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HL-2140
003197

March 31, 1992

U.S. Nuclear Regulatory Commission
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PLANT HATCH - UNIT 2
NRC DOCKET 50-366
OPERATING LICENSE NPF-5
LICENSEE EVENT REPORT
HIGH PRESSURE COOLANT INJECTION SYSTEM
INOPERABLE DUE TO COMPONENT FAILURE AND PROCEDURAL DEFICIENCY

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning a component failure and a procedural deficiency which could have prevented an engineered safety feature (ESF) from fully performing its safety function. This event occurred at Plant Hatch - Unit 2.

Sincerely,

W. G. Hairston, III

JKB/cr

Enclosure: LER 50-366/1992-003

cc: Georgia Power Company
Mr. H. L. Sumner, General Manager - Nuclear Plant
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. L. D. Wert, Senior Resident Inspector - Hatch

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NRC Form 366 (5-89) 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)
PLANT HATCH, UNIT 2	0 5 0 0 0 3 6 6	1 OF 7

TITLE (4)
HIGH PRESSURE COOLANT INJECTION SYSTEM INOPERABLE DUE TO COMPONENT FAILURE AND PROCEDURAL DEFICIENCY

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQ NUM		REV	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
												0 5 0 0 0
0 3	0 5	9 2	9 2		0 0 3		0 0	0 3	3 1	9 2		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)											
POWER LEVEL	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)	X	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)				
			20.405(a)(1)(iii)	X	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
STEVEN B. TIPPS, MANAGER NUCLEAR SAFETY AND COMPLIANCE, HATCH	912 367-7851

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORT TO NPRDS	
X	B J	P D T	I 2 0 4	Y							

SUPPLEMENTAL REPORT EXPECTED (14)

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

ABSTRACT (16)

On 3/5/92 at 0353 CST, Unit 2 was in the Run mode at a power level of 2436 CMWT (100% rated thermal power). At that time, both the Automatic Depressurization System (ADS) and the High Pressure Coolant Injection (HPCI) system were declared inoperable due to failed reactor water level transmitter, 2B21-N095B. This transmitter provides a signal to the logic systems for ADS and HPCI. Appropriate Limiting Conditions for Operation (LCOs) were entered, including one to place the unit in the hot shutdown condition within six hours per Technical Specifications section 3.0.3. At 0950 CST, a temporary modification was installed which placed a trip in each of the affected ADS and HPCI logic channels. This allowed ADS and HPCI to be declared operable per Technical Specifications section 3.3.3 and the shutdown LCO to be terminated. The defective transmitter was replaced, and the channels were tested and declared operable at 1624 CST. On 3/9/92 at 0400 CST, with Unit 2 in the Run mode at 100% power, the HPCI system was declared inoperable when the signal from transmitter 2B21-N095B drifted low. Appropriate LCOs were entered. A temporary modification was installed to trip the affected HPCI channel and, at 1230 CST, the HPCI system was declared operable. The transmitter circuit was repaired and tested, and the channels were declared operable.

The cause of the first event was component failure. The Barton Model 764 transmitter, 2B21-N095B, developed an oil leak. The cause of the second event was an inadequate procedure that required heat shrink too large for the transmitter circuit. Corrective actions for these events included replacing the defective transmitter, replacing a damaged wire, replacing an EMI filter assembly, and revising procedure 57CP-CAL-103-2S.

PLANT AND SYSTEM IDENTIFICATION

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

DESCRIPTION OF EVENT

On 3/4/92 at 1730 CST, Unit 2 was in the Run mode at a power level of 2436 CMWT (100% rated thermal power). At that time, licensed Operations personnel performing a routine channel check on reactor water level instrumentation per procedure 34SV-SUV-019-2S, "Surveillance Checks," noted that reactor water level master trip unit 2B21-N695B was indicating a water level that was seven inches higher than its companion instruments. The procedure requires the instrument indications to be within six inches of each other. Therefore, a Deficiency Card was written to document the condition as required by plant administrative controls and an investigation into its cause was initiated.

On 3/5/92, Instrument and Control (I&C) technicians determined that the Barton Model 764 reactor water level transmitter, 2B21-N095B, which feeds a water level signal to master trip unit 2B21-N695B, had developed an oil leak. The oil protects the transmitter's differential pressure cell from damage and prevents shifts in its calibration. The oil leak, in effect, changed the transmitter's calibration thereby causing its water level signal to drift upward. The defective transmitter was valved out of service so that it could be replaced.

When the Barton transmitter was valved out of service, the pressure across its differential pressure cell was equalized. This is equivalent to a high water level condition; therefore, a high water level signal was transmitted to master trip unit 2B21-N695B per design. Master trip unit 2B21-N695B sends a reactor water level signal to slave trip unit 2B21-N693D; consequently, a high water level signal also was sent to this slave trip unit.

Master trip unit 2B21-N695B generates a low (Level 3) reactor water level permissive signal to the Automatic Depressurization System (ADS, EIIS Code JE) Division II logic system. The high water level signal prevented the trip unit from functioning per its design; thus, ADS was declared inoperable and the appropriate LCOs were entered per the requirements of Unit 2 Technical Specifications section 3.3.3. Slave trip unit 2B21-N693D generates one of the two, series high (level 8) reactor water level trip signals necessary to trip the High Pressure Coolant Injection (HPCI, EIIS Code BJ) system turbine. The high water level signal from the out-of-service transmitter resulted in the slave trip unit assuming the tripped condition per its design. With the affected channel in the tripped condition, the HPCI system remained operable as allowed by Unit 2 Technical Specifications section 3.3.3.

On 3/5/92, I & C technicians were replacing the defective transmitter per procedure 57CP-CAL-103-2S, "ITT Barton Model 764 Differential Pressure Transmitter." At 0353 CST, with Unit 2 in the Run mode at 100% rated thermal power, the technicians opened links in the HPCI system turbine trip logic as

required by the procedure. (Links also were opened in the ADS reactor water level permissive Division II logic system.) This is done to prevent inadvertent logic system actuations during transmitter replacement; however, this action removed the trip from the affected HPCI system turbine trip logic channel. Therefore, the HPCI system was declared inoperable per the requirements of Unit 2 Technical Specifications section 3.3.3. With ADS having previously been declared inoperable, a condition existed which was not addressed by the Technical Specifications action statements for ADS or HPCI, i.e., HPCI and ADS inoperable at the same time. Therefore, an LCO to place Unit 2 in the hot shutdown condition within six hours was initiated per the requirements of Unit 2 Technical Specifications section 3.0.3.

At 0950 CST, an approved temporary modification was implemented to place the affected ADS low water level permissive and HPCI high water level turbine trip channels in the tripped condition. The channels were placed in the tripped condition by installing jumpers in them to simulate trip signals from trip units 2B21-N695B and 2B21-N693D. With the ADS and HPCI trip channels in the tripped condition, ADS and HPCI were declared operable per the requirements of Unit 2 Technical Specifications section 3.3.3. The shutdown LCO was then terminated.

I & C technicians completed the replacement of the defective transmitter. While calibrating the new transmitter, they found that one of the wires from the transmitter to the Electro Magnetic Interference (EMI) filter assembly had been damaged. It was replaced per procedure 57CP-CAL-103-2S and calibration of the transmitter was completed successfully. The jumpers installed under the temporary modification to trip the ADS and HPCI logic channels were removed and the logic channels declared operable at 1624 CST. Applicable LCOs were terminated.

On 3/9/92 at 0400 CST, Unit 2 was in the Run mode at 100% rated thermal power. At that time, licensed Operations personnel observed on the Safety Parameter Display System (EIIS Code IQ) that the reactor water level indication from master trip unit 2B21-N695B was approximately 20 inches lower than the indications from its companion water level instruments. Since this trip unit feeds a water level signal to slave trip unit 2B21-N693D, that trip unit's indication also was low. Master trip unit 2B21-N695B was placed in the tripped condition per the requirements of Unit 2 Technical Specifications section 3.3.3. Slave trip unit 2B21-N693D was not placed in the tripped condition; therefore, the HPCI system was declared inoperable at 0400 CST per the requirements of section 3.3.3. Appropriate LCOs were initiated.

At 1230 CST, an approved temporary modification was implemented to place the affected HPCI high water level turbine trip channel in the tripped condition. This was done by installing jumpers in the logic channel to simulate a trip signal from slave trip unit 2B21-N693D. (A jumper also was installed in the affected ADS logic channel to ensure it remained in the tripped condition during investigation of the problem). With the HPCI logic channel in the tripped condition, the HPCI system was declared operable.

I & C technicians determined that a wire from reactor water level tranmsitter

2B21-N095B to the EMI filter assembly in the transmitter circuit was damaged at the connection point to the EMI filter. The damaged wire was touching a portion of the metal filter assembly grounding the signal from the transmitter. Some of the transmitter's signal going to ground caused the trip units to indicate a water level lower than actual.

The wire and EMI filter assembly were replaced and the transmitter was returned to service per procedure 57CP-CAL-103-2S. The trip units were verified to be indicating the correct water level per procedure 34SV-SUV-019-2S. The temporary modification was removed, the ADS and HPCI logic channels were declared operable, and the applicable LCOs were terminated.

CAUSE OF THE EVENTS

The cause of the first event was component failure. A Barton Model 764 transmitter, 2B21-N095B, developed a leak of the oil in the sealed unit containing the transmitter's differential pressure cell. The oil protects the cell from damage and prevents shifts in its calibration. The oil leak, in effect, changed the transmitter's calibration thereby causing its water level signal to drift upward. The defective transmitter will be returned to the vendor for further failure analysis to determine the cause of the leak.

The cause of the second event was an inadequate procedure. Procedure 57CP-CAL-103-2S required a heat shrink too large for the application in the transmitter circuit. When the damaged wire from the transmitter to the EMI filter was replaced on 3/5/92, the heat shrink required by procedure 57CP-CAL-103-2S was used over the wire-to-EMI filter connection points. The diameter of the heat shrink was too large for this application; therefore, when the conduit from the transmitter to the filter housing was re-connected, it damaged the heat shrink and wires by crushing them. This led to the wire and/or connection point being exposed and shorting to ground against a portion of the metal EMI filter housing. Some of the transmitter's signal going to ground caused the trip units to indicate a water level lower than actual.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This report is required per 10 CFR 50.73(a)(2)(i) because a condition existed which was prohibited by the plant's Technical Specifications. Specifically, both ADS and HPCI were inoperable at the same time, a condition not addressed by the action statements for ADS or HPCI. An LCO to place Unit 2 in the hot shutdown condition within six hours was initiated per the requirements of Unit 2 Technical Specifications section 3.0.3. Per the guidance given in NUREG-1022, entry into section 3.0.3 results from "a condition prohibited by the plant's Technical Specifications."

This report also is required per 10 CFR 50.73(a)(2)(v) because conditions existed which required HPCI, a single train safety system, to be declared inoperable. Specifically, problems with reactor water level transmitter, 2B21-N095B, and the transmitter's circuit resulted in the inability of the HPCI turbine to trip on a high water level signal for short periods of time. HPCI was declared inoperable during these periods as required by Unit 2 Technical Specifications section 3.3.3.

The HPCI system is designed to provide adequate cooling to the reactor vessel to limit fuel-clad temperature in the event of a small break in the nuclear steam supply system that does not result in rapid depressurization of the reactor vessel. One of the design features of the HPCI system is that its turbine will trip automatically on a high reactor water level signal. The purpose of this trip is to prevent overfilling the reactor vessel which could result in water getting into the main steamlines and, from there, into the HPCI steam supply line and the HPCI turbine. The water could damage the steam supply line and/or turbine which would prevent the HPCI system from providing cooling to the vessel should water level subsequently decrease.

ADS is the backup for the HPCI system and is initiated on a low low low (Level 1) reactor water level condition coincident with a high Primary Containment pressure condition. Upon initiation of ADS, the reactor is depressurized to the point where either the Low Pressure Coolant Injection (LPCI, EIIS Code BO) system or the Core Spray (EIIS Code BM) system can operate to maintain adequate core cooling. To help prevent spurious operation of ADS, which puts the vessel through a severe pressure/temperature transient, a low (Level 3) reactor water level permissive signal is required before ADS will actuate. This acts to "confirm" water level is indeed at the ADS initiation point.

In these events, problems with transmitter 2B21-N095B and its signal circuit resulted in some portions of the ADS low water level permissive logic and the HPCI high water level trip logic being inoperable. Except for an approximately six hour period on 3/5/92, however, one system or the other was operable and capable of performing its design function. With ADS inoperable, HPCI was available to provide adequate core cooling in the event of a small break that did not result in rapid depressurization. The HPCI turbine would have tripped automatically on high water level thereby preventing any water carryover into the HPCI system steam supply line and turbine and, thus, would have been available should water level have subsequently decreased. With HPCI inoperable, ADS (as well as the LPCI and CS systems) was capable of performing its design function. Had a small break occurred, ADS would have depressurized the vessel to the point where LPCI or Core Spray could have operated to maintain adequate core cooling.

Even during the brief period of time both systems were considered inoperable, they actually were capable of providing core cooling. HPCI was capable of automatically starting and injecting cooling water to the vessel on a low water level signal. It also was capable of being manually tripped had reactor water level approached the main steamlines thereby maintaining it available for subsequent injection should the need have arisen. Even if the HPCI system had been damaged by water carryover before it could be tripped manually, enough ADS logic was operable to cause it to depressurize the vessel per its design should a subsequent low water level conditon have developed. This is because the ADS logic consists of two independent divisions, Division I and Division II, each capable of initiating ADS should conditions require it. The Division I logic was unaffected by this event because its low (Level 3) reactor water level permissive signal comes from another transmitter and, therefore, was always available to initiate ADS per design. Finally, it should be noted that ADS

could have been initiated manually in the highly unlikely event its Division I logic system failed to function properly.

Based on the above analysis, it is concluded that this event had no adverse impact on nuclear safety. This analysis applies to all power levels and operating conditions for which ADS and HPCI are required to be operable.

CORRECTIVE ACTIONS

Failed transmitter 2B21-N095B was replaced on 3/5/92. The failed unit will be sent to the vendor for further failure analysis.

Procedure 57CP-CAL-103-2S was temporarily changed on 3/9/92 to require the use of a smaller diameter heat shrink. The damaged wire and the EMI filter were then replaced on 3/9/92 using the smaller heat shrink. The permanent revision to the procedure will be effective by 5/25/92. Additionally, procedure 57CP-CAL-103-1S, "ITT Barton Model 764 Differential Pressure Transmitter," will be revised to require the use of the smaller diameter heat shrink. This revision will be issued effective by 5/25/92.

ADDITIONAL INFORMATION

No systems other than ADS and HPCI were affected by this event.

Failed Component Information:

Master Parts List Number: 2B21-N095B
Manufacturer: ITT Barton
Model Number: 147D7701P7642712
Type: Differential Pressure Transmitter
Manufacturer Code: I204
EIIS System Code: BJ, JE
Reportable to NPRDS: Yes
Root Cause Code: X
EIIS Component Code: PDT

Previous similar events in the last two years in which the HPCI system was inoperable were reported in the following Licensee Event Reports:

50-321/1990-001, dated 1/22/90
50-321/1990-015, dated 8/27/90
50-321/1991-001, dated 2/11/91
50-321/1991-033, dated 1/27/92
50-321/1992-006, dated 3/25/92
50-366/1990-005, dated 8/6/90
50-366/1991-001, dated 2/26/91

Corrective actions for the above events included replacing failed components and changing the non-conservative setpoint of Condensate Storage Tank water level switches. Neither the cause of nor the corrective action for any of these previous events involved a reactor water level transmitter; therefore,

corrective actions for the previous events could not have prevented this event. Furthermore, the previous component failures were in the HPCI flow and speed control circuits, and in the system's auxilarily oil pump; thus, the failure of transmitter 2B21-N095B could not have been anticipated based on the previous failures.

There have been no previous similar events reported in the last two years in which the plant had to enter the LCO of section 3.0.3 because of a condition in excess of that addressed in the plant's Technical Specifications.