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SOUTHERN COMPANY
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Docket No. 50-321

HL-5985

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

Edwin I. Hatch Nuclear Plant - Unit 1
Licensee Event Report
Failure of Turbine Stop Valve to Close Renders
High Pressure Coolant Injection System Inoperable

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(v), Southern Nuclear Operating Company is submitting the enclosed Licensee Event Report (LER) concerning the failure of a turbine stop valve to close which rendered the high pressure coolant injection system inoperable.

Respectfully submitted,

Lewis Sumner

H. L. Sumner, Jr.

OCV/eb

Enclosure: LER 50-321/2000-005

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
SNC Document Management (R-Type A02.001)

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NRC FORM 366 (06-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 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 20503. If a document used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)

Failure of Turbine Stop Valve to Close Renders High Pressure Coolant Injection System 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(S) 05000
08	16	2000	2000	005	00	09	15	2000		DOCKET NUMBER(S) 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(vii)
20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(ix)
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)	X 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Steven B. Tipps, Nuclear Safety and Compliance Manager, Hatch	(912) 367-7851

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BJ	SHV	S075	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 15 single-space typewritten lines) (16)

On 08/16/2000 at 0030 EDT, Unit 1 was in the Run mode at a power level of approximately 2763 CMWT (100 percent rated thermal power). At that time, the High Pressure Coolant Injection (HPCI) system was declared inoperable when its turbine stop valve failed to close as required during the performance of a routine weekly test. Operations personnel had started the HPCI system auxiliary oil pump as required by step 7.9.7 of surveillance procedure 34SV-SUV-019-1S, "Surveillance Checks," and Operating Order OO-01-0200S, "Weekly HPCI Auxiliary Oil Pump Exercise." The turbine stop valve opened as expected when the auxiliary oil pump was started. Operations personnel then depressed the manual HPCI turbine trip pushbutton as required by the Operating Order in order to verify proper operation of the HPCI turbine trip solenoid-operated valve and turbine stop valve. The turbine stop valve failed to close as expected when the trip pushbutton was depressed. Operations personnel declared the HPCI system inoperable as required by Condition C of Unit 1 Technical Specifications Limiting Condition for Operation 3.5.1.

This event was the result of turbine stop valve binding caused by galling of the disc guide surfaces. The valve bonnet guide and disc guide ring surfaces were found to be galled to the extent that less than the minimum required clearance existed between the disc and guide. This resulted in valve binding. The cause for the galling could not be determined conclusively. The bonnet guide was machined, the valve was reassembled, and the HPCI system operability test was completed satisfactorily on 08/18/2000.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System codes appear in the text as (EIIS Code XX).

DESCRIPTION OF EVENT

On 08/16/2000 at 0030 EDT, Unit 1 was in the Run mode at a power level of approximately 2763 CMWT (100 percent rated thermal power). At that time, the High Pressure Coolant Injection (HPCI, EIIS Code BJ) system was declared inoperable when its turbine stop valve (EIIS Code BJ) failed to close as required during the performance of a routine weekly test. Failure of the turbine stop valve to close prevents the HPCI system from tripping on various turbine trip and system isolation signals as required by Unit 1 Technical Specifications Limiting Conditions for Operation 3.3.5.1 and 3.3.6.1 and Unit 1 Final Safety Analysis Report, subsection 6.4.1, "High Pressure Coolant Injection System."

Operations personnel had started the HPCI system auxiliary oil pump (EIIS Code BJ) as required by step 7.9.7 of surveillance procedure 34SV-SUV-019-1S, "Surveillance Checks," and Operating Order OO-01-0200S, "Weekly HPCI Auxiliary Oil Pump Exercise." The motor-drive auxiliary oil pump is designed to provide hydraulic fluid to the HPCI system until the turbine-driven main oil pump can develop sufficient pressure. When the auxiliary oil pump was started, oil was supplied to the turbine stop valve's pilot valve and hydraulic cylinder and the turbine stop valve opened as designed.

Operations personnel depressed the manual HPCI turbine trip pushbutton as required by the Operating Order in order to verify proper operation of the HPCI turbine trip solenoid-operated valve and turbine stop valve. Depressing the manual trip pushbutton energizes the turbine trip solenoid-operated valve; this valve then opens, depressurizing the header supplying oil to the turbine stop valve's pilot valve. An internal spring shifts the pilot valve piston, shutting oil flow to the turbine stop valve and allowing a spring in the hydraulic cylinder to close the stop valve. However, the turbine stop valve failed to close as expected when the trip pushbutton was depressed. Because a failure of the stop valve to close prevents the HPCI turbine from tripping on required turbine trip and system isolation signals, Operations personnel declared the HPCI system inoperable at 0030 EDT as required by Condition C of Unit 1 Technical Specifications Limiting Condition for Operation 3.5.1.

CAUSE OF EVENT

This event was the result of the turbine stop valve binding in the open position. The turbine stop valve disc rides inside a bonnet cylinder that guides the movement of the disc. A nominal 0.012-inch clearance exists between the disc guide rings and the bonnet cylinder wall. However, the disc guide rings and cylinder surface had become galled to the extent that the disc bound in the bonnet cylinder.

The cause of the galling could not be determined conclusively. Scale particles from the interior carbon-steel surfaces were found inside the valve; however, no unexpected or unusual debris was found. Routine stroking of the turbine stop valve without steam flow may have allowed scale, or other metal, particles to become trapped between the valve disc and bonnet cylinder, eventually leading to galling and binding. Nonetheless, this appears unlikely to be the cause as:

1. Particles are expected.

2. The valve interior is flushed with steam at least quarterly during HPCI system operability testing.

3. The valve is disassembled and inspected nominally once every six years, with the last inspection having been performed in 1996.

4. The valve is stroked routinely with no steam flow with only one similar problem reported (in 1993, the Unit 2 HPCI system turbine stop valve bound due to galling as reported in Licensee Event Report 50-366/1993-008, dated 11/30/1993).

No other problems were identified; therefore, the cause of the galling could not be ascertained.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This event is reportable per 10 CFR 50.73 (a)(2)(v) because an event occurred in which the HPCI system, a single train safety system, was rendered inoperable.

The HPCI system consists of a steam turbine-driven pump and the necessary piping and valves to transfer water from the suppression pool or the condensate storage tank (EIIS Code KA) to the reactor vessel. The system is designed to inject water to the reactor vessel over a range of reactor pressures from 160 psig through full rated pressure. The HPCI system starts and injects automatically whenever low reactor water level or high drywell pressure indicates the possibility of an abnormal loss of coolant inventory. The HPCI system, in particular, is designed to replace lost reactor coolant inventory in cases where a small line break occurs which does not result in full depressurization of the reactor vessel.

The backup for the HPCI system is the Automatic Depressurization System (ADS) together with two low pressure injection systems: the Low Pressure Coolant Injection (LPCI, EIIS Code BO) system and the Core Spray (EIIS Code BM) system. The Core Spray system is composed of two independent, redundant, 100 percent capacity subsystems. Each subsystem consists of a motor driven pump, its own dedicated spray sparger located above the core, and piping and valves to transfer water from the suppression pool to the sparger. Upon receipt of an initiation signal, the Core Spray pumps in both subsystems start. Once ADS has reduced reactor pressure sufficiently, Core Spray system flow begins.

LPCI is an operating mode of the Residual Heat Removal (EIIS Code BO) system. There are two independent, redundant, 100 percent capacity LPCI subsystems, each consisting of two motor driven pumps and piping and valves to transfer water from the suppression pool to the reactor vessel. Upon receipt of an initiation signal, all four LPCI pumps automatically start. Once ADS has reduced reactor pressure sufficiently, the LPCI flow to the reactor vessel begins. The divisionally separated initiation logic systems for LPCI and Core Spray incorporate "crossover" circuitry allowing each division to trigger an initiation of the other division. With this design, any one operable division of logic can produce a full actuation in both divisions of all the pumps and valves necessary for injection to the reactor vessel.

In this event, the HPCI system was declared inoperable when its turbine stop valve failed to close as required during the performance of a routine weekly test. During the time the HPCI system was inoperable, however, the Reactor Core Isolation Cooling (RCIC, EIIS Code BN) system was available to inject high pressure water into the reactor vessel. Although not an emergency core cooling system, the RCIC system is designed, maintained, and tested to the same standards and requirements as the HPCI system and therefore should reliably inject water into the reactor vessel when required. If a break exceeded the capacity of the RCIC system (400 gallons per minute), the ADS was available to depressurize the reactor vessel to the point that either the Core Spray or LPCI systems could have been used to provide water to the reactor core. The capacity of one loop of the Core Spray system is equal to that of the HPCI system (4250 gallons per minute each); the capacity of one loop of the LPCI system is approximately three times that of the HPCI system. Therefore, any one of the four loops of the low pressure injection systems would have provided sufficient injection capacity for a small break loss-of-coolant accident.

Based on this analysis, it is concluded that this event had no adverse impact on nuclear safety. This analysis is applicable to all power levels and operating modes in which a loss-of-coolant accident is postulated to occur.

CORRECTIVE ACTIONS

The turbine stop valve was disassembled, repaired, and reassembled per maintenance procedure 52PM-E41-002-0S, "HPCI Turbine and Auxiliaries Major Inspection," and Maintenance Work Order 1-00-02529. The HPCI system was proven operable by successful performance of surveillance procedure 34SV-E41-002-1S, "HPCI Pump Operability," and returned to service on 08/18/2000 at 1250 EDT.

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

ADDITIONAL INFORMATION

Other Systems Affected: No systems other than those already mentioned in this report were affected by this event.

Failed Components Information:

Master Parts List Number: 1E41-F3053
Manufacturer: Schutte & Koerting Co.
Model Number: 69-XC-103
Type: Stop Valve
Manufacturer Code: S075

EIIS System Code: BJ
Reportable to EPIX: Yes
Root Cause Code: X
EIIS Component Code: SHV

Commitment Information: This report does not create any permanent licensing commitments.

Previous Similar Events: Previous similar events in the last two years in which the HPCI system was inoperable were reported in Licensee Event Reports 50-321/1999-002, dated 05/24/1999; 50-321/2000-002, dated 02/25/2000; and 50-366/2000-001, dated 03/24/2000. In the first event, the HPCI system was rendered inoperable when a barometric condenser vacuum problem prevented the completion of a surveillance test within the time allowed by the Technical Specifications. The vacuum problem prevented the then recently installed condensate pump from pumping sufficient water to control level in the barometric condenser. In the second event, the HPCI system was rendered inoperable when it failed to trip on high water level following an automatic reactor shutdown. In the third event, the HPCI system was rendered inoperable when water was found in the hydraulic oil system. Corrective actions for these previous events could not have prevented this event because the events and their causes were completely unrelated to this event.