

LR-N04-0095



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U. S. Nuclear Regulatory Commission  
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LER 354/04-001-00  
HOPE CREEK GENERATING STATION - UNIT 1  
FACILITY OPERATING LICENSE NO. NPF-57  
DOCKET NO. 50-354

This Licensee Event Report entitled "Manual Reactor Scram following Isolation of Primary Containment Instrument Gas (PCIG)" is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

Sincerely,

A handwritten signature in black ink, appearing to read "J. Hutton", with the initials "F012" written below it.

James Hutton  
Plant Manager – Hope Creek

Attachment

BJT

C Distribution  
LER File 3.7

Handwritten initials "JED2" in black ink, located in the bottom right corner of the page.

Estimated burden per response to comply with this mandatory information collection request 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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.

# LICENSEE EVENT REPORT (LER)

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

<b>1. FACILITY NAME</b> Hope Creek Generating Station	<b>2. DOCKET NUMBER</b> 05000354	<b>3. PAGE</b> 1 OF 6
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**4. TITLE**  
Manual Reactor Scram following Isolation of Primary Containment Instrument Gas (PCIG)

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	12	2004	2004	001	00	03	11	2004	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>	1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>								
<b>10. POWER LEVEL</b>	67	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)					
		20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)					
		20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)					
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)					
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A					
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)						
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)						
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)						
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)								
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)								

**12. LICENSEE CONTACT FOR THIS LER**

<b>NAME</b> Brian Thomas, Licensing Engineer	<b>TELEPHONE NUMBER (Include Area Code)</b> 856-339-2022
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	IL	CON	S637	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO		MONTH	DAY	YEAR

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

On January 12, 2004, at 1015 hours during the performance of 18-month Technical Specification calibration of the 'C' channel Reactor Building Exhaust (RBE) radiation monitor, the 'A' channel RBE radiation monitor actuated resulting in an actuation of the Primary Containment Isolation System (PCIS). The actuation of PCIS caused the isolation of the Primary Containment Instrument Gas (PCIG) supply to the inboard Main Steam Isolation Valves (MSIVs). Prior to restoration of the PCIG system, the 'D' and 'B' inboard MSIVs began to drift closed. Anticipating the receipt of an automatic scram, the Reactor Operator (RO) manually scrambled the reactor by placing the mode switch to the shutdown position at 1048 hours. Shortly after the scram, the 'A' and 'C' MSIVs began to drift closed. At 1051, PCIG was restored and the inboard MSIVs returned to the open position. The inboard MSIVs never went fully closed which ensured that the main condenser remained available throughout the event for reactor heat removal. Following the manual scram, a low reactor water level scram signal was received (Level 3, +12.5 inches) as expected. At 2123 hours, a second invalid actuation of the PCIS occurred due to equipment related problems.

The cause of the PCIS actuation that led to the manual scram is attributed to a loose LEMO connector on the 'A' channel RBE radiation monitor that allowed intermittent contact when a nearby conduit was used as a hand hold to gain access to the 'C' channel RBE radiation monitor for surveillance testing. The apparent cause of the second invalid PCIS actuation is attributed to faulty Bailey cards associated with the RBE high radiation input to PCIS. The corrective actions associated with this event consist of procedure enhancements, emphasizing standards with maintenance personnel, re-evaluation of the scheduling of surveillance testing, and the repair/replacement of equipment.

This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(A).

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

**PLANT AND SYSTEM IDENTIFICATION**

General Electric – Boiling Water Reactor (BWR/4)

Radiation Monitoring System – EIS Identifier {IL}\*  
 Reactor Protection System {JC}\*  
 Primary Containment Instrument Gas {LK}\*  
 Main Steam Isolation Valves (MSIV) {SB/ISV}\*  
 \* Energy Industry Identification System {EIS} codes and component function identifier codes appear as {SS/CCC}

**IDENTIFICATION OF OCCURRENCE**

Event Date: January 12, 2004  
 Discovery Date: January 12, 2004

**CONDITIONS PRIOR TO OCCURRENCE**

The plant was in OPERATIONAL CONDITION 1 (POWER OPERATION) at approximately 67% Reactor Power at the time of the event. The 'C' Channel Reactor Building Exhaust radiation monitor was out of service (placed in the tripped condition) for surveillance testing which contributed to this event. The 'A' Control Room Emergency Filtration System (CREF) was inoperable but available and was not a contributor to this event.

**DESCRIPTION OF OCCURRENCE**

On January 12, 2004, at 1015 hours during the performance of an 18-month Technical Specification calibration of the 'C' channel Reactor Building Exhaust (RBE) radiation monitor {IL/DET}, the 'A' channel RBE radiation monitor actuated resulting in an actuation of the Primary Containment Isolation System (PCIS). RBE high radiation is a two-out-of-three logic for actuation of PCIS. Since the 'C' channel RBE radiation monitor was in the tripped condition for surveillance testing, the spurious trip of the 'A' channel RBE radiation monitor satisfied the two-out-of-three logic. In response to the PCIS actuation, Operators entered appropriate abnormal operating procedures.

As a result of the actuation of PCIS the following isolations occurred: Primary Containment Instrument Gas (PCIG) system (Group 15), Torus Water Clean Up (Group 8), Drywell Sumps (Group 9), Containment Atmosphere Control System (Group 12), Hydrogen/Oxygen Analyzer (Group 13), Containment Hydrogen Recombination (Group 14), Reactor Coolant Pressure

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**DESCRIPTION OF OCCURRENCE (cont'd)**

Boundary Leakage Detection System (Group 18), and Reactor Building Ventilation Supply/Exhaust and Drywell Purge Supply/Exhaust (Group 19). The Filtration, Recirculation, and Ventilation System (FRVS) and the non-running (B and C) Station Service Water pumps started as designed.

With the isolation of PCIG {LK/-}, PCIG supply was lost to the inboard Main Steam Isolation Valves (MSIVs) {SB/ISV}. The Operating Shift directed the technicians to restore RBE radiation monitoring channel 'C' back to service since it was determined that the actuation of channel 'A' was invalid (not as a result of high radiation). Actions were also initiated to restart the PCIG compressors.

At 1045, the technicians informed the control room that RBE radiation monitoring channel 'C' was returned to service. After performing a channel check to confirm the radiation monitor channel operability, the PCIS and Nuclear Steam Supply Shutoff System (NSSSS) trip logics were reset. At 1046, restoration of the PCIG system commenced. At 1047, the 'D' inboard MSIV began to drift closed (indicating dual position). At 1048, the 'B' inboard MSIV began to drift closed. The Reactor Operator (RO) manually scrammed the reactor by taking the mode switch to shutdown {JC/-} in anticipation of the receipt of an automatic scram. Immediately following the manual scram, the 'A' inboard MSIV began to drift closed. At 1050, the 'C' inboard MSIV began to drift closed. At 1051, PCIG was restored and all inboard MSIVs returned to the full open position. The inboard MSIVs never went fully closed during this event, which ensured that the main condenser remained available throughout the event for reactor heat removal.

Following the reactor scram, reactor water level momentarily dropped below the +12.5 inch low reactor water level setpoint (Level 3) as expected. Level was subsequently restored to the normal band and the plant was stabilized in Operational Condition 3.

At 2123 hours, a second invalid actuation of the 'A' channel of PCIS occurred. As a result of the 'A' channel PCIS signal, the 'A' SSW pump started, 'A' channel PCIS valves isolated, 'A' channel PCIS breakers tripped and the 'E' FRVS fan started (the 'A' FRVS recirculation fan was already running at the time of the actuation). This PCIS actuation was determined to be equipment failure related and not the result of any plant parameters being exceeded; therefore, this actuation is considered invalid.

The above events are being reported in accordance with 10CFR50.73(a)(2)(iv)(A), any event or condition that resulted in the manual or automatic actuation of (1) Reactor Protection System (RPS) including reactor scram and (2) general containment isolation signals affecting containment isolation valves in more than one system.

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**CAUSE OF OCCURRENCE**

The cause of the PCIS actuation that led to the manual scram is attributed to a loose LEMO connector on the 'A' channel RBE radiation monitor due to a lack of specific instructions for disconnection/reconnection of the connector. This loose connection allowed intermittent contact when a nearby conduit was used as a hand hold by technicians to gain access to the 'C' channel RBE radiation monitor for surveillance testing. Accessing the RBE radiation monitor by climbing on plant equipment is attributed to an organizational tolerance of poor work practices. The intermittent contact caused local internal arcing resulting in the high alarm condition on the 'A' channel RBE radiation monitor.

In addition, the scheduling of the 18-month surveillance testing of the 'C' channel RBE radiation monitor while at power contributed to the occurrence of this event. With the 'C' channel RBE radiation monitor placed in a tripped condition for surveillance testing, this condition essentially reduced the PCIS actuation logic from two-out-of-three to one-out-of-two making the system vulnerable to the spurious actuation of one of the other channels. An additional contributing factor that led to the scram was that current Operating procedures did not provide a method to promptly recover PCIG supply to the inboard MSIVs following an invalid PCIS actuation.

The apparent cause of the second invalid PCIS actuation is attributed to faulty Bailey cards associated with the RBE high radiation input to PCIS.

**PREVIOUS OCCURRENCES**

A review of LERs at Salem and Hope Creek Generating Stations for the previous two years did not identify a similar event reported as a result of loose connectors or climbing on plant equipment.

A review of internal events at Hope Creek did identify that in June 15, 2003, a PCIS actuation occurred during performance of surveillance testing of the 'A' channel RBE radiation monitor. Due to human error, the 'B' channel RBE radiation monitor was inadvertently de-energized instead of the 'A' channel. When the 'A' channel was disconnected this satisfied the actuation logic for PCIS actuation. Primary Containment Instrument Gas (PCIG) isolated during this event but was restored prior to the inboard MSIVs drifting closed. The corrective actions from this event involved coaching/counseling of the personnel involved, changes to maintenance procedures to verify that the correct channel is removed from service, and strengthening pre-job briefing requirements. This event was reported as a 60-day telephone notification for an invalid system actuation in accordance with 10CFR50.73(a)(1) (NRC Event #40057).

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**SAFETY CONSEQUENCES AND IMPLICATIONS**

Upon the actuation of Primary Containment Isolation System (PCIS), Operators took prompt actions to restore the Reactor Building Exhaust radiation monitoring 'C' channel from surveillance testing in order to clear the PCIS logic signal. The operating shift also initiated prompt actions to restore primary containment instrument gas (PCIG) in order to prevent the closure of the inboard Main Steam Isolation Valves (MSIVs). Prior to restoration of PCIG, the inboard MSIVs began to drift closed. After two MSIVs began drifting closed, operators manually scrambled the reactor prior to the third and fourth MSIVs drifting closed. Approximately two minutes following the manual scram, PCIG pressure was restored to the inboard MSIVs and the MSIVs returned to the full open position. The inboard MSIVs never went fully closed during this event, which ensured that the main condenser remained available throughout the event for reactor heat removal. Reactor water level momentarily dipped below the Level 3 low water level reactor protection system setpoint as anticipated following the manual scram and level was restored to normal. The plant was stabilized in Operational Condition 3.

The second invalid PCIS actuation did not cause a plant transient (PCIG did not fully isolate) and the equipment actuated as required in response to the PCIS signal.

Based on the above, there was no impact to the health and safety of the public.

A review of this event determined that a Safety System Functional Failure (SSFF) did not occur as defined in Nuclear Energy Institute (NEI) 99-02.

**CORRECTIVE ACTIONS:**

1. The connector of the 'A' Channel Reactor Building Exhaust radiation monitor was repaired.
2. A review of plant equipment was performed at Hope Creek to identify other systems that use the LEMO connector involved in this event. The connectors were identified as being used in other safety related radiation monitoring system (RMS) channels. These RMS channels were inspected and found to be tight.
3. Appropriate procedures will be revised to provide the necessary instructions for the reassembly of the LEMO connectors and to perform verification that the connector is properly assembled. Procedures are currently scheduled to be revised by July 29, 2004, which is prior to the next scheduled performance of surveillance testing of the RMS channels.
4. Activities are being added to the surveillance testing recurring tasks associated with the Reactor Building Exhaust radiation monitors to provide safe access to the monitors during testing. These activities will be added to the recurring tasks by June 1, 2004.
5. Expectations concerning the tolerance of substandard work practices (climbing on equipment) were reinforced with appropriate personnel.

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**CORRECTIVE ACTIONS (cont'd):**

6. The scheduling of the RBE radiation monitor 18-month surveillance testing will be re-evaluated to assess the risk (development of additional barriers to prevent PCIS actuation) to determine if the surveillance testing should continue to be performed in Operation Conditions 1, 2 or 3 or if the surveillance testing should be performed when the PCIS is not required. This assessment will be completed by July 30, 2004.
7. A method to more efficiently restore the Primary Containment Instrument Gas (PCIG) system from an invalid isolation will be developed by December 29, 2004. Necessary procedural guidance to implement this method will be issued by February 17, 2005.
8. Bailey logic modules 9-9-2 and 9-9-3, along with optical isolators A105-A1 and A105-A4, associated with the Reactor Building Exhaust high radiation input into PCIS, were replaced.

The actions specified above are being tracked in accordance with PSEG Nuclear's Corrective Action Program.

**COMMITMENTS**

The corrective actions cited in this LER are voluntary enhancements and do not constitute commitments.