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

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

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 3	05000249	1 of 5

TITLE (4)
High Pressure Coolant Injection System Inoperable Due to Gland Seal Leak Off Condenser Hotwell Level Control Malfunction From A Drain Pump Start Level Switch Failure Cause by Original Design Deficiency

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
03	30	98	98	002	00	04	27	98	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)	099		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)
D. S. Smith, System Engineer	(815) 942-2920 ext 3087

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
X	BJ	LS	M235	Y						

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 March 30, 1998, at 0428, while performing Dresden Operating Surveillance (DOS) 2300-09, High Pressure Coolant Injection (HPCI)[BJ] Gland Seal Leak Off Drain Pump and Condenser Hotwell Level Control Functional Test, the hotwell drain pump failed to start and a condenser hotwell high level alarm was received. HPCI was declared inoperable in accordance with DOS 2300-09 Limitations and Action requirements. Inspection found that the pump start switch was stuck in the open position. The switch was manually cycled several times and exhibited unrestricted movement during subsequent functional testing. The root cause of this event was an original design deficiency. This same model switch (Mercoid Model No. 123) has resulted in several recent HPCI GSLO Condenser level control system failures. A design modification which had been initiated following a previous level switch failure (LER 97-014, Docket number 05000249) has been implemented. All four HPCI GSLO Condenser level switches were replaced with a more suitable type switch for the application. The new switches were satisfactorily functionally tested following installation and the HPCI System was declared operable at 1610 on April 4, 1998. Additionally, the Unit 2 HPCI GSLO condenser hotwell Mercoid level control switches were replaced. The overall safety significance of this event was minimal because all other emergency core cooling systems were available during the time that the HPCI system was inoperable.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Dresden Nuclear Power Station, Unit 3	05000249	98	002	00	2 OF 5

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

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:

High Pressure Coolant Injection System Inoperable Due to Gland Seal Leak Off Condenser Hotwell Level Control Malfunction From A Drain Pump Start Level Switch Failure Cause by Original Design Deficiency

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: 3/30/98 Event Time: 0413 CST

Reactor Mode: 1 Mode Name: Run Power Level: 099

Reactor Coolant System Pressure: 1002 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 LER is being submitted 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 March 30, 1998, at 0428, while performing Dresden Operating Surveillance (DOS) 2300-09, High Pressure Coolant Injection (HPCI)[BJ] Gland Seal Leak Off Drain Pump and Condenser Hotwell Level Control Functional Test, the hotwell drain pump failed to start and a condenser hotwell high level alarm was received. The HPCI System was declared inoperable in accordance with DOS 2300-09 (Limitations and Actions) due to failure of the drain pump to start and a Limiting Condition For Operation (LCO) action was entered. An ENS notification was performed at 0517 CST.

Inspection of the level switch assembly found water level in the condenser hotwell sightglass above the pump start switch elevation with the start switch float arm stuck in the down (switch open) position. At 0755 hours the level switch was manually cycled several times until it did not exhibit any sticking/binding indication. The pump control switch was subsequently placed in AUTO and the hotwell pumped down satisfactorily. At 0831, Operations opened the 3-2301-4 MOV, U3 HPCI Turbine Inlet Inboard Isolation Valve, making HPCI available. The system remained in the LCO.

A new type and style of switch, more suitable to the application, was installed on April 4, 1998, with testing completed at 1010. The LCO was exited at 1610 on April 4, 1998.

Background

In January 1997, following the NRC Independent Safety Inspection (ISI) assessment, the HPCI GSLO drain system was upgraded to Safety Related. As part of this upgrade, DOS 2300-03, High Pressure Coolant Injection System Operability Verification, was revised to require that the GSLO Drain Pump operate normally during all tests to maintain Gland Seal Condenser Level.

GSLO condenser hotwell drain pump operation problems were encountered during subsequent HPCI GSLO system evolutions (LER 97-013, docket number 05000237 and LERs 97-009, 97-014, and 98-001, docket number 05000249).

Corrective actions were implemented that included: like-for-like replacements, increasing the level switch functional test to quarterly, incorporating potential failure mechanisms into the functional surveillance to verify proper switch operation and material condition. A new functional surveillance DOS 2300-09 was developed to demonstrate both level switch and drain pump operation (LER 98-001 corrective action). DOS 2300-09 was scheduled to be performed on a weekly basis until there was sufficient trend data to determine whether to adjust the surveillance frequency or implement an alternative action.

DOS 2300-09 had been satisfactorily completed the first time it was performed. On the second performance of the new surveillance, the pump failed to start and is reported in this LER. Based on the results of the additional inspection and testing, it was apparent that the Mercoid level switches did not exhibit sufficient reliability for continued application in the GSLO Condenser level control system. As a result, the corrective action from LER 97-014, docket number 05000249, to evaluate alternative level switches for the application was accelerated. Several alternative switches for the application were considered. The Magnetrol Float Switch (Model 39-5000-400) was identified as a more suitable float switch for the application and four level switches were installed as replacements on April 4, 1998.

C. CAUSE OF EVENT:

The root cause of this event was an original design deficiency of the installed HPCI GSLO condenser hotwell level control switches, in that, they were not the proper switches for the application. (NRC Cause Code B). Several failure mechanisms relating to packing gland binding, mechanical linkage and switch alignment have been identified for the Mercoid level switches. The switches require excessive maintenance and frequent operation to perform reliably. The increased preventive maintenance (PM) resulting from recent corrective actions was not sufficient to ensure reliable Mercoid switch operation. The replacement (Magnetrol) switch only recommends periodic cleaning of the float and counterweight assembly to assure free movement of the mechanism. The switch mechanism is mechanically separated from the working fluid which removes the potential for alignment and binding conditions encountered with the original switch installation.

D. SAFETY ANALYSIS

The HPCI system is designed to provide make up coolant to the reactor in the event of a small-break Loss Of Coolant Accident. If the HPCI System was to initiate, leakoff collected by the HPCI turbine gland seal leak off system is drawn to the GSLO condenser. The condensate is then returned to the HPCI pump suction via 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. The safety significance of this event was minimal since all other emergency core cooling systems were available during the time that the HPCI system was inoperable.

E. CORRECTIVE ACTIONS:

The Unit 3 HPCI GSLO hotwell level switches were replaced with different type switches. (Complete)

Unit 2 HPCI GSLO hotwell level switches were replaced prior to the Unit 2 post refuel (D2R15) startup. (Complete)

The HPCI GSLO condenser hotwell drain system was successfully tested following the level switch replacements on both units. (Complete)

The newly installed Unit 3 GSLO level control switches will be inspected to verify proper operation and to determine any future PM requirements. PM requirements will be applied to both Units 2 and 3 GSLO level control switches. (249-180-98-00201)

F. PREVIOUS OCCURRENCES:

LER/Docket	Title
97-013-00/05000237	HPCI System Declared Inoperable Due to Excessive Cycling of the Gland Seal Condenser Hotwell Drain Pump due to Pump Stop Level Switch Malfunction.

On June 6, 1997, during scheduled performance of Dresden Operability Surveillance (DOS) 2300-03, High Pressure Coolant Injection System Operability Verification, the High Pressure Coolant Injection (HPCI) Gland Seal Leak Off (GSLO) condenser hotwell drain pump began cycling (on/off) excessively. The cause for the excessive pump cycling was attributed to failure (sticking) of the HPCI condenser hotwell pump stop level control switch 2-2300-LCS-1 in the open position. Corrective actions for this event were to replace the defective switch and functionally verify operability. The corrective actions from this event would not have prevented this event from occurring.

97-009-00/05000249	HPCI System Declared Inoperable Following Gland Seal Leakoff 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. The corrective actions from this event would not have prevented this event from occurring.

97-014-00/05000249	High Pressure Coolant Injection System Inoperable due to Gland Seal Leak Off Condenser Drain Pump Low Level Shut Off Switch Failure Caused by A Misaligned Switch Lever Arm

On December 29, 1997, at 0234 hours, following a manual start of the Unit 3 High Pressure Coolant Injection (HPCI) System gland seal leak off (GSLO) condenser drain pump, the drain pump failed to automatically shut off and the HPCI Gland Seal Condenser Hotwell Level HI/LO Alarm annunciated. The likely cause for failure of the GSLO condenser drain pump to shut off is a failure of the GSLO condenser drain pump low level stop switch in the closed position. Inspection of the pump stop level switch found that the lever arm to float shaft set screw was not tightly secured and that the lever arm to switch mechanical linkage was not properly aligned. The float shaft and lever arm alignment was adjusted and the set screw secured tightly.

Corrective actions from this event, (lever arm alignment), would not have prevented this event from occurring.

98-001-00/05000249 High Pressure Coolant Injection System Declared Inoperable Due to Gland Seal Leak Off Condenser Hotwell Level Control Malfunction Caused by A Loose Lug On The Drain Pump Automatic Start Relay

On February 19, 1998, at 0413, while performing Dresden Operating Surveillance (DOS) 2300-03, High Pressure Coolant Injection (HPCI)[BJ] System Operability Verification, the Gland Seal Leak Off (GSLO) Condenser hotwell level control system did not maintain proper level in the GSLO hotwell. During this event (prior to HPCI steam chest warm-up) the drain pump was manually started from the control room and automatically shut off as expected on pump shut-off level. During the HPCI turbine roll (2500 rpm) two high level alarms occurred. The drain pump was manually started from the control room upon which the condenser level returned to normal. A third high level alarm occurred at which time the pump was verified to have auto started. Troubleshooting identified that the automatic start relay's wire hold down lug was not properly secured. The root cause of the event was an original installation deficiency.

Corrective actions for this event (tightening of the loose relay lug) would not have prevented this event from occurring.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number
Mercoid Corporation	Level Switch	123-2

An industry wide NPRDS data base search was performed on Mercoid Corporation, Model 123 level switches for HPCI System application. One level switch failure was identified. Failure was caused by the mercury bulb coming loose from its holder.