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

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

OCT 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) 50-390/2000-004

The enclosed report provides details of an event where the turbine driven auxiliary feedwater pump was inadvertently started. This event was an invalid actuation of an engineered safety feature and is being reported in accordance with 10 CFR 50.73(a)(2)(iv).

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

Sincerely,

W. R. Lagergren

Enclosure
cc: See page 2

IE22

cc (Enclosure):

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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)

Inadvertent Actuation of the Turbine Driven Auxiliary Feedwater Pump

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
09	10	00	2000	004	00	10	10	00	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	3
POWER LEVEL (10)	0

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)

Work Order 99-015140-000 directed the installation of jumpers in relay rack 1-R-73 on relays BVA and AFA. This action was required by Section 6.2.1 of chemistry and sampling procedure CM 6.60 and was necessary so that the steam generator blowdown sample valves could be opened while the auxiliary feedwater (AFW) pumps were running. The turbine driven AFW (TDAFW) pump receives an engineered safety feature start signal from Train A via relay RAS and from Train B via relay RBS. For relay RAS, actuation is initiated by relay RA2 (1-R-73). Relay RA2 also initiates an actuation signal for the turbine driven level control valves (LCVs). Relays AFA and BVA are located in Row F of the relay rack (1-R-73) in slots four and five. Relay RA2 is located in slot five of Row G of 1-R-73, immediately below relay BVA. Relay RA2 is a Westinghouse AR440 relay with a contact operating bar on the front of the relay. Based on steam flow and LCV actuation data obtained from the Integrated Computer System (ICS), the TDAFW pump started at approximately 01:59. This indicates that the inadvertent starting of the pump occurred during the period the jumper installation was ongoing in the relay rack. The cause of the event is considered to be the inadvertent operation (bumping) of the contact bar of relay RA2. The circumstances associated with this event will be developed into a briefing document. This document will specifically address the sensitivity of Westinghouse AR Relays and the need for extreme care when working around the relays. The briefing document will be provided to affected maintenance organizations to reinforce the cause of this event.

I. PLANT CONDITIONS:

Watts Bar Nuclear Plant Unit 1 was in Mode 3 in preparation for the Unit 1 Cycle 3 refueling outage.

II. DESCRIPTION OF EVENT

A. Event

On September 10, 2000, at approximately 01:30, implementation of Work Order (WO) 99-015140-000 was initiated. This WO directed the installation of jumpers in relay rack 1-R-73 on relays BVA and AFA. This action was required by Section 6.2.1, "Electrical Jumpers Opening (During Operation of Auxiliary Feedwater (AFW) Pumps - Mode 2-6)," of chemistry and sampling procedure CM 6.60, "Steam Generator (SG) Sampling." This action is required so that the SG sample valves could be opened while the AFW pumps were running. The sample valves are automatically closed upon initiation of AFW to maximize the capability to make-up to the SGs, which is the primary safety function of the AFW. It is acceptable to bypass this signal during times of AFW operation when SG inventory is stable and controlled such as during normal shutdown.

The turbine driven AFW (TDAFW) pump, pump C-S, receives an engineered safety feature (ESF) start signal from Train A via relay RAS and from Train B via relay RBS. For relay RAS, actuation is initiated by relay RA2 (1-R-73). Relay RA2 also initiates an actuation signal for the level control valves (LCVs) for the TDAFW.

Relays AFA and BVA are located in Row F of the relay rack (1-R-73) in slots four and five respectively. Relay RA2 is located in slot five of Row G of 1-R-73, immediately below relay BVA. Relay RA2 is a Westinghouse AR440 relay with a contact operating bar on the front of the relay.

Based on steam flow and LCV actuation data obtained from the Integrated Computer System (ICS), the TDAFW pump started at approximately 01:59. This indicates that the inadvertent starting of the pump occurred during the period the jumper installation was ongoing in the relay rack. Therefore, it is reasonable to conclude that the contact bar of relay RA2 may had been inadvertently operated (bumped) during the jumper installation. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as an invalid actuation of an ESF.

Problem Evaluation Report (PER) 00-011538-000 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	Approximate Time	Event
September 9, 2000	23:52	Operations personnel place the two motor driven AFW (MDAFW) pumps and the TDAFW in service for SG level control prior to shutdown of the unit from 20 percent power.
September 10, 2000	00:01	Main feed pump turbines (MFPT) A and B trip when the unit is shutdown, as expected. The shutdown of the MFPTs starts the AFW pumps. The starting of the AFW pumps close the SG blowdown sample valves.
September 10, 2000	00:23	Operations personnel reset the B MFPT trip logic to clear the start signal from the AFW system.
September 10, 2000	00:25	Operations personnel shutdown the TDAFW pump and the controls for the pump are reset. The MDAFW pumps remain in operation for control of SG level.
September 10, 2000	01:30	Maintenance personnel begin the installation of jumpers for control of the SG sample valves in the relay rack.
September 10, 2000	01:59	The TDAFW pump inadvertently starts and the LCVs associated with the pump modulate.
September 10, 2000	02:02	Operations personnel shutdown the TDAFW pump and the controls for the pump are reset.

D. Other Systems or Secondary Functions Affected

There were no other systems or secondary functions affected by the inadvertent starting of the TDAFW pump.

E. Method of Discovery

During a routine observation of the main control boards, the TDAFW pump was found to be running by a licensed operator.

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 TDAFW pump and its associated level control valves responded as expected to the inadvertent actuation signal. The TDAFW pump responded properly when operations personnel shut the pump down by placing the hand switch for the pump's trip and throttle valve in the closed position. No additional automatic or manual safety system responses were required.

III. CAUSE OF EVENT

A team of Engineering and Chemistry personnel analyzed the inadvertent starting of the TDAFW pump. The team concluded that the most likely cause of this event was the inadvertent bumping of the contact actuation bar on the Westinghouse AR relay RA2 during the maintenance activity to install the electrical jumpers. Relay RA2 is located directly beneath relay BVA for which jumpers were being installed in accordance with a chemistry procedure. The team further concluded that an additional cause of this event was the failure to use extreme care when working around sensitive equipment. The basis for this conclusion is that the installation of similar jumpers in relay racks has been successfully carried out several times since Watts Bar was licensed.

The maintenance personnel involved in the event were interviewed and a situational assessment was performed to establish if other factors might have contributed to the event. This assessment considered the worker's schedule, training, experience and behavioral contributors. However, none of these factors were found to have contributed to the event.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

The AFW System consists of two motor driven pumps and one steam turbine driven pump configured into three trains. Each motor driven pump provides 410 gpm of AFW flow, and the turbine driven pump provides 720 gpm to the steam generators. Each motor driven AFW pump is powered from an independent Class 1E power supply and feeds two steam generators. The turbine driven pump supplies a common header capable of feeding the four steam generators. Steam for the operation of the turbine driven pump is provided from one of two main steam lines upstream of the main steam isolation valves.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES (continued)

The AFW System is designed to supply feedwater to the steam generators during normal unit startup, shutdown, and hot standby conditions. The AFW System automatically supplies feedwater to the steam generators to remove decay heat from the Reactor Coolant System upon the loss of the normal feedwater supply. The AFW pumps take suction from the condensate storage tank (CST) and pump to the steam generator secondary side via separate connections to the main feedwater bypass line piping. The steam generators function as a heat sink for core decay heat. The heat load is dissipated by releasing steam to the atmosphere from the steam generators via the main steam safety valves (MSSVs) or atmospheric dump valves.

For the event described in LER 390/2000-04, the safety function (decay heat removal during a planned shutdown) of the AFW was being performed by the two motor driven pumps and was not impacted by operation of the turbine driven pump. Therefore, the inadvertent operation of the turbine driven pump did not have any adverse impact on plant operation.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

1. Operations personnel shutdown the TDAFW pump and the controls for the pump were reset.

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 circumstances associated with this event will be outlined and developed into a briefing document. This document will specifically address the sensitivity of Westinghouse AR Relays and the need for extreme care against physical contact when working around the relays.

2. Once developed, the briefing document will be provided to various groups such as Electrical Maintenance, Instrument Maintenance, and the Fix-It-Now Supervisors so that appropriate personnel may be made aware of the event.

3. The briefing document will be provided to the WBN Training department to evaluate the information for possible inclusion in future craft training modules.

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

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

A review of previous WBN events was performed for "bump type" events and for control switches which were incorrectly positioned due to some inadvertent action. Based on this review, two LERs were identified. One event addressed the inadvertent operation of the hand switch which controls the main feed pump turbine (MFPT) condenser drain pump. The second event addressed the inappropriate positioning of the diesel generator fuel oil transfer hand switches. Both of these events had unique root causes which were not similar to the root cause of LER 390/2000-04. Therefore, the corrective measures developed for the previous events would not be applicable to LER 390/2000-04.

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.