PDR E4

ACTION PLAN # 26

TITLE: Inadvertent Auxiliary Feedwater Pump #1 Suction Supply Transfer from Condensate Storage Tank to Service Water Supply

REV	DATE	REASON FOR REVISION	BY	CHAIRMAN TASK FORCE	APPR. FOR IMPL.
0	6/26/85	Initial Issue	Timothy		

TITLE: Inadvertent Auxiliary Feedwater Pump #1 Suction Supply Transfer from Condensate Storage Tank to Service Water Supply

REPORT BY: Timothy Czuba PLAN NO: 26

DATE PREPARED: June 26, 1985 PAGE: 1 of 4

INTRODUCTION:

The following is the analysis and evaluation to support the action plan for determining the root cause for the auxiliary feedwater pump #1 suction supply transfer from the condensate storage tank to service water. This report has been prepared in accordance with the "Guidelines to Follow when Troubleshooting or Performing Investigative Actions into the Root Causes Surrounding the June 9, 1985 Reactor Trip," Rev. 4.

SUMMARY OF DATA:

This plant has experienced inadvertent auxiliary feedwater suction supply transfers on auxiliary feedpump #1 during pump startups. An analysis of this situation had been initiated prior to the June 9, 1985 reactor trip. The analysis had indicated a need for a time delay in initiating suction transfer due to transients in the auxiliary feedwater supply header on auxiliary feedpump start-up.

A. June 9, 1985 Sequence of Events:

1. The #1 auxiliary feedpump turbine speed was approximately 3625 rpm. The Auxiliary Feedpump #1 low suction pressure alarm actuated. This alarm will actuate on 11 psi decreasing. (See time 1:57:53 in Section B.)

2. The auxiliary feedpump #1 low suction pressure alarm cleared. (See time 1:58:27 in Section B.)

3. The auxiliary feedpump turbine #1 stop valve closed. (See time 1:58:34 in Section B.)

4. The auxiliary feedpump #1 suction supply transferred from the condensate storage tank to service water. (See time 1:58:40 in Section B.)

5. The auxiliary feedpump #1 suction supply was manually reset which returns suction to the condensate storage tanks. (See time 2:00:31 in Section B.)

B. Computer Alarm Printout Data:

TIME	EVENT	REF.	PUMP SPEED (RPM)
1:57:53	APF 1 Suction Pressure Low	P006	3623
1:58:27	AFP 1 Suction Pressure Norm	P006	3471
1:58:34	AFPT 1 Stop Valve No	Z001	2707

TIME	EVENT	REF.	PUMP SPEED (RPM)
1:58:40	AFPT Suct Xfer to SW or PSL	P008	2706
2:00:31	AFPT Suct Xfer to SW or PSL Norm	P008	1767

C. Maintenance and Surveillance/Testing History of Transfer Schemes:

3/25/85 ST 5071.03, Section 6.6 (Calibration of the Auxiliary Feedpump 1-2 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

4/8/85 ST 5071.03 Section 6.2 (Calibration of the Auxiliary Feedpump 1-1 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

4/22/85 ST 5071.03, Section 6.6 (Calibration of the Auxiliary Feedpump 1-2 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

5/6/85 ST 5071.03 Section 6.2 (Calibration of the Auxiliary Feedpump 1-1 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

5/20/85 ST 5071.03, Section 6.6 (Calibration of the Auxiliary Feedpump 1-2 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

6/4/85 ST 5071.03 Section 6.2 (Calibration of the Auxiliary Feedpump 1-1 Suction Pressure Switches) was performed. The calibration was within tolerance. No adjustments were made.

CHANGE ANALYSIS:

According to the maintenance history taken from instrumentation and controls equipment records and from Davis-Besse Maintenance Management System, modifications of the system are as follows:

9/1/81 Auxiliary Feedpump Suction Line Strainers S-201 and S-206 were modified to prevent plugging per FCR 79-0215.

HYPOTHESES:

Hypotheses for the auxiliary feedwater pump #1 inadvertent suction transfer are based on information received during the transfer, information obtained from equipment records, DBMMS, and the computer alarm printout.

A. Hypothesis #1:

Suction header pressure switches PSL 4928A and PSL 4928B setpoints are out of specification.

B. Hypothesis #2:

The low suction pressure alarm pressure switch PSL 503 is out of specification and failed to alarm on an actual low suction pressure condition.

C. Hypothesis #3:

Pressure switches PSL 4928A and PSL 4928B were inadvertently actuated by vibration.

D. Hypothesis #4:

Momentary loss of power to motor operated valves AF 786 and SW 1382 and their control circuits.

This hypothesis is considered infeasible for the following reason:

This system is fail safe and upon loss of power the valves will not transfer. The computer alarm point (P008) indicated that the valves did transfer. Therefore, there could not have been any loss of power to motor operated valves AF786 and SW 1382 and their control circuits.

E. Hypothesis #5:

Operators may have manually transferred suction supply to service water after seeing the low suction pressure alarm.

The scenario was discussed with the operators who were on duty during the transfer and no one recalled manually transferring auxiliary feedpump suction supply to service water. No log entries were made concerning a manual transfer. Due to the nature of this hypothesis, no work can be performed to prove or disprove this hypothesis.

F. Hypothesis #6:

Auxiliary feedpump suction line strainer S-201 was clogged during the transient and caused inadvertent transfer of auxiliary feedpump #1 suction transfer.

This hypothesis is considered infeasible for the following reason:

The pressure switches PSL 4928A and 4928B are located upstream of the strainer and would not see the pressure drop of a clogged strainer. The computer point (P002) for the differential pressure across the strainer was not indicating an alarm condition during the transient.

G. Hypothesis #7:

A low suction pressure transient was induced into the system causing suction supply to be transferred to service water supply. In my discussion with the operator on shift on June 9, 1985, he stated that he saw the station annunciator alarm for low suction pressure for auxiliary feedpump #1. Then he saw that valve transfer to service water had taken place.

If the time response of the interlock control circuit is faster than the computer scan rate, it is possible that a low suction pressure transient could have caused the transfer without the computer seeing the transient, but the station annunciator would.

H. Hypothesis #8:

A low suction pressure was caused by strainer S-257 being clogged. The low suction pressure was properly sensed in the auxiliary feedpump #1 piping causing suction transfer to occur. S-257 is located in the condensate suction header which is common to both feedpumps during normal suction lineup. A suction transfer did not occur in the auxiliary feedpump #2 supply because PSL 4929A and PSL 4929B did not actuate due to their setpoints being out of specification.

ACTION PLAN

ED 6408

Rev. 0

PLAN NUMBER	PAGE
26	1 of 2
DATE PREPARED	PREPARED BY
6/26/85	T. Czuba

TITLE

INADVERTENT AUXILIARY FEEDWATER PUMP #1 SUCTION SUPPLY TRANSFER

SPECIFIC OBJECTIVE

To determine root cause of the Auxiliary Feedwater Pump #1 transfer to service water.

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
	ALL STEPS OF THIS ACTION PLAN ARE TO BE PERFORMED IN ACCORDANCE WITH THE LATEST REVISION OF "GUIDELINES TO FOLLOW WHEN TROUBLE-SHOOTING OR PERFORMING INVESTIGATIVE ACTIONS INTO THE ROOT CAUSES SURROUNDING THE JUNE 9, 1985, REACTOR TRIP."					
1.	Independently verify by a calibration check the setpoint at which the pressure switches (PSL 4928A and PSL 4928B) actuate.	T. Czuba	T. Czuba K. Yarger			
2.	Simulate a low suction pressure on both pressure switches PSL 4928A and PSL 4928B simultaneously, and verify proper valve actuation occurs on AF 786 and SW 1382. Monitor PSL4928A and PSL4928B for actuation during auxiliary feedpump testing, which is being performed by action plans 1A and 1B. Steps 1 and 2 address Hypothesis #1.	T. Czuba	T. Czuba K. Yarger			
3.	Check the calibration of PSL 503 and verify actuation occurs at the required setpoint. This step addresses Hypothesis #2.	T. Czuba	T. Czuba K. Yarger			
4.	Perform a seismic analysis on PSL 4928A and PSL 4928B mounting. This step addresses Hypothesis #3.	Kanut Sagooleim	T. Czuba K. Yarger			

ACTION PLAN
ED 6408

Rev. 0

PLAN NUMBER	PAGE
26	2 of 2

TITLE
INADVERTENT AUXILIARY FEEDWATER PUMP #1 SUCTION SUPPLY TRANSFER

DATE PREPARED	PREPARED BY
6/26/85	T. Czuba

SPECIFIC OBJECTIVE

To determine root cause of the Auxiliary Feedwater Pump #1 transfer to service water.

STEP NUMBER	ACTION STEPS	PRIME RESPONSIBILITY	ASSIGNED TO	START DATE	TARGET DATE	DATE COMPLETED
5.	Perform response time on the interlock control circuit.	T. Czuba	T. Czuba			
	This step addresses Hypothesis #7.		K. Yarger			
6.	Independently verify by a calibration check the setpoint	T. Czuba	T. Czuba			
	at which the pressure switches (PSL 4929A and PSL 4929B)		K. Yarger			
	actuate. Monitor PSL 4929A and PSL 4929B for actuation					
	during auxiliary feedpump testing, which is being performed					
	by action plans 1A and 1B.					
7.	Check the calibration of PSL 509 and verify the actuation	T. Czuba	T. Czuba			
	occurs at the required setpoint. Steps 6 and 7 address		K. Yarger			
	Hypothesis #8.					
	NOTE: The action steps may be performed in any sequence.					