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J. L. Wilson
Vice President, Sequoyah Nuclear Plant

September 9, 1992

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSE DPR-79 - LICENSEE EVENT REPORT (LER) 50-327/92014

The enclosed LER provides details concerning the inoperability of the B-train safety-injection pump because of the associated circuit breaker being nonfunctional. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by technical specifications and in accordance with 10 CFR 50.73(a)(2)(ii)(A) as a condition that was outside the design basis of the plant.

Sincerely,

J. L. Wilson

Enclosure
cc: See page 2

IE22 1/1

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NRC Form 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

Approved OMB No. 3150-0104
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LICENSEE EVENT REPORT (LER)

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TITLE (4) Safety-Injection Pump Inoperable Due to the Associated Circuit Breaker Being Nonfunctional

EVENT DAY (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 8	1 0	9 2	9 2	0 1 4	0 0	0 9	0 9	9 2		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	XX 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	XX 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
J. W. Proffitt, Compliance Licensing	6 1 5 8 4 3 - 6 6 5 1

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
X	B Q	B K R	I 2 0 3	YES					

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 fifteen single-space typewritten lines) (16)

On August 10, 1992, with Unit 1 in Mode 1 at 100 percent power, at 0944 Eastern daylight time, during performance of a quarterly surveillance of the 1B-B safety-injection pump, the pump immediately tripped when the start was attempted. Operations personnel were dispatched to investigate the breaker trip. It was observed that the manual trip button was stuck in the trip position. The assistant shift operations supervisor returned the button to its proper position and notified the main control room of the identified problem and that the breaker should operate properly. Anotner start attempt was made, the safety-injection pump started, and the surveillance was successfully completed. The cause of the manual trip button being stuck could not be determined. Corrective actions included returning the breaker and pump to operable status and briefing of appropriate personnel on the event. Procedural revisions will be performed to ensure proper breaker alignment, and additional testing of end-devices will be performed, where prudent, following breaker manipulations.

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

I. PLANT CONDITIONS

Unit 1 was operating at approximately 100 percent reactor thermal power.

II. DESCRIPTION OF EVENT

A. Event

On August 10, 1992, at 0944 Eastern daylight time (EDT), during performance of a quarterly surveillance of the 1B-B safety-injection (SI) pump (EIIS Code BQ), the pump (EIIS Code P) immediately tripped when the start was attempted. Operations personnel were dispatched to investigate the breaker trip. It was observed that the manual trip button was stuck in the trip position. The assistant shift operations supervisor (ASOS) returned the push button to its proper position and notified the main control room of the identified problem and that the breaker should operate properly. Another start attempt was made, the safety-injection pump started, and the surveillance was successfully completed.

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

There were no inoperable structures, components, or systems that contributed to the event. However, on the following occasions, the opposite train equipment was considered inoperable:

On August 3, 1992, the 1A-A residual heat removal (RHR) pump (EIIS Code BP) was inoperable for eight minutes.

On August 5, 1992, the 1A-A centrifugal charging pump (EIIS Code CB) was inoperable for six hours.

On August 5, 1992, the 1A-A SI pump was inoperable for one hour and 19 minutes.

On August 6, 1992, the 1A-A SI pump was inoperable for three minutes.

On August 7, 1992, the 1A-A RHR pump was inoperable for 27 minutes.

C. Dates and Approximate Times of Major Occurrences

July 31, 1992 — Maintenance was performed on the 6.9 kilovolt (kV) breaker for the 1B-B SI pump. The appropriate postmaintenance test (PMT) was performed on the breaker, then the breaker was returned to service. Independent verification of breaker operability was performed after racking the breaker into position.

August 10, 1992 at 0942 EDT	Limiting Condition for Operation (LCO) 3.5.2 was entered to allow for the performance of the quarterly operability test for the 1B-B SI pump.
August 10, 1992 at 0944 EDT	SI Pump 1B-B was started and immediately tripped. An ASOS was dispatched to investigate the breaker trip. After verifying that the control-power fuses were installed, the ASOS observed that the manual trip button was stuck in the trip position. The ASOS corrected the problem and notified the main control room that the breaker should operate properly.
August 10, 1992	Another start attempt of the 1B-B SI pump was performed, and the surveillance was successfully completed.
August 10, 1992 at 1100 EDT	LCO 3.5.2 was exited.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

Operations personnel performing a quarterly operability test on the 1B-B SI pump observed that the pump immediately tripped after the hand switch was placed in the start position. Investigation of the problem revealed that the manual trip button on the breaker was stuck in the trip position.

F. Operator Actions

Operations personnel identified that the manual trip button on the breaker was stuck in the trip position and corrected the problem. The surveillance on the pump was successfully completed, and the LCO was exited.

G. Safety System Response

No safety system response was required.

III. CAUSE OF EVENT

A. Immediate Cause

The immediate cause of this event was that the manual trip button on the breaker was stuck in the trip position.

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B. Root Cause

Although the root cause of this event could not be conclusively established, TVA considers the cause to have been a combination of failure of the breaker trip button to function properly and lack of attentiveness. It appears that during the process of racking in the breaker, the manual trip button became depressed and stuck in the trip position. It was determined that the close tolerances associated with the manual trip button, such as created by slight bowing of a small cover plate and differences in the travel of the trip button relative to button sleeve, might tend to introduce the potential for the manual trip button to become stuck after being depressed. Additionally, although procedures were followed, had the individuals increased attention to certain details, the misaligned button might have been identified earlier.

C. Contributing Factors

The potential contributing factor to this event was that the procedure requiring verification of breaker operability did not specifically require the position of the manual trip button to be verified.

IV. ANALYSIS OF EVENT

The SI system is the intermediate head portion of the emergency core cooling system (ECCS) and provides cooling water to the reactor core for a design basis accident. Upon receipt of an SI signal, both pumps start and, as the reactor coolant system (RCS) pressure drops below pump shutoff head, deliver borated water to the RCS for emergency cooling. With the undetected failure of the 1B-B SI pump and the assumption of a loss of A-train ECCS, this potential condition is considered to be outside design basis.

During the 10-day period that the 1B-B SI pump may have been inoperable, on August 5, 1992, the performance of the quarterly operability surveillance of the 1A-A SI pump was conducted. This test requires closing of the pump discharge valve, then the pump is operated on recirculation flow. The actual time that this valve was closed was 17 minutes; otherwise, the pump was capable of performing its intended function.

For a large-break loss of coolant accident (LOCA), the RCS will depressurize rapidly, and the high-head SI flow (centrifugal charging pump [CCP] and SI) will bypass the core and discharge to the containment through the break due to the reversed core flow during the blowdown phase. The major sources of ECCS flow during refill and reflood phases are the accumulators and RHR. The high-head SI flows therefore have insignificant impact on the cladding heat-up process during the blowdown phase of the transient.

For a small-break LOCA, a much slower depressurization of the RCS will occur. The major source of the ECCS flow is the high-head SI flow (CCPs and SIs). With two CCPs available and no SI pump, the two CCPs will deliver a greater than or equal amount of SI flow to the cold leg than one CCP and one SI could deliver above an RCS pressure of 900 pounds per square inch. Prior to the loop-seal clearance time, all the SI flow would bypass the core and have no impact on the cladding heat-up process. Therefore, if the operator realigns the SI pumps within 20 minutes and 10 minutes for 3-inch (the limiting break) and 4-inch breaks, respectively, (i.e., when RCS pressure decreases below 900 psi) the current analyses results would not be impacted.

There are no calculations available for a break size above 4 inches. It is expected that for a 6-inch break, the accumulator would deliver flow in approximately 500 seconds (based on engineering judgement). The accumulator flow is typically much higher than the SI flows. The injection of the accumulator flow will help slow down the cladding heat-up process. As the break size approaches one square foot (i.e., large break LOCA), the RHR flow increases due to faster depressurization. It is expected that, for a 6-inch break, the peak clad temperature (PCT) would normally be lower than 1,673 degrees Fahrenheit (F). The effect of the zirconium and/or water reaction would not be a concern for these low-cladding temperature conditions. Also, it is expected that the operator would realign an SI pump within a reasonable amount of time after the initiation of the transient, given the early steps within the emergency instruction to verify pump operation. Based on the discussion above, it is judged that the PCT for intermediate-size breaks would not exceed 2,200 degrees F for the identified condition.

Therefore, in the unlikely event of an accident situation requiring an SI pump during this time period, the operator would have realigned the 1A-A pump discharge valve to ensure safety injection into the core. Although other ECCS equipment was out of service at various times as indicated previously, at least one train of each was actually available, or alignments could have been made to ensure ECCS support. Under those circumstances, TVA believes that there was minimal actual safety significance to any of the conditions that arose during this period.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

Operations personnel identified that the manual trip button on the breaker was stuck in the trip position and corrected the problem. The surveillance on the pump was successfully completed, and the LCO was exited.

The safety-related 6.9 kV breakers on both units were inspected by Operations personnel to ensure that no other breaker was in an inoperable condition as a result of misalignment of the manual trip button. A memorandum was issued to all Operations personnel by the Plant Operations Manager alerting them of the newly discovered threat to breaker operability. This information was covered at shift turnover until all crews were briefed.

An inspection of the breaker by plant personnel, in conjunction with the vendor, was performed and identified that the small cover plate on the breaker face was slightly bowed and may have contributed to the manual trip button sticking. Appropriate Electrical Maintenance personnel have been informed of the potential for misalignment of the breaker and that the trip button can stick in the trip position.

B. Corrective Actions to Prevent Recurrence

1. Electrical Maintenance and Operations training will be revised to include information on the potential for misalignment of the manual trip button on the 6.9 kV breakers when racking in the breaker.

2. The appropriate general operating instruction will be revised to include verification of the manual trip button position.

3. The appropriate maintenance instruction has been revised to include verification of the manual trip button position.

4. Administrative guidelines concerning end-device testing, where prudent, after breaker manipulations will be incorporated into site procedures.

5. An evaluation of the manual trip button sticking mechanisms was performed, and enhancement will be made to the breaker as deemed appropriate.

VI. ADDITIONAL INFORMATION

A. Failed Components

The 6.9 kV circuit breaker failed to operate because the manual trip button stuck in the trip position.

B. Previous Similar Events

A review of previous reportable events was conducted to identify any similar events and, if so, to determine if corrective actions had been unsuccessful in preventing recurrence. Several events were identified that were caused by or had contributing factors similar to those noted in the investigation of this event, i.e., inattention to detail, inadequate verification, and inadequate return of equipment to service. Actions have been taken in response to previous events to ensure that expectations of management were clearly conveyed, understood, and concurred with by working-level personnel.

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This specific condition was not addressed by the previous corrective actions. The appropriate PMI was performed on the component following maintenance on the breaker. However, for some unknown reason, the trip button was engaged and the verifier apparently did not observe the position of the manual trip button. Additionally, it was not specifically required by procedure to observe the position of the manual trip button in verifying breaker operability.

VII. COMMITMENTS

1. Revise the Electrical Maintenance and Operations training by October 8, 1992, to include information on the potential for misalignment of the manual trip button on the 6.9 kV breakers when racking in the breaker.

2. The appropriate general operating instruction will be revised by October 8, 1992, to include verification of the manual trip button position.

3. Administrative guidelines concerning end-device testing, where prudent, after breaker manipulations will be incorporated into site procedures by October 8, 1992.