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

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

OCT 24 2003

10 CFR 50.73

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - DOCKET NO. 50-390 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/2003-003

This submittal provides Licensee Event Report 390/2003-003. This LER addresses an event that occurred on August 25, 2003, which resulted in automatic actuation of engineered safety features, which included the Reactor Protection and Auxiliary Feedwater systems. This event is being reported under 10 CFR 50.73(a)(2)(iv)(A).

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

Sincerely,

W. R. Lagergren

W. R. Lagergren

Enclosure
cc: See page 2

IE22

OCT 24 2003

cc (Enclosure):

INPO Records Center
Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, Georgia 30339-5957

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

Ms. Margaret H. Chernoff, Project Manager
U.S. Nuclear Regulatory Commission
MS 08G9
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

NRC FORM 366 (7-2001) — U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Watts Bar Nuclear Plant	05000 - 390	1 OF 6

4. TITLE Automatic Reactor Trip Due to Bumping of Main Transformer Sudden Pressure Relay

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
08	25	2003	2003	- 003 -	00	10	24	2003	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE: 1

10. POWER LEVEL: 100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Rickey Stockton, Licensing Engineer	(423) 365-1818

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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

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

On August 25, 2003, Watts Bar (WBN) Unit 1 was operating at 100 percent power when there was an operation of the 2 out of 3 logic for the Sudden Pressure Relays (SPRs) for Main Transformer Bank 1C. The actuation of the relays resulted in a turbine trip and a subsequent reactor trip at approximately 0945 EDT. All control rods inserted as required and the safety systems actuated as designed including the motor and turbine driven pumps for the Auxiliary Feedwater (AFW) System. AFW pump 1B-B was available but not operable at the time of the trip due to work on an associated penetration room cooler. The pump started as required. There was no loss of safety function. Unit 1 was stabilized in Mode 3.

The immediate cause of the trip was the actuation of the SPRs which were initiated by a worker bumping into the junction box that houses the relays in the switchyard. Subsequent to this, it was identified that the design of the SPR configuration was sensitive to actuation when force was applied to the relay housing junction box.

Corrective actions include a modification to improve the vibration isolation of the SPRs and the installation of a permanent protective barrier fence with access gate around each of the four SPRs, pipe, hydraulic hose, junction box, and support installations to prevent accidental impact during normal plant operations. Trip hazard signs have been placed on the fence barrier.

LICENSEE EVENT REPORT
TEXT CONTINUATION

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

I. PLANT CONDITION(S)

On August 25, 2003, at approximately 0945 Eastern Daylight Savings Time (EDT), Unit 1 was in Mode 1, steady state operation at 100 percent power. The Reactor Coolant System (RCS) (Energy Industry Identification System (EIIS) Code AB) pressure was 2240 psig and RCS Tavg was 588 degrees F.

II. DESCRIPTION OF EVENT

A. Event

On August 25, 2003, Watts Bar (WBN) Unit 1 was operating at 100 percent power when there was an operation of the 2 out of 3 logic for the Sudden Pressure Relays (SPR) (EIIS Code RLY) for Main Transformer (EIIS Code XFMR) Bank 1C. The actuation of the relay resulted in a turbine trip and a subsequent reactor trip at approximately 0945 EDT. (The SPRs provide protection to the plant in the event that a main transformer becomes overpressurized due to a fault within the transformer.) All control rods inserted as required and the safety systems actuated as designed including the motor and turbine driven pumps (EIIS Code P) for the Auxiliary Feedwater (AFW) System (EIIS Code BA). AFW pump 1B-B was available but not operable at the time of the trip due to work on an associated penetration room cooler. The pump started as required. There was no loss of safety function. Unit 1 was stabilized in Mode 3.

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

There were no inoperable systems that contributed to this event. However, as described above, AFW pump 1B-B was inoperable at the time of the trip but was available for service and started as required.

C. Dates and Approximate Times of Major Occurrences:

Time (EDT)	Event
09:45:33	Main Transformer 1 pressure abnormal.
09:45:33	Sprinkler initiated for Main Transformer 1.
09:45:33	500KV PCB 5044, Main Generator Output breaker operated.
09:45:33	500KV PCB 5088, Main Generator Output breaker operated.
09:45:34	Turbine trip.
09:45:34	Reactor trip as a result of the turbine trip.
09:45:49	Motor driven Auxiliary Feedwater pumps start.
09:45:53	Turbine driven Auxiliary Feedwater pump starts.
09:46	Operations staff enters E-0, "Reactor Trip or Safety Injection."
09:48	Operations staff enters ES-0.1, "Reactor Trip Response."
12:31	Operations staff transitions from ES-0.1 to GO-5, "Unit Shutdown from 30% Reactor Power to Hot Standby."

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

D. Other Systems or Secondary Functions Affected:

There were no other systems affected other than equipment required for plant shutdown.

E. Method of Discovery:

The operators were first alerted of the event by the first out annunciation in the control room.

F. Operator Actions:

Operations personnel responded in accordance with Emergency Procedure E-0, "Reactor Trip or Safety Injection," and transitioned as required into procedure ES-0.1, "Reactor Trip Response."

G. Safety System Responses:

Plant safety systems operated as designed. However, as described above, AFW pump 1B-B was inoperable at the time of the trip but was available for service and started as required.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the trip was the actuation of the SPRs which were initiated by a worker bumping into the junction box (EIIS Code JBX) that houses the relays in the switchyard. This resulted from the worker's inattention to detail and being unfamiliar with the task being performed.

B. Root Cause:

Subsequent to the cause determination above, the investigation identified that the design of the SPR configuration was sensitive to actuation when some amount of force was applied to the relay housing junction box. Specifically, when the worker bumped into the junction box, the impact moved the box enough to result in a wave in the fluid in the flexible hose resulting in actuation of the rapid pressure rise relay, and therefore pickup of the latching relays.

C. Contributing Factors

There were no contributing factors identified in this event.

IV. ANALYSIS OF THE EVENT

The sudden pressure relays provide protection to the plant in the event that a main transformer becomes overpressurized due to a fault within the transformer. The plant responded as designed to the initiating condition. This event is compared to the LOSS OF EXTERNAL ELECTRICAL LOAD AND/OR TURBINE TRIP as described in Final Safety Analysis Report (FSAR) Section 15.2.7. The complete loss of load/turbine trip from full power is examined to show the adequacy of the pressure relieving devices and also to demonstrate protection from departure from nucleate boiling (DNBR). The following plant conditions were bounded by the event described in the FSAR:

1. The anticipatory reactor trip occurred on turbine trip versus the reactor protection system trip setpoints.
2. Reactor control was in automatic versus manual assumed in the FSAR.
3. Steam dumps operated as designed. The FSAR design basis does not credit the operation of the steam dump system or steam generator power operated relief valves (SG-PORVs).

The reactor trip occurred as designed from a turbine trip and station power was not lost during the event. The plant response remained within the FSAR boundary analysis. The main condenser steam dump valves opened per design and as a result it was not necessary for the SG-PORVs to operate. Pressurizer level and pressure did not increase to challenge the pressurizer PORVs and safeties to limit RCS pressure. RCS pressure and loop average temperatures decreased during the transient rather than increasing as predicted by the conservative FSAR assumptions and the DNBR was not challenged. The differences between the FSAR and the plant event are associated with the conservatism assumed in the FSAR analysis and the benign nature of the actual plant event which was quickly brought to a stable condition.

V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the discussion in Section IV above, there was no safety significance to this event.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

The immediate corrective measures developed to address the above cause of the trip included installation of protective barricades around each of the SPR junction boxes for the main transformers and unit station service transformers. This restricts access in the area to prevent inadvertent actuation until a modification to the configuration can be implemented. Also, the Main Transformer's sudden pressure trip cutout blocks were pulled (under Temporary Alteration Control Form (TACF) 01-13-246) to prevent an inadvertent trip until the long-term modification discussed below was installed.

As interim measure, a shift order was issued to move the switchyard access log to the shift manager's desk in the main control room, and Shift Manager approval was required for all switchyard entries. An Operations person was required to accompany any person or group to the switchyard to ensure the scope of the activity is understood, and that hazards and sensitive devices in the work area were identified to better ensure the individuals are aware of the potential consequences of actions until the permanent modification described below could be implemented.

B. Corrective Actions to Prevent Recurrence:

A modification has been implemented that improves the vibration isolation of the sudden pressure relays by making each SPR less susceptible to accidental impact of any SPR, hose, support, pipe stub, pipe manifold, or junction box. In part, the existing 1 inch diameter (5 to 8 feet long) flexible metal hose, which connects each main transformer to the SPR manifold, has been replaced by three 1 inch diameter steel braided rubber hydraulic hoses approximately 3.5 feet long. Each of the new hydraulic hoses has been attached to an individual SPR via a rigid pipe stub and flange which is clamped to the SPR support. The other end of each hydraulic hose has been attached to a new rigid pipe manifold which has been supported from the Main Transformer structure. The rigid pipe manifold has been attached to the Main Transformer oil pressure tap shutoff valve. By comparison in the previous configuration, each single flexible metal hose was attached directly to the Main Transformer oil pressure tap shutoff valve.

In addition, a permanent protective barrier fence with access gate has been erected around each of the four SPR, pipe, hydraulic hose, junction box, and support installations to prevent accidental impact during normal plant operations. Trip hazard signs have been placed on the fence barrier.

Also, the WBN corrective action program has captured actions for additional "on the job" and error prevention tool training for the workers involved in the bumping of the relays.

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

VII. ADDITIONAL INFORMATION

A. Failed Components:

As previously discussed, the cause of this event was attributed to the design such that the SPR configuration was especially sensitive to actuation when some force was applied to the relay housing junction box. Specifically, when the worker bumped into the junction box, the impact moved the box enough to result in a wave in fluid in the flexible hose resulting in an actuation of the rapid pressure rise relay, and therefore pickup of the latching relay. Since the pressure switch and SPR performed as designed once they received the input signal, there was never actually a component failure.

B. Previous LERs on Similar Events:

A review of previous LERs indicated that there had been no plant trips attributed to the actuation of the sudden pressure relays.

C. Additional Information:

None.

D. Safety System Functional Failure Consideration:

This event is not considered a safety system functional failure in accordance with NEI 99-02 in that the principal plant safety systems operated as designed. Therefore, the functional capability of the overall system was not jeopardized.

E. Loss Of Normal Heat Removal Consideration:

This event is not considered a scram with loss of normal heat removal.

VIII. COMMITMENTS

None.