NRC Form 366 (6-89) | U.S. NUCLEAR REGULATORY COMMISSION | Approved OMB No. 3150-0104 Expires 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4) Entry Into Mode 4 Operation Without Two Operable Containment Spray Systems Caused by Inadequate Configuration Control

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 5	0 8	9 2	9 2	0 0 7	0 1	0 8	3 1	9 2		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)			
POWER LEVEL (10)	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)	XX 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)	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)
C. D. McDuffy, Compliance Licensing	6 1 5 8 4 3 - 7 7 6 6

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 fifteen single-space typewritten lines) (16)

This LER is being revised to update a corrective action. On May 8, 1992, at 0330 Eastern daylight time (EDT), TVA discovered that both containment spray (CS) pump suction valves (2-FCV-72-21 and -22) were closed, rendering both trains of CS inoperable. Investigation revealed that this condition existed during the transition from Mode 5 to Mode 4 on May 7 at 1748 (EDT). Upon discovery of the valves in the closed position, Limiting Condition for Operation (LCO) 3.0.3 was entered, and the valves were opened. LCO 3.0.3 was then exited. The root cause of this event is considered to be not implementing the configuration control process. Additionally, operators had not accepted the importance of using the basic operational tools to achieve the expected level of plant operations. Immediate corrective actions included a complete walkdown of the control boards to ensure correct configuration of the equipment and disallowing use of the procedural exceptions that had been misinterpreted regarding configuration control. Long-term corrective actions include the establishment of a task force to review and streamline the configuration control process.

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

I. PLANT CONDITIONS

Unit 2 was in Mode 4 at 337 degrees Fahrenheit (F) and 446 pounds per square inch gauge (psig), preparing for return to service during Day 56 of the Cycle 5 refueling outage.

II. DESCRIPTION OF EVENT

A. Event

On May 8, 1992, at 0330 Eastern daylight time (EDT), TVA discovered that both containment spray (CS) pump suction valves (2-FCV-72-21 and -22) were closed, rendering both trains of CS inoperable. Investigation revealed that this condition existed during the transition from Mode 5 to Mode 4 on May 7 at 1748 EDT.

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

The closed suction valves rendered both trains of CS inoperable.

C. Dates and Approximate Times of Major Occurrences

April 27, 1992	A valve alignment in accordance with the system operations checklist for B train containment spray system (CSS) was started.
April 28, 1992	A valve alignment in accordance with the system operations checklist for A train CSS was started.
May 2, 1992	The CS pump suction valves were configured open according to the valve checklists.
April 30-May 3, 1992	Several test activities were conducted requiring CSS operation. Following completion of these activities, operators closed the suction valves to ensure that maintenance activities did not result in a flow path from the refueling water storage tank (RWST) to the containment sump. This action was not positively controlled by use of the configuration control process; however, operators considered that procedural exceptions allowed this manipulation without a configuration log entry and that barriers to mode change would place the valve in the correct configuration.

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May 5, 1992	The valve alignment checklists for A and B train CSSs were completed.
May 5, 1992 at 1100 EDT	Shiftly performance of shift turnover periodic instruction indicated suction valves were closed. This checklist allowed the operators to check the valves as open or closed; it did not specify the required position.
May 5, 1992 at 1700 EDT	A surveillance instruction (SI) was completed to verify CSS alignment as required by Technical Specification (TS) SR 4.6.2.1.1.a.
May 5, 1992 at 2222 EDT- May 6, 1992 at 0126 EDT	The A train CS pump was started to recirculate the refueling water storage tank. The suction valve was discovered closed before the evolution. Following recirculation, the operator returned the valve to the as-found condition, i.e., closed.
May 6, 1992 to May 8, 1992	Shiftly performance of the shift turnover periodic instruction indicated that the suction valves remained closed.
May 7, 1992 at 1630 EDT	The general operating instruction (GOI) emergency core cooling system (ECCS) master checklist was performed to verify control board switch alignment before mode change. Although the CSS is included in the checklist, these valves were not included.
May 7, 1992 at 1748 EDT	Unit 2 entered Mode 4.
May 8, 1992 at 0330 EDT	A senior reactor operator (SRO) discovered both Unit 2 CS suction valves in the closed position, immediately entered Limiting Condition for Operation (LCO) 3.0.3, and opened the valves. LCO 3.0.3 was then exited. 10 CFR 50.72 applicability was evaluated.
May 8, 1992 at 0700 EDT	10 CFR 50.72 notification was evaluated by oncoming and offgoing shift operations supervisors and Operations management. The event was not considered reportable under 10 CFR 50.72, based on plant conditions. Applicability of 10 CFR 50.73 was recognized.

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May 8, '992 at 0830 EDT	Further management evaluation concluded that a 10 CFR 50.72 report was required.
May 8, 1992 at 1006 EDT	The event was reported in accordance with 10 CFR 50.72.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

While reviewing the control board, the refueling coordinator SRO identified the condition.

F. Operator Actions

Upon discovery of both 2-FCV-72-21 and 2-FCV-72-22 in the closed position, LCO 3.0.3 was entered, and the valves were opened. LCO 3.0.3 was then exited.

G. Safety System Responses

No safety system responses were required.

III. CAUSE OF THE EVENT

A. Immediate Cause

The immediate cause of this event was inappropriate personnel actions. The valves were maintained closed in Mode 5 by operators because of concerns for inadvertent draining of the RWST to the containment sump through the CS pump suction valves. Operators considered that the valves were not required to be open in Mode 5, and barriers to mode change would place the valves in the correct configuration. This action was not positively controlled through the configuration control process and, thus, incorrect valve positions were not identified before mode change.

B. Root Cause

The root cause of this event is considered to be operators not adequately implementing the configuration control process. Additionally, the operators did not understand the importance of using the basic operational tools (i.e., turnover, configuration control, daily journal, etc.) to achieve the expected level of plant operations.

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C. Contributing Factors

The complexity of configuration control requirements and insufficient training on these procedural requirements contributed to this event. Additionally, barriers to mode change, such as the ECCS master checklist, did not result in correcting the configuration before mode change.

IV. ANALYSIS OF THE EVENT

The CSS is designed to prevent the peak containment pressure from exceeding the 12 psig design value after a large loss of coolant accident (LOCA) at full power. The CSS works in conjunction with other systems to remove heat from the containment and, thus, control the peak pressure. The ice condenser provides essentially all of the heat removal in the containment during the early phases of an accident. As long as ice remains, the CSS removes little or no energy from the containment atmosphere.

Significant physical damage to the spray pumps was likely had the pumps been started in the condition found on May 8. If the pumps had started automatically, the operators would have had a very short time period to open the suction valves before the volume of water in the suction piping was exhausted. The operators would not reach the step in Emergency Operating Procedure E-1 that requires verification of spray flow for several minutes after event initiation. This condition could result in the loss of both CS trains.

At the time of this event, the reactor had been shut down for a refueling outage for 56 days, and approximately one third of the fuel assemblies were new and had not been irradiated. The reactor coolant system (RCS) conditions were about 336 degrees F at a pressure of 458 pounds per square inch absolute. With respect to the design basis events discussed in the preceding section, the effects of a large and small LOCA were evaluated for Mode 4.

Based on evaluation, the following conclusions were reached. A large LOCA in Mode 4 would be a much less challenging event than the design-basis LOCA. The latent and sensible heat of the RCS would be much less than that assumed in the design basis accident (DBA) analysis because of the lower temperature and pressure of the reactor during Mode 4. After the initial blowdown of the RCS, steam releases from the RCS would be terminated because the decay heat rate would not be high enough to heat the ECCS flow to boiling temperature. Thus, no steam releases would be expected after a few hundred seconds, and the CSS would not be needed.

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In support of this evaluation, hand and computer calculations were performed and concluded that conservatively-calculated steam releases would be condensed on the containment shell and other passive heat sinks, and the CSS would not be needed to control containment pressure.

Even though it would not be needed for this event, the residual heat removal spray would be available to the operator. The 2000 gpm flow rate is more than sufficient to condense the conservatively-calculated steam release for the conditions at discovery.

The cases of a small-break LOCA and a main steam line break were also evaluated. Based on the evaluations and the large-break LOCA evaluation discussed above, it is concluded that having both trains of CS inoperable during Mode 4 at the end of a refueling outage is well within the bounds of the accident analysis results presented in the Final Safety Analysis Report (FSAR).

In conclusion, the safety significance of having both CSS trains inoperable in Mode 4 was evaluated both qualitatively in comparison with the accidents in the FSAR and quantitatively for the conditions that existed in Mode 4 after a 56-day shutdown. The evaluation considered large and small LOCAs and main steam-line breaks inside the primary containment. These evaluations concluded that the CSS is not required because the ice condenser handles the initial blowdown energy and the passive heat sinks can condense the conservatively-calculated steam release when the ice bed eventually melts. The containment temperature and pressure for these events would be less severe than those presented in the FSAR. Therefore, this event had limited safety significance.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

1. Work was stopped on both Units 1 and 2 until system alignments were verified.

2. A complete walkdown of Units 1, 2, and common main control room switches and bench-board alignments was conducted to verify proper configuration.

3. A standing order was issued covering configuration control and mandatory configuration log entries. The standing order included disallowing use of the exceptions to configuration log entries, requiring a systematic control board walkdown by the oncoming and offgoing licensed personnel, requiring configuration log entries for in-process procedures, and additional restrictions on isolation of pump suction valves.

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4. The Operations superintendent and the Operations manager conducted discussions with the Operations staff. These meetings discussed recent Sequoyah Nuclear Plant (SQN) operational events and Operations performance relative to those events. The use of basic operational tools such as configuration control, shift turnover, procedure use, and daily journal entries as an aid in performing duties versus merely requirements to be followed, was discussed in detail. The role that absence of proper use of these tools played in the recent events was evaluated. This evaluation reinforced the position that rigorous, consistent application of tools in everyday performance of work will prevent mistakes.

5. The operators' shift turnover periodic instructions were revised to delete switch alignment choices.

B. Corrective Actions to Prevent Recurrence

1. A task force is being established to review and streamline the configuration control process. Recommendations provided will be incorporated into the configuration control procedure.

2. In-depth training will be conducted on configuration control requirements following the upgrade of the requirements.

3. The GOI ECCS master checklist was reviewed to determine if appropriate valves were included. The CS pump suction valves from both the RWST and containment sump were not included in the GOI. The GOI will be revised to include these valves.

4. In an effort to improve overall Operations performance, a meeting was conducted with the on-shift assistant shift operations supervisors (ASOSs) to discuss performance and required improvements. The ASOSs were tasked to identify problem areas and recommend and implement associated solutions. This meeting resulted in a consensus that performance needs improvement and a commitment to implement the improvements. It also developed a sense of empowerment and an unwillingness to relinquish that empowerment. Initial recommended areas to improve include professionalism, delegation of responsibilities, shift manning, succession planning and encouraging performance, SRO input to plant work activities, communications, and configuration control. Methods to improve these areas were determined. Implementation is ongoing.

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VI. ADDITIONAL INFORMATION

A. Failed Components

None.

B. Previous Similar Events

Several SQN events involving configuration control and operator performance have been reported (e.g., LER 50-327/92006, "Failure to Properly Verify Reactor Coolant System Flow Above TS Limits," LER 50-327/91025, "Main Steam Isolation Valves Inoperable Because Jumpers on the A Train Closure Circuitry Had Not Been Removed Following Maintenance Activities," and LER 50-328/91008, "Failure of the RWST Wide Range Level Transmitters Because of Inadequate Administrative Controls"). Corrective actions for these events involved correcting specific aspects of Operations' administrative processes without an integrated review of the processes and implementation. Additionally, corrective actions for previous events have been directive in nature, with management determining the problems and associated solutions; the corrective actions for the event discussed in this report are participative rather than directive. This approach charges the operators with the problem determination and the ability to effect change. Past corrective actions such as for the events listed did not prevent the event discussed in this report.

VII. COMMITMENTS

1. A task force is being established to review and streamline the configuration control process. Recommendations provided will be incorporated, as appropriate, into the configuration control procedure by October 8, 1992.

2. In-depth training will be conducted on configuration control requirements following the upgrade of the requirements through special operator training by February 8, 1993.

3. The GOI ECCS master checklist will be revised by September 8, 1992, to include the CS pump suction valves from both the RWST and containment sump.