

Georgia Power Company
Post Office Box 439
Baxley, Georgia 31513
Telephone 912 367-7781
912 537-9444



Edwin I. Hatch Nuclear Plant

February 24, 1997

Docket No. 50-366

HL-5322

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

Edwin I. Hatch Nuclear Plant - Unit 2
Licensee Event Report
High Pressure Coolant Injection System Inoperable
Following Unplanned Engineered Safety Feature Actuation

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(iv) and 50.73(a)(2)(v), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning high pressure coolant injection system inoperability following an unplanned engineered safety feature actuation.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lewis Sumner".

H. L. Sumner, Jr.
Vice President - Nuclear
Hatch Project

9703060122 970224
PDR ADOCK 05000366
S PDR

IFL/eb 050095

Enclosure: LER 50-366/1997-001

cc: Georgia Power Company
Mr. P. H. Wells, Nuclear Plant General Manager
NORMS

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

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

IE221



EXPIRES: 5/31/96

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB87714), 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.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1) Edwin I. Hatch Nuclear Plant - Unit 2	DOCKET NUMBER (2) 05000366	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL YEAR	REVISION NUMBER		
		97	-001	-00	2	OF 7

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 (EIIIS Code XX).

DESCRIPTION OF EVENT

On 1/25/97 at 2335 EST, Unit 2 was in the Run mode at a power level of 2558 CMWT (100 percent of rated thermal power). At that time, Instrument and Control (I&C) technicians were performing routine calibrations of various pieces of instrumentation in the initiation logic for the High Pressure Coolant Injection (HPCI, EIIIS Code BJ) system. The particular instrument which was to be calibrated at this time was relay 2E41-K14, a time delay relay which enables certain system performance annunciators following HPCI initiation. The procedure being used was 57CP-CAL-051-2S, "GE Type CR2820B and ITE Gould Type J20T3 Delay Relay." The procedure requires relay 2E41-K14 to be temporarily disconnected from the logic so that repeated actuations will not produce any system response during the calibration.

When the neutral wire was lifted from this relay per the procedure, operators observed annunciators indicating that HPCI initiation logic had lost power. In addition, valve 2E41-F111 went closed. This valve is a Primary Containment Isolation System (PCIS, EIIIS Code JM) valve located in the vacuum breaker line which connects the HPCI turbine exhaust to the suppression pool atmosphere. With the HPCI initiation logic thus disabled and the vacuum breaker isolation valve closed, the HPCI system was inoperable.

Licensed operators immediately notified the I&C technicians concerning the unexpected system actuation. The I&C technicians then relanded the wires on the relay, which restored the HPCI system initiation logic. The operators then reopened valve 2E41-F111, which restored the HPCI system to operable status.

CAUSE OF EVENT

This event was caused by a less than adequate procedure. Specifically, procedure 57CP-CAL-051-2S was less than adequate in that it required the user to lift the leads from the neutral terminal of relay 2E41-K14 without explaining that the HPCI system would become inoperable or cause an engineered safety features (ESF) actuation because of this action. Hence, the procedure was scheduled to be performed while the HPCI system was required to be operable because it appeared to work planners that the system would remain operable during the calibration.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB7714), 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.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Edwin I. Hatch Nuclear Plant - Unit 2

05000366

YEAR

SEQUENTIAL
YEARREVISION
NUMBER

97

-001

-00

3 OF

7

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

Relay 2E41-K14 is located in the HPCI initiation control logic as shown in Figure 1. When the leads were lifted from the relay, this interrupted the neutral circuit for the entire logic system. This had two results. First, it re-routed the neutral current path through two relays, 2E41-K57 and 2E41-K62, as shown in Figure 2 (next page). Relay 2E41-K57 controls isolation of PCIS valve 2E41-F111. The currents flowing through the remaining, normally-energized relays in the circuit were sufficient to energize 2E41-K57. When it energized, this sent an isolation signal to PCIS valve 2E41-F111, which then closed per design.

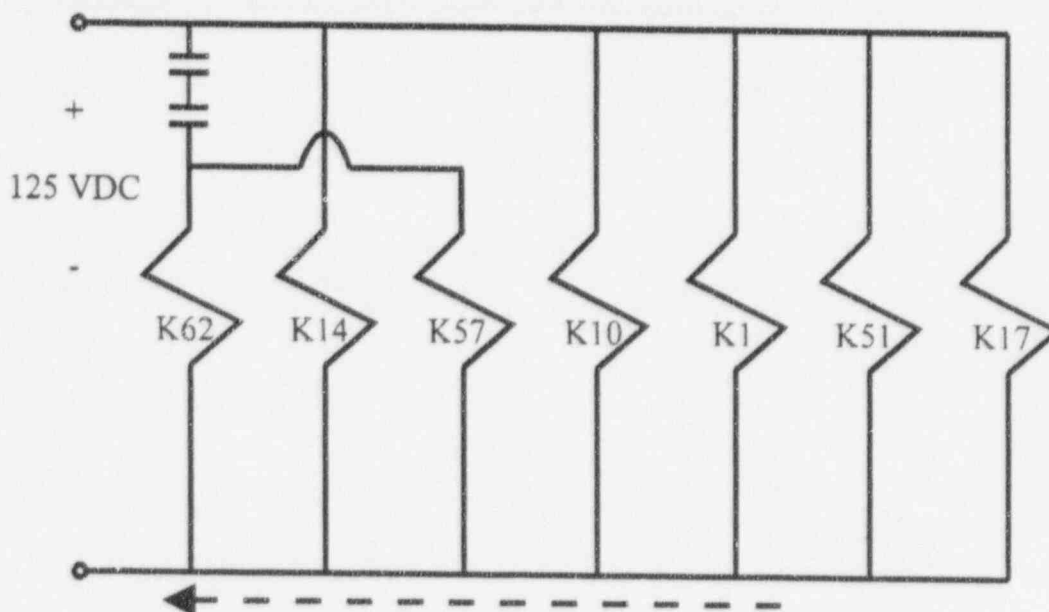


Figure 1, Simplified Circuit in Normal Configuration, with Neutral Circuit Intact.
Dashed Line Indicates Neutral Current Flow.

The second effect was that the HPCI initiation logic system was rendered inoperable. In the configuration shown in Figure 2, the voltage drop across relays 2E41-K62 and 2E41-K57 was enough to prevent any other relays in the logic system from actuating. This would have prevented an automatic initiation of the HPCI system. Therefore, the HPCI system was inoperable as soon as the leads were lifted from the relay.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD
COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION
AND RECORDS MANAGEMENT BRANCH (MNBB7714), 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.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Edwin I. Hatch Nuclear Plant - Unit 2

05000366

YEAR

SEQUENTIAL
YEARREVISION
NUMBER

97

-001

-00

4 OF

7

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

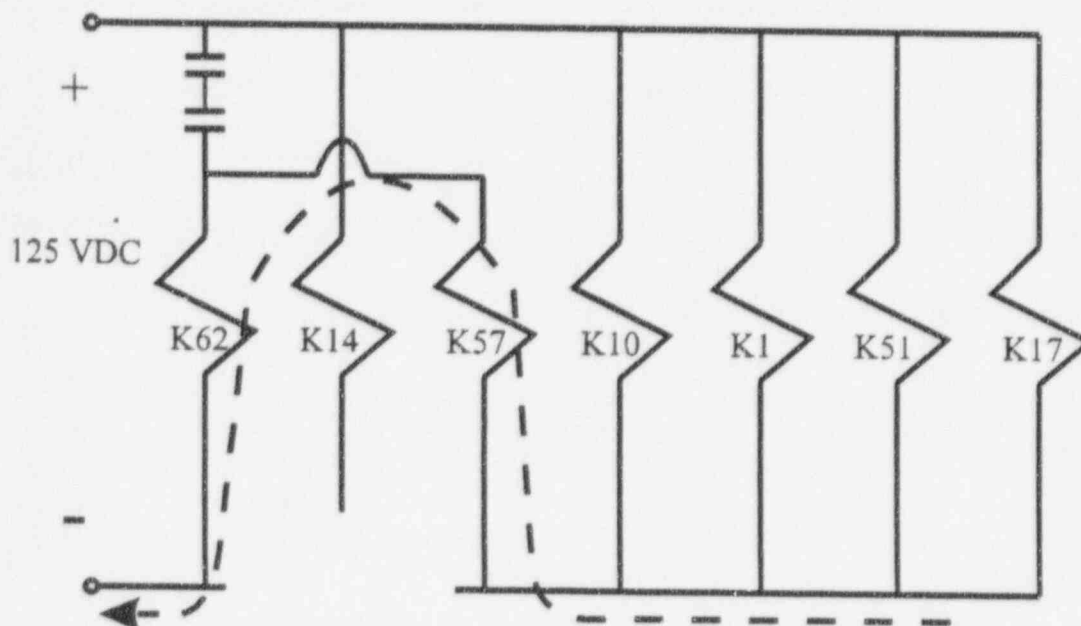


Figure 2, Simplified Circuit Showing Alternate Path Created with Neutral Connection Interrupted.
Dashed Line Indicates Neutral Current Flow.

The annunciators observed by control room personnel showed that some, but not all, of the parallel relays in Figure 2 (K10, K1, K51, and K17) dropped out as a result of lifting the wire. This occurred because the voltage appearing across them was reduced to a level in which the response of General Electric type HGA, 125-volt DC relays becomes unpredictable.

Bench Test Results of Response of General Electric Type HGA 125-volt DC Relay at Conditions of Reduced Voltage		
Voltage Level	Relay Response if Initial Condition Is Picked Up	Relay Response if Initial Condition Is Dropped Out
125-80 VDC	Stays Picked Up	Picks Up
70-80 VDC	Stays Picked Up	Unpredictable
70-15 VDC	Stays Picked Up	Stays Dropped Out
5-15 VDC	Unpredictable	Stays Dropped Out
Below 5 VDC	Drops Out	Stays Dropped out

Extrapolations based on the bench-tested configuration indicate that with the neutral circuit interrupted, the voltage drop across the four parallel relays would be below 15 volts. This was later confirmed by a documented study produced by the plant's Architect/Engineer. Since these are DC

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB87714), 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.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1) Edwin I. Hatch Nuclear Plant - Unit 2	DOCKET NUMBER (2) 05000366	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL YEAR	REVISION NUMBER			
		97	001	00	5	OF	7

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

relays that are in the energized position at the onset of the event, the behavior of these relays under these conditions could not be predicted or accurately modeled. It is to be expected that some relays would drop out at these voltage levels, though some would stay in the energized position. This is in fact what occurred. Operator observations of annunciators which alarmed during the event indicated that the power monitoring relay (K1) and the HPCI pump low flow detection relay (K10) dropped out when the neutral circuit was broken. At least one other relay, low condensate storage tank (EIIS Code KA) level, remained in its energized state.

REPORTABILITY ANALYSIS AND SAFETY ASSESSMENT

This event is reportable per 10 CFR 50.73 (a)(2)(iv) because an unplanned actuation of an engineered safety feature (ESF) occurred. Specifically, PCIS valve 2E41-F111 closed in response to a signal generated during a relay calibration. The event is reportable also per 10 CFR 50.73 (a)(2)(v) because a single train safety system was rendered inoperable. With the leads lifted from relay 2E41-K14, the initiation logic for the HPCI system was disabled, which would have prevented the HPCI system from completing an automatic initiation should one have been required. In addition, with PCIS valve 2E41-F111 closed, the HPCI system is not capable of performing the multiple initiations assumed in the plant's Final Safety Analysis Report (FSAR).

The HPCI system is designed to replace lost reactor coolant inventory in cases where a small line break occurs which does not result in full or rapid depressurization of the reactor vessel. The HPCI system injects water to the reactor vessel at a flow rate of 4250 gallons per minute (gpm) over a range of reactor pressures from approximately 160 psig to rated pressure. The HPCI system automatically starts and injects cooling water whenever a reactor vessel water level decrease or a drywell pressure increase indicates the possibility of an abnormal loss of coolant inventory.

The backup for the HPCI system is the Automatic Depressurization System together with the Low Pressure Coolant Injection (LPCI, EIIS Code BO) system and the Core Spray (EIIS Code BM) system. If a small line break loss-of-coolant accident (LOCA) occurs and the HPCI system is not available, the Automatic Depressurization System will automatically depressurize the reactor pressure vessel to the suppression pool through safety relief valves, lowering pressure to the point where the LPCI and Core Spray systems can add cooling water to the vessel. Both the LPCI and Core Spray systems contain two fully independent and redundant, 100 percent capacity loops for a total of four low pressure injection loops.

PCIS valves are designed to limit the release of radioactive material to the environment in the event of an accident by automatically isolating the lines entering and leaving the Primary Containment (EIIS Code NH). The particular PCIV which was involved in this event is designed to close the line

EXPIRES: 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB87714), 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.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Edwin I. Hatch Nuclear Plant - Unit 2

05000366

YEAR	SEQUENTIAL YEAR	REVISION NUMBER
97	- 001	- 00

6 OF 7

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

containing the HPCI system turbine exhaust vacuum breaker. The turbine exhaust vacuum breaker is required to actuate following a HPCI injection when steam condensing in the turbine exhaust line draws a column of water into the line. Should another HPCI initiation occur while the water is present in the exhaust line, the turbine exhaust line could experience overpressure and vent the pressure through the rupture disk. This would render the HPCI system incapable of performing any subsequent injections. Therefore, the vacuum breaker opens to relieve the vacuum and allow the water column to drain back to the suppression pool.

In this event, the HPCI system was inoperable for a short period of time for two reasons. First, the system was inoperable because leads were lifted from a relay, disabling the initiation logic. Second, the system was inoperable because the vacuum breaker isolation valve was closed, which would have prevented the system from completing multiple actuations. When I&C technicians were notified that the ESF actuation had occurred, they immediately relanded the lifted leads, restoring the HPCI initiation logic to operable status. In this condition, the HPCI system was still inoperable even though it could have automatically initiated as required. Licensed personnel then reopened valve 2E41-F111, which restored the HPCI system to operable status since it would have been incapable of multiple starts and stops.

Should a condition requiring a HPCI initiation have occurred during the time the system was inoperable, I&C technicians would have restored the circuit and licensed personnel would have reopened valve 2E41-F111, as in fact, they did. This would have made the HPCI system available to mitigate the consequences of an accident. Should this have been impossible for some reason, the ADS and low pressure emergency core cooling systems were fully operable and capable of performing as required to mitigate the consequences of an accident.

Based on this analysis, it is concluded that this event had no adverse impact on nuclear safety. This analysis applies to all operating conditions.

CORRECTIVE ACTIONS

1. The wires were reconnected to relay 2E41-K14 and PCIS valve 2E41-F111 was opened, restoring the HPCI system to operable status. This action is complete.
2. Approval of procedure 57CP-CAL-051-2S has been rescinded by the Maintenance Department Manager so that it cannot be performed until it has been corrected.

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MN887714), 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.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Edwin I. Hatch Nuclear Plant - Unit 2

0|5|0|0|0|3|6|6

YEAR

SEQUENTIAL
YEARREVISION
NUMBER

9|7

-

0|0|1

-

0|0

17 OF

17

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

3. This event will be discussed with personnel whose duties involve lifting wires or the planning of such work. The discussion will include an explanation of the causes and consequences of this event. This action will be completed by 3/15/97.
4. Procedures which meet the following criteria will be reviewed:
 - The procedure involves lifting wires or opening links.
 - The procedure involves a safety-related system which uses DC, energize-to-actuate logic.
 - The procedure assumes the affected system(s) will remain operable even with circuit connections interrupted.

The review will be completed by 3/15/97. Until the procedure review is completed, those procedures that are performed that meet the preceding criteria will be reviewed prior to their performance.

5. If other reportable conditions are found as a result of the above review, a revision will be issued to this LER.

ADDITIONAL INFORMATION

1. No systems other than those already mentioned in this report were affected by this event.
2. Failed Component Information: No failed components were identified in connection with this event.
3. Previous Similar Events: No events have been reported in the past two years in which correctly performing a procedure resulted in an unexpected logic configuration that either caused an ESF actuation or disabled an ESF logic system.