



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038-0236

Nuclear Business Unit

SEP 16 1996

LR-N96288

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

Dear Sir:

HOPE CREEK GENERATING STATION  
DOCKET NO. 50-354  
UNIT NO. 1  
LICENSEE EVENT REPORT NO. 96-023-00

This Licensee Event Report entitled "Reactor Core Isolation Cooling System Isolation Due to a Failed Steam Leak Detection Monitor" is being submitted pursuant to 10CFR50.73(a)(2)(iv).

Sincerely,

Mark Bezilla  
General Manager,  
Hope Creek Operations

JWK  
SORC Mtg. 96-085

C Distribution  
LER File

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The power is in your hands.

SEP 16 1996

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Attachment A

The following item represents the commitment that Public Service Electric & Gas Company is making to the Nuclear Regulatory Commission relative to LER 354/96-023-00:

1. Additional failure analysis of the NUMAC drawer will be performed with General Electric. This analysis will be completed and follow up corrective actions determined by January 17, 1997.

NRC FORM 366 (4-95)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98 <small>ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 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.</small>					
<b>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)											
FACILITY NAME (1) <b>Hope Creek Generating Station</b>					DOCKET NUMBER (2) <b>05000354</b>		PAGE (3) <b>1 OF 4</b>				
TITLE (4) <b>Reactor Core Isolation Cooling System Isolation Due to a Failed Steam Leak Detection Monitor</b>											
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
<b>08</b>	<b>21</b>	<b>96</b>	<b>96</b>	<b>-- 023</b>	<b>-- 00</b>	<b>09</b>	<b>16</b>	<b>96</b>			<b>05000</b>
									FACILITY NAME		DOCKET NUMBER
											<b>05000</b>
OPERATING MODE (9)		<b>1</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)		<b>100</b>	20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)		50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)		50.73(a)(2)(x)
			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)			X 50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			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 <b>John W. Karrick, Hope Creek LER Coordinator</b>								TELEPHONE NUMBER (Include Area Code) <b>(609) 339-5298</b>			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	
<b>X</b>	<b>BN</b>	<b>IMOD</b>	<b>G080</b>	<b>Y</b>							
SUPPLEMENTAL REPORT EXPECTED (14)											
YES (If yes, complete EXPECTED SUBMISSION DATE).					<b>X</b>	NO		EXPECTED SUBMISSION DATE (15)		MONTH	DAY
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)											
<p>At 2243 on August 21, 1996, the Reactor Core Isolation Cooling (RCIC) inboard steam supply isolation valve and the RCIC turbine trip throttle valve closed in response to an isolation signal from the RCIC Steam Leak Detection system. The cause of the isolation was a failed NUMAC (Nuclear Measurement Analysis and Control) steam leak detection drawer. There were no signs of steam leakage observed during this event. The RCIC system was declared inoperable and a 14 day Limiting Condition for Operation was entered in accordance with Technical Specification 3.7.4.</p> <p>A 4 hour notification was made to the NRC at 2345 on August 21, 1996, pursuant to 10CFR50.72(b)(2)(ii). This LER is being submitted pursuant to 10CFR50.73(a)(2)(iv).</p> <p>The failed drawer was replaced and the RCIC system was returned to service at 2035 on August 23, 1996. The root cause of the drawer failure is under investigation. The failed drawer will be sent to General Electric for failure analysis and repair. Follow up corrective actions will be developed as needed once the root cause is determined.</p>											

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Hope Creek Generating Station	05000354	96	-- 23	-- 00	2 OF 4

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

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor (BWR/4)  
Reactor Core Isolation Cooling System - EIIS Identifier {BN}  
Steam Leak Detection System - EIIS Identifier {IJ}  
Primary Containment Isolation System - EIIS Identifier {JM}

IDENTIFICATION OF OCCURRENCE

Event date: 8/21/96  
Discovery date: 8/21/96  
Problem Report: 960821223

CONDITIONS PRIOR TO OCCURRENCE

The plant was in OPERATIONAL CONDITION 1 (POWER OPERATION) at 100% of rated thermal power. There were no other structures, systems, or components that were inoperable at the beginning of the event that contributed to the event.

DESCRIPTION OF OCCURRENCE

At 2243 on August 21, 1996, an inboard isolation signal was received from the Reactor Core Isolation Cooling (RCIC) Steam Leak Detection System (SLDS). The RCIC inboard steam supply isolation valve, 1FCHV-F007, and the RCIC turbine trip throttle valve, 1FCHV-4282, closed in response to this signal. The RCIC steam supply line bypass valve, 1FCHV-F076, was in its normally closed position prior to receipt of the isolation signal. The closure of 1FCHV-F007 and 1FCHV-4282 was the expected system response to this isolation signal.

Initial investigations by operators found fault indications on the NUMAC channel D drawer in the RCIC SLDS. Local inspections in the vicinity of the RCIC system revealed no signs of steam leakage. The RCIC system was declared inoperable and a 14 day LCO was entered per Technical Specification (TS) 3.7.4.

A 4 hour notification was made to the NRC at 2345 on August 21, 1996, pursuant to 10CFR50.72(b)(2)(ii). This event is being reported pursuant to 10CFR50.73(a)(2)(iv). The failed NUMAC drawer was replaced and the RCIC system was returned to service at 2035 on August 23, 1996.

ANALYSIS OF OCCURRENCE

The drawer that failed was a NUMAC model number 304A3714, manufactured by General Electric. The NUMAC drawer consists of six thermocouple input cards (A1 through A6), an analog module (A10) which converts thermocouple analog signals to digital signals, a computer module (A13-A14) which compares thermocouple input signals to user defined setpoints, a relay

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Hope Creek Generating Station	05000354	96	-- 23	-- 00	3 OF 4

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

ANALYSIS OF OCCURRENCE (continued)

driver module (A12), a display control module (A15), and two redundant power supply modules.

The initial error message recorded from the drawer's self test display indicated a problem with the A10 analog module D/A (digital to analog) converter. The D/A converter is used to generate test signals for calibration and offset adjustment. Faults generated by the self test routine should only cause an alarm.

Initial troubleshooting by maintenance personnel found error messages on thermocouple input card A3. Module A3 was replaced and all self test errors cleared, however, module A3 is essentially an installed spare whose failure also should not have resulted in an isolation trip signal.

Review of the 30 hour trend data screen provided by the D channel NUMAC monitor for RCIC room differential temperature indicated a spike at the time of the isolation. However, the B channel NUMAC monitor, which senses temperatures in the same proximity as the D channel monitor, did not indicate any variation in differential temperature. The thermocouple wiring for the applicable channels was checked for grounds and the results were satisfactory. Also, thermocouple input readouts appeared normal and outputs to relay modules were tested satisfactorily.

Based on these troubleshooting results, the failure was isolated to the drawer but could not be isolated to a specific component internal to the drawer. As a result, the entire NUMAC monitor was replaced.

APPARENT CAUSE OF OCCURRENCE

The cause of the isolation was the failed NUMAC SLDS drawer. The root cause of the drawer failure is indeterminate as of the report date for this LER.

ASSESSMENT OF SAFETY CONSEQUENCES

The RCIC system is designed to ensure that sufficient reactor water inventory is maintained in the reactor vessel to allow for adequate core cooling. This prevents reactor fuel from overheating during the following conditions:

1. When the vessel is isolated and maintained in the hot standby condition.
2. When the vessel is isolated and accompanied by loss of coolant flow from the reactor feedwater system.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Hope Creek Generating Station	05000354	96	-- 23	-- 00	4 OF 4

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

ASSESSMENT OF SAFETY CONSEQUENCES (continued)

3. When a complete plant shutdown is started under conditions of loss of the normal feedwater system and before the reactor is depressurized to the level for the operation of the shutdown cooling system.

During the 2 days that RCIC was unavailable, the plant maintained normal operations such that the above conditions that require RCIC operation were not entered. Additionally, the High Pressure Coolant Injection (HPCI) system was operable throughout this period.

NUMAC monitors are used in a total of 6 applications (14 monitors total) throughout the plant. The other applications include steam leak detection for HPCI, Reactor Water Cleanup (RWC), and the Main Steam Line Tunnel as well as radiation monitoring for the Main Steam and Offgas Pre-treatment systems. A review of the maintenance history of these monitors did not reveal a significant performance trend or any failures that would indicate the potential for common mode failure.

Upon receipt of the isolation signal, the components actuated by this logic functioned as designed. Variations in plant operating mode would not have affected the significance of this event. Based on the above, there was minimal safety significance associated with this event.

PREVIOUS OCCURRENCES

A review of Hope Creek LERs over the past two years found that LER 96-010 reported a RCIC system isolation during plant startup after Refueling Outage 6. That event occurred during a RCIC system warming evolution and was caused by operator error. Therefore, the corrective actions for that event are not expected to have prevented this event.

A search for industry operating experience data found a series of similar events at the Brunswick plant in 1995 which resulted in RWC isolations. The root cause from those events was foreign materials (very small pieces of wire) found lodged at the bottom of module connectors which resulted in short circuits. Inspections performed on the failed RCIC NUMAC drawer did not find evidence of foreign materials.

CORRECTIVE ACTIONS

1. The failed drawer was replaced and the RCIC system was returned to service on August 23, 1996.
2. Additional failure analysis of the NUMAC drawer will be performed with General Electric. This analysis will be completed and follow up corrective actions determined by January 17, 1997.