

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

TITLE (4)
Auxiliary Feed Pump Turbine Response Time Problems

OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	01010	20.402(b)		20.405(e)		73.71(b)
		20.405(a)(1)(i)		50.35(e)(1)		73.71(e)
		20.405(a)(1)(ii)		50.36(c)(2)		
		20.405(a)(1)(iii)		50.73(a)(2)(i)		OTHER (Specify in Abstract below and in Text, NRC Form 385A)
		20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		
		20.405(a)(1)(v)		50.73(a)(2)(iii)		
				50.73(a)(2)(iv)		
				50.73(a)(2)(v)		
				50.73(a)(2)(vii)		
				50.73(a)(2)(viii)(A)		
				50.73(a)(2)(viii)(B)		
				50.73(a)(2)(ix)		

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

SUPPLEMENTAL REPORT EXPECTED (14)

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

Investigations determined that an improperly sized speed bushing in a new governor installed on Auxiliary Feed Pump Turbine 1-2 caused a slower response time for Auxiliary Feed Pump 1-2 than was required by Technical Specifications. The cause for loose hanger bolts and hanger damage has not been identified. Four different operating events have been postulated and continued investigation and testing is planned to identify the actual causes.

The response time event was reportable per 10CFR50.73(a)(2)(ii)(A).

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Description of Occurrence: On March 23, 1985, the post trip review of a Steam and Feedwater Rupture Control System, SFRCS, (JB), trip from 28 percent rated thermal power showed that Auxiliary Feedwater Pump, AFP, (BA) 1-2 had not met its 40 second response time required by Technical Specification 3.3.2.2. Both AFP's in the Auxiliary Feedwater System are turbine-driven pumps with steam supplied from the two 36" main steam lines through 6 inch supply lines which are reduced to 4 inch lines before reaching the turbines. The SFRCS trip occurred on March 21, 1985, during a controlled shutdown for a maintenance outage (see LER 85-005, NP-33-85-06). AFP 1-2 was declared inoperable at 1110 hours on March 23, 1985, and the Station entered the action statement of Technical Specification 3.7.1.2, which requires the Auxiliary Feedwater System to be restored to operability within 72 hours, or be in Hot Shutdown in the next 12 hours. Since the Station had entered Mode 5 (Cold Shutdown) the same day to permit control rod drive repairs (see LER 85-006, NP-33-85-09), the action statement was being satisfied.

In addition, AFP 1-1 had been declared inoperable on March 16, 1985, after the discovery of damage to the following hangers on the main steam piping to AFPT 1-1:

3A-EBD-19-H14
3A-EBD-19-H25
3A-EBD-19-H28
3A-EBD-19-H32
3A-EBD-19-H34
3A-EBD-19-H135

This was the second time since the beginning of the year that loose hanger bolts and damaged hangers had been discovered on the AFPT steam lines. Investigations initiated following the initial discovery of hanger damage had not yet identified the cause of the damage.

An engineering evaluation of the hanger damage concluded that the damage to hanger 3A-EBD-19-H28 required AFP 1-1 to be declared inoperable. This hanger was repaired on March 17, 1985, allowing AFP 1-1 to be declared operable. Hangers 3A-EBD-19-H25 and 3A-EBD-19-H135 were determined to be operable in their as-found condition. The remaining hangers were restored to their as-built condition by March 23, 1985. An operability analysis for AFPT 1-1 assuming hangers 3A-EBD-19-H25, 3A-EBD-19-H28, and 3A-EBD-19-H135 operable with the other three hangers inoperable determined that the steam supply line for AFPT 1-1 met its short term operability requirements. A visual inspection of the AFPT steam lines after the March 21, 1985 trip and SFRCS actuation did not identify any new hanger damage.

Designation of Apparent Cause of Occurrence: Investigations determined that the cause of the AFPT 1-2 response time problem was the rate at which the turbine accelerated to its full speed of 3600 RPM. The acceleration rate is governed by the size of an internal speed setting bushing within the turbine governor. During the 1984 Refueling Outage a Facility Change Request (FCR 83-136) was implemented which replaced the original AFPT 1-2 governor with a new Woodward PGG governor. The speed setting bushing supplied on the new governor was a 30 second bushing. This rate

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prevented AFPT 1-2 from meeting the AFW system response time requirement. An error made in interpreting events in the post modification testing allowed the response time problem to go undetected.

Since plant startup in January, 1985, after completion of the 1984 Refueling Outage, loose hanger bolts and damaged hangers have been discovered at several different locations in the main steam piping to the AFPT's. Additionally, damage to a single pipe anchor has been discovered. Although the exact cause of damage to piping hangers has not been identified, the following conditions are being investigated:

1. Use of auxiliary steam to perform testing of both AFPTs during the 1984 Refueling Outage.
2. Use of main steam and auxiliary steam to perform monthly surveillance test on pressure switches PSL106A-106D and PSL107A-107D which are located in the steam line to the AFPT's.
3. Opening of valves MS106A and MS107A simultaneously with MS106 and MS107 to supply main steam to AFPT's. Prior to the 1984 Refueling Outage only valves MS106 and MS107 were opened to supply main steam to AFPT 1-1 and AFPT 1-2.
4. Vibration from system actuation and monthly testing which over time loosen hanger bolts until they fail to perform their function during the transient event associated with quick starts of the system.

Additional testing and evaluations are expected to help determine the exact cause of the hanger problems.

Analysis of Occurrence: During the SFRCS trip from 28% reactor power, the slow response time (approximately 48 seconds) for AFP 1-2 did not create any significant problems. AFP 1-1 met the AFW system response time criteria ensuring that adequate feedwater flow was available for cooling the RCS.

Both AFPT steam lines have been affected with hanger damage and loose hanger bolts due to transients loads. Excluding the one damaged pipe anchor and the damage to hanger 3A-EBD-19-H28, analysis has shown that the hanger damage discovered to date has not affected the short-term operability of the piping system.

Corrective Action: The corrective actions taken were:

1. Replace the internal speed setting bushing on the new Woodward PGG governor for AFPT 1-2 with a 15 second ramp bushing. No changes have been made to AFPT 1-1 since it uses the original Woodward governor and not the new Woodward PGG governor.
2. Change the logic for steam supply valves MS106A and MS107A so that they will no longer open simultaneously with valves MS106 and MS107.

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3. Revise the surveillance test for PSL106A-106D and PSL107A-107D so as to perform the test without use of either main steam or auxiliary steam.
4. Instruct operator to slowly open the supply valve from the auxiliary steam system when using auxiliary steam to test AFW pumps.
5. Replace and/or repair damaged hangers and re-torque all loose bolts.

After corrective item 1 was completed on the governor, ST 5071.02, SFRCS Refueling Test, was performed to determine the response time of AFPT 1-2. AFP 1-2 was declared operable at 0608 hours on April 12, 1985. AFPT 1-1 was also tested and its response time was verified to be within Technical Specification requirements.

A test plan is being prepared to perform a systematic test of the steam lines to the AFPT's under Facility Change Request 85-0087. Through this test program the transient loads experienced by the steam line due to system actuation will be measured on selected hangers along with the transient pressurization of the steam lines and the piping temperatures. The test program will assist in quantifying the loads experienced due to the initial pressurization and heatup of the cold steam lines. Also, it will help identify the major causes of hanger damage. Until the cause of hanger damage is identified and corrected, the steam line hangers will be inspected after every initiation of the system including monthly and quarterly surveillance testing.

Additional corrective actions will be reported in a revision to this report.

Failure Data: This is the first report on an SFRCS response time problem.

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DVR No(s): 85-045 & 85-051



June 27, 1985

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Gentlemen:

Enclosed is Revision 1 to Licensee Event Report 85-007. The revisions to the report are indicated by a "1" in the left margin of each page.

Please replace your previous copies of this report with the attached revision.

Yours truly,

Stephen M. Quennoz
Plant Manager
Davis-Besse Nuclear Power Station

SMQ/ljk

Enclosure

cc: Mr. James G. Keppler,
Regional Administrator,
USNRC Region III

Mr. Walt Rogers
DB-1 NRC Resident Inspector

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