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John A. Scalice
Site Vice President, Watts Bar Nuclear Plant

DEC 2 4 1996

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

Gentlemen:

In the Matter of)
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/96024

The enclosed report provides details regarding a maintenance activity that affected the operability of one train of the Auxiliary Feedwater system under certain specific plant conditions. Submittal of this report is in accordance with 10 CFR 50.73(a)(2)(i)(B).

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

Sincerely,

M. Bajestani

FOR J. A. Scalice

Enclosure
cc: See page 2

DEC 2 4 1996

cc (Enclosure):
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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98
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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Watts Bar Nuclear Plant - Unit 1	05000390	1 OF 10

TITLE (4)

Maintenance activity renders Train B of the Auxiliary Feedwater System (AFW) inoperable.

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
11	26	96	96	024	00	12	26	96	FACILITY NAME	DOCKET NUMBER 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	100	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)		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 Bushnell, Licensing Engineer	(423)-365-8048

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

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

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

The output of AFW pump 1B-B supplies steam generator 3 and is governed by two solenoid controlled air operated valves in a parallel configuration, Level Control Valve (LCV) 3-148A, and LCV-3-148. On November 26, 1996, at 2230 (EST), Operations personnel were notified that LCV-3-148A was found to be inoperable during a surveillance. For this particular test, LCV-3-148A did not open because the air supply to the operator of the LCV was terminated incorrectly to the exhaust port on the solenoid. A review of the incorrect supply line configuration determined that there was no loss of safety function since pressure from the AFW pump would have opened LCV-3-148. The cause of this event is attributed to inadequate documentation in the work document which allowed the configuration of the LCV to not be properly maintained during a maintenance activity. The corrective action includes: 1) the correction of the termination of the air supply from the solenoid to the valve operator on LCV-3-148A; 2) briefings will be held with Maintenance personnel on the level of detail which is to be documented in the work document configuration logs; 3) a discussion of the appropriate level of documentation will be included in the training of Maintenance personnel; 4) the fitting installed in the exhaust port of the solenoid valve for LCV-3-148A will be replaced or modified so that the air supply line cannot be mated to the exhaust port; 5) Operations will hold crew briefings on this event to stress the key problem areas and how interface with Operations contributed to the event.

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

I. PLANT CONDITIONS:

At 2230 hours (EST) on November 26, 1996, the Plant parameters were; Mode 1, reactor power 100 percent, reactor coolant system (RCS) (EIIS AB) average temperature - 588 degrees F.

II. DESCRIPTION OF EVENT

A. Event

Limiting Condition for Operation (LCO) 3.7.5 defines the operability requirements for the Auxiliary Feedwater (AFW) system (EIIS BA). Action B of LCO 3.7.5 was entered at 0600 on November 26, 1996, for the performance of maintenance on the motor of the 1B-B (Train B) motor driven AFW pump. The output of the 1B-B pump supplies steam generators number 3 and 4. Water flow to steam generator number 3 is governed by two solenoid controlled air operated valves in a parallel configuration. One valve is a 2-inch bypass Level Control Valve (LCV), 3-148A (EIIS LCV), which fails closed on loss of air. The second is a 4-inch valve, LCV-3-148 (EIIS LCV), which fails open on a loss of air. On November 26, 1996, at 2230 (EST), licensed Operations personnel were notified by Maintenance personnel that LCV-3-148A was found to be inoperable during a scheduled performance of Surveillance Instruction (SI), 1-SI-3-903-B, "Valve Full Stroke Exercising During Plant Operation - Auxiliary Feedwater (Train B)." This SI fulfills quarterly inservice testing requirements for the AFW system defined in Technical Specification 5.7.2.11.

Under normal test conditions, LCV-3-148A would open first and equalize pressure around the valve station, which includes LCV-3-148, allowing LCV-3-148 to open. However, for this particular test, LCV-3-148A did not open because the air supply to the valve operator was routed incorrectly to the exhaust port on the solenoid valve. The solenoid for LCV-3-148A is normally energized and is de-energized to supply air for the control of the LCV. The exhaust port of the solenoid is blocked when the solenoid valve is de-energized.

LCV-3-148A was placed in a configuration that would render the valve inoperable in the lower end of mode 3 (less than 500 psi steam generator pressure) on October 14, 1996, and remained in this configuration for approximately 43 days. Since the time of inoperability is known, the 72 hour time period for restoration of the train allowed by Action B of LCO 3.7.5 began on October 14, 1996, and was exceeded, thereby, constituting a violation of the technical specifications. Violations of the Technical Specifications are reportable under 10 CFR 50.73(a)(2)(i)(B).

Problem Evaluation Report (PER) WBPER961131 was initiated to document this event in the TVA Corrective Action Program.

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

II. DESCRIPTION OF EVENT (continued)

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

The assessment of the failure of LCV-3-148A on November 26, 1996, found that maintenance was performed on the valve during a recent mid-cycle outage. Due to this activity, the air supply line to the valve operator for LCV-3-148A was improperly installed on October 14, 1996, rendering the valve inoperable.

C. Dates and Approximate Times of Major Occurrences

October 13, 1996:

1. Time 1645 - With the unit in Mode 4 following the mid-cycle outage, licensed Operations personnel noted that LCV-3-148A would not completely close.

2. Time 1645 - Since the unit was in Mode 4, entry into an action for LCO 3.7.5 was not required. Therefore, LCO 3.7.5 was logged for tracking only due to the malfunctioning of LCV-3-148A.

3. Time 2300 - Work Order (WO) 96-17812-00 was initiated to troubleshoot LCV-3-148A for the closing problem.

October 14, 1996

1. Time 0551 - Entered Mode 3.

2. Time 2104 - Entered Action B of LCO 3.7.5 based on Maintenance personnel indicating to Operations personnel that the ongoing troubleshooting of LCV-3-148A would make AFW Train B inoperable.

3. Time 2300 - The problem with the closing of LCV-3-148A is resolved with the completion of the calibration of Level Modifier (LM) 3-148A. The performance of this calibration required the removal of the air supply line to the valve operator.

C. Dates and Approximate Times of Major Occurrences (continued)

October 15, 1996

1. Time 0020 - After the completion of the calibration, the stroking of LCV-3-148A was planned as the test to establish that the LCV-3-148A was operable. The Maintenance personnel working on LCV-3-148A documented in the WO package that a licensed Operator stroked the valve and that the test was successful. At this time, it was indicated to Operations personnel that the valve could be returned to service.

2. Time 0024 - LCO 3.7.5 was exited based on the testing of the valve.

November 26, 1996

1. Time 0600 - Action B of LCO 3.7.5 was entered for the performance of maintenance on the motor of the 1B-B motor driven AFW pump.

2. Time 1047 - During performance of 1-SI-3-903-B, LCV-3-148 and LCV-3-148A fail to stroke.

3. Time 2008 - WO 96-19985-00 was approved to troubleshoot LCV-3-148 and LCV-3-148B.

4. Time 2353 - The stroking of LCV-3-148 and LCV-3-148A was successfully completed in accordance with 1-SI-3-903-B.

November 27, 1996

1. Time 0001 - LCO 3.7.5 was exited.

2. Time 0325 - SI's were performed for the stroking of the LCV's for the turbine driven and train A motor driven pumps. The LCV's for these trains stroked properly.

D. Other Systems or Secondary Functions Affected

No other systems or secondary functions were affected by this event.

E. Method of Discovery

On November 26, 1996, at 2230 (EST), licensed Operations personnel were notified by Maintenance personnel that LCV-3-148A was found to be inoperable during a scheduled performance of 1-SI-3-903-B, "Valve Full Stroke Exercising During Plant Operation - Auxiliary Feedwater (Train B)." This SI fulfills quarterly inservice testing requirements for the AFW system defined in Technical Specification 5.7.2.11.

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

There were no automatic or manual safety system responses and none were necessary.

III. CAUSE OF EVENT

Root Cause

Site Standard Practice (SSP) 6.02, "Maintenance Management System," requires that a configuration log be established for in-process maintenance activities. SSP-6.02 requires that the work activities should be described with sufficient detail to ensure that the configuration of the device being serviced is properly restored. For the maintenance activities performed under WO 96-17812-00 on October 13, 1996, the detail contained in the log was inadequate. This resulted in the air supply line to the valve operator for LCV-3-148A being incorrectly installed on the exhaust port of the solenoid valve. The wording that was contained in the log regarding the actions taken during the calibration of LM-3-148A also contributed to the improper verification of the reinstallation of the air line. The wording, as written in the log, implied that the air supply line was removed from the air operator of LCV-3-148A, instead of being removed from the solenoid. Verification was made that the supply line was correctly installed at the valve operator.

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Contributing Cause

1. The stroking of LCV-3-148A was the post maintenance testing (PMT) for the calibration of the level modifier. Although this is an appropriate PMT for the work performed, documentation of the actions performed was not adequate and lacked accountability for the actions taken. This was evident in that the operator who stroked the valve was not identified in the WO log and by the lack of an entry in the operator's log that the valve was stroked.

2. In accordance with industry guidance, a 90° pipe fitting was installed in the exhaust port of the solenoid for LCV-3-148A to prevent foreign material intrusion. The installed fitting mated directly to the air supply line for the valve operator. This allowed the interchange of the supply line to appear to be correct.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

Level Solenoid Valve (LSV) 3-148A (EIIS LSV) is the solenoid that controls the position of LCV-3-148A which is the 2-inch bypass valve in the flow path from the 1B-B motor driven AFW pump to steam generator number 3. It is in a parallel configuration to a 4-inch valve, LCV-3-148, that fails open on loss of actuation air. The 2-inch valve is used to fine tune the flow for operator convenience or to eliminate undue wear on the 4-inch valve. The system requirement for accident mitigation is that AFW must be supplied to at least two steam generators within one minute at a total flow of at least 410 gpm in conjunction with a single active failure. In order to accomplish this, the 4-inch valve must open to provide a flow path.

The valves have level modifiers and valve positioners (modulating controls), and solenoid valves that enable the modulating controls. The valves are split range modulation controlled in that the signal to open goes to both valves and the valves open sequentially with LCV-3-148A opening first. One other feature in the design is that LCV-3-148 is flow to open, that is, pressure developed by the pump tends to push the valve open and conversely pressure from the steam generator tends to hold the valve closed.

The error in the configuration of the air supply line was discovered during a scheduled performance of 1-SI-3-903-B. This surveillance strokes the valve set without the pump running. However, during this test neither of the valves stroked. LCV-3-148A did not stroke because the air supply to the valve operator was routed to a port which was blocked when LSV-3-148A was de-energized.

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

LCV-3-148A fails closed on loss of air and with the supply to the valve operator being blocked by the solenoid, the valve was in the closed position. Normally during a test, LCV-3-148A would open first and equalize pressure around the valve station which includes LCV-3-148. During the performance of 1-SI-3-903-B on November 26, 1996, LCV-3-148A did not open and pressure did not equalize around LCV-3-148. In this condition with the pressure not equalized and the AFW pump not running, steam generator pressure was greater than that which the valve spring could overcome and LCV-3-148 remained closed.

For this event, the range of accidents reviewed concentrated on the worse case scenario, a condition where AFW is required within one minute at a rate of 410 gpm. Taking into account the single failure criteria, this valve station would be required to pass AFW. Had there been an accident, LCV-3-148A would not have opened. However, LCV-3-148 would have opened and supplied the required AFW. This would occur since the AFW pump would start and supply forward pressure to aid LCV-3-148 in opening. Likewise the steam generator level would sink enough for the control system to demand full valve opening. Therefore, the error in routing of the air supply to the valve operator for LCV-3-148A would not have had an adverse affect on the capability of the AFW system to mitigate an accident. However, from a completeness perspective, the operability status of the other trains of the AFW system during the period that LCV-3-148A was inoperable (October 14, 1996, to November 26, 1996) must be considered. Maintenance activities were performed, in particular, on the turbine driven pump, during this time period rendering it inoperable. Nonetheless, this is not an additional safety concern, since the preceding assessment establishes that LCV-3-148 would have performed its safety function.

Watts Bar is considered a "hot standby," Mode 3 plant. This means that system responses for accident mitigation will function to place the plant in a stable condition in Mode 3. From this point, action to place the plant in Mode 4 is an operator controlled evolution and is not time dependent. In addition, there is a pressure switch which blocks LCV-3-148 from the flow path when system pressure is below 500 psi. This function would slow the rate of cooldown, thereby forcing cooldown to be handled by the remaining active steam generators. However, removing LCV-3-148 from the flow path under these conditions is within the design basis, since stability is achieved in Mode 3.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

WO 96-19985-00 was initiated to troubleshoot and repair LCV-3-148A on November 26, 1996. The termination of the air supply from the solenoid to the valve operator on LCV-3-148A was corrected and the valve was returned to service on November 27, 1996.

B. Corrective Actions to Prevent Recurrence

1. Briefings will be held on the documentation expectations for the configuration log with appropriate Maintenance personnel. The proper documentation to be recorded in the log for the performance of a PMT will also be discussed. These briefings will be completed by January 31, 1997.

2. A discussion of the appropriate level of documentation to be provided in the configuration log will be included in the future training of Maintenance personnel as they are processed on site. The updating of the training module which directs this training will be completed by February 14, 1997.

3. A discussion of this event will be added to a training module which covers industry events and directs training for Maintenance personnel. This action will be completed by February 14, 1997.

4. The fitting installed in the exhaust port of the solenoid valve for LCV-3-148A will be replaced or modified so that the air supply line cannot be mated to the exhaust port. As appropriate, this modification will be applied to solenoid valves for the LCV's in each of the AFW trains. These actions will be completed by February 14, 1997.

5. The individuals that performed the calibration of the level modifier and the verification of the installation of the air supply line were contract personnel. These individuals are currently not employed by TVA. In an effort to ensure that no other work activities performed by these individuals during the mid-cycle outage were faulty, a series of the tasks completed by the individuals were reviewed. It was determined that this work order was the only corrective maintenance performed by these individuals. Therefore, it was concluded that this event was an isolated incident.

6. Operations will hold crew briefings on this event to stress the key problem areas and how interface with Operations contributed to the event. This action will be completed by February 28, 1997.

7. The need to enhance the administrative controls for exiting a LCO after completion of a work order will be evaluated. This evaluation and any required changes will be completed by February 14, 1997.

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VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

There were no failures that rendered a train or a safety system inoperable.

2. Component/System Failure Information

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

There were no component failures involved.

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

There were no component failures involved.

c. Root Cause of Failure:

There were no component failures involved.

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

There were no component failures involved.

e. Manufacturer and Model Number of Each Failed Component:

There were no component failures involved.

B. Previous Similar Events

A voluntary LER, 390/96020, was submitted to NRC on July 26, 1996, and detailed a condition where an instrument isolation valve in the Residual Heat Removal (RHR) (EIIS BP) system was found closed and rendered the system inoperable under certain conditions. LER 390/96020 is similar to LER 390/96024 in that at the completion of a maintenance activity, verification was made that the proper configuration was restored and the verification was documented. Therefore, an exact means through which the change in configuration occurred could not be established for LER 390/96020.

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VII. COMMITMENTS

The actions committed to be implemented in response to this event are tabulated in Section V, Corrective Actions.