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SOUTHERN COMPANY
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Docket No. 50-321

HL-5791

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

Edwin I. Hatch Nuclear Plant - Unit 1
Licensee Event Report
High Pressure Coolant Injection System Inoperable
Due to Problems with Barometric Condenser

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 a high pressure coolant injection system inoperability due to problems with the barometric condenser.

Respectfully submitted,

Lewis Sumner

H. L. Sumner, Jr.

JL/eb

Enclosure: LER 50-321/1999-002

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

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. J. T. Munday, Senior Resident Inspector - Hatch

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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

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TITLE (4)
High Pressure Coolant Injection System Inoperable Due to Problems With Barometric Condenser

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
04	29	1999	1999	002	00	05	24	1999		DOCKET NUMBER(S) 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	16

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

SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On 04/29/1999 at 0510 EDT, Unit 1 was in the Run mode at a power level of approximately 446 CMWT (16 percent rated thermal power). At that time, the High Pressure Coolant Injection (HPCI) system was rendered inoperable when the time allotted to perform Unit 1 Technical Specifications Surveillance Requirement 3.5.1.8 expired. Surveillance Requirement 3.5.1.8 requires the HPCI system to be tested within 12 hours of reaching adequate reactor steam pressure and flow. Adequate reactor steam pressure and flow were reached on 04/28/1999 at 1710 EDT. However, the required test was not completed because of high water level in the vacuum tank of the HPCI system barometric condenser. Although high water level in the tank does not make the HPCI system inoperable, this condition prevented the successful completion of the test required by Surveillance Requirement 3.5.1.8 within the allotted 12-hour period. Per the requirements of Unit 1 Technical Specifications Surveillance Requirement 3.0.1, failure to perform the surveillance within the specified frequency made the HPCI system inoperable.

This event was the result of high vacuum in the HPCI system vacuum tank. The high vacuum reduced the vacuum tank condensate pump suction pressure thereby reducing its flow rate. The level in the tank increased as the tank input rate exceeded the reduced pump flow rate. Personnel lowered tank vacuum and successfully completed HPCI system testing on 05/02/1999 at 2019 EDT. The HPCI system was returned to an operable status on 05/02/1999 at 2100 EDT.

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

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 04/29/1999 at 0510 EDT, Unit 1 was in the Run mode at a power level of approximately 446 CMWT (16 percent rated thermal power). At that time, the High Pressure Coolant Injection (HPCI, EIIS Code BJ) system was rendered inoperable when the time allotted to perform Unit 1 Technical Specifications Surveillance Requirement 3.5.1.8 expired. Surveillance Requirement 3.5.1.8 requires the HPCI system to be tested within 12 hours of reaching adequate reactor steam pressure and flow. The Bases for Surveillance Requirement 3.5.1.8 states that adequate pressure and flow are reached when reactor pressure is greater than or equal to 920 psig and two main turbine bypass valves (EIIS Code SO) are open fully, respectively.

Adequate reactor steam pressure and flow were reached on 04/28/1999 at 1710 EDT when reactor power was increased to the point where two bypass valves were open fully. At 1746 EDT, Operations personnel started the Unit 1 HPCI pump to perform the testing directed by Surveillance Requirement 3.5.1.8. However, personnel stopped the pump at 1801 EDT when the vacuum pump for the HPCI barometric condenser vacuum tank tripped. The barometric condenser prevents out-leakage from the HPCI turbine shaft seals by directing the seal steam to, and condensing it in, a low-pressure area. The vacuum pump maintains low pressure (vacuum) in the condenser by removing non-condensable gases. The pump tripped when its overloads opened due to high motor current resulting from the pump pulling water into its suction. Water entered the vacuum pump suction due to high water level in the vacuum tank.

HPCI pump testing was attempted once more, at 0154 EDT on 04/29/1999, with the vacuum pump again tripping on high water in the vacuum tank. Although high water level in the tank does not make the HPCI system inoperable, this condition prevented the successful completion of the test directed by Surveillance Requirement 3.5.1.8 within the allowed time. Per the requirements of Unit 1 Technical Specifications Surveillance Requirement 3.0.1, failure to perform the surveillance within the specified frequency rendered the HPCI system inoperable. Therefore, the HPCI system became inoperable at 0510 EDT on 04/29/1999 when the allotted 12-hour period expired without the required test having been performed successfully.

CAUSE OF EVENT

This event was the result of high vacuum in the HPCI system barometric condenser vacuum tank. Tank vacuum developed during HPCI system operation, although within its normal range of 13 to 20 inches Hg, was too high for the vacuum tank condensate pump. The vacuum existing at the time of the event reduced the pump's net positive suction head below its minimum design value thereby reducing its discharge pressure and flow rate. The water level in the tank increased as the tank input rate exceeded the reduced condensate pump flow rate.

The condensate pump was replaced during the recently completed Unit 1 refueling outage. The previously installed pump had exhibited signs of degradation; therefore, the decision was made to replace it to ensure reliable operation. The replacement pump was ordered to the same operating specifications (pressures, temperature, flow rate) as the existing pump.

The replaced pump had performed properly at suction vacuums as high as 20 inches Hg. However, the replacement pump received from the vendor was designed to operate at a maximum suction vacuum of only 10 inches Hg. It was not clear from information provided by the pump vendor that the pump's design maximum suction vacuum was 10 inches Hg. Since the old pump had operated properly at suction vacuums up to 20 inches Hg, the new pump had been ordered to the same operating specifications, and both pump vendors were the same, personnel felt the new pump would operate at normal vacuums and no adjustments would be needed.

Vacuum in the barometric condenser vacuum tank, as measured during HPCI pump testing, was approximately 18 to 20 inches Hg. Because condensate pump suction pressure was lower than the maximum 10 inches Hg, its flow rate was below that necessary to prevent vacuum tank water level from reaching the high level point. During the test required by Surveillance Requirement 3.5.1.8, that is, with reactor pressure between 920 psig and 1058 psig with the HPCI system pumping against a head corresponding to reactor pressure, the vacuum tank input rate exceeded the reduced pump flow rate. Tank level increased to the point water was entrained in the vacuum pump suction line, tripping the vacuum pump on high motor current. Continual tripping of the vacuum pump during testing prevented the successful completion of Surveillance Requirement 3.5.1.8 prior to the expiration of the 12-hour time limit thus causing the HPCI system to be inoperable.

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 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. Valves in the LPCI flow path are automatically positioned to ensure the proper flow path for water from the suppression pool to inject into the vessel. 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 made inoperable when problems with barometric condenser vacuum tank water level prevented the successful completion of the required testing within the required frequency. The barometric condenser prevents out-leakage from the HPCI turbine shaft seals. However, as stated in Unit 1 Final Safety Analysis Report subsection 7.4.3.2.4, failure of any or all of the barometric condenser components, including the condensate and vacuum pumps, "will not prevent the HPCI system from providing water to the reactor vessel." Consequently, the problem that prevented the completion of the surveillance test would not have prevented the HPCI system from performing its design function. Indeed, successful completion of the surveillance test on 05/02/1999 indicated that the HPCI system had no problems preventing it from functioning. Therefore, except for several hours on 04/29/1999 and 04/30/1999 when under clearance to perform investigation activities, the HPCI system would have been able to start and inject water to the reactor vessel had it been required to do so.

During the time the HPCI system was under clearance and therefore unavailable, 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 approximately equal to that of the HPCI system (4000 gallons per minute and 4250 gallons per minute, respectively); 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 in the event the HPCI system could not perform its intended function.

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.

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

CORRECTIVE ACTIONS

Engineering Support and Maintenance personnel lowered barometric condenser vacuum to approximately 10 inches Hg. Using temporary flow rate and pressure gauges, they then confirmed that vacuum tank condensate pump performance was acceptable.

Operations personnel successfully completed HPCI system testing as required by Surveillance Requirement 3.5.1.8 on 05/02/1999 at 2019 EDT using plant surveillance procedure 34SV-E41-002-1S, "HPCI Pump Operability." Operations personnel returned the HPCI system to an operable status on 05/02/1999 at 2100 EDT.

Surveillance procedure 34SV-E41-002-1S requires the barometric condenser pressure to be checked and recorded. Presently, the procedural limit for condenser pressure is greater than or equal to 10 inches Hg. Therefore, this procedure will be revised prior to the next 92-day HPCI pump operability test to change this limit to 8 to 12 inches Hg. This will help ensure pump suction vacuum is maintained within the range demonstrated to provide acceptable condensate pump operation.

ADDITIONAL INFORMATION

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

Failed Components Information: No failed components directly caused or resulted from this event.

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 Events Reports 50-366/1997-008, dated 09/10/1997, and 50-366/1998-001, dated 02/26/1998. In the first event, the HPCI system was inoperable due to outboard journal bearing damage caused by small particles that contaminated the bearing housing. In the second event, the HPCI system was rendered inoperable during troubleshooting activities for an unexpected automatic swap of the HPCI pump suction source from the condensate storage tank to the suppression pool. Corrective actions for the two previous events could not have prevented this event because the events and their causes were completely unrelated.