

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Browns Ferry - Unit 1	DOCKET NUMBER (2) 05000259	PAGE (3) 1 OF 04
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TITLE (4)
Overpressurization of Core Spray Piping

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 NAMES	DOCKET NUMBER(S)
08	14	84	84	032	00	09	13	84		05000

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)				
POWER LEVEL (10) 100	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(c)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)	
	<input type="checkbox"/> 20.406(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)	
	<input type="checkbox"/> 20.406(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
	<input type="checkbox"/> 20.406(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
	<input type="checkbox"/> 20.406(a)(1)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
<input type="checkbox"/> 20.406(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)			

LICENSEE CONTACT FOR THIS LER (12)

NAME P. N. Ebersole	TELEPHONE NUMBER 2015 712191-1071818
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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)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15): <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td>MONTH</td><td>DAY</td><td>YEAR</td> </tr> <tr> <td> </td><td> </td><td> </td> </tr> </table>	MONTH	DAY	YEAR			
MONTH	DAY	YEAR						

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

With the reactor operating at 100 percent steady state power, a personnel error during the performance of surveillance test 4.2.B.39-A, "Core Spray Logic Test," allowed the inboard injection valve, FCV 75-25, to open. Previous maintenance to the solenoid which controls the air to the actuator of the inboard isolation valve (a testable check valve) caused the actuator to hold the check valve in the open position. This allowed a backflow of reactor coolant into loop I of the core spray system at the system relief valve letdown flow rate. This valve alignment also pressurized the core spray piping to near reactor pressure and heated portions of the piping to a maximum of 400 F.

Loop I was isolated which placed the unit in a 7-day limiting condition of operation. The unit was shutdown and the solenoid repaired. The system and appurtenant equipment were inspected and no damage was noted. Engineering evaluation of the affected piping and supports indicated that the transient did not affect system integrity for continued use.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

During normal operation on August 14, 1984 at 0938, unit 1 was at 100 percent power, unit 2 was at 66 percent power, and unit 3 was in a refueling outage. This event affected unit 1 only.

During conduct of a surveillance test 4.2.B.39-A, "Core Spray Logic," a licensed reactor operator error [failure to open valve breaker (BKR)] was made that allowed the inboard injection valve (INV), FCV 75-25, to open while the outboard injection valve, FCV 75-23, was in its normally open position. During normal operation, logic interlocks prevent this situation from occurring. This surveillance test, however, simulates automatic core spray (BM) actuation; therefore, administrative controls, specifically the opening of the FCV 75-25 breaker, are necessary to prevent valve movement.

In this configuration, isolation from the reactor vessel (RPV) to the core spray system is provided by the testable check valve (V), FCV 75-26. However, as post-incident investigations indicated, maintenance previously performed on the testable check valve caused it to be held open while indicating closed. This is discussed in more detail below.

In this arrangement, the core spray system was aligned to the reactor. The operator in the control room and the operator conducting the test were aware that FCV 75-25 had opened. This action was not addressed in the procedure and the operator conducting the test proceeded to review the test instruction to ascertain if this operation was erroneous. A core spray system high pressure annunciator (ANN) would have been expected to alarm if the testable check valve was not holding. Also, the control room operator did not notice a system pressure change.

At about 0945 a roving fire watch noticed smoke near loop I core spray piping and phoned in a fire alarm. The fire brigade entered the reactor building (NG) and correctly assessed that reactor water was leaking back into the core spray system. The unit 1 assistant shift engineer phoned the unit 1 operator and instructed him to close the injection valve to isolate the system. The operator responded and terminated the event. Duration of the event was approximately 13 minutes. The fire brigade had also noted a water/steam mixture being sprayed from the core spray pump "A" seal area. Several workers received clothing contamination as a result of walking in this water.

Core spray loop I was isolated and tagged, which placed the unit in a 7-day limiting condition of operation. In the meanwhile, the plant manager ordered an investigation of the event. Site engineering and maintenance staffs inspected all affected components and found no damage. The extent of the pipe heating was determined by examination of paint damage on the piping. The maximum temperature experienced was estimated to be below 400°F. Paint damage extended from the injection valves down to the system relief valve (RV). Tennessee Valley Authority's Engineering Design analyzed the system piping and supports (SPT) for the transient and found that integrity for continued use was assured. The pump "A" seal (SEAL) was removed and no damage was observed. Also, there was no evidence that hot water entered the pump area piping, which indicates the pump discharge check valve was holding. This apparent seal leakage was attributed to be backflow through the above seal leakoff from the clean radwaste (WD) drain system header. The system relief valve ties to the same local header.

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

The investigations and analyses suggested that the testable check valve was not holding. The affected unit was shutdown on August 21, 1984 and the drywell (BD) entered for a physical inspection of the valve. This inspection indicated that the testable check valve was being held open because of an improper insert in the testable actuator solenoid (SOL). Improper operation of the solenoid apparently caused confusion which resulted in the indicating wiring being altered to provide the apparent correct indicated position. Maintenance history was researched; however, it cannot be conclusively determined when the error was made.

Immediate corrective action was to correct the solenoid assembly and indicating circuitry. Similar installations on the other core spray loop, and the residual heat removal (BO), high pressure coolant injection (BJ), and the reactor core isolation coolant (BN) systems on units 1 and 3 were examined and found not to have a problem. History records and accessible wiring were examined on unit 2 to provide confidence to continue operation to the scheduled refueling outage in September 1984. The root cause of this event was determined to be twofold. First, an improper insert in a rebuilt solenoid valve caused the airflow internal to the solenoid to be misdirected. Secondly, an operator error, which in part may have been prevented by improved wording in the procedure regarding the valve breaker manipulations, caused the opening of FCV 75-25. To prevent recurrence, procedures have been revised to be more descriptive in valve and actuator maintenance and return to service checks. In addition operator training was conducted on this event with particular attention to valve breaker manipulation and a change is being made to this surveillance instruction which will make the wording more specific. A detailed report is being prepared at the plant which will address generic considerations. This report will be finished by the end of September.

An additional event occurred following the incident which had no bearing on the sequence described above, but which is reportable. As the licensed reactor operators began to "back out" of the surveillance test, all eight diesel generators (DG) received an automatic start signal. This occurred under similar circumstances as was reported in Licensee Event Report BFR0-50-296/84008 on unit 3. A special test was subsequently performed to determine if the test switch (HS) utilized in this surveillance was causing these spurious starts. No problem was found and the automatic starts are attributed to incomplete reset of the core spray logic prior to disconnecting the test switch. The surveillance instruction is being examined to see if resequencing particular steps can minimize recurrence possibilities. There was no safety concern as the diesel generators were available to perform their intended functions.

The purpose of this core spray check valve is to limit loss of reactor coolant outside containment in the event of a core spray line break. The design is passive to the extent that the testable actuator will not impede valve closure if any substantial flow is across the valve in the reverse direction. Thus, for this case, the check valve remained operable to fulfill its design function. The reverse flow during this event was comparatively low and would not have been sufficient to override the actuator and close the valve.

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

There are broader considerations regarding protection of the core spray system from pressure and temperature transients. Generic implications of the incident and additional recommendations to prevent similar recurrences will be completed by September 30, 1984.

Responsible Plant Section OP

Previous Similar Events BFRO-50-296/84008

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
Browns Ferry Nuclear Plant
P. O. Box 2000
Decatur, Alabama 35602

September 13, 1984

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

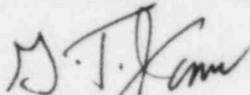
Dear Sir:

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT UNIT 1 - DOCKET
NO. 50-259 - FACILITY OPERATING LICENSE DPR-33 - REPORTABLE OCCURRENCE
REPORT BFRO-50-259/84032

The enclosed report provides details that concern overpressurization of
core spray piping. This report is submitted in accordance with 10 CFR
50.73 (a)(2)(i), (ii), and (iv).

Very truly yours,

TENNESSEE VALLEY AUTHORITY



G. T. Jones
Plant Manager
Browns Ferry Nuclear Plant

Enclosure

cc (Enclosure):
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INPO Records Center
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NRC Resident Inspector, BFN

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