NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 3	05000249	1 of 4

TITLE (4)
Unit 3 High Pressure Coolant Injection System Inoperable due to Gland Seal Leak Off Condenser Hotwell Level Control Malfunction.

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
									N/A	N/A
10	29	98	98	007	01	5	28	99	FACILITY NAME N/A	DOCKET NUMBER N/A

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)							
POWER LEVEL (10)	98		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(2)(i)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.405(a)(1)(ii)		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)
R. K. Nelson, System Engineering	(815) 942-2920 ext. 2258

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

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

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

On October 29, 1998, during the quarterly Unit 3 High Pressure Coolant Injection (HPCI) system operability surveillance, shortly after bringing the HPCI turbine up to full speed, the gland seal leak off (GSLO) condenser hotwell "HI/LO level" alarm was received. The GSLO drain pump was verified to be operating. The local hotwell sightglass level continued to increase above the top of the sightglass. The HPCI turbine was tripped from the control room and the HPCI system was declared inoperable at 1955 hours. Extensive troubleshooting was conducted that systematically addressed all failure modes that could have contributed to the GSLO condenser hotwell level control malfunction. In addition to the troubleshooting, a review of past LERs and similar events was conducted along with a comparison of HPCI operating practices between Dresden Station and Quad Cities Station. The LER review revealed that a continuous vent line that had been installed from the GSLO drain pump suction to the GSLO condenser shell had been removed in 1987. A new vent line has been installed from the GSLO drain pump casing to the GSLO condenser shell. The new vent will eliminate the possibility of the pump becoming air bound.

Following troubleshooting and installation of the continuous vent on the GSLO drain pump casing, the quarterly Unit 3 HPCI operability surveillance was satisfactorily completed, and the HPCI system was declared operable on November 5, 1998. The overall safety significance of this event is minimal since this concern would not have prevent automatic HPCI actuation and all other emergency core cooling systems were available during the time that the HPCI system was inoperable.

The cause of the failure of the GSLO drain pump to maintain level in the GSLO condenser hotwell was attributed to air binding of the pump due to absence of a vent on the pump casing.

PLANT AND SYSTEM IDENTIFICATION:

General Electric – Boiling Water Reactor - 2527 MWt rated core thermal power

Energy Industry Identification System (EIIS) Codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommended Practice for System Identification in Nuclear Power Plants and Related Facilities.

EVENT IDENTIFICATION:

Unit 3 High Pressure Coolant Injection System Inoperable due to Gland Seal Leak Off Condenser Hotwell Level Control Malfunction.

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: 10/29/98 Event Time: 1955 CDT
Reactor Mode: 1 Mode Name: Run Power Level: 98
Reactor Coolant System Pressure: 1000 psig

No systems or components were inoperable or out of service at the start of this event which contributed to the event.

B. DESCRIPTION OF EVENT:

This event is being reported pursuant to 10 CFR 50.73(a)(2)(v)(D) which requires the reporting of any event or condition that alone could have prevented the fulfillment of the safety function of a system required to mitigate the consequence of an accident.

On October 29, 1998, during the quarterly Unit 3 High Pressure Coolant Injection (HPCI) [BJ] system operability surveillance, shortly after bringing the HPCI turbine up to full speed (4000 rpm), the gland seal leak off (GSLO) condenser hotwell "HI/LO level" alarm was received. The Nuclear Station Operator (NSO) verified that the alarm was due to a GSLO condenser hotwell high level condition. Locally, an equipment operator verified that the GSLO drain pump was operating and that the GSLO condenser hotwell level was at the top of the local sightglass and increasing. The local hotwell sightglass level continued to increase above the top of the sightglass. The NSO then tripped the HPCI turbine from the control room. The HPCI system was declared inoperable at 1955 hours on October 29, 1998. Upon tripping the HPCI turbine, the GSLO drain pump automatically pumped down the hotwell, as observed at the local sightglass.

On the following shift, the GSLO drain pump and condenser hotwell level control float switches were satisfactorily tested per DOS 2300-09, High Pressure Coolant Injection Gland Seal Leak Off Drain Pump and Condenser Hotwell Level Control Functional Test. During the test the GSLO drain pump properly lowered level in the condenser hotwell with no alarms.

The inability to properly maintain level in the GSLO condenser can be caused by the GSLO drain pump not starting automatically at the correct time or the inability of the GSLO drain pump to remove condensate faster than it is entering the condenser. Extensive troubleshooting was conducted that systematically addressed all failure modes that could contribute to each of these. For each failure mode all potential causes were identified. Inspections, testing or evaluations were performed to eliminate or validate each as the actual cause.

The failure modes that were addressed that could have prevented the GSLO drain pump from starting automatically at the correct time are:

- Hotwell level float switch malfunction
- GSLO drain pump control circuit malfunction
- GSLO drain pump power supply malfunction
- GSLO drain pump running indication malfunction
- Abnormal input to hotwell

The failure modes that were addressed that could have contributed to the inability of the GSLO drain pump to remove condensate faster than it is entering the condenser are:

- GSLO drain pump suction or discharge flow path obstruction
- GSLO drain pump air binding
- GSLO drain pump degradation
- Inadequate GSLO drain pump net positive suction head
- Abnormal input to hotwell

In addition to the troubleshooting, a review of past LERs and similar events was conducted along with a comparison of HPCI operating practices between Dresden Station and Quad Cities Station. The LER review revealed that a continuous ¼" vent line that had been installed from the GSLO drain pump hotwell suction flange to the GSLO condenser shell had been removed in 1987 (LER 87-014-00/05000249). The LER stated that the vent line was removed to alleviate the possibility of the pump becoming air bound. A new ¼" vent line containing a 1/8" orifice has been installed from the GSLO drain pump casing to the GSLO condenser shell. The new vent, installed on the pump casing rather than the pump suction, will eliminate the possibility of the pump becoming air bound. The review of HPCI operating practices revealed an unnecessary step in several HPCI procedures at Dresden Station that starts the GSLO drain pump regardless of the GSLO condenser hotwell level. This step has the potential to lower the level of the hotwell below the normal low level pump shutoff point. The procedures containing this step have been revised.

Following troubleshooting and installation of the continuous vent on the GSLO drain pump casing, the quarterly Unit 3 HPCI operability surveillance was satisfactorily completed on November 5, 1998. Following the satisfactory operability surveillance and a review of all troubleshooting, the Unit 3 HPCI system was declared operable at 0910 hours on November 5, 1998.

C. CAUSE OF EVENT:

Comprehensive failure analysis and testing was performed. This concluded that pumpdown of the hotwell is delayed if the drain pump casing is air bound. The cause of the failure of the GSLO drain pump to maintain level in the GSLO condenser hotwell was attributed to air binding of the GSLO drain pump due to absence of a vent on the GSLO drain pump casing. [NRC Cause Code B.]

Contributing factors related to this event were the lack of comprehensive troubleshooting, ineffective prior corrective actions, and design weaknesses [NRC Cause Code E.]

D. SAFETY ANALYSIS

The overall safety significance of this event is minimal. The HPCI system is designed to provide make up coolant to the reactor in the event of a small-break Loss Of Coolant Accident. In the event that the HPCI System initiates, steam leak off collected by the HPCI turbine gland seal leak off system is drawn to the GSLO condenser and condensed. The condensate is then returned to the HPCI pump suction by the GSLO condenser drain pump. If the GSLO condenser hotwell level control system fails to maintain a normal level in the hotwell, then the GSLO condenser can flood and steam will no longer be drawn off of the turbine shaft glands, stop valve stem, or control valve stems. Initially, this occurrence alone would not prevent the HPCI system from functioning during a design basis accident. Continued steam leakage into the HPCI room could result in a HPCI system isolation (Group IV) due to high room temperature, rendering the system inoperable. In addition, all other emergency core cooling systems were available during the time that the HPCI system was inoperable.

E. CORRECTIVE ACTIONS:

1. A continuous vent has been installed from the casing of the Unit 3 HPCI GSLO drain pump back to the shell of the GSLO condenser. (Complete)

2. A continuous vent has been installed on the casing of the Unit 2 HPCI GSLO drain pump. This enhancement was performed on Unit 2 even though the Unit 2 GSLO piping configuration differs from Unit 3 and has not experienced the air binding phenomena. (Complete)

3. HPCI system surveillance and operating procedures have been revised to remove steps that manually start the GSLO drain pump and have the potential for operating the pump below the pump's low level shutoff. (Complete)

4. A comprehensive "point-to-point" review of the HPCI system was also performed with the objective to prevent any future HPCI equipment failures. (Complete)

F. PREVIOUS OCCURRENCES:

LER/Docket	Title
97-009-00/05000249	HPCI System Declared Inoperable Following Gland Seal Leak Off Condenser Hotwell High Level Due to Drain Pump Stop Switch Failure.

On September 5, 1997, at 1438 with Unit 3 in Mode 1(Run) while performing the quarterly High Pressure Coolant Injection (HPCI) system operability verification, the gland seal leak off (GSLO) condenser hotwell high level alarm was received while rolling the turbine to full speed following the turbine warm-up. The gland steam exhauster tripped resulting in a GSLO condenser high pressure alarm. The HPCI turbine was manually tripped from the control room. The HPCI System was declared inoperable and the appropriate Technical Specification actions were taken. The cause of this event was the failure of the GSLO condenser drain pump low level stop switch to shut off the pump at the required low level due to a rotated mercury bulb. This resulted in cavitation/air entrainment in the pump suction and air accumulation in the discharge pressure regulating valve sensing line causing a reduction in the pump capacity. Corrective actions for this event replaced the defective switch and performed an internal boroscope of the level control and alarm instrumentation piping. Following replacement, level switch operation was functionally verified.

Several other LERs involving HPCI GSLO hotwell level control malfunctions were reviewed that were due to level switch malfunctions but did not result in GSLO drain pump air binding. The GSLO condenser hotwell level control and alarm switches have been replaced with a different kind of switch more suitable for this application since these events.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model/ Part Number
N/A		