSKI: Phil, you have been pretty  
3 close with the MPR analysis. Could you give a brief  
4 description?

5 MR. HILDEBRANDT: The analyses done to date,  
6 and this is a transient analysis as compared to the steady  
7 state analysis which was performed previously and discussed  
8 at our meetings in Bethesda a couple of weeks ago.

9 The transient analysis continued to indicate  
10 that large amounts of water were being formed, particularly  
11 in the cross-over lines containing 107A and 106A steam  
12 admission valves.

13 The transient analysis has not yet, and is just  
14 in fact today going to be looking at the effects directly  
15 on the turbine. However, past testing by the turbine vendor,  
16 Terry Corporation, has shown water slugs in the turbine  
17 initially slowing the turbine down resulting in the governor  
18 valve opening, and then basically allowing more water in  
19 potentially and letting the turbine overspeed.

20 So all indications so far are that continues to  
21 be a viable hypothesis.

22 MR. ROSSI: Okay. Your transient analysis is  
23 mainly to determine how much water gets to the turbine, or  
24 are you also looking at an analysis of the turbine?

25 MR. HILDEBRANDT: We are also looking at an

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1 analysis of the turbine. However, that is a more difficult  
2 and it will be less conclusive connotatively because there  
3 is no performance information on the turbine numerically  
4 that is available.

5 MR. ROSSI: Terry has done tests in the past  
6 that indicate that they would overspeed.

7 MR. HILDEBRANDT: What they have done in the past,  
8 they have admitted water to the turbine, initially slowed it  
9 down and found that the governor valve would open in response  
10 to that, and then find that the turbine speed would increase.

11 Now they had not actually hit a so-called over-  
12 speed trip because they didn't let it go that far.

13 MR. ROSSI: Oh, okay. But that is just because ---

14 MR. HILDEBRANDT: The trend.

15 MR. ROSSI: The trend was there and there wasn't  
16 any reason to believe that it wouldn't have continued to go  
17 to the overspeed trip had they not chosen to stop it before  
18 it went there.

19 MR. HILDEBRANDT: Yes, sir. Now that is based  
20 on discussions. There is no report available on that from  
21 the Terry Corporation.

22 MR. BEARD: But these are the results of tests  
23 that they have performed?

24 MR. HILDEBRANDT: Yes. I understand this was  
25 on the order of 15 years ago that these tests were run.

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1 MR. BELL: Do they inject cold water or hot  
2 water into the steam supply to that turbine?

3 MR. HILDEBRANDT: This was more than one case,  
4 and let me describe those cases.

5 One case was steam initially flowing, and they  
6 would inject between 50 and 100 pounds of water. I misspoke.  
7 Fifty and six hundred pounds of water. In that case the  
8 turbine would bog down, and since it was already running,  
9 would not experience any tendency to go towards an overspeed  
10 condition.

11 The other tests were starts, and again admitting  
12 large amounts of water, and the numbers I don't recall, and  
13 I am sure that it is anything more than somebody's memory  
14 15 years old. And they would have the characteristic I  
15 described a moment ago, and this is cold water.

16 MR. BEARD: In most cases it was cold.

17 MR. HILDEBRANDT: Cold water, yes.

18 MR. BEARD: Did you get the impression in  
19 discussing this matter with the Terry Turbine folks that  
20 the objective of the test was to address the possibility of  
21 water hammer type situations or would it have been out of  
22 scope to address the potential for overspeed?

23 MR. HILDEBRANDT: The initial purpose of the test  
24 in our understanding, and again this is going back in some-  
25 one's memory 15 years ago, and there is only one individual

m 1-6

1 that currently has this memory at Terry at the present time,  
2 is that the testing was being done to confirm the adequacy  
3 of these turbines with large amounts of moisture entering  
4 them for the types of service they see in such as this PWR.

5 I don't know, and it is uncertain at this point  
6 whether they were done specifically for overspeed purposes.  
7 We don't know that purpose.

8 MR. BEARD: But I think you said that there was  
9 no report that Terry had of these tests that would have  
10 showed one way or the other.

11 MR. HILDEBRANDT: Yes, sir, that is correct.

12 MR. BELL: Your hypothesis, if I remember it  
13 correctly, is that as the steam enters the piping it is  
14 condensed and then passes through the turbine trip throttle  
15 and through the governor and into the nozzle block and flashes  
16 in the nozzle block?

17 MR. HILDEBRANDT: Yes, sir.

18 MR. BELL: And increases the speed to the turbine?

19 MR. HILDEBRANDT: Yes, sir.

20 MR. ROSSI: I assume that you have still not  
21 found any testing that has been done in the past where you  
22 did a quick start of these turbines with the cross-over  
23 valves and lines?

24 MR. WILCZYNSKI: That is true, we have not found  
25 that.



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1 MR. ROSSI: You have not found any tests.

2 MR. WILCZYNSKI: No, sir.

3 MR. BELL: How about in the initial hot functional  
4 testing of the plant or the additional testing of the Terry  
5 turbine?

6 MR. WILCZYNSKI: No.

7 MR. BEARD: I don't know who I should be  
8 addressing this question to, but if I remember right, in the  
9 -- well, let me start over.

10 Could someone explain to me how the program at  
11 your company works for evaluating operating experiences from  
12 other licenses to determine the applicability to your plant  
13 and how that may have related to this Terry turbine problem?

14 MR. WILCZYNSKI: I am not sure that we have the  
15 people in this room that can answer how that system is set  
16 up in the company.

17 MR. BEARD: Let me ask a more limited question.  
18 Do you know whether or not any experience -- what I am trying  
19 to get to is in your action plan you report that some number  
20 of prior occurrences were found after the event, and I am  
21 trying to understand that had some type of a review of  
22 operating experiences been conducted as a matter of a routine  
23 general program prior to the event, could these prior  
24 experiences have been picked and applied at this facility in  
25 some manner that could have caused this problem to be

Sim 1-8

1 investigated prior to the event and, hence, not failed in  
2 a real demand? That is what I am trying to understand.

3 MR. ROSSI: If you don't have the people here to  
4 answer that, that is fine because that is better than ---

5 MR. GRIME: We understand that we have that  
6 interface.

7 MR. ROSSI: We understand that you can't have  
8 everybody here to answer every question. If somebody did know,  
9 that would be nice to know, but if we want to pursue that,  
10 we can ask Bill Rolls to find the people.

11 MR. BEARD: I guess the only other question I  
12 have on this subject or this action plan was if this informa-  
13 tion was known by the vendor some number of years ago that  
14 there is a possibility that you would go to overspeed when  
15 you get some amounts of water in here, and would you have  
16 expected him to have advised you of this potential, or is  
17 my presumption inaccurate?

18 MR. WILCZYNSKI: It is my belief that the vendor  
19 should take it on his part to inform the people to which he  
20 sells these units of this possibility.

21 MR. BEARD: Have you discussed with Terry Turbine  
22 as to whether or not they have advised people?

23 MR. WILCZYNSKI: No, we have not.

24 MR. ROSSI: Well, the question of who Terry Turbine  
25 advises other than Davis-Besse I think is one that is outside



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1 of their scope.

2 MR. BEARD: Right.

3 MR. ROSSI: But let me ask a related question  
4 that is within your scope. You have presumably now reviewed  
5 specs and information provided to you, to you Davis-Besse  
6 by Terry Turbine. Did you find any specs that would indicate  
7 that this might be a problem or any specs saying that you  
8 have to have a certain steam quality and you shouldn't have  
9 slugs and that kind of thing?

10 MR. WILCZYNSKI: No, we have not found anything  
11 that talks about the amount of water and what possibilities  
12 that might cause.

13 MR. ROSSI: Or gives you limits on the operation  
14 of the pump with water?

15 MR. WILCZYNSKI: No.

16 MR. ROSSI: And have you done what you would  
17 consider to be a reasonable look for that sort of information  
18 at this point in time?

19 MR. WILCZYNSKI: I would say that we have. We  
20 have reviewed the Terry Turbine instruction manual and have  
21 not found any information in there, and that is where I would  
22 expect to see it, especially since the tests they had done  
23 were back in the late 60's.

24 MR. BEARD: Do you know if Terry Turbine has a  
25 program to where your technical manual would be updated

Sim 1-10

1 with service letters that would advise customers of problems  
2 or is that an area -- in other words, would you have expected  
3 to receive updates on your tech manual from Terry Turbine,  
4 because I understand that kind of service is provided by  
5 some vendors?

6 I am just wondering like could the information  
7 be here at the site and you just didn't look in the right  
8 place? I am not criticizing you, but I am saying did you  
9 find any service letters from Terry Turbine?

10 MR. WILCZYNSKI: There were some letters that  
11 came in that were added to the technical manuals, and none  
12 of those talked about the water conditions.

13 MR. BEARD: Okay.

14 MR. ROSSI: Do you have any more on this one? I  
15 am finished.

16 Okay. I guess the next one is Action Plan No. 8  
17 on the main feed pump turbine.

18 MR. GRIME: Maybe before we go to this other  
19 one, there is one correction on some information supplied  
20 yesterday, and lest we forget it, maybe we ought to provide  
21 that at this time relating to your question on the atmospheric  
22 vent valves and their relationship to the SFRCS.

23 So, Phil, if you want to ---

24 MR. BELL: I think I asked you questions concerning  
25 the control signals that were sent to the atmospheric vents.

Sim 1-11

1 MR. HILDEBRANDT: That is correct.

2 MR. BELL: And I was asking about the period  
3 directly after the trip and I was told that the atmospheric  
4 vents would receive a signal from the ICS following the  
5 trip and then there was a statement made that if the main  
6 steam isolation valves are closed that the header pressure  
7 control signal is transferred to the atmospheric vents.

8 And then I asked a question concerning the closure  
9 of the atmospheric vents by the SFRCS ---

10 MR. HILDEBRANDT: That is the area ---

11 MR. BELL: --- on low steam generator level.

12 MR. HILDEBRANDT: Yes, sir, that is the area I  
13 want to clarify. The atmospheric vent valves, once we get  
14 to the conditions you just described, MSIV closed, if an  
15 SFRCS trip is obtained on low level or high level or low  
16 pressure or reverse Delta P on the main feed water check  
17 valves, any of those conditions will result in a signal  
18 to close the AVV, the atmospheric vent valve is if it is  
19 open.

20 MR. ROSSI: That is low level, high level,  
21 reverse Delta P and low pressure did you say?

22 MR. HILDEBRANDT: And low pressure, any one of  
23 those conditions by themselves will close the AVV.

24 MR. ROSSI: That is everything except loss of  
25 the reactor coolant pumps, to state it simply.

Sim 1-12

1 MR. HILDEBRANDT: That is correct, and I want  
2 to make sure that we understand that.

3 Now with regard to the event on June 9th  
4 specifically, the AVVs were closed at the reception of the  
5 initial low-level SFRCS trip.

6 MR. BELL: Are you talking about the low level  
7 that occurred just prior to the manual initiation of the low  
8 pressure?

9 MR. HILDEBRANDT: No, the initial one that is  
10 presumably the cause of the closure of the MSIVs.

11 MR. BEARD: They were closed that early.

12 MR. HILDEBRANDT: The AVVs were already closed.  
13 I mean they weren't in control at that point. So the SFRCS,  
14 without going into a detailed description, would have had no  
15 effect on the AVV at that point. The AVV was free then to  
16 open and control pressure at set points, if so desired by  
17 the operator, at any time after the MSIV had closed up until  
18 the point where the next SFRCS trip was received, which was  
19 the low level trip followed right on its heels by the  
20 operator initiating a low-pressure trip.

21 So at that point then the SFRCS would have closed  
22 the AVV and not permitted it to reopen once we had received  
23 this low-level trip and also the low pressure that was  
24 coincidental within a few seconds.

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1 MR. BEARD: Is it correct that the close  
2 signal to the atmospheric vents is -- or would be the result  
3 of a partial trip? I guess the proper term is -- in other  
4 words, it would not have to wait until there was a full  
5 actuation?

6 MR. HILDEBRANDT: I have asked that question,  
7 and I don't know the answer. I am looking for that answer.

8 I know on a full trip it will do it; half trip,  
9 I don't know the answer.

10 MR. BEARD: Okay. But on the full trip,  
11 clearly there was one momentary actuation right after the  
12 reactor trip on low level.

13 MR. HILDEBRANDT: Yes, sir.

14 MR. BEARD: And then there was a full trip  
15 that persisted right before the manual initiation, so at  
16 least at that point it would have gotten the close signal.

17 MR. HILDEBRANDT: At the point of the full trip  
18 on low level, and then subsequent manual initiation.

19 MR. BEARD: I see.

20 MR. ROSSI: But that only occurs if the MSIVs  
21 are already closed?

22 The SFARSE does that period, regardless of the  
23 the --

24 MR. MILDEBRANDT: That is correct, and that  
25 is a coincident thing. MSIVs are called upon to close on



1 low pressure.

2 The signals are obtained at the same time.

3 MR. BEARD: Was it correct -- I just want  
4 to make sure I understood what you said, Phil, that with  
5 regard to that very early initiation at low level that  
6 lasted some three seconds, or whatever it was, that during  
7 that time the atmospheric vents would have received a  
8 close signal, but they were already closed, and that  
9 basically had no effect, but then after the SFARS system  
10 had reset itself at the end of the three seconds, that  
11 the close signal to those valves would have been removed  
12 and, therefore, for that period of time subsequent to that  
13 and prior to the next actuation, they would have been available  
14 to the ICS for their normal function?

15 MR. HILDEBRANDT: Yes, sir; that is correct.

16 MR. BELL: One more quick question. I would  
17 assume that the SFRCS signal would go to the solinoid on  
18 that valve and isolate, or perhaps remove error from the  
19 operator? Where the integrated control systems signal would  
20 go to the NEDA-P, and then manipulate the valve, is that  
21 correct?

22 MR. HILDEBRANDT: I don't know the answer.  
23 We can find that answer for you.

24 MR. BELL: Your P&ID would have that kind of  
25 information I believe?

1 MR. HILDEBRANDT: Yes, sir. Have that kind  
2 of information, just don't recall.

3 MR. ROSSI: Let's see. The SFRCS then, its  
4 actuation on everything except loss of pumps will close the  
5 AVPs.

6 MR. HILDEBRANDT: Yes, sir.

7 MR. ROSSI: And they then will stay closed by  
8 that no matter what happens until the SFRCS is either  
9 manually reset or -- how about if you just get back to where  
10 you have normal pressure level and so forth signals, does  
11 that automatically then allow the AVPs to revert back to the  
12 ICS?

13 MR. HILDEBRANDT: It has to be manually reset.

14 MR. ROSSI: Has to be manually reset. So,  
15 between the time it is initiated and it is manually reset,  
16 it is locked -- the AV s are locked out, and after you  
17 manually reset it then they can be used again and as I  
18 recall, somewhere in the transient they were manually  
19 reset.

20 MR. HILDEBRANDT: Yes, sir. Once the operator  
21 recognized he had initiated the low pressure full trip, he  
22 then went back and reset from that condition, allowing him  
23 to reuse the atmospheric vent valves, since the MSIVs are  
24 closed.

25 MR. BEARD: Just a point of clarification. Are



1 you referring back to when the assistant went back behind  
2 and used the initiate bypass and block feature?

3 MR. HILDEBRANDT: In the safety features  
4 actuation system, yes, that is correct. The safety features  
5 actuation system block is a location of a block to clear  
6 the SFRCS signal, and I can't go beyond that in detail.

7 MR. BEARD: I am just trying to understand.  
8 I think what we said earlier was that when the safety --  
9 steam feed rupture control system actuated very early to  
10 the perceived low level, right about the time of the  
11 reactor trip, it stayed on about three seconds, but then  
12 after that, to make it available, you would have to manually  
13 reset it, or if you hadn't manually reset it, the valves  
14 would remain with the close signal?

15 MR. HILDEBRANDT: The initial one short SFRCS  
16 low level trip, that will reset itself. The low level will  
17 reset itself.

18 MR. BEARD: Low level will reset itself, even  
19 on the valve itself without manual actuation?

20 MR. HILDEBRANDT: My understanding, and we can  
21 go into the detail of exactly how it happens, I believe the  
22 AVV just did not seal in because it was closed, and hence,  
23 it would not have any effect on the SFRCS trip.

24 The low level clearing was -- did not require  
25 subsequent manual operation to make the AVV operable again

1 in that case.

2 MR. BEARD: And that was because it never  
3 latched up?

4 MR. HILDEBRANDT: Never sealed in to start  
5 with.

6 MR. BEARD: After three seconds, or whatever  
7 the time was.

8 MR. HILDEBRANDT: That is correct.

9 MR. ROSSI: But had it sealed in -- I mean had  
10 the low level been there for say 10 or 15 seconds, or a  
11 minute, and then your recovered level -- it would have taken  
12 manual action to give you back the control of the AVVs.

13 MR. HILDEBRANDT: That is correct.

14 MR. BEARD: Let me go on to one other little  
15 point and make sure that I understand this. Later when  
16 the operator did try to manually reset something, are you  
17 saying that he went over to the S FAS, engineer Safety  
18 Feature Actuation Systems Panel, and I guess did he then go  
19 to a set of switches associated with the atmospheric vents  
20 and hit some block, or reset, or override there?

21 MR. HILDEBRANDT: This is second hand. I am  
22 told that that very signal you just described, that block,  
23 is contained in the SFAS cabinet associated with the AVVs,  
24 and I can't describe it beyond that.

25 MR. BEARD: SFAS?

1 MR. HILDEBRANDT: SFAS. That is correct.  
2 Engineer Safety Features Actuation System.

3 MR. BEARD: Okay. Wherever it is located,  
4 he then used that thing at some point in the event.

5 MR. HILDEBRANDT: In order to block and permit  
6 reuse of the atmospheric vent.

7 MR. BEARD: Would that have been a reset  
8 type thing, or would it have been an override type thing?

9 MR. HILDEBRANDT: I don't know the answer.

10 MR. BEARD: As I understand it, subsequent  
11 to, you know, some minutes later when the first low level  
12 actuation came in and persisted, followed almost immediately  
13 by the low pressure actuation, the low pressure part was  
14 reset by the operator less than a minute later, but the  
15 low level condition and actuation continued for a substantial  
16 number of minutes, so that if he was able to regain control  
17 of events, it would have to be through some device that  
18 functions as an override, not simply a reset of the system  
19 because the condition is clear.

20 MR. HILDEBRANDT: That is correct; that is  
21 correct. That is my understanding.

22 MR. BEARD: I see some heads around the room  
23 nodding yes. Is that generally the way people --

24 MR. BLAY: Basically, what he is talking about,  
25 that panel has a -- I would call it a block -- I don't know

1 if it is an actual override, block, signal to the vent valves,  
2 but it is for the vent valves themselves.

3 MR. ROSSI: Only for the vent valves.

4 MR. BLAY: Yes.

5 MR. ROSSI: Okay. So it allow you to get back  
6 in control of just the vent valves.

7 MR. BLAY: Right. Now, the initiate bypass  
8 button which you mentioned earlier, I believe those are so  
9 you can reset the low pressure trip.

10 MR. BEARD: But the thing I am trying to  
11 understand is it wouldn't have had an impact on the  
12 continuing actuation to the low level?

13 MR. BLAY: Right.

14 MR. ROSSI: I assume that the information on  
15 when the vent valve was locked from opening by the SFRCS,  
16 and when the operators reset things and so forth, and when  
17 they could have been using it for control, that that has all  
18 been factored into this action plan on the problems with the  
19 erratic pressure control.

20 MR. BLAY: Yes, sir.

21 MR. ROSSI: That has all been factored in there,  
22 so I think that is going to -- probably our biggest concern  
23 is all that is in there, and then the second concern we have  
24 is that we know enough to reasonably accurately describe the  
25 transient. Do we have that information now?

1 MR. BELL: I think so.

2 MR. ROSSI: Okay. So, why don't we go on now  
3 to Action Plan No. 8 on the main feed water pump trip.

4 Okay. We have been given the sheet here that  
5 indicates that the troubleshooting was done, and that you  
6 found a bad faulty card. Frequency to voltage converter.  
7 And that you removed that card and it is being tested by  
8 General Electric to confirm that that indeed is a failed  
9 card. Is that an accurate, or reasonably accurate example  
10 of what you have done.

11 MR. BLAY: Reasonably, yes. What we did, we  
12 found there was a circuit board that had what seemed to  
13 be a failed component on it, and that component was the  
14 FV converter.

15 We have, as we mentioned, the week of July 8th,  
16 we have performed that testing already. Wednesday and  
17 Thursday of this week, to prove that it was, indeed the FV  
18 converter that failed, and we conclusively proved it was the  
19 FV converter.

20 MR. ROSSI: And that would explain the overspeed  
21 that occurred on the 9th?

22 MR. BLAY: Yes. Under the summary, there is  
23 a statement in there, it says increase speed demand error  
24 signal.

25 That 'demand' word, I really don't like that

1 in there. I mentioned that in the letter.

2 It is more of an increased speed error signal.

3 MR. GRIME: I think we should consider that  
4 'demand' should be deleted from that, and then the quotation  
5 mark moved to the end of signal.

6 MR. BEARD: I think it is technically more  
7 correct.

8 MR. ROSSI: Increased speed --

9 MR. GRIME: Increased speed error signal.

10 MR. BEARD: Demand being the set point either  
11 manually or from the ICS. It probably didn't change.

12 MR. BLAY: Well, that is basically true.

13 MR. ROSSI: Okay. What you just said, I think,  
14 the last paragraph says during the week of July 8th the  
15 circuit board will be tested.

16 You are saying that has now been completed,  
17 and you did, indeed, conclude that there was --

18 MR. BLAY: There was a failure of a part.

19 MR. BEARD: Can I understand something, or  
20 help me understand something. Did the testing at General  
21 Electric confirm that the converter was failed, or were they  
22 asked to look at the question also of why it failed, or the  
23 likely cause of its failure?

24 MR. BLAY: That question has been addressed.

25 We have not decided how far we will take it. The component



1 which failed is made by Teledyne, and the questions that  
2 arose as to whether we should go to Teledyne with this  
3 to find out exactly whether it was a diode or whatever  
4 inside the module, what actually failed inside of it.

5 MR. BEARD : I am not getting so much at the  
6 hardware, you know, bits and pieces of it failing, as much  
7 as the question of could some input signal to the board  
8 that was funny have caused the failure?

9 MR. BLAY: Per GE, they see no reason for  
10 that. GE is saying random electronic failure.

11 MR. BEARD: GE says random failure.

12 MR. BELL: There is no possibility that the  
13 change in speed could have increased this frequency input  
14 to the frequency to voltage converter to a point where a  
15 failure could occur, or occurred, because of the rapid  
16 increase in turbine speed?

17 MR. BLAY: The indications that we have in  
18 terms of speed, it appears to update only every thirty  
19 seconds, but the speed did not increase to the point where  
20 the FV converter could not have handled the frequency in  
21 voltage probably.

22 MR. ROSSI: Well, you had had a number of  
23 control system problems before this event, and what I think  
24 you are basically saying is that the failure that occurred  
25 on June 9th was unrelated to those, and the concern that you



2-11-Joe Wal

1 are hearing from both sides of me is how far have you looked  
2 to be sure that that is the case.

3 Because, you may have found the specific  
4 component failure because of the June 9th event, but now  
5 you are still left with the problems that you originally  
6 had before June 9th with the control system for the feed  
7 pumps, and there may also be a relation between those  
8 problems and what occurred on June 9th.

9 I mean the relation may be you had some problems  
10 somewhere in the control system, and that problem was what  
11 caused the component failure.

12 I mean, that is one of the concerns, and then  
13 of course the other concern is a more basic one, and that  
14 is that even if this was just a random component failure on  
15 June 9th, you still have feed water pumps that have a problem  
16 with them. What are you doing about those problems?

17 MR. BLAY: We are investigating those -- I  
18 think it was April the 24th we had a trip of one pump, and  
19 June 2nd trips of both feed pumps trying to come up -- we  
20 have a hypothesis as to why those pumps tripped. We are  
21 trying to prove that in the event that could have been the  
22 case.

23 End 2.  
24 SueWal fols.

25

25

#3-1-SueWalsh 1 MR. ROSSI: Okay. So, you are still pursuing  
2 that.

3 MR. BELL: On June the 9th, you had Number 2  
4 main feed pump in manual --

5 MR. BLAY: ICS manual.

6 MR. BELL: -- Yes. I understand that. The ICS  
7 control station for Number 2 main feed pump was in manual,  
8 and the turbine control station was in automatic.

9 So the Number 1 main feed pump was in full  
10 automatic control.

11 MR. BLAY: Correct.

12 MR. BELL: You had instrumentation on either one  
13 or both of those feed pumps. Would you tell me which one  
14 of those feed pumps was instrumented?

15 MR. BLAY: Actually both of them were.

16 MR. BELL: Both feed pumps were instrumented.

17 MR. BLAY: Yes. Number 1 had more instrumenta-  
18 tion than Number 2. But we had some instrumentation on  
19 both of the feed pumps.

20 We had more instrumentation on Number 1.

21 MR. ROSSI: You had another problem I think  
22 which had occurred with the main feedwater pump control  
23 that occurred some time before the actual event. Didn't  
24 you have a backup oil pump or a control oil pump start  
25 for some unknown reason an hour or so preceding the event?

#3-2-SueWalsh 1

2 MR. BLAY: Approximately twelve minutes before

3 the event, yes.  
4 MR. ROSSI: Have you identified the cause of that5 problem?  
6 MR. BLAY: That problem is not unusual since the  
7 MVT was put in service. Any time the control valve is moved  
8 the standby oil pump starts due to the drop in oil pressure.9 MR. ROSSI: Is that supposed to do that according  
10 to G.E.?11 MR. BLAY: G.E. is working on that, determining  
12 whether we need to put in some further orifices or whether  
13 orifices that are in place now are not correct anymore.

14 That is being addressed.

15 MR. BEARD: Do you know if that is being addres-  
16 sed within the context of the event, that that situation  
17 may have been a contributory factor to the failure experienc-18 ed in the event?  
19 MR. BLAY: In terms of a contributory factor to  
20 the trip of Number 1 feed pump turbine, it is not being  
21 addressed as such. But it is being addressed in terms of  
22 the previous problems.23 MR. BEARD: Okay. I have a concern that you found  
24 a failed component, a converter on one of the boards.

25 MR. BLAY: Yeah.

MR. BEARD: Help me understand why you are

#3-3-SueWalsh

2 convinced -- and I assume you are -- that this is the only  
3 problem that was of significance during the June 9th event?

4 In other words, how you get the assurance that  
5 you have searched far enough and wide enough and deep enough  
6 to find all of the problems that may have impacted the June  
7 9th event?

8 MR. BLAY: Okay. Basically, if you look at the  
9 circuitry for that F/V converter, the only signal coming to  
10 it that could effect is the speed pickups which pick up  
11 the pulse signal.

12 And what we've seen, and what G.E. feels is that  
13 it was just a random electronic failure, there was no other  
14 electrical signals that could have effected that component;  
15 therefore, that component is failed.

16 We are not saying the June 2nd trips -- those  
17 trips we are saying are unrelated but they are being investi-  
18 gated for further control problems.

19 MR. BEARD: Let me say it differently. Is it  
20 possible, or have you investigated that separate of electronic  
21 control signals coming into the unit, you may have had a  
22 governor problem or some other kinds of problems, and you  
23 just at this point may have only found the first problem?

24 MR. BLAY: Okay. We did further testing once we  
25 found it's that board to see if indeed the control valve  
moved properly and the electronics downstream of that were

#3-4-SueWalsh1

functioning properly. And we found out that they were.

2 MR. BEARD: Do you feel like that the testing that  
3 you have performed is an adequate test for diagnostic trouble-  
4 shooting versus compliance with your technical specifications?

5 MR. BLAY: I'm not sure what you mean by --

6 MR. ROSSI: These would not have technical specifi-  
7 cations.

8 MR. BEARD: Well, I don't know what tests you  
9 performed, but I think your plant has a history -- at least,  
10 in my personal understanding -- of performing a monthly  
11 surveillance type of test that would be spelled out by your  
12 tech specs. And because you pass that, you consider the  
13 equipment to be operable and then that's the end of the  
14 troubleshooting process.

15 And my question is centered on the surveillance  
16 testing and the tech specs, is based on the premise that  
17 you think everything is working and you are only doing a  
18 confirmatory test; and, therefore, with that premise it may  
19 be totally inappropriate for a troubleshooting or diagnostic  
20 test.

21 And I don't know what testing you are referring  
22 to.

23 MR. BLAY: Well, first off, there are no surveil-  
24 lance tests for the main feed pumps. The testing that was  
25 performed was basically a G.E. lineup test, where they go



#3-5-SueWalsh1 through when they install the equipment they do testing to  
2 ensure that it's working properly. Those were the tests  
3 that were performed.

4 MR. ROSSI: Was it performed by G.E., or was the  
5 vendor here -- or, was G.E. here to supervise that testing?

6 MR. BLAY: It was performed by and -- well, with  
7 T.Ed. personnel, with G.E.

8 MR. ROSSI: So, a G.E. person was here to observe  
9 the testing.

10 MR. BLAY: He observed the testing and he also  
11 informed us as to what tests must be performed.

12 MR. BEARD: Do you feel like that that test that  
13 was performed -- or, did G.E. indicate to you -- that it  
14 was an appropriate or adequate test for troubleshooting to  
15 find problems versus confirming it's installed properly?

16 MR. BLAY: To find problems with the electronics  
17 and hydraulics, yes, that was -- per G.E. -- the adequate  
18 test.

19 MR. BEARD: Okay. I have a little different  
20 question, a different subject.

21 We were told by somebody here at Toledo Edison  
22 in one of the first few days after the event when we were  
23 here that on these feed pumps, if I remember correctly,  
24 there are two separate speed pickup units, and that these  
25 come down in parallel, and at some point they come together

#3-6-SueWalsh 1

2 at a commonality, and then there is a one wire that goes  
over into the control circuit, so to speak.

3 MR. BLAY: That's correct.

4 MR. BEARD: Can you, in that sort of space,  
5 relate where this board is?

6 MR. BLAY: The board that we found the failed  
7 component?

8 MR. BEARD: Yes.

9 MR. BLAY: Just downstream of the -- where your  
10 redundancies become one.

11 MR. BEARD: Okay. So, it's before this wire  
12 that goes out that somebody referred to, but it's in where  
13 they come together?

14 MR. BLAY: Yes. There is basically two speed  
15 pickups which come to a redundant speed pickup circuitry  
16 and from there it goes to position 4 board which is the one  
17 that we found failed.

18 And that's just one wire. So, from downstream  
19 there, there is no redundancy in the speed pickup.

20 MR. ROSSI: The control equipment that is used  
21 for these pumps, I assume that this is standard G.E. equip-  
22 ment that is used on a lot of main feed pumps, on a lot of  
23 plants in the country; is that --

24 MR. BLAY: That's correct.

25 MR. ROSSI: You are sure of that?



#3-7-SueWalsh1

2 MR. BLAY: Yes. That -- G.E. is getting that  
3 information together for us. Roughly we were told there  
4 is somewhere around a hundred and fifty to a hundred and  
5 seventy units in service, fossil, nuclear. We are not sure  
6 how many nuclear.

7 We may be the only retrofit.

8 MR. ROSSI: You could be the only retrofit?

9 MR. BLAY: Yeah.

10 MR. ROSSI: What was the reason again for that  
11 retrofit? What problem was it that you were trying to solve  
12 by retrofitting?

13 MR. BLAY: Well, the MHC unit that we had in the  
14 past, or what I'm aware of, we were having some problems  
15 with that -- the control unit. It was -- the linkages were  
16 getting worn and it was to the point where it needed to be  
17 overhauled, completely redone.

18 MR. BEARD: Were the problems that you experienced  
19 related to this so-called rapid feedwater reduction program  
20 in the ICS?

21 MR. BLAY: Problems on June 9th or --

22 MR. BEARD: No, the problems that you referred to  
23 on the old system that prompted you to put in a newer system.

24 MR. BLAY: No. I believe the problems with MHC  
25 unit was just control problems, stability, the linkages --  
there was a lot of slop in the linkages where they had worn.

#3-8-SueWalsh1

2 MR. ROSSI: So, is it a fair summary to say that  
3 your old control system was worn and was giving you problems  
4 and needed overhaul anyway, and you put in a new one at the  
5 time you overhauled it?

6 MR. BLAY: A more up-to-date one, a current one.

7 MR. BEARD: You did, as I remember, decide to do  
8 this on one of the two pumps at a time, checked it out before  
9 you, for example, just replaced both of them?

10 MR. BLAY: The change out to the electronic  
11 governor?

12 MR. BEARD: Yes.

13 MR. BLAY: No. That was performed during the  
14 1984 outage on both.

15 MR. BEARD: Oh, I guess I was thinking of the aux  
16 feed. The aux feed, you did one at a time?

17 MR. BLAY: That's correct.

18 MR. ROSSI: Do you have anymore?

19 MR. BELL: Yes, sir. Dr. Rossi asked you about  
20 the pickup of the standby oil pump, and if I heard you  
21 correctly you said that was caused by a change in regulator  
22 position, control oil regulator position?

23 MR. BLAY: Basically, the oil system drives the  
24 control valves through the governor. We found, since we  
25 put this MV-20 system in service that any time the control  
valves move a fair amount -- I can't say exactly how far you

#3-9-SueWal 1 have to move the valves, I don't think a whole lot -- but  
2 you will drop the hydraulic oil header pressure down to  
3 the setpoint that starts the standby oil pump.

4 MR. BELL: The plant was sitting at a steady  
5 ninety percent power. What physical phenomenon could  
6 occur to cause a change in speed demand to cause governor  
7 valve motion?

8 MR. BLAY: Okay. At the same time that the stand-  
9 by oil pump started, there was a feedwater oscillation, a  
10 slight one, which indicates that turbine speed did change.  
11 And again on the computer printout, the turbine speed you  
12 can see that the turbine did pick up speed.

13 MR. BELL: Now, if I understand your system cor-  
14 rectly anything that can affect feed pump suction pressure  
15 will affect the Delta P across the feed rec valve network  
16 and be fed back through the system to cause a change in  
17 feed pump speed?

18 MR. BLAY: That would be true.

19 MR. BELL: How sensitive is this system to  
20 changes in the aerotor tank level?

21 MR. BLAY: Whew!

22 MR. BELL: The reason the I asked that is because  
23 that is the head on the booster pump --

24 MR. BLAY: That's correct.

25 MR. BELL: -- and as head on the booster pump

#2-10-SueWalsh

decreases then the booster pump discharge pressure decreases which decreases feed pump --

MR. BLAY: Uh-huh.

MR. BELL: -- suction pressure, and we go on and on and on.

MR. BLAY: My feeling, you know, you are talking just a few feet maybe, or inches. I don't know what kind of level change you are talking about but I wouldn't think that would affect your Delta P a whole lot until you increased your turbine speed enough to cause the control valve to move enough to start the oil pump, the standby oil pump.

MR. BELL: Thank you.

MR. BEARD: I think this is the last question I've got. When you talked to the manufacturer of this new control system you put in, you know, where you replaced your worn one, did he give you any feel --

MR. BLAY: Uh-huh.

MR. BEARD: -- as to whether he had had any prior experience with these circuit boards or the frequency to voltage converter, as to whether that had been a problem, or you are the first people that have reported it, or anything of that nature?

MR. BLAY: Okay. At this point, we haven't got any letter saying that this is what we have had in the past.

#3-11-SueWalsh  
2 But indications from G.E. are that this is the first in-  
3 service failure of an F/V converter since the mid-70s when  
4 the units were installed.

5 There was some indication they had a few failed  
6 in their burn-in period, like two or three. But in-service,  
7 well, since the Summer of '75 when these new ones came out,  
8 they've only had a very few that have failed.

9 MR. BEARD: What I'm trying to really say is  
10 that if it's a new system -- at least, at your plant --

11 MR. BLAY: Yeah.

12 MR. BEARD: -- is it possible that it's really  
13 a design weakness to cause the failure versus a purely  
14 random failure?

15 I don't really know that the vender would have  
16 received the information from non-nuclear facilities about  
17 the failures and maybe it could have happened a hundred  
18 times in the last ten years but he is just not aware of it.

19 But, see, since you are talking about a system  
20 that is at least new to this plant and it failed within the  
21 first, I think, six months -- didn't you just start up in  
22 January, and in June a component failed, that's a little  
23 early for a normal wearout type random failure.

24 And --

25 MR. BLAY: Well, in terms of electrical components  
like that, early in life is where you would expect them to



#3-12-SueWalsh fail. I don't know what the curve exactly looks like.

2 MR. BEARD: It's a classic bathtub curve. The  
3 bathtub curve you are talking about.

4 MR. BLAY: Yeah.

5 MR. BEARD: But are you saying that it may be a  
6 failure that's in that early part of the bathtub?

7 MR. BLAY: That is what G.E. has indicated.

8 MR. BEARD: Okay. Both failures -- maybe it's  
9 a terminology question. But those are not referred to as  
10 random failures. And if that's the kind of thing that they  
11 are telling you, that's not what most people call random  
12 failures.

13 That's called premature fatality, because your  
14 burn-in period and your initial testing, when you install the  
15 equipment, it's supposed to operate it for a period of time  
16 to weed all those failures out and get you on the flat part  
17 of the bathtub --

18 MR. BLAY: Yeah.

19 MR. BEARD: -- or, you are just asking for  
20 problems.

21 MR. BLAY: Okay. The boards are burned in at  
22 G.E. prior to coming to us. So --

23 MR. BEARD: Okay.

24 MR. ROSSI: Well, is there anything that is done  
25 when you retrofit this control system that it's enough

#3-13-SueWalsh  
2 different from when it is originally used that that could  
3 give you problems that other people would not experience?  
4 I'm talking more now in terms of not just the component  
5 failure but the problems that you were having prior to  
6 June 9th.

7 Or, is that -- let me ask the question a different  
8 way. Is that being looked at?

9 MR. BLAY: In terms of testing or --

10 MR. ROSSI: In terms of checking with G.E.  
11 specifically as to whether they have looked at whatever  
12 interfaces there are when you do the retrofit compared to  
13 what there might be when it's originally supplied with  
14 the pumps, or with the pump turbines?

15 MR. BLAY: Other than the testing we have  
16 performed, I would have to talk to G.E. in terms of what  
17 else should be looked at.

18 MR. ROSSI: Who did the work of the retrofitting?  
19 Did G.E. come here and put it in?

20 MR. BLAY: G.E. installed it.

21 MR. BEARD: Who did the interface design work?

22 MR. BLAY: Between ICS and the --

23 MR. BEARD: Between the new control system, the  
24 G.E. control system and the rest of your plant to make  
25 certain that this control system would really fit your  
equipment and your application?

#2-14-SueWalsh

2 MR. BLAY: Well, the equipment, I don't know how  
3 far you want to take that. But all the equipment that is  
4 running is G.E. equipment.

5 MR. BEARD: Let me give you an example of what I  
6 think Ernie and I are trying to shoot at. We are trying  
7 to explore the area that's analogous to the situation that  
8 we have explained on the spurious actuation of the steam  
9 feed rupture control system, wherein existing Bailey  
10 transmitters that functioned in a certain way with their  
11 own characteristics were replaced by new equipment which  
12 functioned presumably better, but it made it so much better  
13 that phenomena that had been masked earlier now got through  
14 and caused spurious actuations.

15 And I think we are trying to explore the area that  
16 with your new system here, could something similar to that  
17 have happened here or had someone looked at that, or is some-  
18 one as a result of this event going to look at it?

19 END #3  
20 Simons flws

21

22

23

24

25

26

27

Sim 4-1

1 MR. BLAY: When we installed the system, MPR  
2 did some stability tests. I am not sure exactly what all  
3 they did, but that was looked at. In terms of the future  
4 at this time, we haven't really discussed that.

5 MR. ROSSI: Let's see, on the June 2nd reactor  
6 trip, what tripped the feed pumps again?

7 MR. BLAY: The theory we have behind that is  
8 that there is a feed pump turbine trip which is not a  
9 GE supply trip. It is a high-pressure discharge trip, and  
10 we feel we may have picked up the high-pressure discharge  
11 trip at the time.

12 MR. ROSSI: So right now all you know is you  
13 tripped the reactor on June 2nd and both feed pumps tripped  
14 and it wasn't overspeed or any of that kind of thing, and  
15 you don't know specifically what signal tripped it.

16 MR. BLAY: That is correct.

17 MR. BEARD: Oh, I do have another question.  
18 Earlier someone told us, or my memory of what someone  
19 told us, and I can go back and check the transcript to verify  
20 what was said, and the important thing is what we know  
21 today, but I was led to believe that prior to June 9th the  
22 experience you had with trouble shooting possible failures  
23 and this, that and the other led you to the conclusion that  
24 while you hadn't found the result, it seemed to be more  
25 associated with a post-trip situation, with automatic

Sim 4-2

1 controls and more on No. 1 pump than No. 2 pump.

2 My question is with regard to that third part,  
3 that it is more associated with No. 1 than No. 2. Did I  
4 remember that right, or is that in agreement with your  
5 understanding, even though both pumps had tripped?

6 MR. BLAY: Well, part of the reason you are  
7 saying that is No. 1 is the one that tripped following the  
8 April 24th reactor trip.

9 MR. ROSSI: You have one more trip on No. 1 than  
10 you do on 2.

11 MR. BLAY: Correct. So in terms of that, what  
12 you say would be somewhat correct, yes.

13 MR. BEARD: Okay, because the thought that I  
14 was trying to sort out in my mind was that the most recent  
15 experience you had was that both pumps had tripped, but I  
16 thought I had been told that the best belief going into  
17 the June 9th situation was that the problems were more  
18 associated with No. 1 than No. 2 and I was trying to  
19 reconcile that, but I think you have explained it.

20 MR. ROSSI: Well, I think there was some  
21 additional trouble shooting that was done on the No. 1 pump  
22 at some point in time also.

23 MR. MISSIG: After the June 2nd trip, we were  
24 testing the No. 1 main feed pump and we were picking up  
25 a trip as soon as we started and stopped the No. 2 motor



Sim 4-3

1 oil pump, the main oil pump.

2 MR. ROSSI: You tripped the No. 1 pump whenever  
3 you started and stopped the No. 2 oil pump?

4 MR. MISSIG: Correct. That is in the report  
5 that we submitted to you and we believe that what happened  
6 there, GE was here assisting us while we were doing this  
7 testing, was that there was a sticky check valve or maybe  
8 something that was in the check valve, and what was  
9 happening was that the header pressure would drop and we  
10 were picking up both the active and inactive thrust trips,  
11 which shouldn't happen. You would either get one or the  
12 other.

13 MR. ROSSI: Did you repeat that same test with  
14 the No. 2 pump?

15 MR. MISSIG: Yes, and we did not ---

16 MR. ROSSI: You didn't see it with the No. 2  
17 pump.

18 MR. MISSIG: And the only time it would trip  
19 would be when we were testing No. 1 and shutting off No. 2  
20 main oil pump. That is about it.

21 MR. BEARD: I have just an administrative question  
22 here at the end, and I am not sure if maybe, Mr. Grime,  
23 you are the best one to answer this, but yesterday we had  
24 a discussion of one of your status reports, which is, if  
25 I remember correctly, is that the trouble shooting had

Sim 4-4

1 basically been completed, your folks believed that they had  
2 determined the root cause and were at the point of writing  
3 up or reviewing the report that would support that conclusion.

4 Now on this particular one you obviously have  
5 not presented it in that report, but are we generally in  
6 the same position that we were on the other one yesterday?

7 MR. GRIME: To the best of my knowledge, we  
8 are not in that we haven't really started to draft a findings  
9 report, a detailed report on this one. We have, as you  
10 may recall, just recently had approved some additional action  
11 plans to look at the other main feed pump in this area, and  
12 maybe Jeff can correct me if I am wrong, but my assumption  
13 is that he is probably planning to wait until he completes  
14 the other action plan before he submits a report.

15 MR. BLAY: Well, I am not sure. We can write up  
16 a findings report of what we found.

17 MR. ROSSI: Well, if you are looking for root  
18 causes, it may very well be that you ought to wait until  
19 you have looked at the other pump and put all of the informa-  
20 tion that you can possibly get together because you may find  
21 out something that is not known now. So I would not rush  
22 to write up the report until you people are comfortable  
23 that you know everything there is to be known about the root  
24 cause and the justification.

25 We have asked a lot of probing questions about

Sim 4-5

1 how sure are you that you have found the root cause, and I  
2 would hope you think about those when you write your  
3 justifications, and that is really true for any of your  
4 justifications.

5 I know we have had a lot of questions on the  
6 team as to how deep we ought to get into commenting on your  
7 trouble shooting plans, and they are really your plans and  
8 we have provided comments that may have gotten you to think  
9 about things that you might not have thought of otherwise,  
10 but when the root causes come in, they are going to really  
11 be looked at to make sure that people really know what the  
12 root causes are. So just keep that in mind.

13 MR. GRIME: Some of our findings reports may  
14 actually be along the lines of just reporting findings and  
15 pointing out that we are still wanting to do new work to  
16 find the full root cause. We have allowed them to have  
17 detailed findings reports of that nature if it seems  
18 appropriate, and maybe they have disproved all of the  
19 hypotheses in the original proposed trouble shooting report  
20 and now have some new hypotheses that go perhaps in a  
21 different direction.

22 MR. BEARD: I think at the end of the road,  
23 whenever you get there, and that is what I was really trying  
24 to determine, is that while you may want to do some  
25 additional testing and you feel like you have found the root

4-6  
1 cause subject to new information you may learn next week,  
2 you are at that point of having finished the work but have  
3 not completed the writeup on it, and I think that is what  
4 I wanted to establish.

5 But with regard to the writeup of the report,  
6 our expectation would be that you would address all these  
7 reasons and defend why you think this is the root cause and  
8 especially the area of completeness, you know, like we  
9 discussed yesterday.

10 I don't think that the report that we are  
11 expecting would be the report that says, at least in its  
12 final stage you might want to go with a preliminary report,  
13 but the final report I think that we would want to be pretty  
14 conclusive that you have done all the testing you want to  
15 do, whether it was in several stages or whatnot, and you  
16 are very confident that you have found the root cause, and  
17 not the kind of thing you were describing.

18 MR. GRIME: Right.

19 MR. ROSSI: Well, at the end of next week I guess  
20 our report -- we are supposed to finish a report at the end  
21 of next week, and it is pretty clear that if we do that,  
22 which we are currently planning to do, that a lot of the  
23 root causes are still not going to be known, and at that  
24 point in time there will have to be some definition of  
25 who does what with respect to your root causes after that,

Sim 4-7

1 and that I think is not really known right now, but that  
2 will get done at some point in time.

3 I assume that you are not being held up now  
4 anywhere by waiting for comments or anything from this  
5 team, and if that should occur at any point in time, then  
6 you ought to contact either us directly or contact the  
7 region, but we don't think we are holding you up with any-  
8 thing and you still haven't identified and justified the  
9 root causes in a lot of areas, and when the time comes that  
10 you have done that, then there will have to be some discussion  
11 about the involvement of Region III and the involvement of  
12 the NRC headquarters and the involvement of the team, and  
13 that we haven't done yet.

14 MR. GRIME: Do you want to talk some about  
15 that now as far as revised action plans or potential future  
16 ones?

17 MR. ROSSI: I don't think we are ready. Why  
18 don't we put that off until later in the day.

19 MR. BEARD: The only thing that I was wanting  
20 to clarify was that I would like to be able to put in the  
21 report that we are going to produce next week that while  
22 you haven't done the writeup phase and there is additional  
23 look/see in No. 1, do you feel like basically you have the  
24 root cause in hand? Now is that correct or am I misunder-  
25 standing, because I do not want to misquote the situation.



Sim 4-8

1 MR. BLAY: At this time I would say for the  
2 main feed pumps for the No. 1 trip on June 9th that that  
3 would be true.

4 MR. ROSSI: But you still have this thing that  
5 I think you are going to have to qualify that with the  
6 fact that they are continuing to look at the other pump  
7 and other things and they may find some more basic ---

8 MR. BEARD: Well, it is analogous I think to  
9 other situations where you want to do a hot functional test  
10 to actually replicate the failure and confirm that under  
11 hot DP or hot steam conditions that those are really the  
12 right causes, but I think you are saying that you think  
13 you are there.

14 MR. GRIME: Yes.

15 MR. BELL: Does this feed pump control system  
16 use valve position feedback in its control of the turbine?

17 MR. BLAY: That is correct, it does. It uses  
18 operator cylinder and pilot valve position feedback circuitry,  
19 and that circuitry has been tested.

20 MR. ROSSI: Do you have any more?

21 MR. BEARD: No, I am finished. Why don't we  
22 take a five minute recess.

23 MR. ROSSI: This is probably a good time for  
24 a few minutes break.

25 (Recess taken.)

1 MR. ROSSI: Okay, we are all ready. Let's go  
2 ahead and start.

3 The next discussion is on the trouble shooting  
4 that has been done in accordance with action plan No. 12 on  
5 valves AF-599 and AF-608. On this one we have had a number  
6 of meetings and discussions on what you found, and it is  
7 our understanding from your current status that the problem  
8 has been identified as being an improper setting of the  
9 torque limit switch bypass contacts, and that the thing  
10 that has not changed since the last time we discussed this  
11 is that you have now reproduced the failure on both valves  
12 with a differential pressure across the valve of 1050 psi.  
13 Is that correct?

14 MR. LONG: That is correct.

15 MR. ROSSI: Okay. And you have done it for both  
16 of the valves and you have done it more than just one time  
17 on the valves I gather.

18 MR. LONG: Originally I did AF-599 without use  
19 the Movats system. We tried it just using a little chart  
20 recorder measuring switch position and current, and we did  
21 the valve to fail one out of three times at a differential  
22 pressure of 1050. The valve did stroke at a differential  
23 pressure of 350 and 750, and some of the readings we got  
24 and the way that the valve acted at the unseating force of  
25 1050, we were concerned that we weren't seeing everything

Sim 4-9

1 that was happening. So that is when we called Movats back  
2 in and we retested both valves using Movats both at the 1050  
3 psi differential and again at the 750 and 350.

4 MR. ROGERS: The original testing, was it at  
5 608 or 599?

6 MR. LONG: Without Movats?

7 MR. ROGERS: Yes.

8 MR. LONG: The rate was 608, the first one we  
9 did.

10 MR. ROGERS: You at first said 599 and I think  
11 you meant 608.

12 MR. ROSSI: Was 608 the one that had the bypass  
13 switch that was set closest to what the procedure was?

14 MR. LONG: Yes.

15 MR. ROSSI: So 599, it failed every time you  
16 tested it?

17 MR. LONG: Yes, it failed every time.

18 MR. ROSSI: At what DPs?

19 MR. LONG: At 1050. It did pass at 350 and 750.  
20 However, our traces indicated that it just barely passed  
21 the 750.

22 MR. ROSSI: It just barely passed the 750. Okay.  
23 And it was the one that had the contacts that were further  
24 misadjusted?

25 MR. LONG: Right. They were the ones that were

Sim 4-10 1 only like a third of the turn after stem motion.

2 MR. ROSSI: Okay. And I gather that these  
3 contacts, that they are still in the condition they were  
4 in at the time of the event and you have not readjusted  
5 them.

6 MR. LONG: Right, we have not readjusted them.

7 MR. ROSSI: So everything is in the as-found  
8 condition and you have done this testing. How did you do  
9 the testing?

10 MR. LONG: We took a hydropump and we connected  
11 it. On AF-608 we connected the hydropump in between AF-608  
12 and the substream check valve and we pressurized it up to  
13 the 1050, let it set several minutes and then opened the  
14 valve.

15 On AF-599 we went in upstream of the check valve  
16 into a test connection, which in that case and at that time  
17 we were actually pressurizing all the way back to the feed  
18 pump discharge valves all the way up to AF-599 where we  
19 had to go into the system, and again we took it to a maximum  
20 of 1050 and tested the valves.

end Sim 21  
Joe fols 22

23

24

25

1 MR. BEARD: I am lost. Do we have a cartoon  
2 or could somebody draw one so that I can understand what  
3 you just said?

4 MR. BELL: I think he said leaked by during  
5 his hydro test -- no?

6 MR. ROSSI: I think it was the location of the  
7 test connection. I mean, you went to the best test connection  
8 on each valve and you pressurized it upstream.

9 MR. LONG: (From chalk board) On AF 608, we  
10 brought the hydro pump into a test connection on the steam  
11 gener recirc line. We set the recirc. We had the drain  
12 valve shut. We closed AF 608, and then we pressurized the  
13 area between the check valve and here to the pressure.

14 On AF 599, these connections were welded caps,  
15 so we came upstream to where the flow transmitter was, and  
16 came out here with the hydro pressure, which actually  
17 pressurized it back to the discharge valve on the aux feed  
18 pump.

19 It was just the reason on AF 599 there were  
20 welded cap connections, so we couldn't go in here.

21 MR. BEARD: If you put the pressure on the  
22 upstream side of the valve -- well let me say it this way:

23 You put it on the pump side of the valve rather than the  
24 steam generator side?

25 MR. LONG: Yes, sir.



1 MR. BEARD: And if I remember right, these  
2 valves are basically bi-directional, so that shouldn't  
3 make any difference.

4 MR. LONG: That is correct. They are six inch  
5 flex wedge valves.

6 MR. ROSSI: Now, have definitely determined that  
7 there was pressure drop that was higher than 750 across each  
8 of those valves on June 9th? And I gather that the way you  
9 would have gotten pressure drop was you had the pressure in  
10 the steam generators, which was up around 900 to 1000 I guess  
11 at the time the valves wouldn't open, and the check valve  
12 would have had to leak some, I guess.

13 MR. LONG: Since our original discussion, it  
14 now appears talking to Mr. Hildebrandt, is that the pressure  
15 actually was in the direction from the aux feed pump. That  
16 the pressure -- at one time we had a fifteen hundred pound  
17 discharge pressure on the aux feed pump, and what -- with  
18 608 closed and 599 closed, the pressure in the steam generator  
19 was going down.

20 I think it got to a point of close to 800  
21 pounds.

22 So, we actually had a DP in a direction from  
23 the -- that the steam generator was lower than the upstream  
24 side.

25 MR. ROSSI: Okay. So, that is the way they

1 would have just normally been expected to work, no matter  
2 how they got closed then.

3 I mean even if the pumps had not tripped.

4 MR. HILDEBRANDT: I am not sure I understand  
5 your question. The pressure in this case appears to have  
6 been higher in the direction that it is higher on the feed  
7 water pump, than it was in the steam generator side, which  
8 is the same way that Jim just described it. He went through  
9 the testing in terms of which direction you put the Delta-P  
10 on.

11 MR. ROSSI: Okay. So, you have actually put  
12 the Delta-P on in the direction that you believe that exists?

13 MR. HILDEBRANDT: Yes, sir.

14 MR. ROGERS: How much of a Delta-P do you  
15 postulate was there on June 9th?

16 MR. LONG: You can estimate that it is between  
17 zero -- depending on where leakage is on, and as much as on  
18 the order of six to seven hundred psi.

19 MR. ROSSI: So, it wasn't as high as a thousand.  
20 It was more like six or seven hundred.

21 MR. LONG: Based on the numbers we have  
22 got now, yes, sir.

23 MR. ROSSI: The bypass contacts, once -- or the  
24 torque switch, once it torques out, it stays torqued out  
25 until -- I mean, what do you have to do to try to open it

1 again.

2 MR. LONG : You can either go down  
3 and manually engage the valve and break up -- go to the  
4 open position and break out of the seat, or in the case  
5 that we did during the incident, it looked like the operator  
6 rocked the valve back and forth with the hand wheel and  
7 actually relaxed the spring back, causing the torque switch  
8 to reclose, and then hammering the valve open.

9 MR. ROSSI: Okay. But once the torque switch  
10 torques out, it takes LOCA action to get it back into the  
11 circuit. Nothing that can be done from the control room  
12 once that happens?

13 MR. LONG: You could try to plug the valve,  
14 which means that you go to close, and then try to open it  
15 and hope that maybe you can hammer off the seat.

16 That would be the other possibility, but  
17 that is not a recommended way of doing things.

18 MR. ROSSI: Okay.

19 MR. BEARD: The setting that the bypass switch  
20 had for 608, I believe you said earlier was like eight turns,  
21 the procedure said nine turns, so it is fairly close?

22 MR. LONG: Correct.

23 MR. BEARD: And you are saying that in here  
24 that setting was such that it was -- the bypass was opening  
25 before you got off the seat?

1 MR. LONG: (Pause) Yes. Or before it completely  
2 cleared the seat to drop the forces across the valve enough  
3 to keep the torque switch from taking the valve out.

4 MR. BEARD: Is that saying -- I am trying to  
5 remember the gentleman's sketch a few weeks ago on what  
6 actually takes place that you have to actually clear the seat  
7 and then you get the DP actually across the valve itself,  
8 and so there is an additional force in there that you have  
9 to overcome, and they had a greater torque, and hence a need  
10 for a longer bypassing of the torque switch.

11 MR. LONG: Right.

12 MR. BEARD: Are you saying that this setting --  
13 I assume that we are talking a number like five percent, was  
14 so early that the valve hadn't even gotten into that second  
15 phase of the DP part of the problem.

16 In other words, you really just hadn't even  
17 gotten that far?

18 MR. LONG: On AF 599, from the MOVATS data we  
19 have, it appears the disc had not even started moving. Most  
20 of the motion we had was just the stem picking up, and then  
21 the torque switch trip.

22 MR. BEARD: But 599, if I remember correctly,  
23 was the one that was grossly misadjusted.

24 MR. LONG: That was grossly misadjusted.

25 MR. BEARD: I am trying to understand on the

1 other one.

2 MR. LONG: Now on the other one -- well.

3 MR. CHARBONNEAU: When we first ran the test,  
4 whichever one was the closest, 608, we showed the switch  
5 was dropping out on the down slope, just as it had barely  
6 popped out of the seat, and we said that was too close.

7 MR. BEARD: That was the zero DP.

8 MR. CHARBOTTEAU: That was a zero DP condition. Under  
9 low load condition that peak load stretches itself further  
10 into the cycle, and under this testing condition we showed  
11 now that the bypass was dropping out under the high load  
12 condition, and that the torque switch was stripping because  
13 of the load.

14 When the valve did not fail -- in other words  
15 it did operate -- we showed that the load, for whatever reason  
16 had not reached the torque switch trip signal.

17 Each time it failed we measured the load, and  
18 you could see it on the signature, and knew clearly what  
19 torque switch had tripped. I think that is what you are  
20 asking.

21 MR. BEARD: I am really trying to put it in  
22 very simple words that I can digest easily, and I think that  
23 there is a certain amount of force and torque that has to be  
24 applied to get this bugger up off the seat.

25 MR. CHARBONNEAU: Right.



1 MR. BEARD: And then once you transition from  
2 that effort to overcoming the DP that is now felt across the  
3 valve, there is an additional torque involved there, because  
4 of the DP.

5 MR. CHARBONNEAU: But it is much less.

6 MR. BEARD: Much less?

7 MR. CHARBONNEAU: The forces are a lot higher  
8 to unseat the valve, because you have -- you have got two  
9 main elements.

10 You have the -- I guess the industry word is  
11 diction, or whatever you want to call it, the seating force  
12 from the previous closing operation, and the other element  
13 being the high Delta-P.

14 The minute you pop it off the seat, you have  
15 eliminated that previous seating force. Now all you are  
16 left with is the friction forces which are significant.

17 MR. BEARD: The Delta-P.

18 MR. CHARBONNEAU: The Delta-P, which are  
19 significant.

20 However, they are not equal to the unseating  
21 force.

22 MR. BEARD: Okay. What I am really trying to  
23 get to is the basic understanding of what you said in the  
24 status report. When we had our previous meeting on this  
25 subject, I had the impression that the valve in previous

1 tests was not tested with the DP across it.

2 MR. CHARBONNEAU: Correct.

3 MR. BEARD: And that the setting there if you  
4 ran the test might pass the test, because you had overcome  
5 the forces and applied the torques for getting the valve  
6 off the seat, but you hadn't had it adjusted for enough  
7 reopening stroke to overcome the DP part of it.

8 And I think -- I am trying to understand it  
9 from that viewpoint, you see, and I got the impression that  
10 this last test showed it was at the previous setting of  
11 roughly five percent. It was unbypassing the torque switch  
12 even before you had overcome the unseating part of the problem  
13 and before -- hence before -- or as you were transitioning  
14 into the DP part of the torque.

15 MR. ROSSI: Well, I think the situation is the  
16 torque, to unseat it, is different when you have a DP across  
17 it than it is when you don't have a DP, is that what you are  
18 saying?

19 MR. CHARBONNEAU: Absolutely.

20 MR. ROSSI: The torque to unseat it is different  
21 with respect to its magnitude and how long the torque stays  
22 high as you start to move it off of the seat, and you turn  
23 the actuator, is that -- that is what you are saying.

24 MR. BEARD: You have some documents that you  
25 are referring to that have some cartoons in them. Would they

1 be useful.

2 MR. LONG: I don't know if you ever got a copy  
3 of the report from the test we just did with the Delta-P.

4 MR. BEARD: I do not believe we received it.

5 MR. ROSSI: There are phenomena that are called  
6 thermal binding, and pressure locking, which is primarily  
7 related to flexible disgate valves.

8 I assume this is not a flexible disgate valve,  
9 is that correct?

10 MR. CHARBONNEAU: Well, it is.

11 MR. ROSSI: It is a flexible disgate valve?  
12 So it has got two gates on it that do that?

13 MR. NADEAU: No, it is a single switch wedge.  
14 It is not a two piece.

15 MR. ROSSI: It is a single split wedge?

16 MR. NADEAU: Right.

17 MR. ROSSI: There have been documents put out  
18 by IMPO that talk about problems with thermal binding and  
19 pressure locking and that kind of thing. Are you familiar  
20 those phenomena also?

21 MR. GRIME: Just a minute. Do we want to --

22 MR. ROSSI: Why don't we wait and come back to  
23 this in a minute.

24 You are familiar with the pressure binding and  
25 thermal locking and that kind of thing that IMPO has described

1 and I think has been known in the industry. Have you ruled  
2 that out as a contributing cause to this problem?

3 MR. CHARBONNEAU: I would have to say yes,  
4 because even if either of those two conditions existed,  
5 we never gave the motor a chance to pull it out. Thermal  
6 binding is a problem if you have got an undersized -- I use  
7 the word undersized, I don't really mean it that way --  
8 you have got a relatively small motor, okay?

9 It is enough to handle the design conditions  
10 and you get a thermal binding condition, you would go to  
11 lock rotor and trip on thermal overload.

12 The motors are such that are used on 599 and 608.  
13 They have plenty of power behind them, and I would think that  
14 you have enough if you have a thermal binding condition.

15 Thermal binding, by the way, is most predominant  
16 in solid wedge, and the flex wedge, such as 599 and 608,  
17 will be so-called very forgiving to a thermal condition.

18 MR. ROSSI: But what about the pressure locking?

19 MR. CHARBONNEAU: Pressure locking, you can't  
20 rule out from any gate valve.

21 Again, if it was a hydraulic lock in the bonnet  
22 you would have to give the operator a chance to go to lock  
23 rotor condition.

24 If it went out on thermal, with the bypass  
25 properly adjusted, one would have to suspect either an

1       incorrectly sized motor, or hydraulic locking of the bonnet.

2               MR. ROSSI: Okay. So your argument really is  
3       that the bypass -- that the bypass contacts -- it really  
4       opens before you tripped the motor on June 9th.

5               It wasn't just a torque out -- how do you know  
6       that the bypass switch is opened on contacts, and opened on  
7       June 9th, and you just didn't get a flat out -- okay, no,  
8       never mind. I think I see.

9               You are saying the torque switch is bypassed  
10      initially.

11              MR. CHARBONNEAU: Supposed to be.

12              MR. ROSSI: Okay. And if you had either pressure  
13      locking or thermal binding, you wouldn't have had a torque  
14      switch in there?

15              MR. CHARBONNEAU: Correct.

16              MR. ROSSI: Okay. And it would have gone out  
17      on thermal overload and you know it didn't go out on thermal  
18      overload on the 9th.

19              MR. LONG: We have no thermal overloads on our  
20      safety-related equipment.

21              MR. ROSSI: All right. It couldn't have gone out  
22      on thermal overload. So, if it had been pressure locking or  
23      thermal binding that had caused the valves not to open, they  
24      would not have torqued out, you would have burned out the  
25      motor?



1 MR. BELL: Or tripped the magnetic overloads  
2 in the circuit breaker.

3 MR. LONG: If it could have got that high, yes.  
4 It would probably have burned the motor.

5 When we went to Limitorque two weeks ago today,  
6 and discussed this with Pat McQuillan of Limitorque and  
7 he informed us that that motor, four horsepower motor on  
8 that unit, can develop 40,000 pounds of thrust through that  
9 actuary, and he said had that valve, the limit switch been  
10 set correctly, it would have pulled that valve open against  
11 the required Delta-P.

12 MR. BEARD: So there is plenty of torque in the  
13 motor?

14 MR. LONG: There is plenty of torque in the  
15 motor actuary.

16 MR. ROSSI: And you really have done enough  
17 you feel to eliminate thermal binding or pressure locking  
18 as a cause?

19 MR. LONG: Yes.

20 MR. BAJESTANI: The horsepower calculation  
21 shows that we actually need 2.9 horsepower motor.

22 MR. ROSSI: Yeah, but that is all based on not  
23 having pressure locking or thermal binding, isn't it?

24 MR. BAJESTANI: Right.

25 MR. ROSSI: And if you have pressure locking or

1 thermal binding you wouldn't know how much torque it takes  
2 to pull it off.

3 But your main argument is that the torque  
4 switch certainly wasn't in there when you started to move it,  
5 so it had to move a little bit before you got the torque  
6 switch in, and that would be inconsistent with thermal  
7 binding or pressure locking?

8 MR. BAJESTANI: Right, that is correct.

9 MR. ROSSI: Do you agree with that?

10 MR. LONG: I would discount thermal binding  
11 just from the scenario that at no time did hot water ever  
12 get to those valves.

13 The valves are located down in the mechanical  
14 penetration room, some distance from the steam generator,  
15 and unless we had gross amount of back leakage through the  
16 check valve the high speed generator water would have never  
17 reached those valves.

18 I think our hydro tests proved those check valves  
19 hold.

End 5. 20  
SueWal foli. 21

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#6-1-SueWalsh

2 So, the only water that would have gone through  
3 the valves would have been from either the condensate system  
4 or the service water system, depending on which one was  
5 selected. So, I think in this case we can discount any  
6 thermal binding in these valves.

7 MR. HILDEBRANDT: In fact, no water got there.  
8 It would have been residual water sitting in the line.

9 MR. ROSSI: Okay. Now when you go back up to  
10 mode 3 you are going to do this test again? Is that what  
11 you intend to do?

12 By running the auxiliary feedwater pumps and  
13 trying it again? Is that your intent? Or, what do you  
14 intend to do?

15 MR. LONG: Right now we are still in the --  
16 trying to set up a scenario of what we want to do for  
17 corrective action, what further testing we think may be  
18 required on these valves and also other valves in the plant.

19 MR. ROSSI: Let me ask you another question.  
20 You had one of these valves, I think it was 599, that  
21 wouldn't open after the March 1984 event where you had a  
22 stuck steam generator safety valve. One of them wouldn't  
23 open at the end of that and you had to go down and hand-  
24 crank it open. And you readjusted the torque switch at  
25 that time.

MR. LONG: Correct.

#6-2-SueWalsh1

2 switch, did you reproduce the failure? Or, do you know?

3 MR. LONG: To the best of my knowledge, we did  
4 not reproduce the failure.

5 MR. ROSSI: Did you try to reproduce the  
6 failure?

7 MR. LONG: No.

8 MR. ROSSI: You did not try to reproduce the  
9 failure --

10 MR. LONG: No.

11 MR. ROSSI: -- and you didn't reproduce the  
12 failure, you just readjusted the torque switch?

13 Are you pretty sure of that?

14 MR. LONG: Yes. Normally the way, since I've  
15 been here, if we had a valve torque out, the first thing  
16 I would do would be to send a maintenance crew down there  
17 to do a check of the valve to make sure it was set cor-  
18 rectly, to make sure the limits were set, per our procedure  
19 at that time, to check the valve stem to insure that it was  
20 lubricated and clean, and to adjust the packing.

21 If we still had problems at that time I would  
22 contact engineering and say: We've got a -- we have a valve  
23 torque out. I can't figure out what's doing it.

24 And at that time, Masoud would then go through  
25 the Torrey Pine study and say it's either the correct setting,

#6-3-SueWalsh

2 and you've got a problem, or no, we've got the incorrect  
3 setting. And in this case, we readjusted the closed torque  
4 switch setting on both those valves from the existing one  
and a half down to the one which it is now.

5 MR. BEARD: Was that based on Torrey Pines?

6 MR. LONG: Based on the Torrey Pines study.

7 MR. BEARD: So, the Torrey Pines study told you  
8 that the most desirable setpoint was one?

9 MR. LONG: One --

10 MR. BAJESTANI: One for closed.

11 MR. BEARD: One for closed?

12 MR. LONG: Yeah, originally the Bechtel setting  
13 was one and a half, both open and closed. And the Torrey  
14 Pines study, we reduced the closed setting to one.

15 MR. BEARD: So, you basically concluded that as  
16 a result of your people going down there and inspecting  
17 the valve and checking settings that you didn't have the  
18 right setpoint and blamed the failure on that?

19 MR. LONG: Well, the people in the plant, we  
20 determined that we could not find any reason for the valve  
21 torquing out.

22 MR. ROSSI: When it torqued out in March of '84  
23 did it have a DP across it, or do you know what happened?

24 MR. LONG: I don't know that, sir.

25 MR. ROSSI: No one has looked I guess? It may



#6-4-SueWalsh1

2 or may not have had a DP. Well, it must have had. It might  
3 possibly not have had any DP across it then if you didn't  
4 have the pump running.

5 MR. LONG: I would suspect it did not have. The  
6 majority of the time the valves are tested, there is no DP.

7 MR. ROSSI: Well, this wasn't a test now in March  
8 of '84. This was at the end of the event where you had  
9 blown down the one steam generator and they had replaced the  
10 safety valve, as I recall, and they tried to get flow to  
11 the one steam generator and they couldn't get the valve  
12 open.

13 You remember this event, don't you, Walt?

14 MR. BEARD: I remember reading --

15 MR. ROSSI: Do you know whether they would have  
16 had DP across it at the time they couldn't open it?

17 MR. ROGERS: If they had any DP it would have been from  
18 the auxiliary feed pump side. It would not have been from the  
19 steam generator at that point.

20 MR. BEARD: That is the one that had the stuck  
21 safety?

22 MR. ROGERS: I think that was the side that had  
23 the stuck safety and they were trying to restore auxiliary  
24 feedwater to that side because they wanted to use auxiliary  
25 feedwater because it would in fact spray up at the very top  
of the tubes instead of trying to use startup feed water, and

#6-5-SueWalsh

2 they did in fact have to go down on the trip throttle valve  
3 and adjust it to slowly crack it open to actually feed that  
4 generator.

5 And I think it was at that point in time that they  
6 were trying to -- I do not know whether they had to actually  
7 turn on the auxiliary feed pump and actually correct the  
8 trip throttle valve when they found that the valve wouldn't  
9 work properly.

10 MR. ROSSI: If they had the pump on --

11 MR. ROGERS: If they had the pump on --

12 MR. ROSSI: -- they would have DP across it.

13 MR. ROGERS: Then, they should have at least 1050  
14 DP.

15 MR. ROSSI: And then --

16 MR. ROGERS: I would have to go back and pull the  
17 computer traces for that. That data is available to be  
18 looked at.

19 MR. ROSSI: Is that terribly hard to do?

20 MR. ROGERS: No.

21 MR. ROSSI: Okay. I would be curious as to whether  
22 when they tried to open the valve in March of '84 there was  
23 a DP across it. And, then another question on that is, was  
24 the bypass switch set the same way or even closer to the  
25 closed position in March of '84 than it was on June 9th?

MR. LONG: I would say it was probably set closer

#6-SueWalsh

in '84 because when we did the maintenance during this last outage we then reset the valve per the new Torrey Pines procedure for the five percent.

MR. GRIME: Jim, do we have good access? Could we get that information on the Delta P question that Dr. Rossi had back in March of '84?

MR. LONG: Yeah, we can get it. I'm not sure where to start looking. But we can get it.

MR. ROSSI: Yeah, because the cause in March of '84 may have been the same thing, and especially if you didn't reproduce the failure before you readjusted the torque switch, you may have been -- it may have been the wrong problem.

MR. GRIME: Let's plan on doing it.

MR. BEARD: Could I ask you a pointblank question about it? Is it possible that the settings for the bypass switch and the torque switch were what caused the March '84 event and it was maybe not diagnosed?

MR. ROSSI: That's the same question I think that I just asked.

MR. BEARD: You know, I didn't realize. I was thinking about something else. But I will just leave that one.

Let me ask -- we can go to this for a minute. The cartoon that you gave me, Jim, shows I guess torque versus the position of the valve with various -- for various

#7-SueWalsh

DPs across it.

2 MR. LONG: Yes.

3 MR. BEARD: And, you know, at a previous meeting  
4 I had the impression that the problem was that the bypass  
5 switch around the torque switch opened too soon.

6 MR. LONG: Yes.

7 MR. BEARD: Okay. But at that time my impression  
8 was that that was the only problem known. Now, in glancing  
9 at these curves that you just layed on the table here, it  
10 appears that that may have been a problem but also you have  
11 shown here the value of the torque switch itself.

12 And it appears, if I understand this curve properly,  
13 that the torque switch would turn off the motor whenever the  
14 bypass switch weren't open even if it was set significantly  
15 later.

16 In other words, the problem is not just that the  
17 bypass switch opened earlier and allowed the torque switch  
18 to become operable too early; it seems like regardless of  
19 when it opened, the torque switch said it was too small for  
20 a DP of 1050.

21 Now, am I misunderstanding or is that -- because  
22 your cartoon here indicates I guess a range of the torque  
23 switch values -- the torque switch trip values, which is below  
24 the torque that would exist for 1050 and essentially at the  
25 top end of that range, that's the value to peak torque for 750,

#3-SueWalsh

which corresponds to your earlier statement that at 750 it passed the test but maybe just barely.

MR. LONG: Yes.

MR. BEARD: I guess what I'm saying --

MR. LONG: It appears right now that besides the problem of having the bypasses set too early, we may have a calculation problem with where to set the torque switch.

In other words, we have the torque switch set at a one and a half setting which according to my calculations should have been sufficient for a 1050 DP. Now, the MOVATS data indicates that that may in fact not be the case.

MR. ROSSI: Is that true for both valves or just one of the two?

MR. BAJESTANI: That's true for both valves.

MR. ROSSI: So, let me ask the question, even had the bypass contacts been set at ten percent stroke instead of five percent the torque switches would have torqued out the valves with 1050 across it on June 9th?

MR. LONG: Possibly.

MR. BAJESTANI: Possibly.

MR. ROSSI: Possibly they would have anyway.

MR. BELL: Art, you are wrinkling your eyebrows.

MR. CHARBONNEAU: I do that all the time.

(Laughter.)

MR. BELL: Did you have something that you wanted



#9-SueWalsh

to interject?

2 MR. LONG: Am I saying that --

3 MR. CHARBONNEAU: I -- Joe, correct me if I --

4 Joe Nadeau is the one that set the final data, but my  
5 recollection, I remember unseating those two large elements,  
6 the previous closing forces and the high Delta P loads.  
7 To unseat the valve, you've got to overcome those two. Okay.

8 I believe that you folks, through your calculations,  
9 said it required something like thirteen thousand pounds to  
10 run --

11 MR. BAJESTANI: Fifteen.

12 MR. CHARBONNEAU: Fifteen with a twenty-five  
13 percent margin included. And we show the torque switch at  
14 about thirteen and a half to fourteen, which is well within  
15 that margin.

16 It would be our opinion that had the bypass switch  
17 been set properly, the valve would have unseated and at the  
18 present torque switch setting the valve would have successfully  
19 gone to an open position.

20 MR. BAJESTANI: With a 1050 across?

21 MR. CHARBONNEAU: With a 1050.

22 MR. BEARD: Well, maybe I'm not understanding  
23 this cartoon.

24 MR. BAJESTANI: Is that the 608 or 599?

25 MR. BEARD: I don't know. It's whatever Mr. Long

#60-SueWalsh

handed me.

2 MR. LONG: That was in the 599 package.

3 MR. BEARD: Okay. Well, let me tell you where I  
4 am coming from --

5 MR. LONG: Okay.

6 MR. BEARD: -- and maybe you can tell me where  
7 I'm missing the boat.

8 As I understand this torque curve, if I looked at  
9 only the 1050 one about in here I'm unseating the previous --  
10 or, I guess here I'm unseating the previous closure and this  
11 latter part of the curve has to do with the DP more than the  
12 other.

13 MR. CHARBONNEAU: No, that's where it's wrong.  
14 The high loading conditions that you see there --

15 MR. BEARD: Here?

16 MR. CHARBONNEAU: At the beginning you are not  
17 doing anything, as a matter of fact. You are just turning  
18 the internal gears. Right. All the way through there, you  
19 are doing nothing.

20 MR. BEARD: Right here?

21 (Pointing.)

22 MR. CHARBONNEAU: No. Just keep going over to the  
23 right.

24 MR. BEARD: Here?

25 MR. CHARBONNEAU: Now, you are picking up the stem

#601-SueWalsh and you are unseating.

2 MR. BEARD: Right.

3 MR. CHARBONNEAU: You do not unseat until the end  
4 of each one of those signatures when it goes back down.

5 MR. BEARD: Here, or out here?

6 MR. NADEAU: Way out.

7 MR. BEARD: Way out beyond the curve?

8 MR. NADEAU: Well, the top one went right off the  
9 page it was so far out. The next one down at 750 unseated  
10 where you see it drop down.

11 MR. BEARD: Now, where does five or ten percent  
12 fall on this figure, or is it off the page?

13 MR. NADEAU: It's off the page.

14 MR. BEARD: Five percent is off the page?

15 MR. NADEAU: Yes.

16 MR. BEARD: So it's the end of the figure that  
17 is not on the page that I misunderstood?

18 (No reply.)

19 In other words, you are saying that with the torque  
20 switch set to the proper -- the bypass set to the proper value,  
21 that it would not re-engage the torque switch or allow the  
22 torque switch to cut off the motor until a value of stroke  
23 beyond the page here and by that time --

24 MR. CHARBONNEAU: Right.

25 MR. BEARD: -- the torque would have come back down

#6-2-SueWalsh1

from these high values shown on the figure --

2

MR. CHARBONNEAU: Absolutely.

3

MR. BEARD: -- and, therefore, the torque setting would be appropriate.

5

MR. CHARBONNEAU: Yes.

6

MR. BEARD: Ah, so.

7

MR. ROSSI: Your statement that the bypass contacts being at ten percent rather than five percent on June 9th would have allowed the valve to be open is based on your analysis of the testing that was done with the differential pressure across the valve, not on their calculations of what the torque would be with the pressure -- a differential pressure of 1050 across the valve?

14

Is that correct or --

15

MR. CHARBONNEAU: I don't know where this ten percent number came from.

17

MR. LONG: No, originally I think we were referring to it when we had our original discussion, we indicated that we were considering resetting them to a value of ten percent.

20

I think that we have shown that after we have tested these now with pressure that it doesn't look like even the ten percent would have covered the unseating.

23

MR. BEARD: Do you have any feel for what kind of number you are talking about? Is it eleven percent or is it thirty percent?

24

25

#13-SueWalsh

MR. LONG: Do you remember?

MR. BAJESTANI: Okay. Ten percent is a 1.25 second which is --

MR. BEARD: 1.25 seconds?

MR. BAJESTANI: Yeah, 1.25, something like that. We calculated we needed 1.5 seconds which corresponds to that -- thirteen percent, Joe?

MR. NADEAU: Yeah, I don't remember that. Probably thirteen.

MR. BEARD: So, to give you some margin you would probably -- I'm speculating now, but you would probably end up with something like maybe fifteen.

Is that what you are saying?

MR. BAJESTANI: Actually, as a positive corrective action what we attempted to do, we contacted Velan, which is the valve manufacturer, and we also talked to Limitorque.

One of the options is to actually bypass the torque switch with ninety percent --

MR. BEARD: Ninety?

MR. BAJESTANI: Right. And we also -- we have learned that there are some utilities that they do that, they bypass at ninety percent.

MR. ROSSI: Are you finished with that part?

MR. LONG: In answer to your earlier question, if we were going to pick a number I think instead of saying we

# 14-SueWalsh

1 were just going to set it at fifteen percent, what we would  
2 do would be to take a trace of the valve and find its unseat-  
3 ing torque.

4 The ideal condition would be to do each one under  
5 a DP. That would be the preferred method if it was possible  
6 and we could do it, would be to test every valve under its  
7 designed DP and actually did trace and pick a point.

8 Other than that, it's going to be a, pick a number  
9 that we feel is going to be far enough down the line to make  
10 sure that it's bypassed and insure that the torque we are  
11 setting then is also high enough to overcome any unknown  
12 forces that might be there.

13 MR. BEARD: Okay. So, really your selection of  
14 ninety may be based more on generic applicability rather  
15 than these specific valves that we are talking about.

16 MR. LONG: That's correct.

17 MR. CHARBONNEAU: Could I just add one thing here  
18 so that we could get both sides of this point?

19 MOVATS has tested in excess of three hundred valves  
20 and set them up, and we typically use -- we give our field  
21 engineers guidance on where do you set the bypass switch.

22 And our procedures state, as I recall, between  
23 five and ten percent as soon as you see on the signature  
24 that you are unseating, not from the beginning, not from the  
25 stem movement or anything like that. It's when you begin to



# 15-SueWalsh

unseat, set the bypass to drop out five to ten percent --

2

MR. BEARD: Beyond that?

3

MR. CHARBONNEAU: -- beyond that. Okay.

4

MR. BEARD: Okay. I see.

5

MR. CHARBONNEAU: Of the three hundred and some odd

6

valves that we have tested, we have not been informed of any

7

failures of those valves.

END #6

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Simons flws

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Sim 7-1 1

2 MR. ROSSI: That is with DP you have tested it,  
3 with differential pressure?

4 MR. CHARBONNEAU: No, sir. Ninety-five percent  
5 of the valves that we have tested is without DP. We can set  
6 the torque switches to the calculated values and set the  
7 bypass to five to ten percent.

8 MR. ROSSI: Well, if you have tested them without  
9 the differential pressure across them, that might not be a  
10 test that -- or I would not expect to see any failures for  
11 that.

12 MR. CHARBONNEAU: My point is that it is not  
13 necessarily conclusive, I agree with you, but these are plants  
14 that have had their valves reset and have been operating a  
15 year and a half and almost two years, and there are over  
16 300. Now, granted, we don't have any engineering data  
17 because every valve is different and every pressure valve is  
18 going to give you a different signature.

19 MR. BAJESTANT: Yes, but we have some test results  
20 now that show that 10 percent is not adequate.

21 MR. BEARD: Well, wait a minute. I perceive  
22 that what you are saying is that your field reps are instructed  
23 to set as their value like five to 10 percent after valve  
24 unseating, and I hear someone else suggesting five or ten  
25 percent of maybe a different value.

MR. CHARBONNEAU: That is correct and that is

Sim 7-2 1 why the suit is correct.

2 MR. BEARD: Am I misunderstanding what we are  
3 talking about, this difference?

4 MR. CHARBONNEAU: That is right, and there can  
5 be a big difference. We do not say from the start of valve  
6 when you turn the switch. We don't say five to ten percent  
7 from that point. It is five or ten percent when you begin  
8 to see the valve unseat because you have to take up all the  
9 slop and you have got to pick up hammer blow and then you have  
10 got to pick up the disc. You have got to take care of the  
11 gap in the disc and every valve is different.

12 Then the minute you start pulling the disc out,  
13 five to ten percent ---

14 MR. BEARD: Beyond that.

15 MR. CHARBONNEAU: Yes.

16 MR. BEARD: Okay. Is it possible that  
17 some misunderstanding of that communications to the end-  
18 users such as Toledo Edison could have contributed to this  
19 matter?

20 MR. CHARBONNEAU: No, sir. That is an internal  
21 number that we use, and this is one of the very first times  
22 that it has ever gone outside of Movats because we have  
23 no engineering or test justification.

24 MR. BEARD: But that seems to be the crux of  
25 the difference between two 10 percent numbers.

Sim 7-3

1 MR. CHARBONNEAU: Oh, yes. If we took 10 percent  
2 from the start of the cycle when we turned the switch, I  
3 guess I would have to look at the signatures, but I don't  
4 think 599 or 608 would make it.

5 MR. BAJESTANT: If we used your 10 percent, that  
6 is different. That is true.

7 MR. BEARE: How does the 10 percent number that  
8 you recommend to your field reps relate to time, such as  
9 1.5 seconds? I am not sure I know how to correlate those  
10 two values.

11 MR. CHARBONNEAU: It would probably be, what is  
12 that two seconds from the start of the cycle? Probably  
13 two to two-and-a-half seconds.

14 MR. ROSSI: When we were here the last time and  
15 talked about the problem of 599 and 608 and we were talking  
16 about changing bypass contacts to 10 percent. Had you  
17 actually had a procedure and everything to make that change  
18 at that time? Had we not gone back and tested the valve  
19 with the differential pressure across it, did you at the time  
20 we discussed this a couple of weeks ago have actual settings  
21 that you were ready to go to in the bypass context?

22 MR. BAJESTANT: No.

23 MR. ROSSI: You didn't have the settings. What  
24 you were going to do is have Movats do the settings for  
25 you and you were going to set them at 10 percent, or what

Sim 7-4

1 was going to be done after that last meeting?

2 MR. LONG: Well, at that last meeting we weren't  
3 going to do anything other than trouble shoot the valves  
4 again to see what kind of signatures we were getting with  
5 the Delta P and to see if our original conclusion that the  
6 bypass was in fact the problem was in fact a valid assumption.  
7 At that time we just said that a possibility exists that  
8 we would change our procedure to change the 10 percent  
9 setting and then based on this data see if that would be  
10 good enough.

11 MR. ROSSI: Well, one of the problems that I  
12 am having is that is it possible to set these bypass contacts  
13 other than for some setting like 90 percent where you would  
14 have a high degree of assurance that you are not going to  
15 put it in too soon, is it possible to set it at around 15 or  
16 20 percent without testing it with the DP across it that it  
17 might have to open against?

18 MR. LONG: Well, right now having the signatures  
19 we have on these two valves, we have enough data that we  
20 know exactly where to set it.

21 MR. ROSSI: Yes, but that is because you have  
22 done it with the differential pressure. But my question is  
23 is it possible to set these valves that the bypass contacts  
24 on these valves might have to open with a differential  
25 pressure without actually taking the signature with a



Sim 7-5

1 differential pressure across it?

2 MR. BAJESTANT: Based on Movats' experience, they  
3 are saying that 10 percent should be adequate.

4 MR. BEARD: Their version of 10 percent.

5 MR. BAJESTANT: Their version of 10 percent, which  
6 we go to 15 percent.

7 MR. CHOULES: I have got a question. I am pretty  
8 familiar with this, and we have thrown a lot of 10 percent  
9 numbers around. The original 10 percent number you guys are  
10 talking about was the 10 percent of valve travel when the  
11 stem starts to move. Now if I am hearing him, I think he is  
12 saying the same thing.

13 MR. CHARBONNEAU: We use five to ten percent  
14 as soon as the valve begins to unseat.

15 MR. CHOULES: Well, that is the same thing as  
16 the stem starting, isn't it?

17 MR. BAJESTANT: No.

18 MR. CHARBONNEAU: No. That is not the same. In  
19 a globe it is. There is a time difference to take up the  
20 machining gap between the stem and the disc, and in this  
21 particular valve, the stem is going to move quite a ways  
22 because it has got to allow the disc faces to relax and then  
23 it pulls out.

24 MR. BEARD: Would that difference be on the order  
25 of five to ten percent also? I mean I am trying to get a



Sim 7-6

1 feel for what the difference between these 10 percents might  
2 be. Is that on the order of five percent?

3 MR. BAJESTANT: That is actually 75 milli seconds  
4 I think. Right?

5 MR. NADEAU: No, I can't handle the time part.  
6 It perturbs the position of valve stem.

7 MR. BEARD: Would the valve stem maybe move  
8 some percentage before the valve starts to actually unseat?

9 MR. CHARBONNEAU: Yes.

10 MR. BEARD: And would a ball park feel for it  
11 be on the order of five percent or ten percent?

12 MR. NADEAU: Maybe less than that.

13 MR. BEARD: What would you suggest? I don't mean  
14 to pin anybody down. I am just trying to get a feel for  
15 what the difference between these two 10 percents might be.  
16 Is it one percent or five percent or ten percent?

17 MR. CHARBONNEAU: This is a six-inch valve, right?

18 MR. LONG: Yes. Well, I guess one way of doing  
19 it is we figured out that it took 8.6 seconds for travel, and  
20 at 8.6 seconds we said that okay, that would be .86 seconds  
21 worth of travel for 10 percent, that if we set a prior  
22 procedure, the valve would have moved .86 seconds into the  
23 valve stroke. Our data indicated that we should have had  
24 it set, to completely unseat it, was it 1.5 seconds, was  
25 that the number?

Sim 7-7

1 MR. BAJESTANT: 1.5, yes.

2 MR. LONG: So .86 was our 10 percent and 1.5 would  
3 have probably been close to your 10 percent.

4 MR. CHARBONNEAU: Yes.

5 MR. ROSSI: That is almost a factor of two  
6 difference then, isn't it.

7 (Messrs. Long, Bajestant and Carbonneau nodding  
8 affirmatively.)

9 MR. BEARD: That is why I was trying to relate  
10 it to a number like 5 or 10 because that is a number  
11 I hear you saying, that it is like 5 or 10 percent. But  
12 I still have difficulty, and maybe it is not worthwhile  
13 pursuing any further in this larger group, but I have  
14 difficulty understanding the correlation between a time  
15 setting or a time calculation and valve movement or valve  
16 stem movement.

17 MR. ROSSI: I think Walt has a diagram on the  
18 board.

19 MR. ROGERS: The stem moves and the disc doesn't  
20 move until the step hits the top of the disc right in here  
21 in this groove and the disc starts coming.

22 What TECO is talking about is stem movement.  
23 What Movats is talking about is disc movement.

24 MR. BEARD: I understand that part, but how do  
25 you relate these physical motions to time?

Sim 7-8

1 MR. ROSSI: The time now for how long it takes  
2 the stem to go to the point where it catches with the disc  
3 and then how long it takes the stem to ---

4 MR. BEARD: That is not my understanding, because  
5 I think, or my understanding certainly is this is an  
6 electrically operated motor operator valve, right?

7 MR. CHARBONNEAU: Yes.

8 MR. BEARD: Anyway, you know what I am talking  
9 about. I am trying to understand whether in the time domain  
10 you are talking about the time I flip a switch, so to speak,  
11 and turn this jewel on until it reaches the full closed  
12 position is eight seconds or so.

13 Now if that is the starting point, so to speak,  
14 then that may be even before this starts to move.

15 MR. CHARBONNEAU: It is.

16 MR. BEARD: And I am trying to understand if  
17 Toledo Edison in their usage of this 1.2 seconds or .8 seconds  
18 are talking about what is in effect the time the motor is  
19 turned on or whether you are talking about time from some  
20 physical motion of either the stem or the disc.

21 MR. LONG: Our time that we were going to base  
22 it on was strictly a handwheel turn percentage.

23 MR. BEARD: So it is really position.

24 MR. LONG: A position, but it was based on just  
25 watching when the stem nut started to move. That is when

Sim 7-9

1 we would start our time from. Nothing else has moved. The  
2 Movats data, if you look at their traces, they actually  
3 record the actual time from the time that the valve is  
4 energized until everything starts to happen, when the stem  
5 picks up, when it unseats and so forth, and they can actually  
6 tell you exactly how long it took all those things to take.  
7 Then we also recorded the total stroke time, and in this  
8 particular case the valve took 8.6 seconds from full closed  
9 to full opened, and then it showed ---

10 MR. BEARD: This time of eight seconds is from  
11 stem motion, isn't it?

12 MR. LONG: I believe that is from the time the  
13 motor is energized.

14 MR. BEARD: From the time the motor is energized.  
15 Okay. So the time that you are referring to is from when  
16 you flipped a switch, so to speak, and energized the motor,  
17 and then the stroke would be when you get to the full closed  
18 position. So there are really two differences between what  
19 I hear from the different sides of the room.

20 One difference I perceive is the difference between  
21 when the stem physically starts moving and when the disc  
22 starts moving and the valve is unseated or is starting to  
23 unseat. And another one is the time it would take the  
24 electrical side of the machinery to start either of them  
25 moving.



Sim7-10

1 MR. CHARBONNEAU: That is right. The Toledo  
2 procedure is a good one in that it uses stem movement. So  
3 all the gear slop and everything else is taken out. One  
4 element, and only because they have never been able to see  
5 it before, is how much time is now required to take the gap  
6 out. So, granted, I would like to say that it appears that  
7 we are a little bit more sophisticated only because we can  
8 see that space.

9 MR. BEARD: Okay. Well, I am not trying to  
10 assign worry or blame either one, but I am just trying to  
11 understand.

12 MR. CHARBONNEAU: And my point is that they are  
13 both good ways of doing it.

14 MR. BEARD: But I understood Mr. Long to say that  
15 when you are referring to a number like .86 seconds or 1.5  
16 seconds, that was basically the electric motor turn-on time.

17 MR. LONG: Yes.

18 MR. ROSSI: The Movats procedure always sets  
19 it according to the signature. You always use the signature  
20 so you know exactly when it started to unseat and then you  
21 use that as the basis of your procedure, or do you use the  
22 time and so forth?

23 MR. CHARBONNEAU: Well, yes, if you are going to  
24 do it from valve unseating, and that is what we base it from,  
25 but ---

MR. ROSSI: You do that with the signature always?

Sim 7-11

1 MR. CHARBONNEAU: I would be misleading everyone  
2 if I said you had to do it that way. You could crank the  
3 valve open until you see stem movement and then you would  
4 continue opening the valve until you felt the additional load  
5 of unseating of the disc.

6 MR. ROSSI: And then count the turns from that ---

7 MR. CHARBONNEAU: Five to ten percent more turns,  
8 five to ten percent more time, whatever you want to use for  
9 your basis.

10 MR. BEARD: I thought the basic thing with turns  
11 was because of the bypass switch that was associated with  
12 valve position. In other words, at a certain position in  
13 the stroke you want to the bypass to come off and get your  
14 overtorque protection. That is why I was so confused by this  
15 discussion about time.

16 MR. CHARBONNEAU: I apologize. That is probably  
17 our fault because we use time, but without having that  
18 instrument, you can use turns and you can physically measure  
19 the stem.

20 MR. BEARD: Is the procedure that Ted uses based  
21 on hand cranks for setting it, or is it based on time or how  
22 does the procedure that you had in effect on June 8th ---

23 MR. LONG: It was based on a percentage of hand-  
24 wheel turns.

25 MR. BEARD: Percentage of hand wheel turns. So



Sim 7-12

1 that is really a position.

2 MR. LONG: Yes.

3 MR. ROSSI: Of the stem.

4 MR. LONG: Of the stem, but that could also  
5 be correlated into time of how far the valve actually  
6 traveled to reach that number of turns. So they could  
7 be correlated.

8 MR. BEARD: Right, but the direct measure, as I  
9 understand it, is really valve position or turns and the  
10 other one is somewhat of a secondary or indirect measure.

11 MR. LONG: You mean the time.

12 MR. BEARD: The time, yes. The time would be  
13 indirect.

14 MR. CHARBONNEAU: I think I would have to say  
15 you are right because once we determine time, we multiply  
16 it by the total number of turns and advise the client to  
17 go five more turns.

18 MR. BEARD: I would like to raise one administra-  
19 tive matter. Mr. Long just walked over here and handed me  
20 two documents related to the test results on 599 and 508 that  
21 have these cartoons in them that we have been discussing. If  
22 no one objects, I would like to suggest that they be entered  
23 as part of this meeting as an Exhibit 1 for 608 and Exhibit  
24 2 for AF-599, if there are no objections.

25 (No response.)

Sim 7-13

1 (The document referred to were marked  
2 Exhibits No. 1 and No. 2 and were  
3 submitted for the record.)

4 MR. GRIME: I think we can maybe get copies to  
5 facilitate that.

6 MR. BEARD: Well, are these copies we can give  
7 to the reporters.

8 MR. GRIME: Yes.

9 MR. BEARD: As soon as I make copies so we will  
10 have it over the weekend, I would like to give it to you  
11 to be included in the transcript, if that is okay with  
12 you Ernie.

13 MR. ROSSI: That is fine.

14 MR. BELL: What harm would come to the valve motor  
15 if the torque switch was bypassed 100 percent of the time?

16 MR. LONG: Well, assuming that the open limit  
17 switch turned the motor off when the valve approached its  
18 backseat, nothing.

19 MR. ROSSI: But if you set it at 90 percent, then  
20 that ensures that you backseat it properly, or it assures that  
21 it never torques out when it is unseated.

22 MR. BELL: So you are telling me that those  
23 utilities that set the torque switch at 90 percent of -- excuse  
24 me, set the bypass switch for 90 percent of valve travel are  
25 using the torque switch as a backup then to the open limit

Si m 7-14,

switch?

2

MR. BAJESTANT: That is the purpose of the torque switch, yes.

3

4

MR. CHARBONNEAU: And the only negative aspect of that is you lose torque switch protection mid-stroke.

5

6

MR. ROSSI: That was his real original question was what is the problem and consequences of losing that protection in mid-stroke.

7

8

9

MR. BELL: So by losing protection in mid-stroke then you have to rely on the thermal overloads in the valve control room for protection of the valve motor?

10

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MR. CHARBONNEAU: Correct.

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MR. BELL: But in this application your thermal overloads are removed from the 400A volt controllers.

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1 MR. CHARBONNEAU: Correct.

2 MR. ROSSI: So, on your plan, if you set it  
3 at ninety percent and don't have torque protection for most  
4 of the stroke when you are opening the valve, the consequences  
5 might be that if something is wrong and the thing binds up  
6 as you are trying to open it, you burn out the motor?

7 MR. LONG: That is correct.

8 MR. BEARD: And I believe also another factor  
9 that has to be not forgotten is I believe there is NRC  
10 guidance out in the form of regulatory guides that address  
11 thermal overloads protection during safety related operations  
12 of these valves.

13 MR. LONG: We are in accordance with those  
14 guidelines.

15 MR. BEARD : I believe you are, but all I am  
16 saying is that even if you had taken the shorting bars out,  
17 put the thermal overloads back in, still for safety system  
18 actuations have to bypass that protection.

19 MR. LONG: That is right.

20 MR. BEARD: What you have done by putting in  
21 shorting bars.

22 MR. LONG: Right.

23 MR. CHARBONNEAU: I don't believe that is  
24 correct. I don't believe you have to bypass your thermal  
25 overloads to meet that reg guide.

1 MR. BEARD: You may be correct. I am just  
2 going from memory.

3 MR. CHARBONNEAU: Right. The overloads have  
4 to be sized to such a magnitude such that they would not  
5 represent a significant risk in the valve performing a  
6 safety function.

7 That reg guide is being challenged, by the  
8 way, by AEOJ right now.

9 MR. BEARD: Okay. Well, I think that you  
10 probably said it much more precise than I had referred to  
11 it, but generally most people think of that concept as the  
12 bypassing of the overloads.

13 MR. CHARBONNEAU: Some do do that, automatically.

14 MR. ROSSI: Let me ask a couple of questions  
15 about the differential pressure that this valve might have  
16 to open against.

17 I gather that the discharge of the pressure  
18 of the auxiliary feed water pumps is something like 1500 psi?

19 MR. BAJESTANI: That is close.

20 MR. ROSSI: Is it possible that the valve may  
21 actually have to open during feed line or steam line break  
22 with a pressure that is bigger than a 1000 psi -- I am now  
23 questioning is 1050 the right DP, that is my question?

24 MR. BEARD: You say 1500 was -- you have  
25 recirc lines, right?



1 Is the 1500 corresponding to running down  
2 recirc?

3 MR. HILDEBRANDT: That is the pressure of  
4 recirc.

5 MR. BEARD: Okay.

6 MR. LONG: I guess in answer to that question,  
7 if that is the case, then it may not only be the valve, but  
8 I believe the piping where the valve is installed is not  
9 designed for anything much greater than ten -- I think the  
10 design pressure of the piping also is ten fifty. When we  
11 did our calculations to determine what pressure we wanted  
12 to test these act, the pressure was 1050, up to and including  
13 the auxiliary feed water valves A 599 and 608.

14 MR. ROSSI: You mean the piping between the  
15 pump and the valves is only 1050?

16 MR. LONG: The design pressure.

17 MR. ROSSI: That clearly looks like that --

18 MR. HILDEBRANDT: Let us go confirm that.

19 MR. ROSSI: Beg your pardon?

20 MR. HILDEBRANDT: Let us go and confirm that.

21 MR. ROSSI: There isn't any question in my  
22 mind about the piping. My question was is there any  
23 situation where the valve might have to open if there is more  
24 than 1050 across it, and that is more debatable, I guess,  
25 at least in my mind right now.



1 But have you looked at that? If the discharge  
2 pressure of the pump is merely 1500 psi, might you have to  
3 open the valve with -- during some kind of an accident with  
4 greater than 1050 across it.

5 MR. BAJESTANI: The piping design is for 1350.

6 MR. ROSSI: Beg your pardon?

7 MR. BAJESTANI: 1350.

8 MR. BEARD: 1350 is the piping design number?

9 MR. BAJESTANI: Piping design, 1350.

10 MR. BEARD: Is that the operating value, or  
11 design value in the sense that that includes your margins?

12 I am trying to understand the term, 'design  
13 value.'

14 On a vessel, the design value and operating  
15 value may not be the same.

16 MR. BAJESTANI: I will have to check on that.  
17 I am not sure.

18 MR. GRIME: I think we ought to get back on  
19 both of those questions really, relative to the design values  
20 for the piping, and the maximum differential pressure that  
21 we would expect those valves to see in various scenarios.

22 MR. BELL: If there was a 1500 pound Delta-P  
23 across the valve, that would say steam generator pressure  
24 was at zero.

25 MR. BEARD: That is right.

1 MR. BELL: And I don't think you want to feed  
2 a steam generator that has no pressure. That is the faulted  
3 steam generator, so I think probably the answer to your  
4 question, Dr. Rossi, is that --

5 MR. HILDEBRANDT: It may be a steam generator  
6 that has blown dry as a result of loss of pressure control  
7 on the secondary side.

8 Put water back into the steam generator -- we  
9 have done that in this plan and other plans.

10 MR. BELL: Under that condition, though, will  
11 the SFRCS system let you do that?

12 MR. HILDEBRANDT: You have to bypass to do it.  
13 Now, I may have to consider higher Delta-P. I think we ought  
14 to go determine what seems to be the reasonable Delta-P.

15 MR. ROSSI: Yeah. I indicated that -- I am  
16 not at all sure that it is greater than 1050. I feel confident  
17 that it is not greater than 1500, but from what I have heard  
18 today, I am not quite as confident that it is not greater  
19 than 1050.

20 There may be a lot of arguments why 1050 is  
21 appropriate, but they may count of races between recovery  
22 of pressures and assumptions that you don't have leakage.  
23 Safety valves and a bunch of other things, and it is not  
24 clear to me right now that 1050 is really the right number.

25 It must be somewhere between 1050 and 1500

1 from what I have heard, or at least -- well, 900.

2 MR. BEARD: Let me ask a question in a little  
3 bit different vein.

4 Earlier I heard someone say that based on the  
5 results to date, that Toledo Edison decided that the minimum  
6 acceptable setting was 1.5 percent, or about thirteen  
7 percent.

8 Now, was that calculation based on 1050, or  
9 some number higher than 1050.

10 MR. BAJESTANI: 1050.

11 MR. BEARD: 1050. So, while you may not have  
12 completed all your plans for corrective actions for this  
13 problem, the initial estimate was based on 1050.

14 MR. BAJESTANI: That is true.

15 MR. ROSSI: I suspect if the problem -- if it  
16 turns out that 1050 isn't high enough, then the valve design  
17 is in question, because my understanding is that the valve  
18 design specifies a DP of only 1050.

19 MR. BEARD: Yeah, in this whole line of  
20 questioning in my mind brings up the kind of thing -- I guess  
21 I am talking to Mr. Grime, the kind of thing that we have  
22 raised on other action plans and other root cause determinations  
23 of has the investigation really been wide enough and deep  
24 enough in all the right areas that you don't find one problem  
25 today, and then at the next event, next year, you find that

1 there was this over-pressurization consideration that  
2 hadn't been looked at.

3 Because you know, we had this discussion on --  
4 for example, the main feed water pump. And so I think it  
5 is all in that same general vein that the investigation  
6 has to really fix the system right, not just the top of the  
7 pudding.

8 MR. ROSSI: Do you have any more questions?  
9 Walt?

10 MR. ROGERS: I would like to go back to 608  
11 for a minute. From what I have gathered from what you all  
12 said, the maximum Delta-P that you expected to see during  
13 the event on June 9th was 800 pounds.

14 Now, I have watched 608 six times, or nine times.  
15 At 1050, there is a one in three chance the valve will open.  
16 At 750, its two out of two so far.

17 At 800, wouldn't this valve have opened?

18 MR. LONG: (Pause.) I would say that looking  
19 at our data, it appears that it probably would have opened  
20 at 800.

21 MR. BEARD: Let me see if I can help you a  
22 minute.

23 MR. LONG: Okay.

24 MR. BEARD: Going back to the cartoon that  
25 I have been referring to, I think that your cartoon and your

1 test data as you described it, test results indicate that  
2 at 750 it was very marginal. It was marginal.

3 MR. LONG: Yes.

4 MR. BEARD: So, while you may not have to  
5 have hit 1050 during the event that it actually occurred,  
6 with a DP on the order of 800, the probabilities are more  
7 towards the direction it would not have worked rather than  
8 it would have worked, I believe?

9 MR. LONG: In conjunction with that, we did  
10 find that the preload on the spring back was what we would  
11 consider a little less than the half turn that was specified  
12 for Limitorque. It was in the magnitude of maybe of a quarter  
13 turn light, which would have caused the torque switch to  
14 trip a little early anyway.

15 MR. ROGERS: So --

16 MR. BEARD: Do you agree with what I said about  
17 the 800 would be more likely not to have worked?

18 MR. LONG: I think so, yes, sir.

19 MR. ROGERS : With the torque switch -- you  
20 all have now done some thrust signatures, and you know what  
21 the torque switch setting is supposed to equate to in terms  
22 of thrust.

23 MR. LONG: Yes.

24 MR. ROGERS : What is the correlation between  
25 the MOVATS thrust signatures, and that torque switch setting

1 thrust? Are they equivalent?

2 MR. LONG: The design of -- the calculated figures  
3 indicates that we needed -- at a one and a half setting,  
4 the unit should have developed fifteen thousand pounds of  
5 thrust.

6 MR. ROGERS : Okay.

7 MR. LONG: The actual thrust that was developed  
8 at one and a half AF 608 was around thirteen thousand.

9 So, the unit was not developing the full thrust.

10 MR. ROGERS: Can you all explain why, or is  
11 that two thousand pounds that big a difference?

12 MR. LONG: Well, Limitorque indicated there wasn't  
13 that big a difference. They said they didn't think there was  
14 that big a difference.

15 I would say that that can be accounted for  
16 the fact that a spring back was pro'ably set a little light,  
17 and we also found that the torque switch was inbalanced a  
18 little bit.

19 The spring back did not deflect equally in both  
20 directions for the same given setting, so I would say those  
21 two factors combined would have caused the torque switch to  
22 trip a little earlier -- a little lighter thrust than designed  
23 for one and a half.

24 MR. ROGERS: I guess --- from looking at the  
25 testing I have seen, I guess you are saying that you feel



1 comfortable that that eight hundred pounds DP, given the way  
2 it was set up, it would have failed?

3 MR. LONG: There is a good possibility, yes.

4 MR. ROGERS : Will your testing go back and  
5 use that 800 DP, -- 800 pounds DP?

6 MR. LONG: I don't understand your question  
7 at all.

8 MR. ROGERS: Do you think you all are going to  
9 end up testing the valve, using the 800 pound DP, instead of  
10 the 750, and the 1050.

11 A lot of the discussion we have had  
12 has been using the 1050 DP, which I feel very comfortable  
13 that the valve will just lay there and die.

14 But I am not so comfortable that at 800 pounds  
15 the valve would not pass.

16 That is just my -- listening to what I have  
17 heard, I am not so sure that that lowering it 250 pounds that  
18 maybe that thing would have passed. That maybe the problem  
19 is something other than the bypass.

20 It may be something in the torque switch. That  
21 is why I have been talking about this, and it does sound like  
22 there is some difference between what you thought the torque  
23 switch setting was versus what it really was, realizing that  
24 the dial was set properly, but the thrust at which it actually  
25 trips out is different than what you expected it to be.

1 MR. LONG: That is correct. And we had determined  
2 that on the first signatures that the unit was not delivering  
3 the thrust or calculated value that it should have at the  
4 15,000.

5 MR. ROGERS: Okay. I guess on another -- same  
6 type line, but not quite the same thing, is that with the  
7 bypasses at where Bechtel had originally told you to set  
8 these valves, would these valves have failed?

9 MR. LONG: Bechtel never told us where to set  
10 the bypasses.

11 Okay. The procedures for setting  
12 the bypasses prior to the Torrey Pine Study, according to the  
13 operators, was that we close the valve, took up the back-  
14 lash, and gave it a couple of turns.

15 Period.

16 MR. ROGERS: Okay. PORV switch settings were  
17 given to you by Bechtel?

18 MR. BAJESTANI: That is true.

19 MR. ROGERS: For opening this valve. The 1.5  
20 or whatever, would that have been adequate to open the  
21 valve, given the thrust signatures that you have seen?

22 MR. LONG: That is the same value we have now.  
23 We did not change the open. The only value we changed was  
24 the closed value. We felt that the one and a half was  
25 seating the valve too tight.

1 MR. ROGERS: So bypass recommendations came  
2 from Torrey Pine?

3 MR. BAJESTANI: That is true.

4 MR. ROGERS : Do you all know of any other  
5 company that uses the Torrey Pine recommendations in the  
6 nuclear industry?

7 MR. BARBET: Right now, no.

8 MR. ROGERS: You know that they don't?

9 MR. BARBET: I know that they don't.

End 8. 10

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#9 - SueWalsh 1 Except possibly for St. Vrain.

2 MR. BEARD: Except for St. Vrain?

3 MR. BARBAT: Possibly. We are involved with --

4 MR. BEARD: Excuse me. Which company are you  
5 with?

6 MR. BARBAT: Torrey Pines.

7 MR. BEARD: Oh, you are with Torrey Pines? I'm  
8 sorry.

9 MR. BARBAT: But I'm not sure whether -- directly,  
10 Torrey Pines did not write any procedure for setting the  
11 bypass switches for them unless it would have been for the  
12 specific project for the St. Vrain reactor.

13 MR. ROGERS: Uh-huh. Based upon what you have  
14 seen with the MOVATS testing and all of that, are you pretty  
15 much in agreement that the bypasses recommendations were not  
16 proper for setting these valves?

17 MR. BARBAT: It was our intent, at least from the  
18 discussions that we had, that the five percent was for disc  
19 movement. It's apparent now that it's very difficult for  
20 somebody in turning the handcrank to establish whether he  
21 is really getting stem movement or he is really getting disc  
22 movement.

23 MR. ROGERS: Well, is that Toledo Edison's under-  
24 standing of the Torrey Pines' recommendations, that it was  
25 disc movement, not stem movement?

#9-2-SueWalsh 1

2 MR. BAJESTANI: We understand the procedure actually  
3 says the stem movement. The procedure -- the one we got from  
4 Torrey Pines says stem movement.

5 MR. ROGERS: Ya'll really meant to say disc?

6 MR. BARBAT: We said to take out the backlash and  
7 in looking at this over here when you look at the stem move-  
8 ment, that can be backlash, although it's hard to say whether  
9 it's backlash.

10 MR. BEARD: I get the feeling that Torrey Pines  
11 might want to reconsider their final recommendations.

12 Would that be easier?

13 MR. BARBAT: We can specify those discs, yes.

14 MR. BEARD: No, I'm just saying as a result of  
15 your involvement in Toledo Edison's troubleshooting of their  
16 event --

17 MR. BARBAT: Uh-huh.

18 MR. BEARD: -- and the equipment failure associated  
19 with it, would it be reasonable to expect that Torrey Pines  
20 is likely to reconsider the recommendations they have  
21 previously issued?

22 MR. BARBAT: Reconsider from what respect?

23 MR. BEARD: Be it clarification or whatever, maybe  
24 a --

25 MR. BARBAT: Yes.

MR. BEARD: -- different number. I don't know.



#B-SueWalsh1

MR. BARBAT: Yes.

2 MR. BEARD: Okay.

3 MR. ROSSI: Let's see, I guess you asked the  
4 question about whether any nuclear plants had the Torrey Pines  
5 setting, and the answer was maybe St. Vrain and nothing else.

6 MR. BARBAT: The only reason I'm saying that is  
7 because we are associated with the same company that designed  
8 St. Vrain. That would be the only reason.

9 MR. ROSSI: No other nuclear plants?

10 MR. BARBAT: No.

11 MR. ROGERS: If the valve had been set in accordance  
12 with the MOVATS recommendation of disc movement for the bypass,  
13 would the valves have failed based upon the data that ya'll  
14 have seen?

15 MR. LONG: I would say based on the traces we took  
16 it is a good possibility that even had they been set correctly  
17 at the five percent position, per the procedure, they still  
18 would have failed.

19 MR. BEARD: That wasn't the question that Walt  
20 asked, though, was it?

21 MR. ROGERS: If you had used -- if you used MOVATS  
22 recommendation of five to ten percent of disc movement, would  
23 the valves have failed?

24 MR. LONG: I would say no, they would not have  
25 failed.

#9 - SueWalsh 1

MR. GRIME: Even if it was on the lowest end of  
2 five percent?

3 MR. LONG: Yeah.

4 MR. ROGERS: Okay.

5 MR. GRIME: I think there is really quite a number  
6 of these types of questions we have to fully address yet to  
7 get to --

8 MR. BEARD: Well, I don't see any details or  
9 clarifications. And details, when there is a recommendation  
10 or a message is sent that when, for example, I say five  
11 percent I mean five percent for a very precisely defined  
12 thing. That seems to be where a lot of confusion may have  
13 entered.

14 MR. ROSSI: With the potential for very big  
15 mistakes if there is a misunderstanding, from what I'm  
16 hearing.

17 MR. BEARD: Are you finished, Walt?

18 MR. ROGERS: I think so. Were there any other  
19 things that ya'll found with the valves other than the  
20 bypasses and the slight difference between the thrust and  
21 the torque switch setting with regards to the valves?

22 Anything else that you found that is not quite  
23 right?

24 MR. LONG: The only other thing we found was that  
25 on AF-599, as we stated earlier, we had found that the lock nut

#5-SueWalsh

had been installed backwards on the valve which had no effect on the incident. It should have been turned outwards so he could set the set screw. It had no -- nothing happened on the event because of that.

MR. ROGERS: Okay. It's also my understanding that these valves had heaters, space heaters?

MR. BAJESTANI: Yes. That's true.

MR. LONG: Yes, they do. They still do.

MR. ROGERS: And that the valves were not environmentally qualified with these space heaters installed?

MR. BAJESTANI: That's true. We got a letter from Limitorque that stated that when they performed their environmental qualification test they didn't use the space heaters. And they recommended just to --

MR. ROSSI: When did you get this letter from Limitorque?

MR. BAJESTANI: About two weeks ago.

MR. ROSSI: So, that was after the event?

MR. BAJESTANI: Correct.

MR. ROSSI: Did you get the letter -- I mean, what caused Limitorque to send you the letter?

MR. BAJESTANI: Well, what happened is I got a purchase order to buy some space heaters, and I am involved in the equipment qualification. And I look at the test report and the test report doesn't mention anything about

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2 the space heater. So I got in contact with Limitorque and  
3 they said that they never recommended to use the space  
4 heater and they never tested the space heater.

5 They have some justification that if something  
6 goes wrong it's not going to short, it's going to open. Okay.  
7 But in the EQ test, they didn't use the space heater.

8 So, what we are doing now, we are going to dis-  
9 connect all the space heaters.

10 MR. BEARD: Does the EQ test basically address  
11 the question of would this device perform it's safety-related  
12 function during the most severe accident conditions that  
13 could occur postulated for license basis, such as and includ-  
14 ing a seismic event and all that other remote stuff?

15 MR. ROSSI: It doesn't cover seismic.

16 MR. BEARD: Excuse me. Not seismic, but really  
17 the worst case environmental conditions that the grossest  
18 accident that would ever happen?

19 MR. BAJESTANI: Yes.

20 MR. BEARD: And how did those conditions relate  
21 to the conditions on June the 9th?

22 MR. BAJESTANI: Basically, the EQ test, all it is  
23 addressing -- it is a LOCA test which for Davis Besse we  
24 have 293 degree maximum temperature, 56 psi pressure and  
25 that's what they test for.

MR. BEARD: But were you anywhere near those

#9 - SueWalsh 1

conditions on June the 9th?

2 MR. BAJESTANI: No.

3 MR. BEARD: So the space heater question is not  
4 related to this event?5 MR. BAJESTANI: Not really, no. That's just the  
6 EQ --7 MR. GRIME: Some of that additional information  
8 has been discovered.9 MR. BEARD: I have -- I think -- I hope it's my  
10 last two questions, I really do.11 When we were here before, we were in a situation  
12 where, as I understand from the utility, had some initial  
13 settings on these bypass switches; and then you received some  
14 information from Torrey Pines that suggested a different  
15 setting. Now, you've had an event, and you decided to bring  
16 in MOVATS and they suggested an additional setting which is  
17 different.18 And I had asked whether or not you had contacted  
19 Limitorque to get their concurrence or nonconcurrence on  
20 the findings of MOVATS, since they are the designers and  
21 manufacturers of this outfit -- of this equipment. And I  
22 have not -- maybe you said it and I missed it, Jim.23 MR. LONG: I did. Masoud and I went to Lynchburg  
24 two weeks ago and talked to Pat McMillan of Limitorque  
25 discussing this exact problem. And he concurred that the



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2 bypasses were in setting correctly and then we asked him  
3 where he recommended setting them, and he told us that  
4 Limitorque will not tell us where to set them, that is the  
5 responsibility of the valve manufacturer.

6 MR. BEARD: I understand. But they basically  
7 were not in disagreement with the MOVATS recommendation;  
8 is that correct?

9 I'm trying to understand that you've got input  
10 from very many different sources, and I'm having trouble  
11 understanding who agrees with who and who may not disagree.

12 It's that simple.

13 MR. LONG: Limitorque would not give us an official  
14 statement, but they said they felt that the ten percent  
15 would probably be correct.

16 MR. BEARD: Okay.

17 MR. LONG: They also said that it is up to the  
18 valve manufacturer to set where the bypass is set at.

19 MR. BEARD: Your valve manufacturer?

20 MR. LONG: Yes.

21 MR. BEARD: That's Velan?

22 MR. BAJESTANI: Yes.

23 MR. ROSSI: What did they say?

24 MR. BAJESTANI: They said that they got -- actually  
25 it was preset.

(Laughter.)

#9 - SueWalsh 1 MR. BEARD: You got the A/C salute?

2 MR. BAJESTANI: Right.

3 (Laughter.)

4 I've got a letter from them, too.

5 MR. ROSSI: They said what again?

6 MR. BAJESTANI: They said that the bypass was pre-  
7 set by Limitorque and when they got it actually there they  
8 set it on the valve and they ship it to us.

9 MR. BEARD: I'm not so sure I wish I hadn't asked  
10 that question.

11 (Laughter.)

12 All right. The second question I had is just an  
13 administrative matter.

14 Jim, you are the lead individual for this action  
15 plan?

16 MR. LONG: Yes, sir.

17 MR. BEARD: And you are associated with the  
18 Maintenance Department here at the plant?

19 MR. LONG: Yes, sir. I am Maintenance Specialist  
20 and Limitorques are one of my areas.

21 MR. BEARD: Okay. You have obviously involved the  
22 Plant Engineering staff I believe -- I won't say obvious.

23 Is it true you have involved the Plant Engineering  
24 staff and the Corporate Engineering staff of your Company  
25 in this troubleshooting process?

#90-SueWalsh

MR. LONG: Yes, sir.

MR. BEARD: Were they also involved in the less formal maybe, but the troubleshooting effort, involved with this valve problem back in March of I guess it was '83 or '84, the Plant and the Corporate Engineering staff?

MR. LONG: I don't remember exactly but I know that the Corporate Engineering was involved in it.

MR. BEARD: Okay.

MR. LONG: Normally if a Limitorque was involved it usually was taken care of by downtown Engineering.

MR. BEARD: And this is the gentleman sitting besides you?

MR. LONG: Yes.

MR. BEARD: Thank you.

MR. ROSSI: Are you finished?

MR. BEARD: I hope so.

MR. ROSSI: Anything?

MR. BELL: No, sir.

MR. BEARD: I suggest we adjourn. Oh, the final report that we are talking about for this root cause that is not what has been given us today?

MR. GRIME: Not at all.

MR. BEARD: Right. I just want to make sure everybody is clear on that.

MR. GRIME: In fact, that's not your report; that's

#9 - SueWalsh

Limitorque's report.

2

MR. LONG: Yes. This is just the report from

3

Torrey Pines, from MOVATS.

4

MR. BEARD: This is MOVATS report to you folks.

5

Fine.

6

MR. ROSSI: Okay. Why don't we adjourn then. And

7

we can go off the record now.

8

(Whereupon, a recess is taken at 11:45 a.m., to

9

reconvene at 1:10 p.m., this same day.)

END #9  
Simons flws

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## AFTERNOON SESSION

(1:10 p.m.)

MR. ROSSI: Okay, why don't we go ahead and begin. During the break a question came up about an action plan for trouble shooting on main feedwater pump turbine No. 2, and we have discussed it amongst the team and concluded that we see no reason to comment on that action plan.

We would like a copy of your action plan as soon as it is approved and available, and our decision not to make any comments on it is based primarily on the fact that it will be in accordance with the general guidelines for doing the trouble shooting for quarantined equipment.

So with that we see no reason for you to wait to do the work until we have made comments. We would like to get a copy for our record as soon as it is available.

MR. BEARD: We might possibly after reading it have a copy we would like to give you, but certainly we don't anticipate anything that you should hold up your work for.

MR. GRIME: We appreciate that, and that is the basis on which we will pursue that. We will get you the copy and proceed unless we hear to the contrary.

MR. ROSSI: Okay. The next action plan that we are going to discuss is No. 27 on MS-106, the main steam inlet valve to auxiliary feedwater pump to Turbine 1-1.

Sim 10-2

1           You have given us the status of the work that  
2 has been done, and basically you have done I guess all of the  
3 action plan, except that it has to be done with the plant in  
4 operating hot standby.

5           MR. BONNER: Yes, sir, that is correct.

6           MR. ROSSI: And what you have found so far is  
7 a couple of wiring discrepancies, a loose connection and a  
8 couple of mechanical problems with the valve, and your main  
9 hypothesis based on what you have done to date is that it  
10 bound part way open and then reclosed.

11          MR. BONNER: That the torque switch opened causing  
12 the valve to stop for some reason.

13          MR. BEARD: Are you saying that the torque  
14 switch may have opened spuriously or do you suspect that it  
15 opened because of high torque, or do you know?

16          MR. BONNER: I am unsure. I do not know.

17          MR. ROSSI: You have not been able to reproduce  
18 the failure?

19          MR. BONNER: No.

20          MR. ROSSI: So when you have cycled the valve  
21 so far with it in its as-found condition, it has cycled with  
22 the correct times?

23          MR. BONNER: That is correct.

24          MR. BEARD: Let me ask a hypothetical. If the  
25 root cause is that its torque switch opened, either spuriously



Sim 10-3,  
1 or because of high torque, in the middle of its stroke during  
2 the event, would it have stopped, closed, continue to open  
3 or what?

4 MR. BONNER: It would have stopped. The valve  
5 would have stopped until the point where -- again, as was  
6 pointed out in the discussion of 599 and 608, where the valves  
7 stopped, it required that local movement of the valve would  
8 have required that so that repositioning of the valve could have  
9 continued by either going down there and providing hammer blows  
10 from the handwheel or jacking the valve back and forth by  
11 operation from the push buttons on the control switch.

12 MR. BEARD: I guess I am trying to put it into  
13 context. During the event, and initially this valve got an  
14 open signal because of low-level actuation just prior to the  
15 manual actuation on low pressure ---

16 MR. BONNER: That is correct.

17 MR. BEARD: And it started to open.

18 MR. BONNER: That is correct.

19 MR. BEARD: Shortly after that it got the manual  
20 actuation which wanted to tell it to go closed.

21 MR. BONNER: Yes, sir.

22 MR. BEARD: That manual actuation had not occurred,  
23 but basically this torque switch that you believe is the  
24 root cause, if just that had occurred, what would have been  
25 the impact on the thing? Would it have stopped in mid-stroke?

Sim 10-4

1 MR. BONNER: It would have stopped in mid-stroke.

2 MR. BEARD: And it was only because after it  
3 had already stopped because of the torque switch, that then  
4 when the closed signal came in and it allowed it to change  
5 direction in mid-stroke? Is that the way ---

6 MR. BONNER:: Yes.

7 MR. ROSSI: Well, this valve later on got another  
8 signal to open, and it had to open and serve its safety function;  
9 is that correct?

10 MR. BONNER: Yes.

11 MR. ROSSI: Does the torque switch have to be  
12 reset for that to happen?

13 MR. BONNER: I am not sure I understand your  
14 question. In the case of the operation of the valve during the  
15 day of the event, the valve, as you have said, went open ---

16 MR. ROSSI: Ultimately.

17 MR. BONNER: Yes, ultimately.

18 MR. ROSSI: I mean that was its final action.

19 MR. BONNER: What cause it under that particular  
20 instance during the initial low steam generator level activation  
21 from SFRCS and then the subsequent initiation of the manual  
22 actuation of SFRCS, what caused it to stop, I cannot say.  
23 Perhaps it was due to the system configuration. At the time  
24 of the manual actuation you in addition have the crossover  
25 valve, MS-106A coming open as well, which could have presented

Sim 10-5

1 certain system configuration that would have added additional  
2 loading to the valve. I do not know for sure what possibly  
3 happened.

4 MR. BEARD: What convinces you that the root  
5 cause of the torque switch opening, and what is the evidence  
6 or whatever that caused you to arrive at that conclusion?

7 MR. BONNER: There are two contacts, or there  
8 is a series of contacts in the open circuitry which could  
9 open and stop the movement of the valve in the open direction.

10 In those series of contacts the most likely to  
11 open under conditions as the valve is opening were tested  
12 functionally during our testing on this particular valve.  
13 The remaining contact, which could have activated or have  
14 been activated, which we cannot really test, is the torque  
15 switch.

16 I am saying that all of the other contacts are  
17 testable from the standpoint that I can independently activate  
18 some other device which will in turn activate it and stop  
19 the process, or under the particular circumstance the only  
20 other thing under those circumstances, the only other thing  
21 that is going to operate or stop the valve is the torque  
22 switch.

23 So that is only testable from the standpoint that  
24 if system conditions caused it to open or caused the operator  
25 to act in such a way that the contact opened, the torque

Sim 10-6

1 switch contact opened.

2 MR. BEARD: But, I mean, do you have any, and  
3 I won't say evidence, but any supporting information that  
4 you would say it is reasonable basis for believing that the  
5 torque switch really opened? For example, you mentioned  
6 some hydraulic interaction possibility.

7 MR. BONNER: Yes.

8 MR. BEARD: Have you gone through that scenario  
9 in enough detail and in enough completion to say that it is  
10 very reasonable? In other words, I understand the scenario  
11 where it would cause high torque to be present or some other  
12 scenario that would support some reason for the torque  
13 switch opening.

14 MR. BONNER: No, sir, I have not, other than to  
15 speculate.

16 MR. BEARD: Speculation is what bothers me, and  
17 I don't mean that in any personal way. So don't get me wrong.  
18 But what I am thinking is this. You have tested these other  
19 possibilities, and any one of those contacts in the open  
20 circuit to the MOV, obviously if any of them opened, the motor  
21 is going to stop running, right?

22 MR. BONNER: That is correct.

23 MR. BEARD: You have tested each of those and  
24 you were unable to reproduce the failure in the sense that  
25 you couldn't cause it to stop running.

Sim 10-7

1 MR. BONNER: That is correct.

2 MR. BEARD: On this one you can't test it, or  
3 you didn't test it, but that one when you cycled the thing,  
4 it was unable to reproduced it to stopping.

5 MR. BONNER: That is correct.

6 MR. BEARD: So what I am saying is, and my  
7 personal opinion is that the selection of that contact to be  
8 the one that was the culprit over any other contact I do not  
9 understand any basis for. I think it might be a guess based  
10 on experience, and it might be a guess based on probabilities  
11 in the sense that more often you find this contact opens and  
12 that one opens, but I find no basis. It is speculation.

13 MR. ROSSI: Well, you haven't concluded what the  
14 root cause on this one here is.

15 MR. BONNER: That is correct. One of the other  
16 things that I might point out is in this particular operation  
17 the other contacts which would have opened to stop the  
18 movement of the valve, either the main steam pressure sensing  
19 switches or the one pound suction pressure switches, neither  
20 one of those two showed an alarm indication during the day  
21 of the transient. However, I have not proven that those  
22 alarms do work, as I found out that the alarm indication for  
23 the crossover valves 106-A and 107-A didn't work either during  
24 that day.

25 MR. BEARD: So there are other possibilities. It

Sim 10-8

1 could have been told to stop.

2 MR. BONNER: Yes, sir.

3 MR. ROSSI: Well, have you tried to simulate the  
4 low level in the SFRCS system followed by the low pressure?  
5 Have you simulated the actual signals that went to the valve  
6 on the day of the event?

7 MR. BONNER: No, sir. The only simulation I have  
8 done is gone to the SFRCS cabinet for that particular cable  
9 and inputted contacts in a means of simulating what occurred  
10 during the day of the event; in other words, initiating an  
11 open signal to the valve and then immediately following that  
12 approximately two seconds later initiating a closed signal,  
13 a maintain closed signal.

14 MR. ROSSI: You have done that though?

15 MR. BONNER: Yes, sir, I have.

16 MR. ROSSI: And it cycled in the normal time  
17 all the way opened and all the way closed in the normal time.

18 MR. BONNER: Yes sir.

19 MR. BEARD: You did find a surprising number  
20 of problems involved, you know, two different wiring  
21 discrepancies, a bad connection, some gap that was wrong,  
22 you found a number of things that really weren't right.

23 But it seems like that at the point you are at,  
24 as I understand it, you really haven't found the root cause  
25 yet.



Sim 10-9

1 MR..BONNER: The information that is there  
2 is inconclusive, as I pointed out.

3 MR. ROSSI: Do you know if when MS-106 finally  
4 opened to feed auxiliary feedwater pump No. 1 on the day of  
5 the event? Did it open all the way or is there any way of  
6 knowing that?

7 MR. BONNER: There is no way of knowing that as  
8 far as I know from the indications that I have looked at  
9 and that I have had available to me.

10 MR. ROSSI: Do you have any more questions on  
11 this?

12 MR. BEARD: Yes. On the second page of the status  
13 report you have a sentence that says "This preliminary  
14 assessment," and I assume that is referring back to the  
15 torque out, "is based on Finding No. 5 (possible binding and  
16 the Movats' test data report."

17 Could you elaborate on what you are referring  
18 to here?

19 MR. BONNER: During the stroke operation of the  
20 valve under our test arrangement we had the Movats' equipment  
21 hooked up to it to take a look at the thrust developed, the  
22 limit switch position and the operation of the motor and  
23 motor current readings. I have that report.

24 It was the opinion from Movats that they felt  
25 that it was unlikely that the valve had even come off of the

Sim 10-10

1 seat or that it had even opened under that event based on  
2 what they had seen from looking at the report and based upon  
3 where the closed to open bypass switch was in relationship  
4 to the operation of the forces for unseating the valve.

5 MR. ROSSI: You are saying that this valve may  
6 have the same problem as the 599 and 608 valves; is that  
7 what you are saying?

8 MR. BONNER: Yes.

9 MR. ROSSI: When you had steam across it, or  
10 steam differential pressure.

11 MR. BONNER: Yes. I wish to point out though  
12 that the additional information that I have looked at and  
13 the reason that it is difficult to pinpoint and say that  
14 it is similar in nature to 599 and 608 is the data collected  
15 for the aux feed pump turbine runs and the data collected  
16 during the event on aux feed pump turbine No. 1 in particular.

17 In looking at the information that I have and in  
18 conversations with those people working on the aux feed  
19 pump No. 1, they have from the first initiation of the SFRCS  
20 on channel one on the low level steam generator until the  
21 manual activation of SFRCS on both channels that there is an  
22 increase in the speed, a significant enough increase from  
23 zero of the speed of the turbine to indicate that that valve  
24 had to actually get off of the seat to both fill the line  
25 and supply some driving force to the turbine.

1           Again, if it were a matter of that not being  
2 there at all, and that evidence of the speed increasing on  
3 the turbine itself not until after the signal from the  
4 manual activation of the SFRCS which would indicate that  
5 the crossover valve was now opening and driving and filling  
6 the lines and driving the turbine, that I would have reason  
7 to believe that the torque switch had taken the valve out  
8 before it was pulling off of the seat.

9           The operation of the valve, it appears that it  
10 did go, from that information, that it did go to some  
11 mid-position and stop, for whatever reason, most likely the  
12 torque switch and then return closed.

13           MR. BEARD: What is the stroke time on that  
14 valve?

15           MR. BONNER: I beg your pardon?

16           MR. BEARD: Do you happen to know what the stroke  
17 time on that valve is?

18           MR. BONNER: The last ST that was run on it in  
19 May and then our recent stroke time from the test was  
20 approximately 26 seconds from closed to open.

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1 MR. BEARD: Do you know what the opening stroke  
2 time is?

3 MR. BONNER: Open to close was likewise 25 to  
4 26 seconds.

5 MR. BEARD: So --

6 MR. BONNER: Which corresponds to the previous  
7 ST data.

8 MR. BEARD: If you considered it, as we discussed  
9 earlier on 599 - 608, some of that initial period is getting  
10 unseated, and then it starts moving?

11 MR. BONNER: Yes, that is correct.

12 MR. BEARD: How far do you think it would go  
13 in a period like four seconds?

14 MR. BONNER: One thing that I want to suggest  
15 here is that that total stroke time includes the initial  
16 taking up of the slack and movement of the stem until the  
17 point of pulling the disc off the seat.

18 MR. BEARD: It includes that time?

19 MR. BONNER: Yes, sir. And that in probably --  
20 (pause) that the unseating time was approximately one point  
21 four-eight seconds.

22 MR. BEARD: So that is one and a half seconds,  
23 right?

24 MR. BONNER: Yes, sir.

25 MR. BEARD: So you had another two and a half

1 seconds to play with, how far do you think the valve would  
2 have gone?

3 MR. BONNER: From the time of initiation until  
4 the time that it turned around, or stopped?

5 MR. BEARD: No. Until the -- the four seconds?  
6 Let me just ask the question: How open would the valve go  
7 in four seconds?

8 MR. BONNER: What percentage open would it be?

9 MR. BEARD: Yes. I don't need a precise answer.  
10 I am just --

11 MR. BONNER: I understand. What I had done was  
12 I had taken the plot of the speed from the auxiliary feed  
13 pump and tried to plot the time that it started in seconds,  
14 to the rpm as it was plotted out by the group on the aux feed  
15 pump turbine, and then tried to draw a line in here to give  
16 something relative for the position of the valve, and then  
17 -- it would have been about fifteen to twenty percent open.

18 And that is rough.

19 MR. ROSSI: You had an indication in the DAD  
20 system that the valve left the closed position.

21 MR. BONNER: No, sir, not in the -- the DAD  
22 information is this information -- this plot out here. The  
23 information that I am working from is the alarm printout.

24 MR. ROSSI: Okay. The alarm printout gave you  
25 an indication of when the valve left the closed position?

1 MR. BONNER: Yes, sir.

2 MR. ROSSI: And then it gave you an indication  
3 of when it got back to the closed position again?

4 MR. BONNER: Yes, sir.

5 MR. ROSSI: And that is the time you are using?

6 MR. BONNER: Correct.

7 MR. ROSSI: Had the valve not moved -- I mean,  
8 there is no possibility that the valve didn't move off the  
9 seat during this is there? I mean, could you have gotten  
10 those signals and had the valve not move off the seat?

11 MR. BONNER: No, I don't believe --

12 MR. ROSSI: Is it possible they could have gotten  
13 those signals and the valve not move off its seat?

14 MR. CHARBONNEAU: I don't think that we are  
15 qualified to answer that question, not knowing the rest of  
16 the circuit.

17 MR. BONNER: What we did -- again, under the  
18 testing of the valve, we have looked intentionally at the  
19 operation of the contact for the input to the alarm printer  
20 to determine if that was operating correctly, and it is.

21 MR. BEARD: So it is set at a value that would  
22 be after the peak torque was over?

23 MR. BONNER: No, sir. I am speaking of the  
24 contact off of the limit switch arrangement, which opens to  
25 alarm on the printout.



1 MR. LONG: It is on the same rotor as the  
2 bypass, is it not?

3 MR. BONNER: Yes.

4 MR. BEARD: It is on what?

5 MR. BONNER: It is on the same rotor as the  
6 bypass contact itself is.

7 MR. BEARD: Is it after the bypass?

8 MR. BONNER: No, sir.

9 MR. LONG: Same time.

10 MR. BEARD: At the same time.

11 MR. BONNER: At the same time. It occurs at  
12 the same time.

13 MR. BEARD: Well, if you had the disease that  
14 goes with AF 599 and 608, in that that contact opens early,  
15 followed by a torque out condition, you would have then --  
16 correct me if I am wrong -- I am just trying to see if I  
17 understand what you are saying.

18 The scenario is you could have gotten the bypass  
19 contact open and simultaneously you would get the alarm  
20 saying it is off the seat, and not fully closed, and followed  
21 immediately by torque out.

22 MR. BONNER: No, sir, not in this particular  
23 case. In this particular case, we have, again, the SFRCS  
24 activation of Channel 1 low steam generator level occurs  
25 first.

1 MR. BEARD: Right.

2 MR. BONNER: Several seconds later, the alarm  
3 printout indicates that MS 106 is not closed.

4 MR. BEARD: Right.

5 MR. BONNER: Then occurs the operator action  
6 of initiating the SFRCS on both channels.

7 Then after that, much later than that, would  
8 have -- was the occurrence of the valve returning to its seat,  
9 indicating that the valve was closed at that point.

10 From the initial SFRCS initiation, there is  
11 approximately 18 or 19 seconds.

12 What that comes down to is that the valve itself  
13 had to be traveling during that period of time, because it  
14 would not have been given the signal to close until after  
15 the manual actuation of the SFRCS, but yet it did occur at  
16 some time much later than the manual initiation of the SFRCS.

17 In other words, if it came off of its seat  
18 long enough to trip the rotor and give the alarm, then it  
19 would have had to have turned around in just about the same  
20 amount of time that existed between that alarm and the alarm  
21 printed out for the manual initiation of the SFRCS.

22 In other words, approximately six seconds.  
23 Three seconds from indicating that it was off its seat to the  
24 manual actuation, another three seconds to return it to  
25 approximately the same position.

1 But yet there is a total period of time of  
2 about 18 or 19 seconds that I cannot account for.

3 MR. BEARD: I was really trying to explore  
4 bits of information that I thought you gave us. One is  
5 the report here says the possibility of binding, and you  
6 said that MOVATS has suggested that maybe it was unlikely  
7 the valve had actually come off the seat, and that you thought  
8 that probably it had come off the seat because there would  
9 have had to been some motive force, the steam, to get the  
10 turbine to trip, and I am wondering -- I was trying to explore  
11 the area of maybe the motive force that tripped the turbine  
12 was really from 106-A, because the time of those trips --

13 MR. ROSSI: Well, it was. 107-A, that is the  
14 hypothesis for tripping the turbine is that the steam came  
15 from 107-A -- or 106-A, whichever it is.

16 That is the hypothesis for tripping the turbine,  
17 not that it came from 106.

18 The other question -- I believe, isn't that  
19 correct?

20 MR. HILDEBRANDT: That's right. The 106 begin  
21 open signal was two seconds before the low pressure manual  
22 actuation and beginning opening 106-A. Two second span  
23 between those two.

24 MR. BEARD : Two seconds?

25 MR. HILDEBRANDT: Two seconds. That -- begin

1 opening signal on MS 106. Two seconds later was the manual  
2 low pressure. We don't have a computer point showing  
3 initiation of opening 106-A.

4 MR. ROSSI: Because that was not working at  
5 that time.

6 MR. HILDEBRANDT: That is correct. So that  
7 there is five, six, seconds. Something like that.

8 MR. ROSSI: Is it possible that 106 never  
9 opened, and that ultimately it was 106-A that fed the turbine  
10 one?

11 MR. BONNER: Again, because of the period of  
12 time, -- first of all, the rotor, we do know would have had  
13 to have tripped in that period of time to have given the  
14 signal to the alarm printout, and the period of time from  
15 that showing that the valve was off its seat until the time  
16 that it went closed was approximately 18 seconds.

17 Would it -- if it would have never returned to  
18 its seat, in other words went open, and then received the  
19 manual initiation two seconds afterwards, it would have returned  
20 in a likewise period of time.

21 MR. ROSSI: I have another question. If the  
22 torque switch had torqued out when it originally opened, I  
23 assume that driving it back closed again would make sure that  
24 the torque switch was reclosed again, so you could open the  
25 valve the next time.

1 MR. BONNER: Once again, yes. That is  
2 correct.

3 MR. BEARD: At least it would bypass it, right?

4 MR. ROSSI: Well, it would be bypassed for  
5 some portion, but then it would be back in after the bypass  
6 contacts open

7 MR. BONNER: Yes. Again, it would have acted  
8 in the same way. It would have repeated the same direction  
9 or same operation.

10 MR. ROSSI: This is a gate valve, I assume?

11 MR. BONNER: That is correct.

12 MR. ROSSI: So it could have opened up only  
13 part way later on?

14 MR. BONNER: Yes, that is correct.

15 MR. ROSSI: It could have opened up part way,  
16 torqued out, and just sat there, and then when it came time  
17 to close, it would have closed and you might not have ever  
18 known that.

19 MR. BONNER: That is correct.

20 MR. ROSSI: Do you have anything more for  
21 them?

22 MR. BONNER: I want to point out one thing.  
23 At the time that MOVATS had written this report, they  
24 weren't fully aware of the information that I had looked  
25 at on the auxiliary feed pump, and they were looking at the

1 information strictly from the standpoint of what they had  
2 seen from their past experience.

3 And that it is difficult to tell from the  
4 information here, but it still appears to me that the valve  
5 did open, at least a certain amount.

6 MR. ROSSI: And you are pretty sure it opened  
7 later on ultimately to feed the pump. But I don't know how  
8 sure you are of that point.

9 MR. BONNER: Later on, it would have had to  
10 have done it to successfully feed the pump because that  
11 in my estimation was the means of driving that pump.

12 Because they reset -- because the operators  
13 had reset the manual initiation of the SFRCS.

14 MR. BELL: But that is only important if on  
15 the reset signal that 106 they got is closed, and I don't  
16 know if that is the case or not.

17 MR. BEARD: If the alarm printer is inoperable  
18 on 106-A, that may be --

19 MR. ROSSI: You might have set it through 106-A  
20 throughout, and just assumed -- and maybe 106 never did  
21 open.

22 MR. BONNER: 106 is shown, again, the same way  
23 -- its rotor tripping the next time.

24 MR. BEARD: Say that again?

25 MR. BONNER: After the manual actuation, or the



1 reset of the SFRCS, 106 is again shown going open, or  
2 indicates from the alarm printout that its rotor has tripped  
3 or opened up the contact to provide signal to the computer.

4 MR. ROSSI: And there is no indication this  
5 time that it ever reclosed like it did before.

6 MR. BONNER: That is correct.

7 MR. BEARD : That is the one that says it is  
8 not closed. Did you get the one that says it is full open?

9 MR. BONNER: There is no full open indication  
10 on MS 106.

11 MR. BEARD : All you know is that it cleared  
12 the same position it cleared the first time.

13 MR. BONNER; Yes, sir.

14 MR. HILDEBRAND: The area that would have to be  
15 developed through that valve is equivalent of approximately  
16 a two inch line, diameter lines, since there is a full  
17 restriction upstream of that line.

18 Although it is a six inch valve normally,  
19 you only have to come up in the area that is equivalent  
20 to about a two inch --

21 MR. ROSSI: So it could have come open a little  
22 ways, and bound, and stopped right there, and everything  
23 would have --

24 MR. HILDEBRANDT: That was Bill's discussion  
25 earlier, that is right.

1 Done that, and still have adequate flows for  
2 106.

3 MR. ROSSI: But the only problem is that it  
4 didn't do that on the retest, so if it did that kind of  
5 thing, it only happened under those circumstances with hot  
6 steam and all that kind of stuff.

7 MR. BEARD : Well, I guess the only last question  
8 I have is that the Report doesn't seem to indicate what  
9 MOVATS findings were in regard to the kinds of things they  
10 reported on 599 - 608, in the sense that in their judgment  
11 experience was the bypass switch set at a proper place, and  
12 was the torque setting adequate to allow the valve to stroke,  
13 and things of that nature.

14 That is not in your enclosure here. It would  
15 be interesting to know if that was their conclusion or not?

16 MR. ROSSI: I thought they said that they  
17 concluded that the bypass switch was not set properly, and  
18 that is the reason that they were surprised the valve ever  
19 came open, is that correct?

20 MR. HILDEBRANDT: Yes.

21 MR. BONNER: At the time that I was doing  
22 this report here, I had not had time to read through and  
23 discuss with MOVATS the content of the report, and did not  
24 wish to put in any further information within the preliminary  
25 report than what I had to give.

1 MR. ROSSI: But nonetheless it is correct that  
2 MOVATS analyses indicates that this bypass switch was  
3 improperly set also? Like 599 and 608.

4 Is that correct?

5 MR. BONNER: That is my understanding, yes,  
6 from reading the report.

7 MR. BEARD: So, I guess the bottom line is that  
8 in terms of likely root causes, I don't see that there is  
9 a compelling case been made that it is really --

10 MR. ROSSI: No, let me interrupt a minute before  
11 you go on.

12 I think very clearly it has not identified  
13 the root cause.

14 MR. BEARD: I was about to conclude with the  
15 statement that the most meaningful statement on this whole  
16 report is that everything should be considered inconclusive  
17 at this point. That is where I am at the moment.

18 MR. BELL: Finding No. 5 is the cocked packing  
19 gland flange. If that valve had opened, and came in contact  
20 with that packing gland flange, would you expect to see any  
21 damage on that flange from the threads on the valve stem?

22 MR. BONNER: I did not see any when I did  
23 the visual inspection on the valve.

24 MR. ROSSI: You haven't actually taken them  
25 apart or anything like that?

1 MR. BONNER: No, we have not.

2 MR. ROSSI: All you have done is tested the  
3 circuitry so far, and at some point you might get to --

4 MR. BONNER: Stroke the valve?

5 MR. ROSSI: Stroke the valve, and if you don't  
6 find the cause with all these other things, then you will  
7 probably have to do something else to identify what happened?

8 MR. BONNER: That is correct.

9 MR. ROSSI: Are you still within the action  
10 plan that you originally gave us?

11 MR. BONNER : Yes.

12 MR. ROSSI: So you haven't completed that?  
13 You haven't?

14 MR. BONNER : 18. Step 18 is yet to be  
15 completed.

16 MR. BEARD: Let me make sure I understand that,  
17 because I think there is a misperception here.

18 As I understand it from your summary, it says  
19 you have completed all those steps except the one that would  
20 require cock testing.

21 MR. BONNER: Step 18 requires valve testing under  
22 system operating parameters.

23 MR. BEARD: So you have gone as far as you can  
24 go, and your results were inconclusive?

25 MR. BONNER: Yes, sir.

1 MR. BEARD: Do you have any reason to suspect  
2 that the hot testing system operating parameters are going  
3 to lead you to a better result, -- what I guess I am trying  
4 to get at is would you reasonably expect you are going to  
5 have to expand your action plan to include additional  
6 troubleshooting phases?

7 MR. BONNER : Yes, at this time I do.

8 MR. BEARD : That is all I was trying to get  
9 to. Thank you.

End 11. 10  
SueWal fols. 11

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#1 - SueWalsh

MR. ROSSI: Let's see, are you finished?

MR. BEARD: Yes.

MR. ROSSI: Are you finished with this, Larry?

MR. BELL: Yes, sir.

MR. ROSSI: Do you want to take a short break?

MR. GRIME: Fine.

MR. ROSSI: All right.

(Whereupon, a recess is taken at 1:44 p.m., to reconvene at 2:17 p.m., this same day.)

MR. ROSSI: Are ya'll ready? Why don't we begin?

MR. GRIME: Yes.

MR. ROSSI: And this is 9A and 9B, the one on the turbine bypass valve failure. And as I read this one, I understand that you have looked at the traps and drains and you found one trap I guess that had a clogged strainer in it. And you had one trap that was opened all the time apparently.

MR. RAYNES: Right.

MR. ROSSI: But it doesn't appear that that combination would explain having water in your line.

MR. RAYNES: Well, the traps are designed for a regular use I think. With a cool-down they actually should use the drain valve, and that's 2575. When you startup after a cold shutdown or whatever to get the water up.

Although this shows that one trap that was failed



#1 2-SueWalsh

open was draining continuously, this --

MR. ROSSI: But that presumably would have kept water from going into the line --

MR. RAYNES: That's right.

MR. ROSSI: -- I mean, the fact that it was open all the time might have been some other problem --

MR. RAYNES: That's right.

MR. ROSSI: -- but not the collection of water itself.

MR. RAYNES: Uh-huh.

MR. ROSSI: The way I read Number 1 is that you looked at the things that might explain why you had water there and all that stuff. If there were some problems, that wasn't the reason you had the water.

MR. RAYNES: Right.

MR. ROSSI: And then the next thing you did is, you disassembled the valve and you found a number of abnormalities there. Some of these I gather were pre-existing problems with the valve; is that correct?

Or, were these all caused by the damage? Or, do you know?

MR. RAYNES: I got a partial report back from my alarm from Fisher valve, and they said that the Belleville springs and spaces that were found jammed or broken had happened prior to our event. That will be coming out in the

# 3-SueWalsh

Findings Report that I will have out next week. But they said the oxidation on it had been for a week or so prior to what we saw.

So that didn't happen at the time.

MR. ROSSI: What about the others? You don't know yet?

MR. RAYNES: We just had more information this afternoon that will -- that we will be putting together also on -- this was the only valve that was rebuilt in '82. We didn't know that before. It was never written on that MWO that we had reviewed, and it's only one of the turbine bypass valves that had the modified stem which uses the cotter-pin.

So, we are looking into that now also.

MR. ROSSI: Well, tell me, do you still think that this valve was damaged by waterhammer, or do you now think it may have been something else?

MR. RAYNES: I think that it still is waterhammer, a combination of waterhammer and probably the valve, not -- the internals of the valve not being properly assembled or --

MR. GRIME: The missing cotter-pin and Belleville springs?

MR. RAYNES: Missing nut and cotter-pin. There is evidence of a cotter-pin never being there. So we have to go back and look these things over. But the report that is coming

#4-SueWalsh

from Fisher will have a lot to do with what we say in our Findings Report.

MR. ROSSI: Well, assuming that it turns out that they come back and say that it looks like it was waterhammer that caused it, then you've got the problem of finding out what caused the waterhammer.

MR. RAYNES: We are also working with Yarway Traps who are evaluating our design, the way our traps are designed right now in the system. And we are getting together Monday morning to put all the information together.

MR. ROSSI: Are you still within the action plan that we were originally given for doing this work?

MR. RAYNES: Well, we are working under the guidelines using them to help in the troubleshooting.

MR. ROSSI: Yes, but you understand the guidelines --

MR. RAYNES: Yes.

MR. ROSSI: -- say you are supposed to have an action plan before you start doing the troubleshooting. So, if you are doing a different --

MR. RAYNES: Yes.

MR. ROSSI: -- kind of troubleshooting than what the original action plan said, you really ought to be doing a new action plan.

MR. RAYNES: I updated the action plan for the Fisher that was not on the first, the two Fisher valves and the other

#175-SueWalsh

part is within the guidelines.

2 MR. BEARD: Do we have a copy of that revision?  
3 Or, have we been provided a copy, do you know?

4 MR. GRIME: I would assume that it has been, but  
5 I do not personally have knowledge of that.

6 MR. BEARD: I'm sorry, I can't remember your name.

7 MR. RAYNES: Matthew Raynes.

8 MR. BEARD: Matthew. Is that what you like to be  
9 called, Matthew?

10 MR. RAYNES: Yes.

11 MR. BEARD: Okay. You updated the action plan  
12 once for the Fisher --

13 MR. RAYNES: Yes, for the Fisher work.

14 MR. BEARD: Okay. Now, other than that all --

15 MR. RAYNES: All the work that --

16 MR. BEARD: What is your latest revision of that  
17 plan, then? Do you have that with you?

18 Can you just tell us the revision number and date,  
19 and I can probably find out whether we've got it.

20 MR. RAYNES: It's Revision 2, and I revised it  
21 on Monday.

22 MR. BEARD: Monday of this week?

23 MR. RAYNES: Yes.

24 MR. BEARD: Has it been approved?

25 MR. RAYNES: Yes.

# 6-SueWalsh

2 July the --

3 MR. RAYNES: 8th.

4 MR. BEARD: -- 8th. Thank you. All right. I  
5 don't know whether we have got that or not.

6 Do you believe that it's likely that your present  
7 action plan will lead you to a conclusive result of the  
8 root cause, or do you anticipate that you are likely to have  
9 to explore other avenues beyond what is in the plan?

10 MR. RAYNES: I believe that we will be able to  
11 put together the information with all the people that have  
12 been involved working in the action plan; we will be able  
13 to do it.

14 MR. BEARD: I was curious about two items. Was  
15 this the valve that I believe the action plan stated that  
16 has no periodic maintenance of test equipment?

17 MR. RAYNES: Yes.

18 MR. BEARD: Okay. I realize it's not a safety-  
19 related piece of equipment.

20 MR. RAYNES: That's right.

21 MR. BEARD: But a turbine bypass is a useful  
22 function to have, of course.

23 And then I was a little surprised to see that if  
24 I go down through this list of activities and the results,  
25 it looks as though there is something like ten anomalies that

#1 - SueWalsh1

2 are listed here that you found. How many of those related to  
3 the event is a different matter, but you found like ten  
4 things. You know, strainers clogged, strainers deformed,  
5 broken linkage on a positioner, et cetera, et cetera, et  
6 cetera. That's ten items.

7 Would you consider that usual or normal? Or,  
8 would you consider that abnormal? Or, how would you consider  
9 or characterize that?

10 MR. RAYNES: I think when you start at the top and  
11 look at steam traps, after we had met with them we set up a  
12 program. And I think that most likely a lot of the steam  
13 traps are going to be failed open, flowing by, which is not  
14 bad but they should be looked at.

15 Other than that, I don't -- I really -- I think  
16 that is abnormal.

17 MR.ROSSI: You have no preventive maintenance  
18 program. How do you find problems like this in --

19 MR. RAYNES: They --

20 MR. ROSSI: -- the normal course of operation?

21 MR. RAYNES: They have a periodic maintenance  
22 procedure that is being reviewed, and I believe it's in the  
23 approval process now that they go around and they take  
24 temperature readings across the steam trap and they will tell  
25 you if there is -- if the DP across it isn't large enough, then  
you have a failed open trap. And they just write "Not Okay."



#1-3-SueWalsh

MR. BEARD: That's for the traps?

MR. RAYNES: Right, steam traps.

MR. BEARD: What about --

MR. RAYNES: Otherwise, the valves -- in 1980, all six valves were sent out to Fisher to be worked on. The other valves we took apart today were in good condition. The valve that we found failed, SP13A2, had been worked on in '82 with no rep available and no rep there.

MR. BEARD: That's different from the other valves?

MR. RAYNES: Yes.

MR. BEARD: The other valves were reworked with the rep present or something?

MR. RAYNES: Yes, all of them were in '82. They just did this one -- I haven't found out why yet. But, you know, that will be looked into.

MR. BEARD: I have one thing I wanted to be sure I understood correctly. On your Activities Number 3 there where you disassembled the valve, SP13A2, you said that you found the stem was scored in several locations apparently due to clamping in vise.

I wanted to be sure I understood. Is that from some previous clamping or the clamping that you did as part of the troubleshooting or what?

MR. RAYNES: No, this was prior to us opening it. It was -- the Fisher rep was appalled, and I think that's due

#1 - SueWalsh

to something in the shop or whatever. I would not like to say at this time, but someone didn't know he had to preload the springs in the valve and I have the feeling that they did it themselves in the shop.

MR. BEARD: Okay. The information at the end of the summary, you mention here that there is investigation in the differences in the temperatures between the two steam headers downstream of the MSIVs.

I think this is something Mr. Hildebrandt suggested in an earlier meeting. And if I remember right, I think he said that particular one came down like 200 degrees lower than the others.

MR. HILDEBRANDT: Close to a hundred, 140.

MR. BEARD: Okay. Some, I hope, significant number. Someone had raised the question at that time as to whether it's the abnormal situation, the one that came down or the one that stayed up.

Or, maybe a better question would be, can you elaborate a little bit on this paragraph and tell us what is going on or where you are now in that analysis?

MR. HILDEBRANDT: Nothing specific has gone on at this point. The temperature differences are noted and the attention has been paid to the other part that Matt described to you today.

MR. BEARD: Is that part of the action plan in the

#10-SueWalsh sense that it will be required to be completed prior to  
2 the diagnosis of the root cause?

3 MR. HILDEBRANDT: Yes.

4 MR. BEARD: Does it look like -- I guess I was  
5 intrigued last time we were here by your announcement of  
6 this temperature observation.

7 Do you think that would be a likely major contri-  
8 butor of this event?

9 MR. HILDEBRANDT: It could be a source of the  
10 water as a result of the condensation -- it appears that it  
11 could be a source of the condensation as a result of having  
12 to heat up that line via the bypass around the MSIV.

13 Whether that is the source, it is yet to be  
14 determined. It has not yet been done.

15 MR. ROSSI: Do you have anything more?

16 MR. BEARD: I think in summary if somebody asked  
17 me your best shot right now, I think you said it earlier,  
18 Matthew, it looks at this point like you had a waterhammer  
19 situation that was complicated by some valve assembly problem.

20 MR. RAYNES: Yes.

21 MR. BEARD: That's where I see you are at now.

22 MR. RAYNES: Yes. We will have a more comprehensive --  
23 we will be able to put a lot more together when our information  
24 is together hopefully some time next week.

25 MR. BEARD: I don't have any more comments on this.

#1 1-SueWalsh

MR. ROSSI: Shall we go directly on to Plan 18?

MR. GRIME: Fine. Tom Gulvas is here to address that one.

MR. ROSSI: Okay. This one I gather is -- what you have mainly done is work to verify that SP7A was working properly and that on the day of the event they just thought it wasn't working properly.

Is that a fair summary?

MR. GULVAS: That's correct. We haven't done work to date to verify that it operates.

MR. ROSSI: Okay. What you have done is, you have looked at the analyses and evaluation of the event, flows of the curve and calibration of flow channels and that kind of thing. And based on that it appears that the valve really was passing flow on the day of the event --

MR. GULVAS: Correct.

MR. ROSSI: -- and it was probably working. And then the next steps, I assume, are in accordance with the action plan you are going to go in and actually verify that the valve opens and closes the way it's supposed to, and that kind of thing.

MR. GULVAS: Uh-huh.

MR. ROSSI: Okay.

MR. GULVAS: We determined it best to wait until the SFRCS action plans were initiated and work in conjunction

#1 2-SueWalsh with those, because we have to trip -- the valve actuates on a SFRCS trip, so we determined to wait.

MR. ROSSI: Now, I gather that you really haven't gotten into the actual action plan that was written yet?

MR. GULVAS: Well, the calibration checks on the flow instrumentation was in the action plan.

MR. ROSSI: Okay.

MR. GULVAS: But that's the only part we've done.

MR. ROSSI: That's the only part you've done?

MR. GULVAS: Yes.

MR. ROSSI: Okay.

MR. GULVAS: The remainder will be probably initiated certainly next week.

MR. ROSSI: But you have done more evaluations of the event that would lead you to a conclusion that there was flow through the valve and you did get flow into the second steam generator?

MR. GULVAS: Correct.

MR. BEARD: I had a couple of minor questions. I was unaware that you had a startup flow channel, because on the DADS data that I believe I saw -- I might have missed it -- but the only one I saw was composite main feedwater.

MR. GULVAS: No, that's --

MR. BEARD: Do you know if that instrument string is connected into the DADS system?

#1 3-SueWalsh

MR. ROSSI: I think we have that --

MR. GULVAS: Yes. It is.

MR. ROSSI: -- information.

MR. BEARD: It is?

MR. ROSSI: We have that information, because I think Wayne and --

MR. BEARD: That may explain some of the conflict I had with this, because people were indicating that they were able to see a distinctive change in flow reading. And I was looking at the one for the composites and I did not see a distinctive flow change.

The second minor item I had was, you indicated on the flow transmitter, I guess it was something about you noticed a shift I guess when you went to operating pressure of some 50 millivolts. And I'm just trying to get that in perspective.

Is that a zero to ten volt transmitter, plus or minus ten or something?

MR. GULVAS: Plus ten -- or, minus ten and plus ten.

MR. BEARD: Okay. So a few millivolts is really small compared to tens of volts.

MR. GULVAS: Right. And, as I said, it was in a negative or towards zero direction, which would mean that, you know, it was a considerable shift as far as the flow



#14-SueWalsh

was concerned.

2 MR. BEARD: Yes. A zero to one volt signal, for  
3 example, would have been a different situation?

4 MR. GULVAS: Right.

5 MR. BEARD: Okay. Let's see, I only had one --  
6 there was one part that really relates to exactly what  
7 happened during the event, and I'm a little confused and maybe  
8 this is the time to get straightened out.

9 As I understand it, during the event what the  
10 operator had to do was to realize that this startup valve  
11 had been closed by the actuation of the SFRCS.

12 So, to reestablish a flow path for the startup  
13 feed pump what he wanted to do was to go over and hit the  
14 appropriate switches to override that signal and then manually  
15 reopen the valve. Okay.

16 (Mr. Gulvas nodded in the affirmative.)

17 And then as I understand the event, he went over  
18 and tried to do this override or block function and he never  
19 received the reset light; therefore, he figured he never got  
20 control of the valve. And, therefore, did he ever attempt  
21 to reopen the valve that we are aware of?

22 Or, did he just stop at that point? What do we  
23 know about that?

24 MR. GULVAS: Well, he called the technician over  
25 and the technician took a bulb from the corresponding reset in

#15-SueWalsh another channel and placed it in the reset in question, and  
2 the bulb blew.

3 MR. BEARD: Right. I knew that part. But I --

4 MR. GULVAS: Okay.

5 MR. BEARD: What happened in terms of valve  
6 controls?

7 MR. GULVAS: Apparently they did, you know,  
8 manually open the valve.

9 MR. ROSSI: How much flow did you get through  
10 the valve? Do you know?

11 What was the indicated flow from the --

12 MR. GULVAS: The indicated flow when it opened  
13 was approximately one and a half percent of full open flow.

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Sim 13-1

1 MR. ROSSI: One and a half percent?

2 MR. GULVAS: Correct.

3 MR. BEARD: Of full startup flow. I mean the  
4 full flow that could go through the startup valve.

5 MR. GULVAS: Right.

6 MR. ROSSI: So that something like what, a couple  
7 of gpm or something? Is that what you are talking about, a  
8 few gpm?

9 MR. GULVAS: Our instrumentation, we have two  
10 signals. One measures it in inches of Delta P across the  
11 transmitter and the other one is compensated for temperature  
12 and that reads it in thousand pounds per hour, and we were  
13 showing 70,000 pounds per hour approximately.

14 MR. BEARD: Okay. Does one and a half percent  
15 indicate a number like leakage?

16 MR. GULVAS: That is being looked into now.

17 MR. BEARD: Because I was thinking, you know,  
18 and going back to my question about did the guy actually  
19 try to reopen the valve because I think your case is that  
20 the valve really was operable and the problem was only  
21 an indicator problem. If he stopped there, and whatever  
22 flow was just a leakage from a "closed" valve, and had he  
23 really tried to open it, he would have gotten much more  
24 than any one and a half percent.

25 MR. GULVAS: The position indication shows the

Sim 13-2

1 valve opening to 12 persen. But at the time the main feed  
2 pumps were basically stopped and the startup feed pump was  
3 just coming on. So there was a supply transition going on  
4 at that time.

5 MR. ROSSI: Well, what about later in the  
6 transient, was this valve used later on to provide flow?

7 MR. GULVAS: No. They had aux feed after that,  
8 and that goes through a different routing to the steam  
9 generator. So this was basically closed again.

10 MR. ROSSI: But did they close it -- did somebody  
11 go back and reclose it then or have they never reopened it  
12 or what?

13 MR. GULVAS: I am not sure. It was only open  
14 for a short period of time.

15 MR. ROSSI: And only a small amount?

16 MR. GULVAS: Right. But both No. 2 and No. 1  
17 startup valves opened together and closed together.

18 MR. BEARD: On the DADS printouts for the pages  
19 that were given to us, on the sheets that had the steam  
20 generator traces, there is a trace for the main feedwater  
21 startup control valve position percentage open.

22 MR. GULVAS: Correct.

23 MR. BEARD: And on, and let's see, I happen  
24 to have here the one for one steam generator which is not  
25 the A. So let me change the page here. For the No. 2

Sim 13-3

1 steam generator which you call the A startup valve it looks  
2 like that at some point in time it was opened 10 to 15  
3 percent. So that corresponds to what you are talking about.

4 MR. ROSSI: How much was the other one opened?

5 MR. GULVAS: Slightly higher.

6 MR. BEARD: The other one was opened roughly  
7 a scosh under 20 percent on the average and there was a  
8 period that it was less than that and a period that it  
9 was more than that, but on the average something under  
10 20 in just eyeballing it.

11 MR. GULVAS: Correct.

12 MR. BEARD: So that the valves were not opened  
13 by grossly different values.

14 MR. GULVAS: Right. And if you notice the  
15 time, they opened basically at the same time.

16 MR. BEARD: Roughly, yes. And again the  
17 operator at this point, and I am not sure if you are the  
18 right one or someone else, was opening these in anticipation  
19 of Steve getting the startup pump running, right? So he  
20 was basically getting ready for startup flow.

21 MR. GULVAS: I am not aware of the operational  
22 procedures, so I can't say for sure.

23 MR. BEARD: I don't have any further questions.

24 MR. ROSSI: I don't have any more either.

25 MR. ROGERS: The original reset light bulb

1 that was not illuminated, did you all ever look at it to  
2 find out why it wasn't working right?

3 MR. GULVAS: The original bulb?

4 MR. ROGERS: Yes.

5 MR. GULVAS: No.

6 MR. BEARD: Did you check out the socket?

7 MR. GULVAS: That is part of our additional  
8 work under the action plan.

9 MR. BEARD: So you have got that in your  
10 program but you haven't gotten to it yet?

11 MR. GULVAS: Right.

12 MR. ROSSI: Does anybody have anything else?

13 MR. BEARD: Is that the last action plan?

14 MR. ROSSI: You have been through them all.

15 MR. GRIME: That is our final of our preliminary  
16 status on the action plans.

17 MR. BEARD: This is a status we have been  
18 through since yesterday for every item except the rupture  
19 control system.

20 MR. GRIME: That is correct.

21 MR. ROSSI: Okay. Then why don't we close the  
22 meeting.

23 (A recess was taken from 2:45 to 2:58 p.m.)

24 MR. ROSSI: Mr. Hildebrandt has some information  
25 to give on the design pressure for the piping in the



Sim 13-5 1 auxiliary feedwater system.

2 MR. HILDEBRANDT: The question was raised  
3 this morning as to what is the design pressure for the  
4 piping Dr. Rossi just mentioned.

5 The PNIDs prepared by Bechtel show it as  
6 six-inch class 600 piping, which for the temperature  
7 conditions of the auxiliary feedwater should be good to  
8 1500 psi working pressure per the applicable codes on  
9 this system, and that is the same working pressure, the  
10 maximum head expected from the auxiliary feedwater pump,  
11 and therefore the piping and fittings and valves should be  
12 adequate.

13 MR. ROSSI: That is all.

14 (Whereupon, at 3:00 p.m., the meeting  
15 adjourned.)

16 \* \* \* \* \*

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CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the  
NRC COMMISSION

In the matter of: Fact-Finding Meeting on Status Report  
On Quarantine Equipment (Continued)

Date of Proceeding: July 12, 1985

Place of Proceeding: Oak Harbor, Ohio

were held as herein appears, and that this is the original  
transcript for the file of the Commission.

MYRTLE H. WALSH  
Official Reporter - Typed

GARRETT J. WALSH, JR.  
Official Reporter - Typed

*Myrtle H. Walsh*  
Official Reporter - Sigt.

*Garrett J. Walsh, Jr.*  
Official Reporter - Signature

MARY SIMONS  
Official Reporter - Typed

*Mary Simons*  
Official Reporter - Signature

EXHIBIT 1  
7/12/85

Test I.D. 346-070685-AF-606

### Purpose

Tests were performed to determine the operator's ability to unseat the valve with maximum system differential pressure. Five opening strokes were attempted at 1050 to 1100 psi.

### Results

Test #1 and #2 indicate the thrust required to open the valve with differential pressure of 1050 was 11,800 pounds and 12,897 pounds respectively with a corresponding spring pack displacement of .086" and .095". The significance of this load is the proximity to torque switch trip. Previous testing as reported in test results run on 06/18/85 indicates torque switch trip occurs at 13,096 pounds of thrust or .096" of spring pack displacement. Although the valve successfully opens during Test #1 and #2, this close proximity to torque switch trip clearly illustrates a need for proper bypass protection or a higher torque switch setting.

During Test #3, the differential pressure was raised to 1095 psi. During this attempt to open the valve, the motor operator was unable to unseat the gate. An analysis of the signature indicates the thrust required was greater than the torque switch trip point. Without sufficient bypass protection, the motor de-energized when the torque switch opened. This occurred at 13,096 pounds of thrust or .096" of spring pack displacement.

The fourth attempt to open the valve resulted again in a failure to open. The motor operator de-energized when the load exceeded the torque switch trip point. Signatures were not saved, as they were a duplicate of Test #3.

~~During Test #5, at 1100 psi, a load hammering off the operator was heard during unseating of the gate. Analysis of the signature shows the load required to unseat the gate was at the exact point of torque switch trip. This caused the operator to energize and de-energize due to the torque switch opening and re-closing. In effect, the operator hammered the gate out of the seat and eventually completed the open cycle.~~

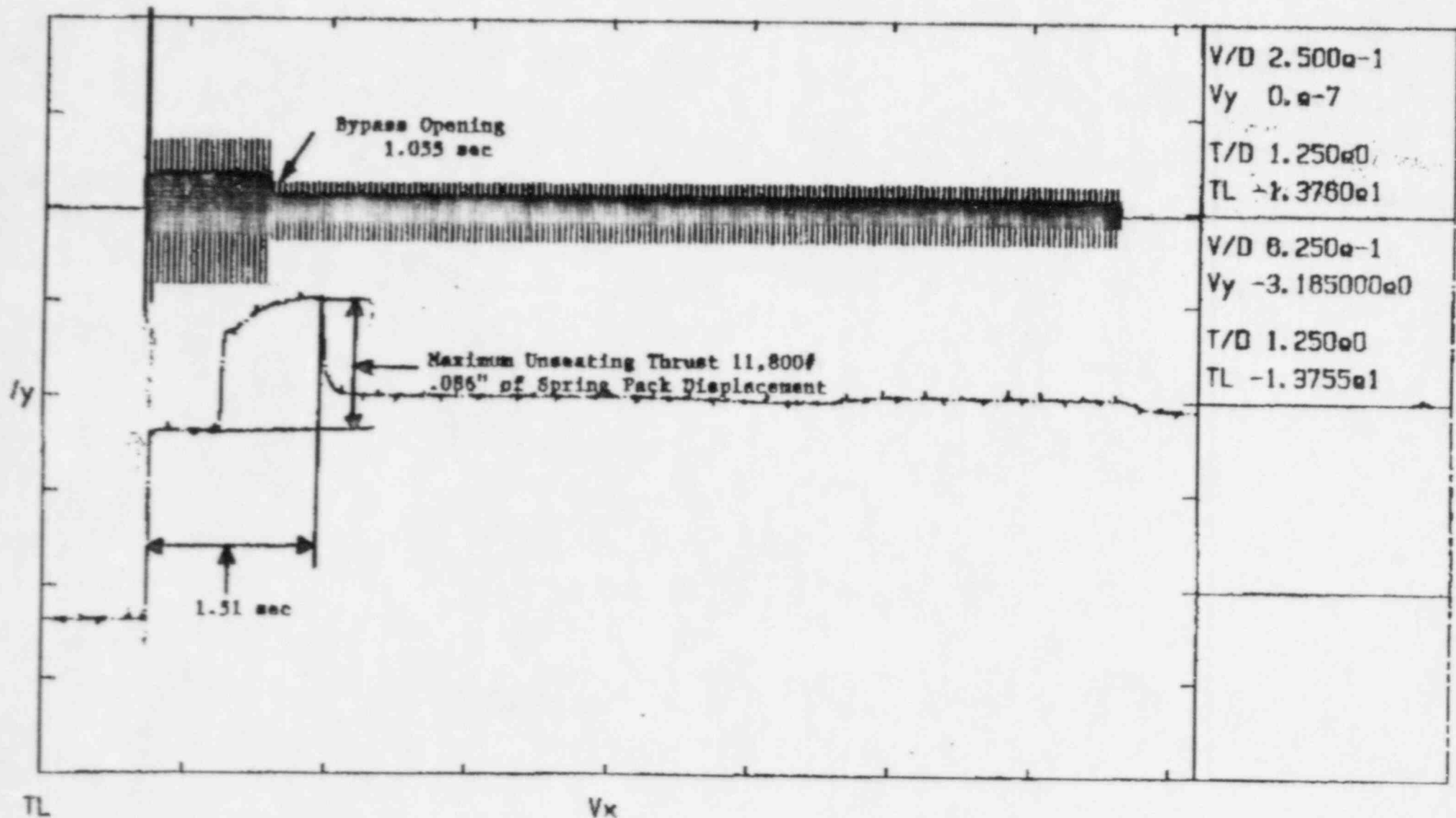
### Conclusions

Resetting of the close-to-open bypass switch to properly cover the unseating of the valve at maximum system Delta P and, verification that the torque switch trip setpoint is in accordance with the design calculation will assure reliable operation.

Test I.D. 346-C70685-A7-608

Test #1

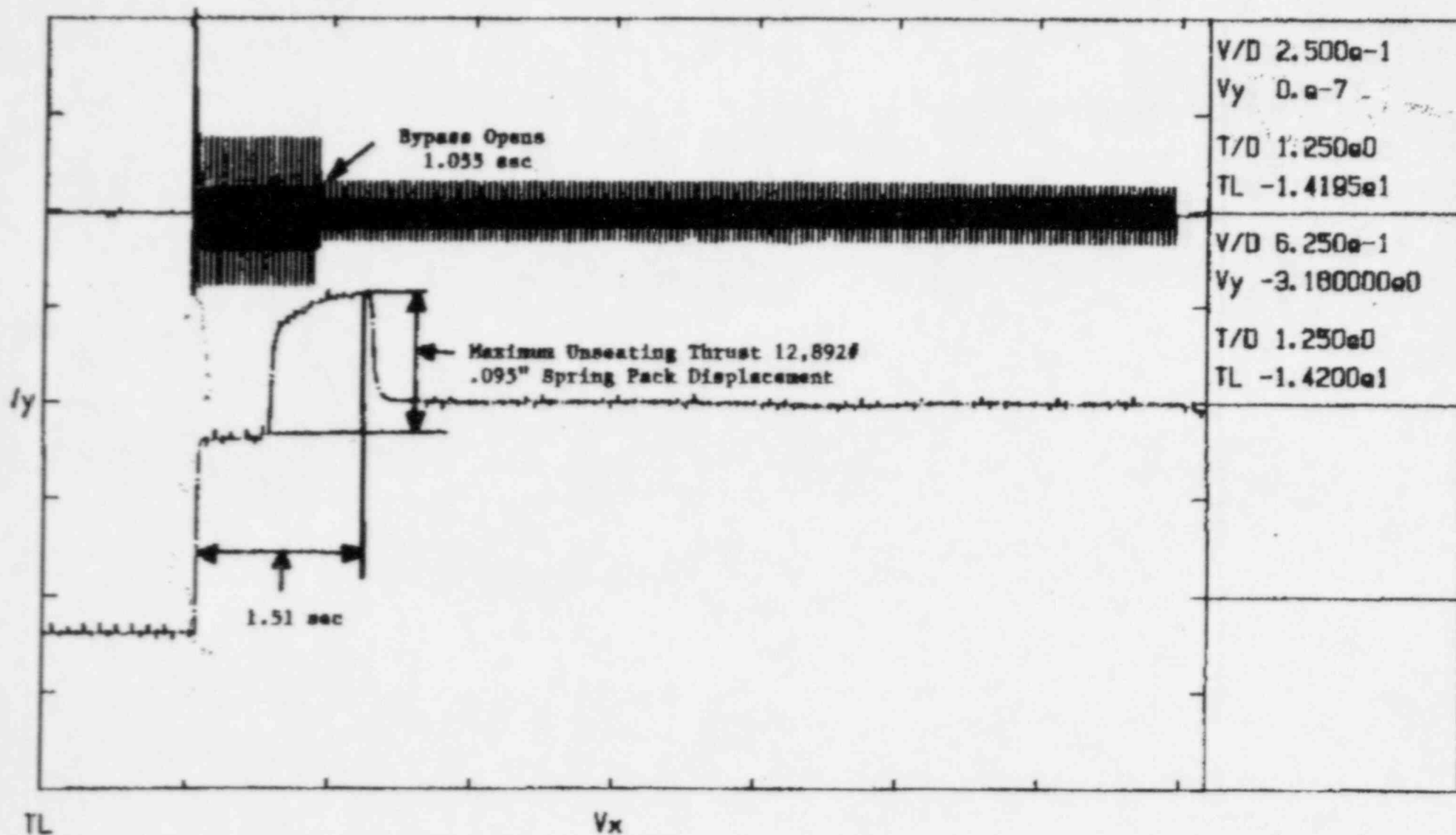
TMD and Switches - Close-to-Open Stroke  
 Differential Pressure 1050 psi  
 Valve completes entire opening stroke



Test I.D. 346-070683-AF-608

Test #2

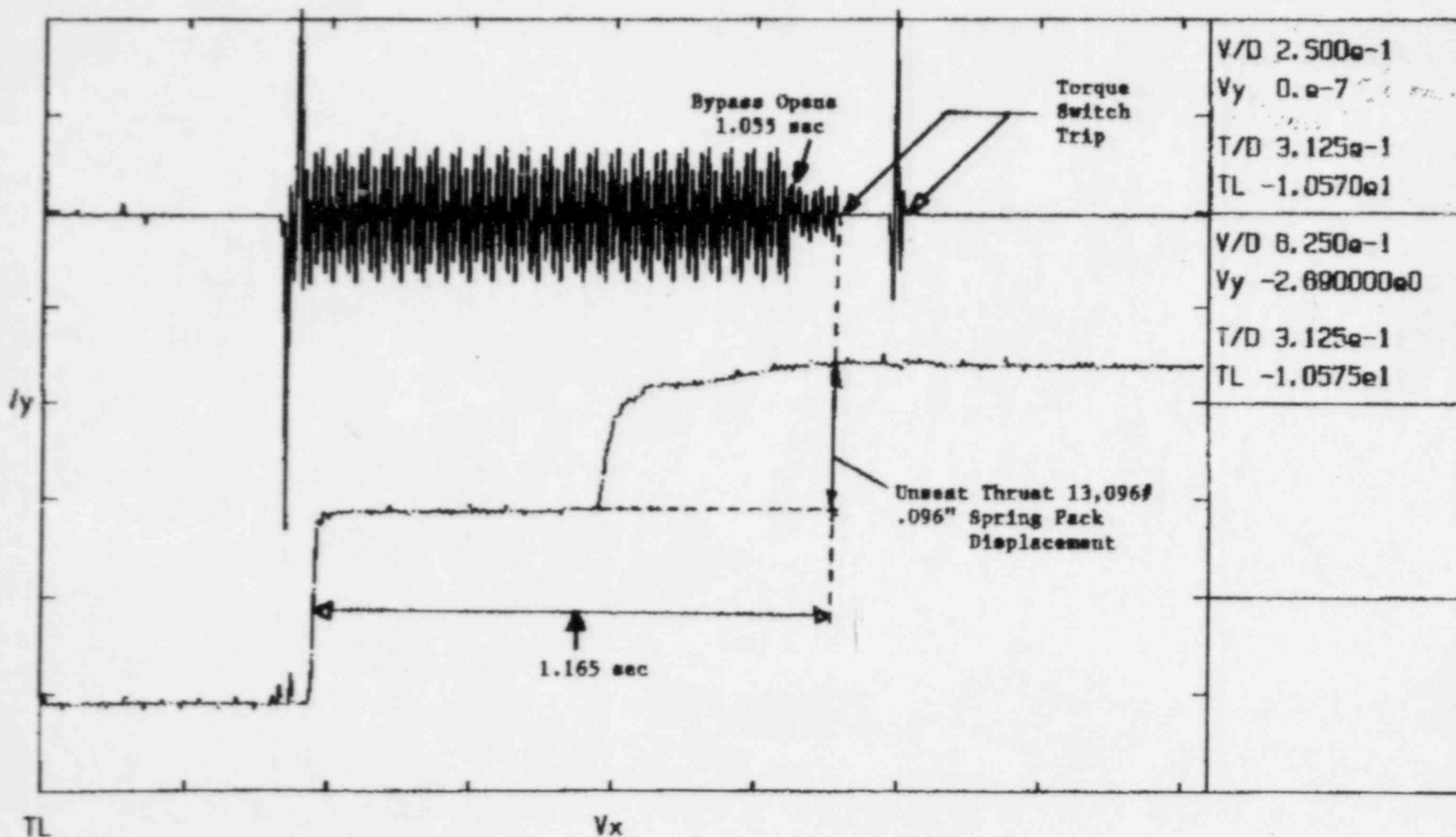
TMD and Switches - Close-to-Open Stroke  
 Differential Pressure 1050 psi  
 Valve completes entire opening stroke



Test I.D. 346-070683-AF-608

Test #3

TMD and Switches - Close-to-Open Stroke  
 Differential Pressure 1093 psi  
 Valve de-energizes attempting to unseat valve

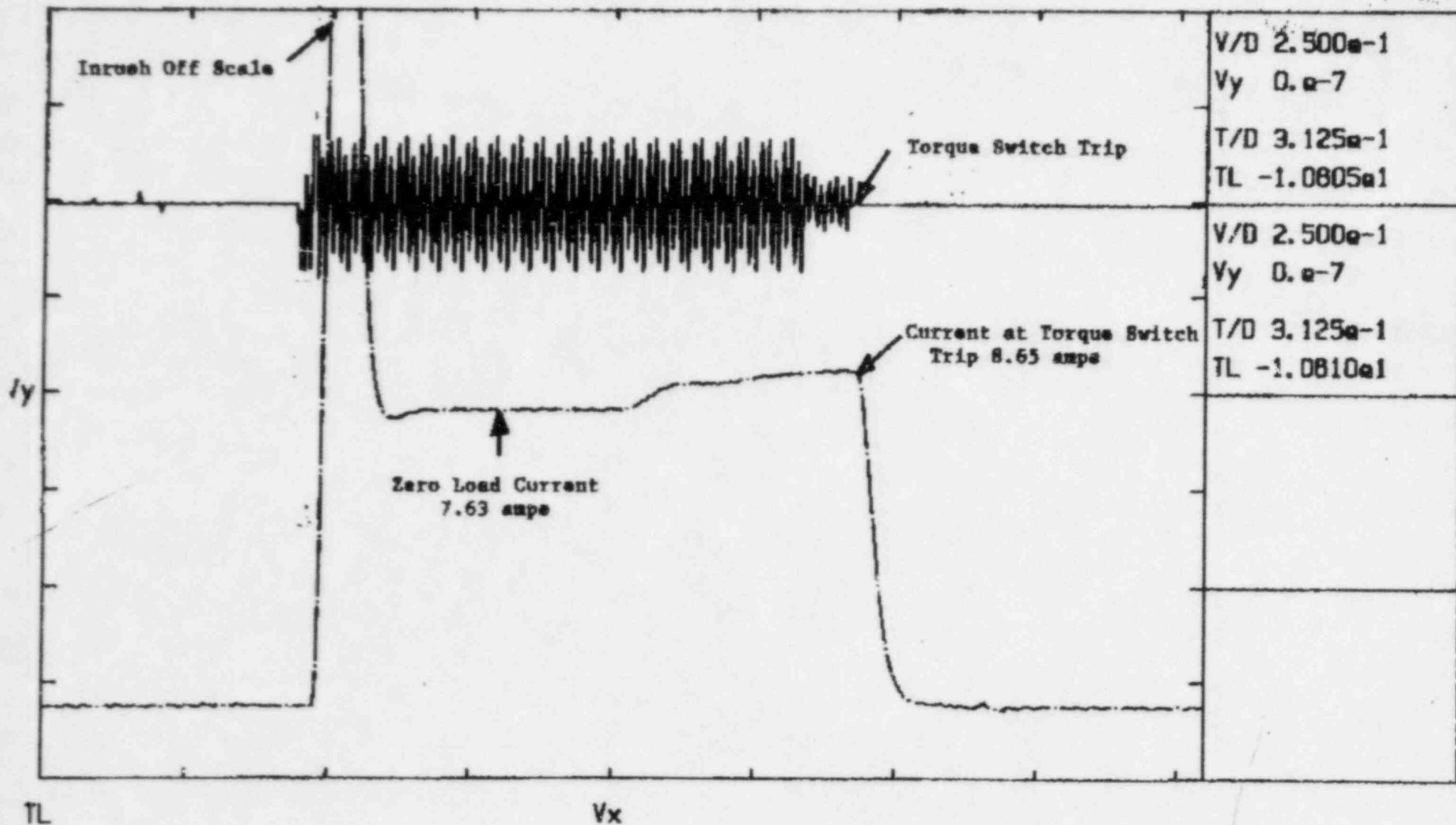




Test I.D. 346-070685-AF-608

Test #3

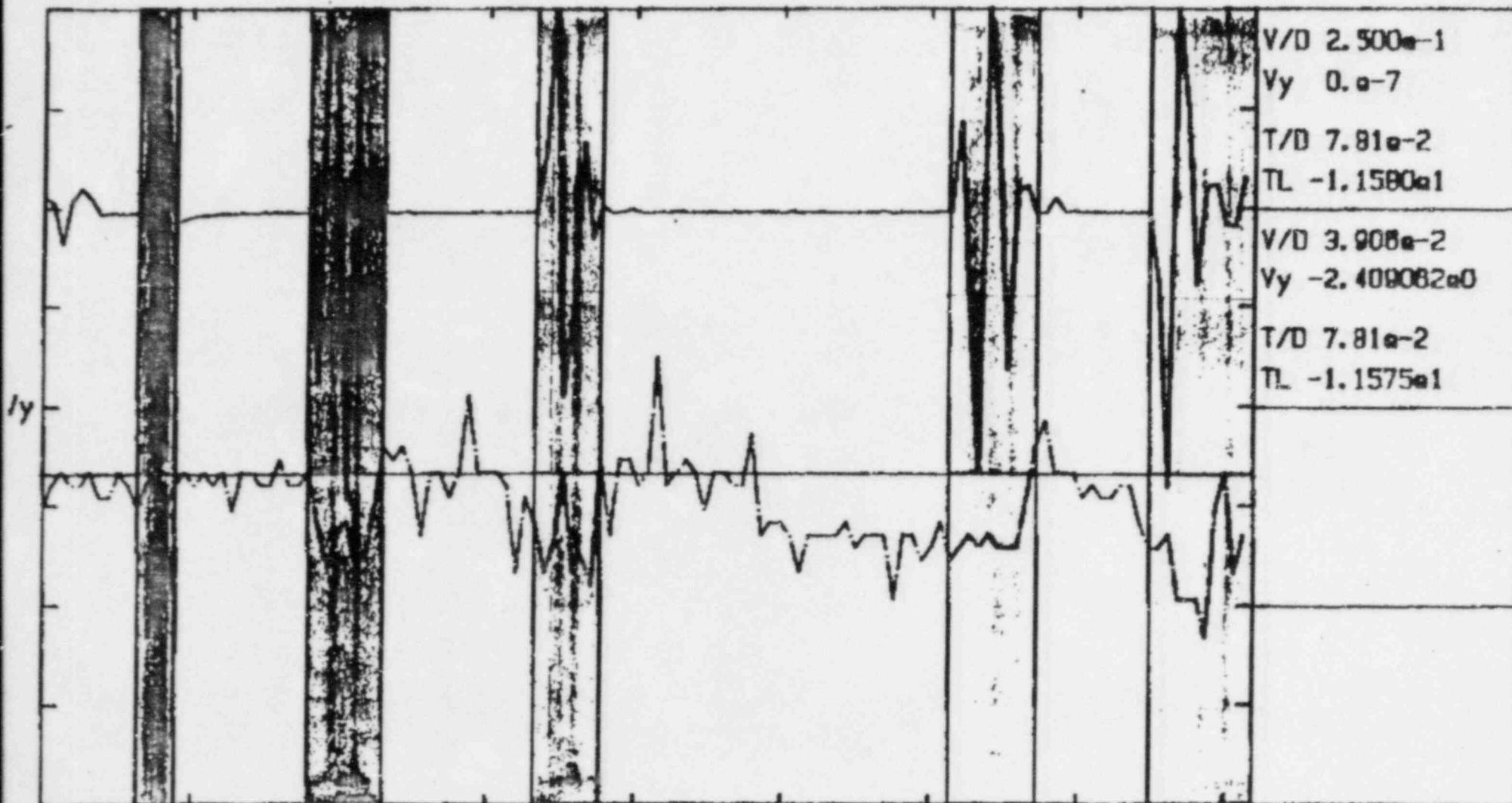
Current and Switches - Close-to-Open Stroke  
 Differential Pressure 1095 psi  
 Valve de-energizes attempting to unseat valve



Test I.D. 346-070685-A7-608

Test #5

TMD and Switches - Close-to-Open Stroke  
Differential Pressure 1100 psi  
Shaded Areas Indicate Closed Torque Switch



TL

Vx

Test I.D. 346-070683-AF-608

Test #3

TMD and Switches - Close-to-Open Stroke  
 Differential Pressure 1100 psi  
 Hammering effect as Torque Switch chatters at trip point

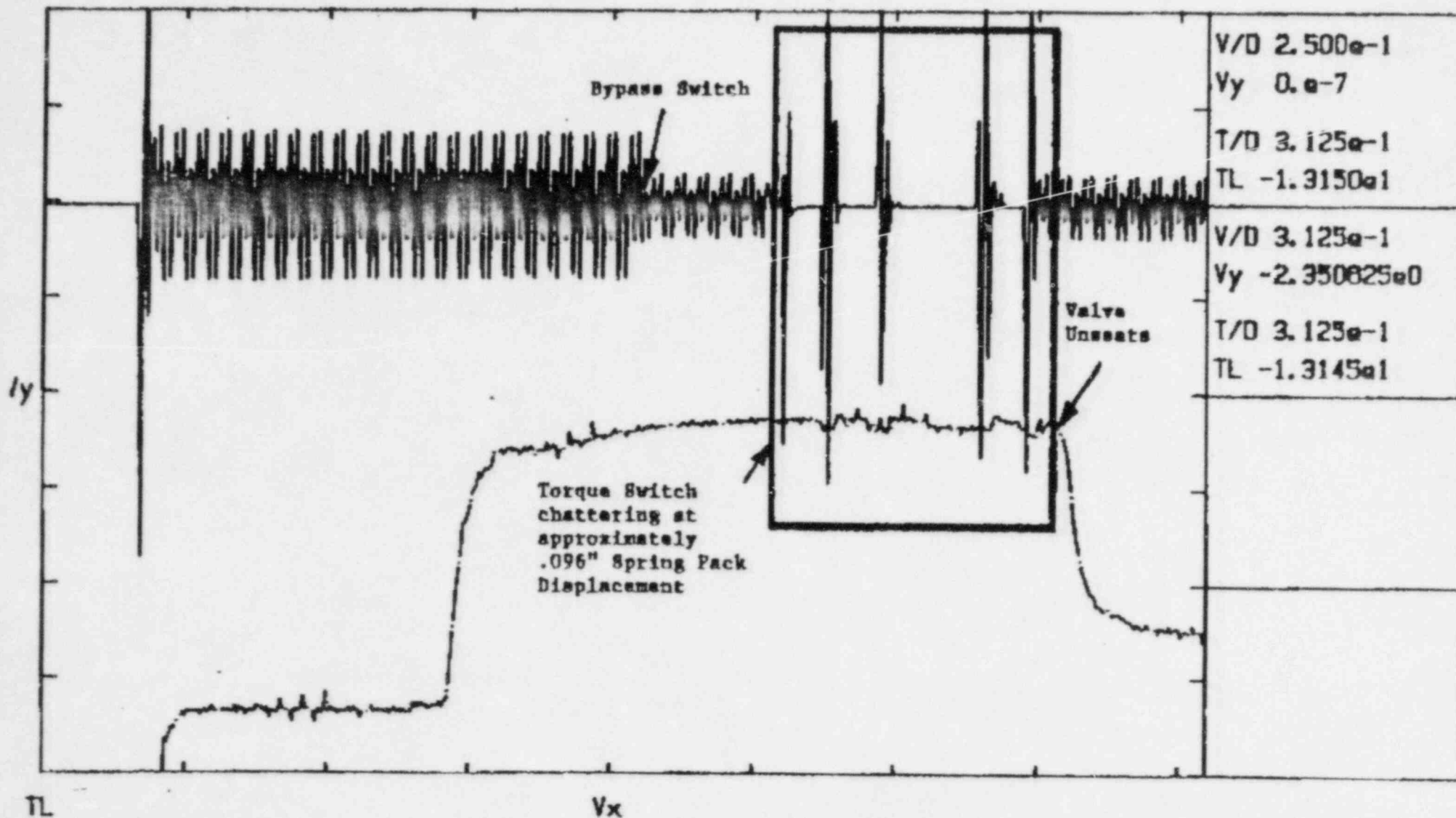


EXHIBIT 2  
7/12/85

Test I.D. 346-070585-AF-599

### Purpose

To determine the operator's ability to unseat the valve with maximum system pressure drop applied. Three opening strokes were performed at 1050 psi, one opening stroke at 750 psi, and one opening stroke at 350 psi to determine valve operability.

### Results

Analysis of signatures taken during Test #1, #2, and #3 verified that the torque switch tripped during the unseating of the valve as a result of the valve stem load being in excess of the torque switch trip setpoint. These tests were conducted with 1050 psi differential pressure across the gate.

A current signature was also run at this time which showed a relatively small increase in motor current as a result of the increased load during the unseating attempt.

Also, between Test #2 and #3, an unsuccessful attempt was made to electrically jog the valve off of the seat (Refer to signature labeled Test 2A).

At the completion of Test #3, with the operator torqued out and yet still unseated, the operator was put in manual and the handwheel rocked in an attempt to unseat the valve. During this operation, the torque switch re-closed and the operator re-energized and opened the valve (Refer to signature labeled Test 3A).

Test #4 was conducted with a differential pressure across the valve of 750 psi. During this open stroke, the recorded thrust load was statistically at the torque switch trip setpoint momentarily, however, the torque switch did not open, thereby allowing the valve to go to its full open position. With the load so close to the trip setpoint, it is our opinion that valve reliability with the 750 psi pressure differential is questionable with the bypass switch at its present position.

Differential pressure across the valve was decreased to 350 psi for Test #5. Analysis indicates a decrease in unseating thrust to 9939 pounds or .039" of spring pack displacement. This is well below the torque switch trip point of 14,699 pounds. This valve would therefore operate at this Delta P even with the close-to-open bypass switch set improperly.

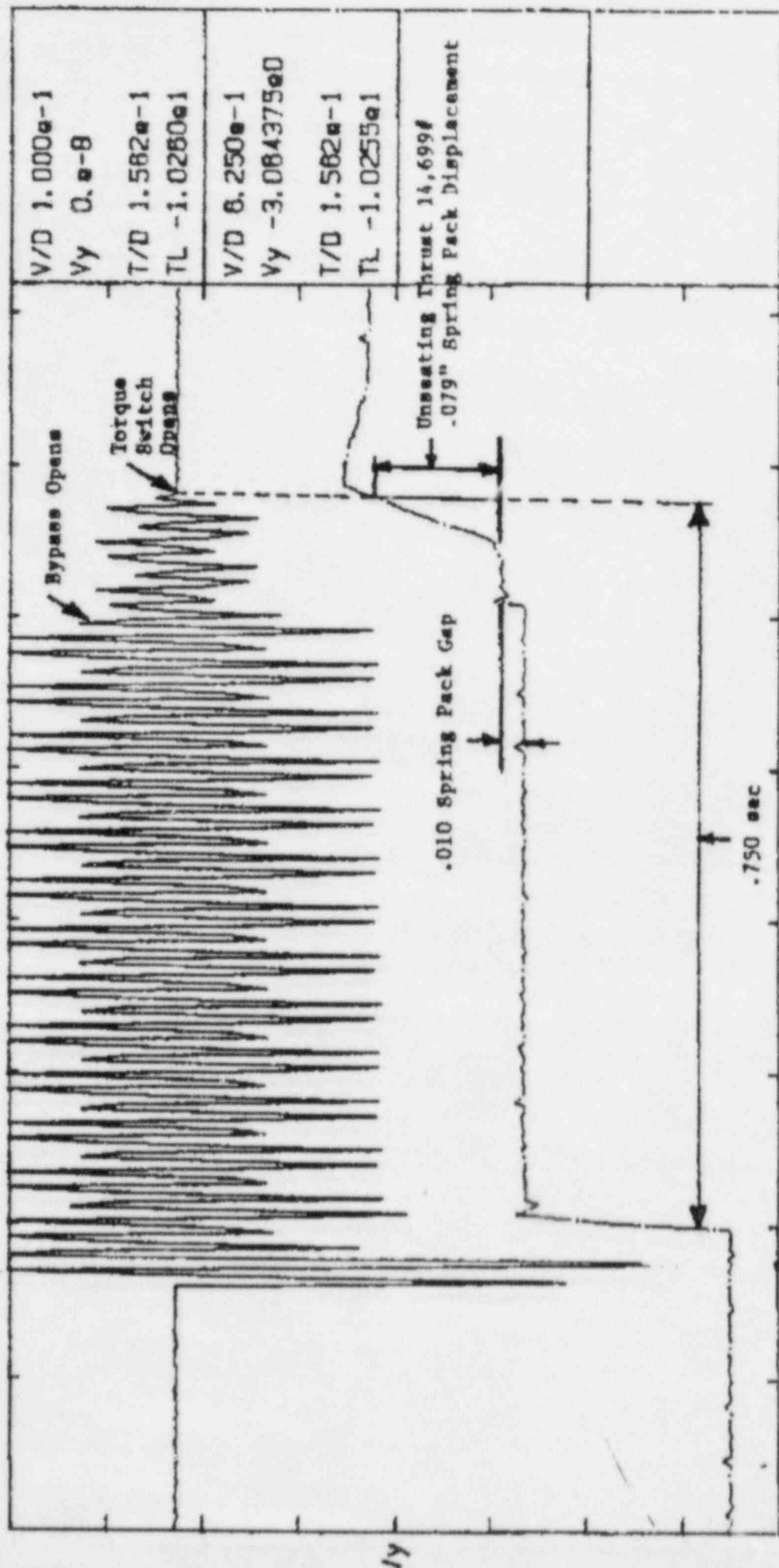
### Conclusion

Resetting of the close-to-open bypass switch to properly cover the unseating of the valve at maximum system Delta P and, verification that the torque switch trip setpoint is in accordance with the design calculation will assure reliable operation.

Test I.D. 346-070383-AF-599  
 Test #1

TMD and Switches - Close-to-Open Stroke  
 Differential Pressure 1050 psi

Operator de-energized when load increased above torque switch trip point.



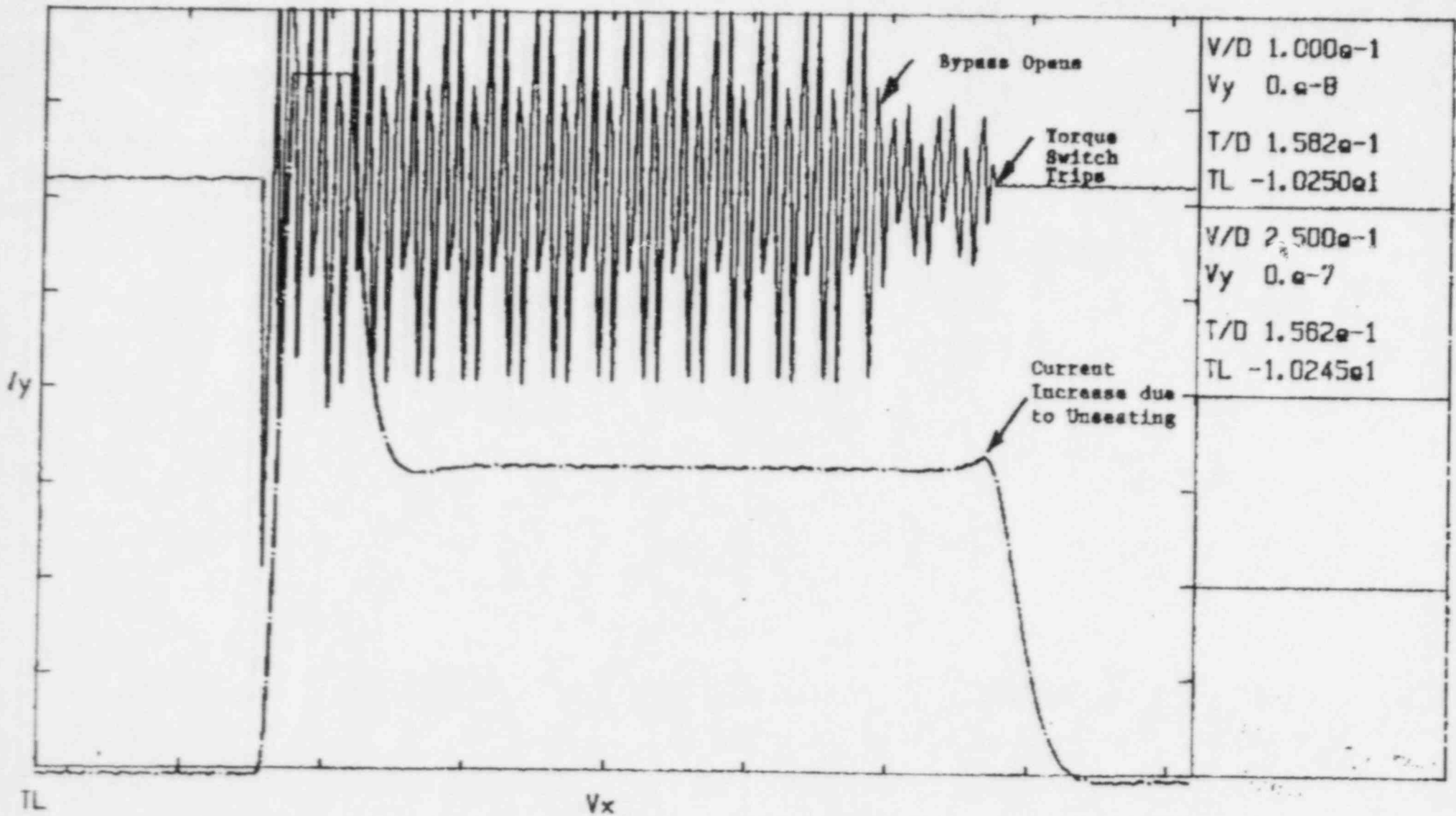
Vx

TL

Test I.D. 346-070585-AF-599

Test #1

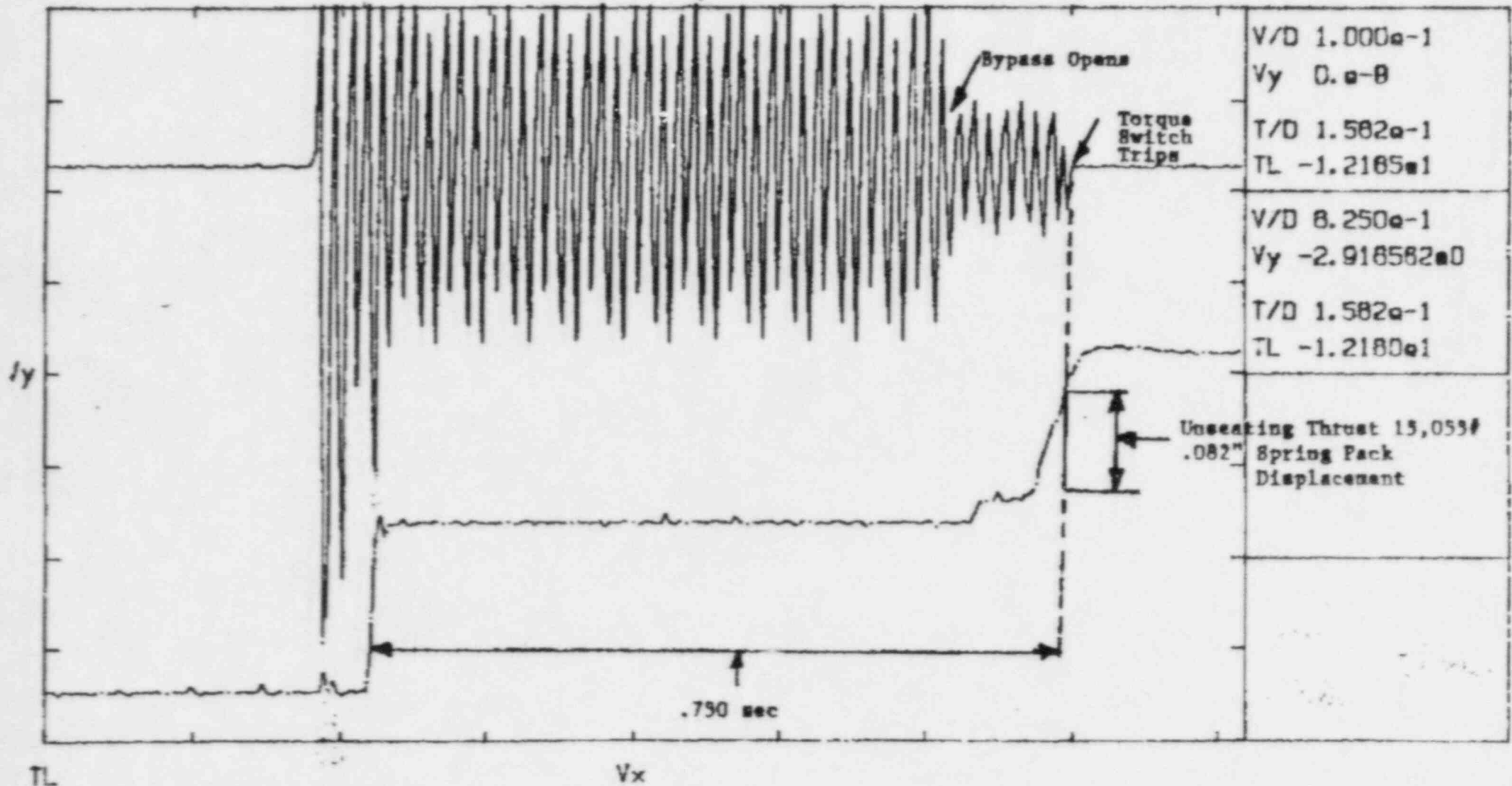
Current and Switches - Close-to-Open Stroke  
Differential Pressure 1050 psi





Test I.D. 346-070583-AF-399  
Test #2

TMD and Switches - Close-to-Open Stroke  
Differential Pressure 1050 psi  
Operator de-energized when load increased above torque switch trip point.



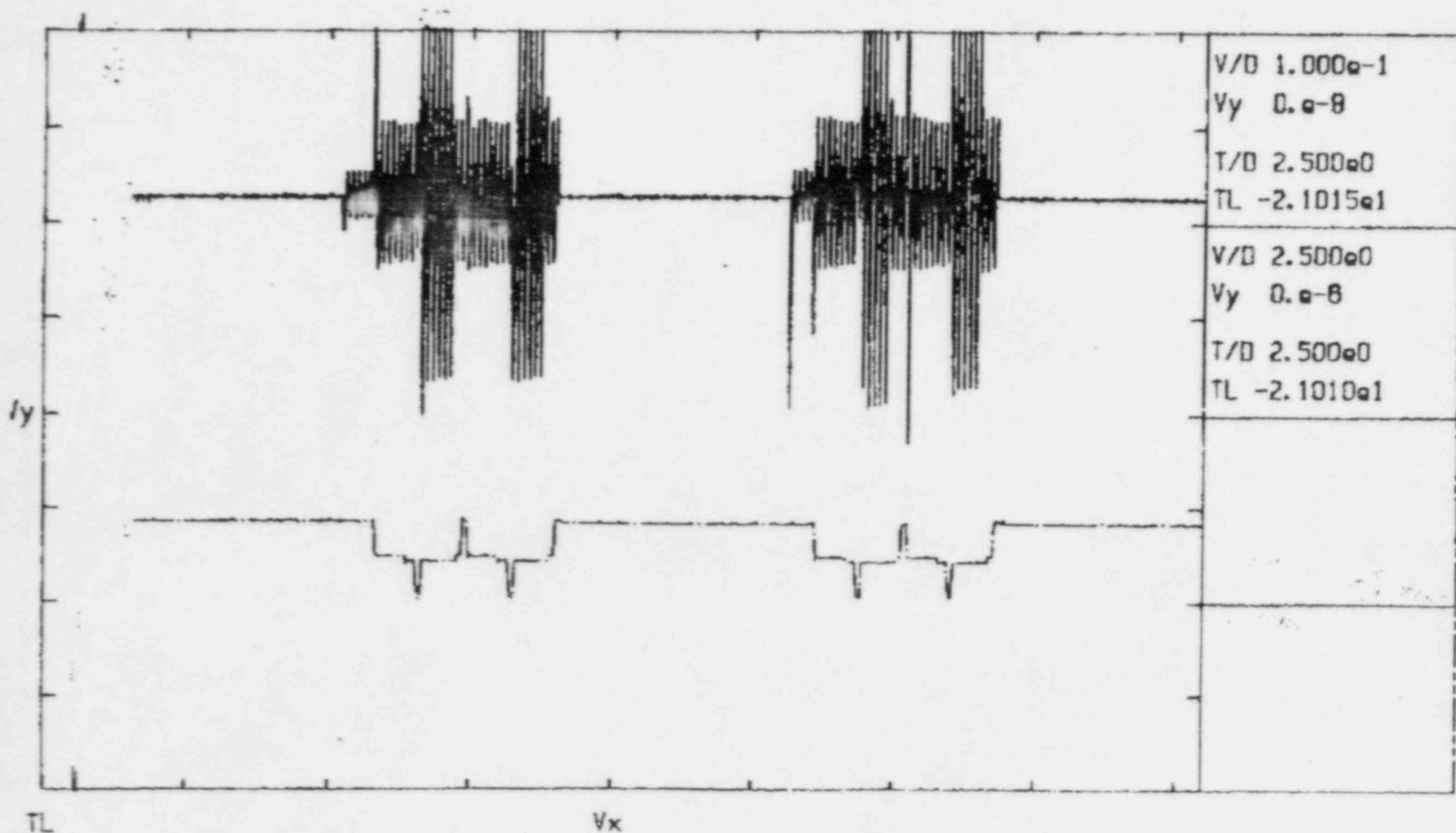
Test I.D. 346-070585-AF-599

Test #2A

TMD and Switches - Close-to-Open Stroke

Differential Pressure 1050 psi

Unsuccessful attempts to jog the gate out of the seat.



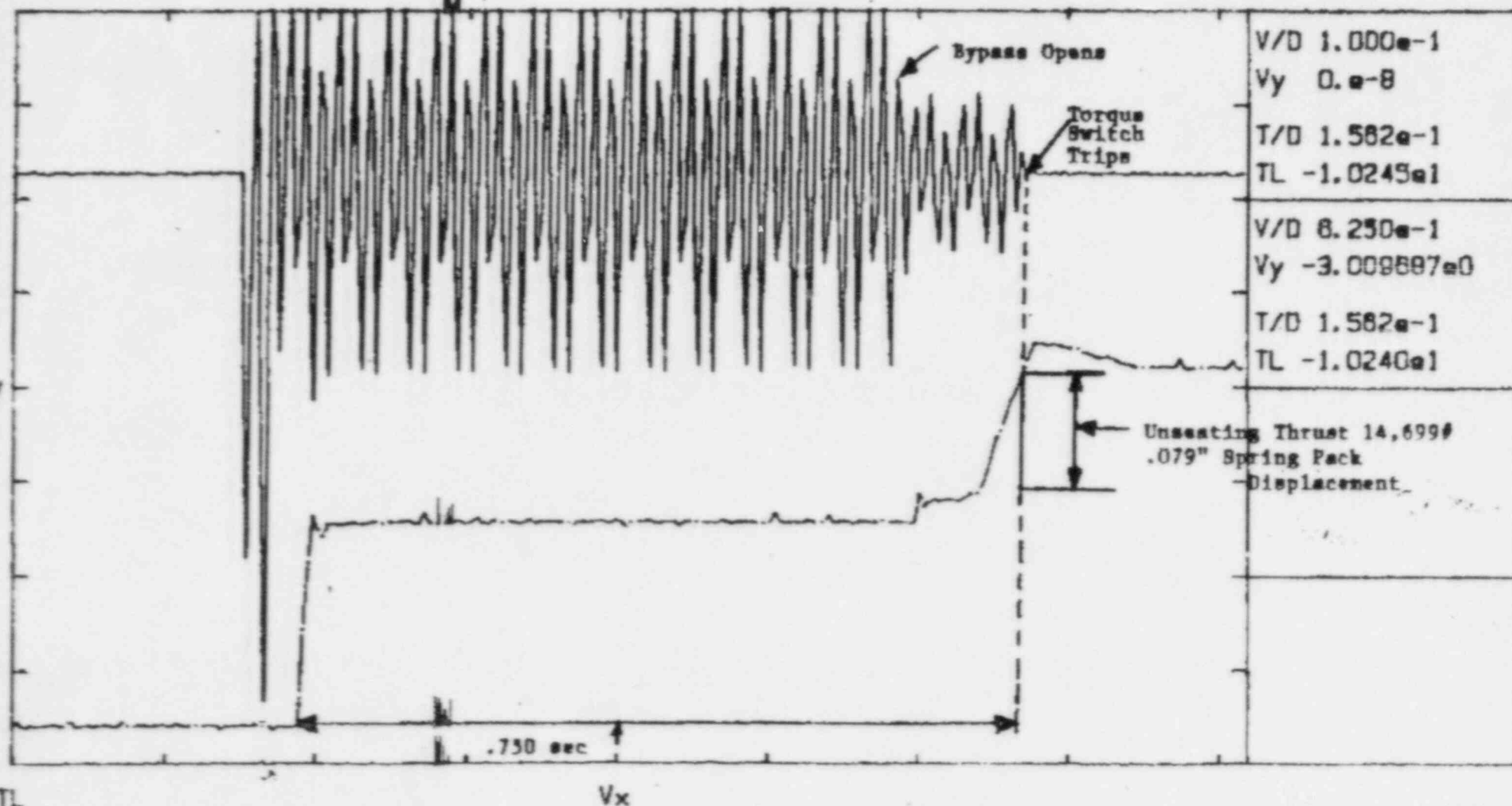
Test I.D. 346-070585-AF-599

Test #3

TMD and Switches - Close-to-Open Stroke

Differential Pressure 1050 psi

Operator Re-energized when load increased above torque switch trip.



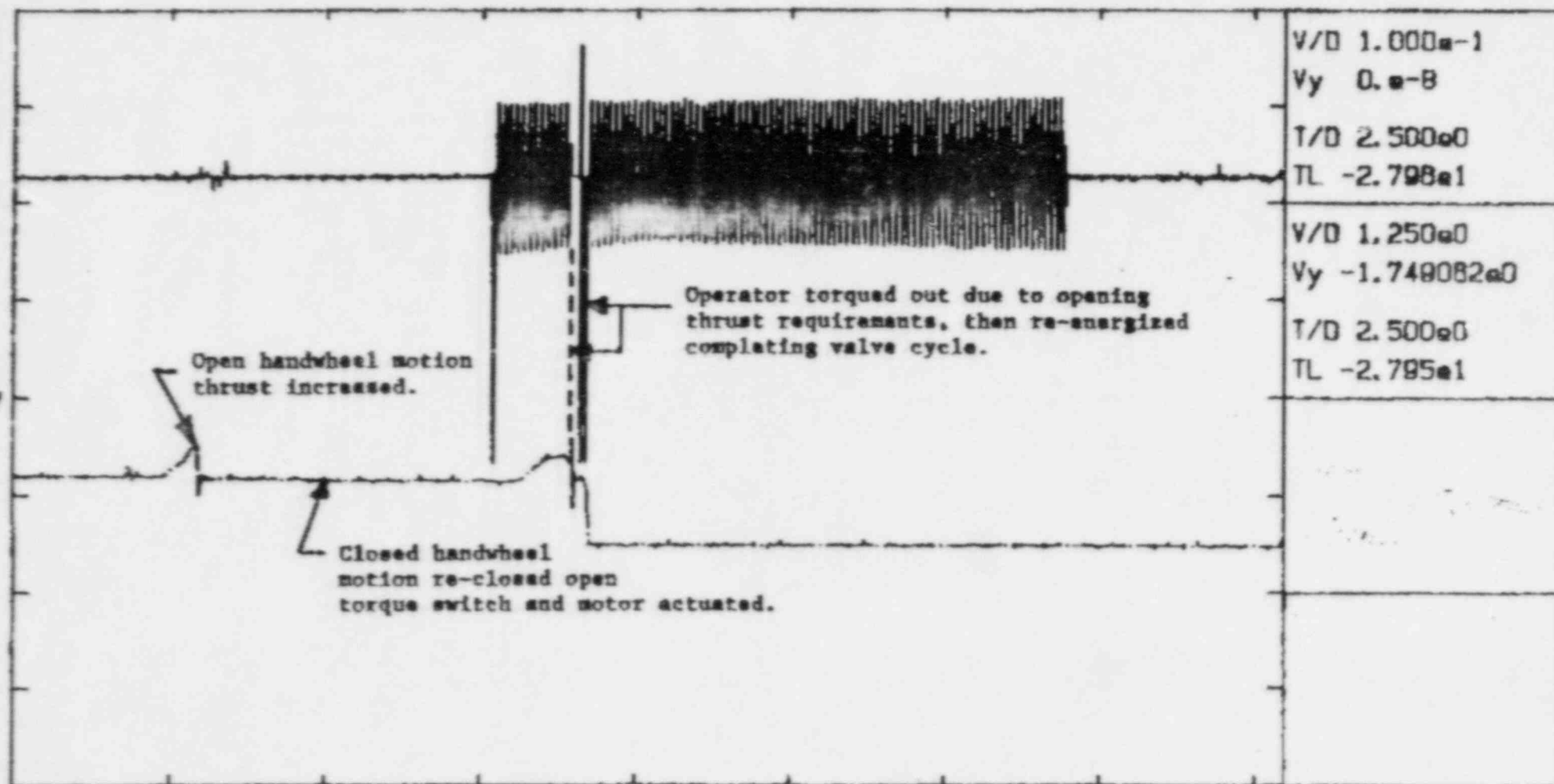
Test I.D. 346-070383-AF-399

Test #3A

TMD and Switches - Close-to-Open Stroke

Differential Pressure 1030 psi

Operator was manually operated until valve load decreased  
below torque switch trip point and operator energized.



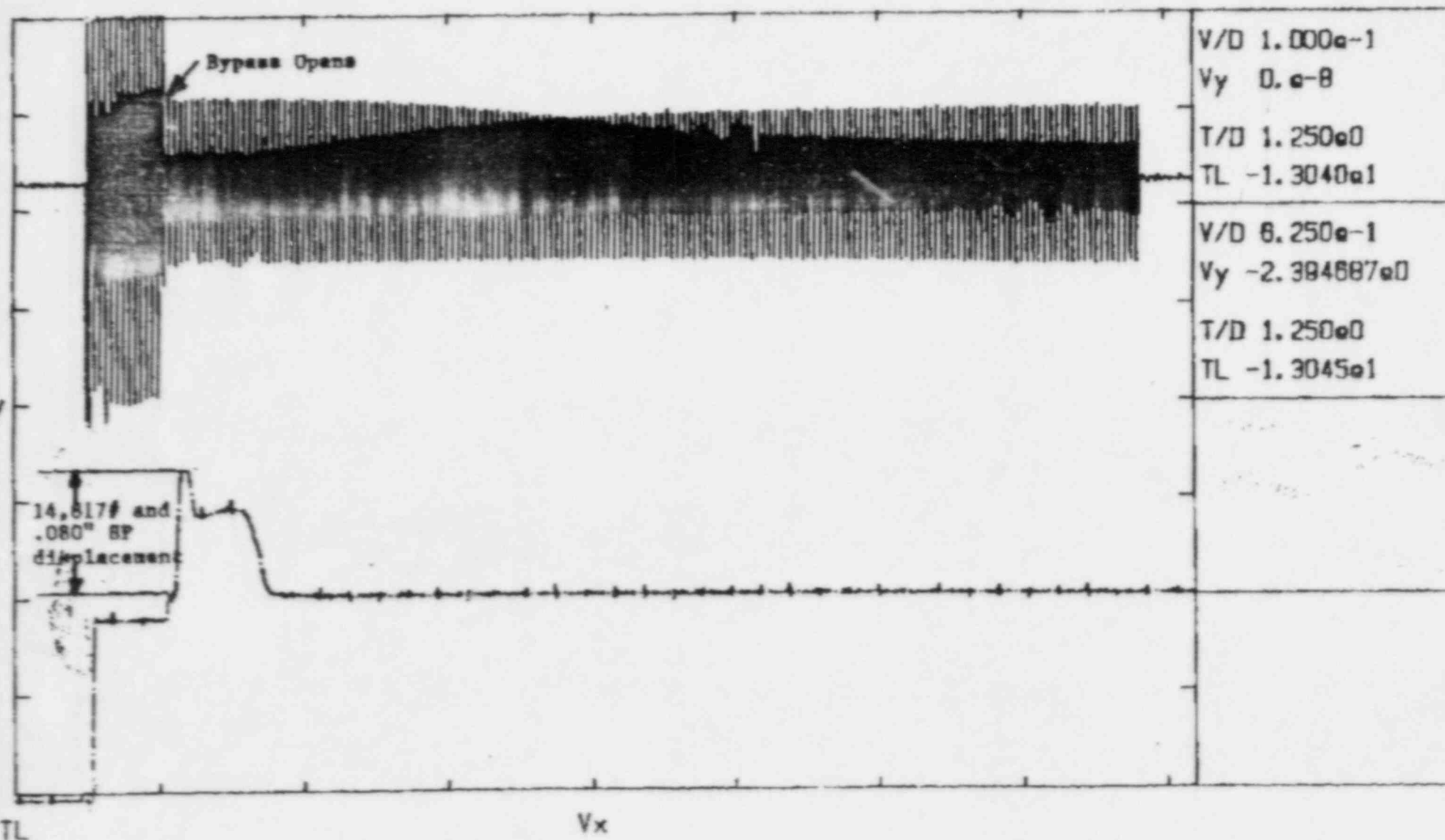
TL

Vx

Test I.D. 346-070583-AP-599

Test #4

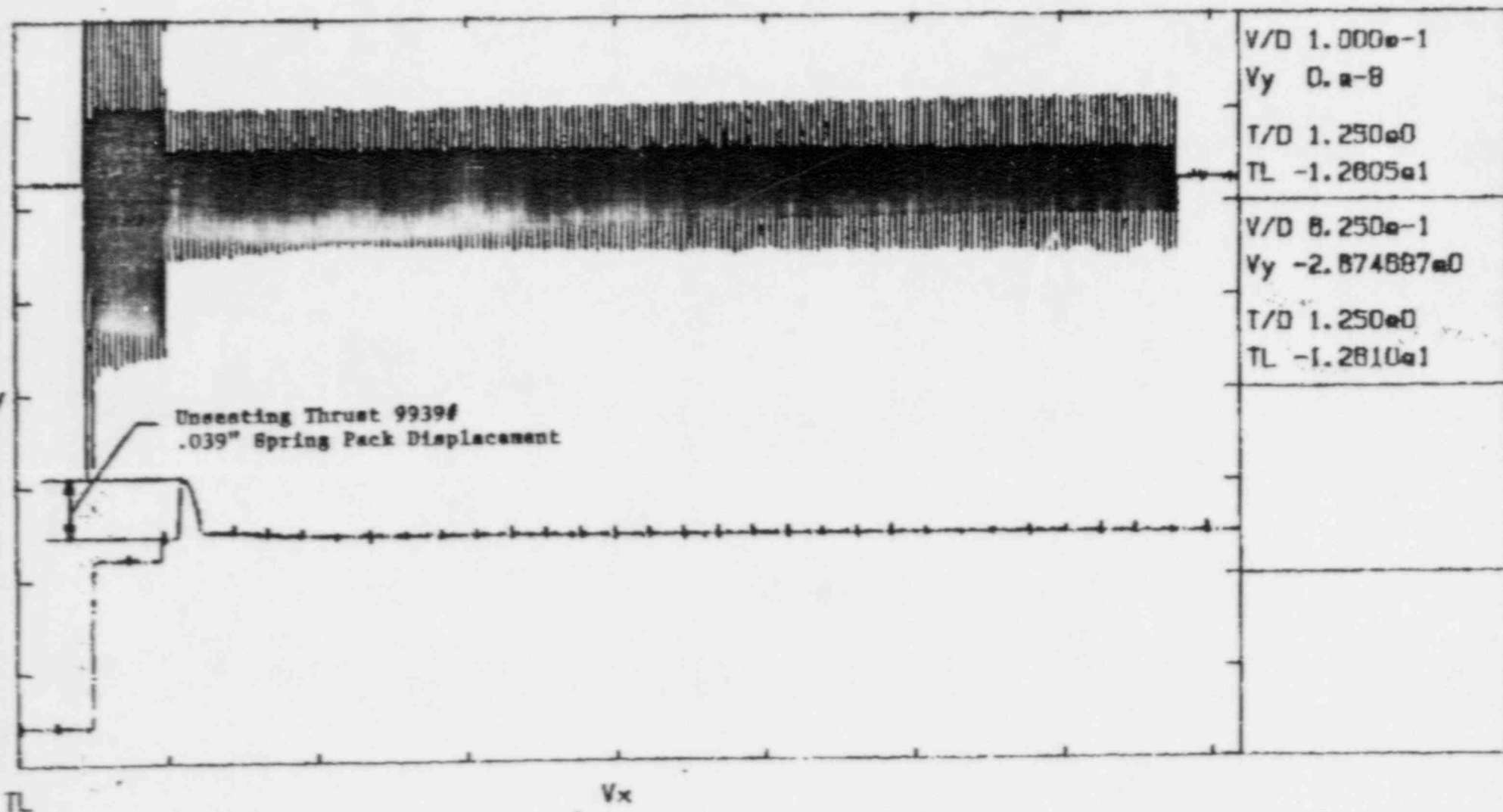
TMD and Switches - Close-to-Open Stroke  
Differential Pressure 750 psi



Test I.D. 346-070585-AP-399

Test #5

TMD and Switches - Close-to-Open Stroke  
Differential Pressure 330 psi





Overlay relationship between thrust requirements at 1030 psi,  
750 psi, and 350 psi, including their respective proximity to torque switch trip.

