Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

William R. Lagergren, Jr.
Site Vice President, Watts Bar Nuclear Plant

NOV 0 6 2000

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/2000-005

The enclosed report provides details of an event where a main feed pump turbine tripped due to a condenser vacuum transient. The tripping of the feed pump turbine automatically actuated the auxiliary feedwater system. Therefore, this event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as an actuation of an engineered safety feature.

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

for W. R. Lagergren

Enclosure
cc: See page 2

IE22

cc (Enclosure):

NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

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NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50.0 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20603. In an information collection does not display a currently valid OMB control number, the NRC may no conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

Main Feed Pump Turbine Trip due to a Condenser Vacuum Transient

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
10	06	00	2000	005	00	11	06	00	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	13

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Jerry L. Bushnell, Licensing Engineer	(423)-365-8048

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	NO X				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 6, 2000, at 19:22, WBN Unit 1 entered Mode 1 following the completion of the Unit 1 Cycle 3 refueling outage. Reactor power reached approximately 13 percent power at 19:39 and steam generator (SG) level was being maintained by the 1B turbine driven main feedwater pump (TDMFP). The 1A TDMFP was not in service at this time but the condenser for the 1A pump was operational. As part of the routine start-up activities, the Operations staff was preparing to roll the main turbine. However, at this time, low condenser vacuum was experienced on the 1B TDMFP. The condenser transient caused the 1B pump to trip and this satisfied the logic for the starting of the auxiliary feedwater (AFW) pumps as an Engineered Safety Feature. The AFW system functioned properly to maintain the water level of the steam generators. In addition to this, the Operations staff entered Abnormal Operating Instruction 16, "Loss of Normal Feedwater," and started the standby main feedwater pump. Due to these actions the reactor power was maintained at 13 percent. The condenser vacuum transient was caused by the improper control or modulation of FCV-2-35, the condensate short cycle recirculation valve. This was attributed to the flow controller for FCV-2-35 not being adjusted appropriately to respond to plant conditions. Corrective actions included; 1) The calibration of FCV-2-35 and its instrument loop was verified, 2) Revision of a setpoint and scaling document.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. PLANT CONDITIONS:

Following the completion of the Unit 1 Cycle 3 refueling outage, Watts Bar Nuclear Plant Unit 1 was in Mode 1 at approximately 13 percent power.

II. DESCRIPTION OF EVENT

A. Event

On October 6, 2000, at 19:22, WBN Unit 1 entered Mode 1 following the completion of the Unit 1 Cycle 3 refueling outage. Reactor power reached approximately 13 percent power at 19:39 and steam generator (SG) level was being maintained by the 1B turbine driven main feedwater pump (TDMFP). The 1A TDMFP was not in service at this time but the condenser for the 1A pump was operational. As part of the routine start-up activities, the Operations staff was preparing to roll the main turbine. However, at this time, a condenser vacuum transient was experienced on the 1B TDMFP. The condenser transient caused the 1B pump to trip and this satisfied the logic for the starting of the auxiliary feedwater (AFW) pumps as an Engineered Safety Feature (ESF). The AFW system functioned properly to maintain the water level of the steam generators. In addition to this, the Operations staff entered Abnormal Operating Instruction (AOI) 16, "Loss of Normal Feedwater," and started the standby main feedwater pump. Due to these actions the reactor power was maintained at 13 percent.

The Operations staff reported this event to NRC at 21:19 on October 6, 2000. This report was made in accordance with 10 CFR 50.72(b)(2)(ii) as a result of the automatic actuation of the ESF.

Problem Evaluation Report (PER) 00-013705-000 was initiated to document this event in the TVA Corrective Action Program.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

There were no inoperable structures, components or systems that contributed to this event.

C. Dates and Approximate Times of Major Occurrences

Date	Time	Event
October 6, 2000	18:14	The 1B TDMFP is placed in service. The Standby Main Feed Pump is removed from service. The 1A TDMFP remains out-of-service.
October 6, 2000	19:22	WBN Unit 1 enters Mode 1 following the completion of the Unit 1 Cycle 3 refueling outage.
October 6, 2000	19:39	The 1B TDMFP trips due to low condenser vacuum. The two motor driven and one turbine driven auxiliary feedwater (AFW) pumps start automatically to maintain SG level. The Standby Main Feed Pump is placed into service in accordance with AOI-16.
October 6, 2000	20:19	The AFW pumps are removed from service.
October 6, 2000	21:19	The automatic actuation of the AFW system was reported to NRC in accordance with 10 CFR 50.72(b)(2)(ii).
October 6, 2000	23:45	The 1B TDMFP is placed in service and the Standby Main Feed Pump is removed from service.

D. Other Systems or Secondary Functions Affected

There were no other systems or secondary functions affected by the starting of the AFW pumps or the condenser transient.

E. Method of Discovery

The Operations staff was made aware of the 1B TDMFP trip and the subsequent starting of the AFW pumps by main control room alarms and indicators.

F. Operator Actions

The actions taken by Operations personnel related to this event are discussed in Item C, "Dates and Approximate Times of Major Occurrences," of this Section.

G. Automatic and manual safety system responses

The AFW pumps and their associated level control valves responded as expected to the engineered safety feature actuation signal. The AFW pumps also responded properly when operations personnel shut the pumps down. No additional automatic or manual safety system responses were required.

III. CAUSE OF EVENT

Flow in the condensate system is controlled by flow control loop 1-LPF-2-35A. The output of this control loop modulates flow control valve (FCV) 2-35 to maintain the flow through the system at greater than 5500 gpm. The tripping of the 1B TDMFP resulted from low condenser vacuum caused by the improper control or modulation of FCV-2-35. Vacuum in the feed pump condenser decreased as the flow in the condensate system decreased. Both the 1A and 1B feed pump condensers were in service and this reduced the operational margins which contributed to the decrease in vacuum in the TDMFP condenser. However, the flow controller for FCV-2-35 was field tuned in 1997 to minimize flow oscillations in the condensate system. The tuning in 1997 adjusted the proportional band from 90 percent to 125 percent. The inspection of the controller performed for LER 390/2000-05 identified that FCV-2-35 responded very slow at the 125 percent setting. Therefore, the as-found configuration of the controller allowed the condensate flow to decrease below the operational requirements.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

For the condensate system, the short cycle recirculation mode of operation is used at unit start-up to put the main condenser and the gland seal condenser in operation. The recirculation mode is also used for cleanup of the condensate system while establishing main condenser vacuum. When the hotwell pumps are running, a minimum flow is maintained by the short cycle recirculation valve, FCV-2-35, which opens to divert condensate flow to the condenser. FCV-2-35 modulates to maintain a minimum of 5500 gpm flow in the hotwell pump discharge header. When the condensate system is delivering 5500 gpm or more to the feedwater system, FCV-2-35 will close. The operation of FCV-2-35 in this manner is completely automatic during any mode of plant operation that requires the hotwell pumps to be in operation.

The condensate system except for the condensate storage tank (CST) is located in the turbine building and has no safety-related or seismic qualifications. However, correct operation of FCV-2-35 is necessary to maintain proper condenser vacuum for the TDMFP. For the event documented by LER 390/2000-05, feedwater flow was being maintained by the 1B TDMFP. The 1A TDMFP was not in service. Therefore, when the 1B pump tripped due to the condenser vacuum transient, the logic for the starting of the auxiliary feedwater (AFW) pumps was satisfied and the AFW system functioned properly to maintain the water level of the steam generators. Subsequent to the AFW start, the standby main feed pump was placed into service by the Operations staff and the AFW pumps were returned to their standby configuration. Considering that the safety system (AFW) functioned as designed to mitigate the transient, there were no safety consequences to this event.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

1. The Operations staff entered Abnormal Operating Instruction (AOI) 16, "Loss of Normal Feedwater," and started the standby main feedwater pump.

B. Corrective Actions to Prevent Recurrence - (TVA does not consider these items to constitute regulatory commitments. TVA's corrective action program tracks completion of these actions.)

1. The calibration and operation of FCV-2-35 and its associated instrument loop were verified with Work Order 00-013701-000. The valve was found to respond very slowly with a simulated flow change. The proportional gain for controller FIC-2-35 was changed from 125% to 100% and the response of the valve was appropriate. The setpoint was found to be correct.

2. The plant Setpoint and Scaling Document for control loop 1-LPF-2-35A will be revised to reflect the optimum settings of the controller to ensure the proper response of the valve.

C. Corrective Actions to Enhance Operating Margins - (TVA does not consider these items to constitute regulatory commitments. TVA's corrective action program tracks completion of these actions.)

1. Instruction General Operations (GO) 3, "Unit Startup from Less Than 4% Reactor Power to 30% Reactor Power," will be revised to include a precaution to have only one TDMFP condenser in service when starting a TDMFP at low power levels. GO-3 will also be revised to strengthen the precautions concerning the placement of a TDMFP in service at low power levels to increase operational margins. The precaution will address condenser vacuum, hotwell temperature, hotwell flow, and back pressure control.

2. The lesson plans associated with the condensate and feedwater systems for the training of the Operations staff will be revised to discuss the limited operational margins and the potential to trip a TDMFP during low power operation and the transition to two pump operation.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

There was no safety train inoperability due to a failed component.

2. Component/System Failure Information

   a. Method of Discovery of Each Component or System Failure:

      This event did not involve a failed component.

   b. Failure Mode, Mechanism, and Effect of Each Failed Component:

      This event did not involve a failed component.

   c. Root Cause of Failure:

      This event did not involve a failed component.

   d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

      This event did not involve a failed component.

   e. Manufacturer and Model Number of Each Failed Component:

      This event did not involve a failed component.

B. Previous Similar Events

For Watts Bar Nuclear Plant, the following three LERs were initiated as a result of events involving low TDMFP condenser vacuum or high back pressure:

390/96-09
390/96-15
390/96-16

C. Additional Information: - None.

D. Safety System Functional Failure:

This event did not involve a safety system functional failure as defined in NEI-99-02, Revision 0.

VII. COMMITMENTS - None.