

LICENSEE EVENT REPORT (LER)

Facility Name (1) Dresden Nuclear Power Station, Unit 3	Docket Number (2) 0 5 0 0 0 2 4 9	Page (3) 1 of 0 5
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Title (4) HPCI System Inoperable Due to Failure of Minimum Flow Valve

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 Names	Docket Number(s)	
0 9	1 5	8 7	8 7	0 1 5	0 0	1 0	1 4	8 7	N/A	0 5 0 0 0	
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OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)									
POWER LEVEL (10) 0 1 0	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> Other (Specify						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	in Abstract						
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	below and in						
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)	Text)							

LICENSEE CONTACT FOR THIS LER (12)

Name Jerry Lizalek, Technical Staff Engineer (X-421)	TELEPHONE NUMBER AREA CODE 8 1 5 9 4 2 - 2 9 2 0
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
X	B J	X X 2 0	L 2 0 0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> Yes (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	Expected Submission Date (15)
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 15, 1987 at 0450 hours, with Unit 3 at 10% rated thermal power while performing Dresden Operating Surveillance (DOS) 2300-3, High Pressure Coolant Injection (HPCI) System Pump Test, HPCI minimum flow valve M03-2301-14 tripped thermally while traveling in the closed direction. Subsequent investigation revealed that the valve gearbox was degraded and at 0950 hours on September 16, 1987 the HPCI system was declared inoperable. The root cause of the M03-2301-14 valve failure was determined to be water intrusion into the Limitorque motor-operator gear case. This resulted in internal corrosion of the gearbox.

Corrective action included rebuilding of the motor operator and performing a motor current signature to ensure proper operation. The safety significance of this event was minimal due to availability of the Automatic Depressurization, Isolation Condenser, Low Pressure Coolant Injection, and Core Spray systems to provide redundant means of reactor inventory and pressure control during any design basis loss of coolant accident. A previous event involving an inoperable HPCI system is reported by LER #87-17 on Docket #050249.

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PLANT AND SYSTEM IDENTIFICATION:

General Electric Boiling Water Reactor - 2527 Mwt rated core thermal power. Energy Industry Identification System (EIS) codes are identified in the text as [XX].

EVENT IDENTIFICATION:

The High Pressure Coolant Injection (HPCI) [BJ] system was declared inoperable upon discovering the HPCI minimum flow motor operated (MO) valve M03-2301-14 in a degraded condition:

A. CONDITIONS PRIOR TO EVENT:

Unit: 3	Event Date: 9/15/87	Event Time: 0450 hours
Reactor Mode: N	Mode Name: Startup	Power Level: 10%
Reactor Coolant System (RCS) Pressure: 925 psig		

B. DESCRIPTION OF EVENT:

On September 12, 1987, while performing surveillance testing of the HPCI system, the HPCI gland seal leakoff (GSLO) blower tripped. The HPCI system was declared inoperable, and repairs to a HPCI GSLO condenser cooling water inlet pressure control valve were implemented, as documented by LER #87-17 on Docket #050249.

Following repairs to the GSLO condenser cooling water inlet pressure control valve, a test of the HPCI system was performed at 340 psig reactor pressure at 2045 hours on September 14, 1987. Satisfactory operation of the HPCI system was observed, and reactor pressure was then increased in order to continue with testing of the reactor feedwater [SJ] system. (The feedwater system testing program was implemented following an August 7, 1987 event where feedwater piping system oscillations occurred during a unit shutdown; refer to LER #87-13 on Docket #050249.)

The HPCI system was again tested at 10% rated thermal power and 925 psig reactor pressure at 0450 hours on September 15, 1987. While performing Dresden Operating Surveillance (DOS) 2300-3, HPCI System Pump Test, HPCI system minimum flow valve M03-2301-14 was discovered to be tripping on a thermal overload condition while traveling in the closed direction. The valve was cycled open and then closed again. The valve again tripped thermally when reaching the closed position. The Operations Department immediately performed Dresden Operating Procedure (DOP) 040-1, Motor Operated Valve Failure, and the event was recreated three additional times. Work Request #68911 was then initiated to inspect the M03-2301-14 valve.

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Investigation by maintenance personnel revealed that the M03-2301-14 valve gearbox was in a degraded condition. It was then postulated that the valve could fail to operate automatically in this degraded condition, and the HPCI system was declared inoperable. This action was taken as a conservative measure after discussion with representatives of NRC Region III Headquarters, although it was believed that HPCI was available to perform its designed function. Since it was believed that this degraded condition was an underlying root cause to the previous thermal overload trips of M03-2301-14 in the closed position, HPCI was declared inoperable as of 0450 hours on September 15, 1987. This determination was made at 0950 hours on September 16, 1987; a 10 CFR 50.72 phone notification was made at 1055 hours.

As required by Technical Specification 4.5.C.2 when the HPCI system is determined to be inoperable, the Low Pressure Coolant Injection (LPCI) [B0] system, Core Spray [BM] system, Automatic Depressurization System (ADS) [SB], and the motor operated isolation valves and shell side make-up system for the Isolation Condenser system [BL] were immediately demonstrated operable.

C. CAUSE OF EVENT:

This event is being submitted to comply with 10 CFR (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 structures or systems that are needed to mitigate the consequences of an accident.

The root cause of the M03-2301-14 valve failure was determined to be water penetration into the Limatorque motor operator gearbox. The valve is mounted in the vertical position with the Limatorque motor operator at the lowest point. This orientation allowed water leaking past the valve packing, to travel down the valve stem and into the Limatorque motor operator gear case via the quad ring seals. Once the water entered the gear case, corrosion began to take place. All internal parts of the operator showed signs of corrosion. Additionally, the gear case grease was found in a hardened state.

The root cause of the valve tripping on thermal overloads has been attributed to a corroded spring pack bearing (see Figure 1). This bearing is responsible for aligning the worm with the Belleville spring pack via the bearing cartridge cap. The torque switch pinion gear then rides along a rack type gear located on the bearing cartridge cap. Since the spring pack bearing was no longer intact, worm movement could not be measured by the Belleville spring pack via the bearing cartridge cap, and when the valve reached the closed position, the torque switch could not actuate. With the torque switch no longer available to operate, the Limatorque motor operator continued to thrust the valve disc into the seal until the motor stopped. Once stopped, the motor locked-rotor current caused the thermal overloads to trip.

D. SAFETY ANALYSIS OF EVENT:

Although the HPCI minimum flow valve M03-2301-14 was observed to trip on a thermal overload condition while traveling in the closed direction, testing immediately performed in accordance with DOP 040-1 verified the HPCI system was still available to automatically initiate in the event of a design basis Loss of Coolant Accident (LOCA). The M03-2301-14 valve was available to open and allow a minimum flow path once the HPCI system began to operate. Additionally, once rated system flow

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would have been obtained, the M03-2301-14 valve would have automatically closed (tripping on thermal overloads) allowing full system flow, 5000 gpm, to enter the reactor vessel. When inspection by the Maintenance Department revealed that the valve M03-2301-14 gearbox was in a degraded condition, HPCI was declared inoperable based on concern that the valve could fail to operate during future use in this degraded condition.

Additionally, the ADS, Isolation Condenser, LPCI and Core Spray systems were available to provide redundant means for reactor inventory and pressure control during any design basis accident. For these reasons, the safety significance of this event was minimal.

E. CORRECTIVE ACTIONS:

The Mechanical Maintenance Department was immediately dispatched to repair the M03-2301-14 valve following the directions outlined in Work Request #68947. All worn and corroded parts were replaced and new quad rings were installed. Additionally, a Grease Relief Kit was installed to prevent possible Belleville spring pack hydraulic lock, and the gear case was greased with Mobilux EPO grease. The valve was successfully cycled three times to prove operability. Subsequently, the Electrical Maintenance Department performed a motor current signature per Work Request #68911 and Dresden Maintenance Procedure (DMP) 040-29, Motor Operated Valve Signature, and verified that the open/close limit switches and open torque switch bypass switch were set properly. The HPCI system was tested satisfactorily following these repairs on September 23, 1987.

F. PREVIOUS EVENTS:

<u>LER Number/Docket</u>	<u>Title</u>
87-14/050249	Plant Shutdown Due to Inoperable HPCI and Isolation Condenser Systems.
87-17/050249	HPCI System Inoperable Due to Tripping of the Gland Seal Leakoff Blower Caused by Condenser Overflow.

G. COMPONENT FAILURE DATA:

Manufacturer: Limitorque Corporation
 Nomenclature: M03-2301-14 HPCI Min Flow Valve Motor Operator
 Model Number: SMB-0

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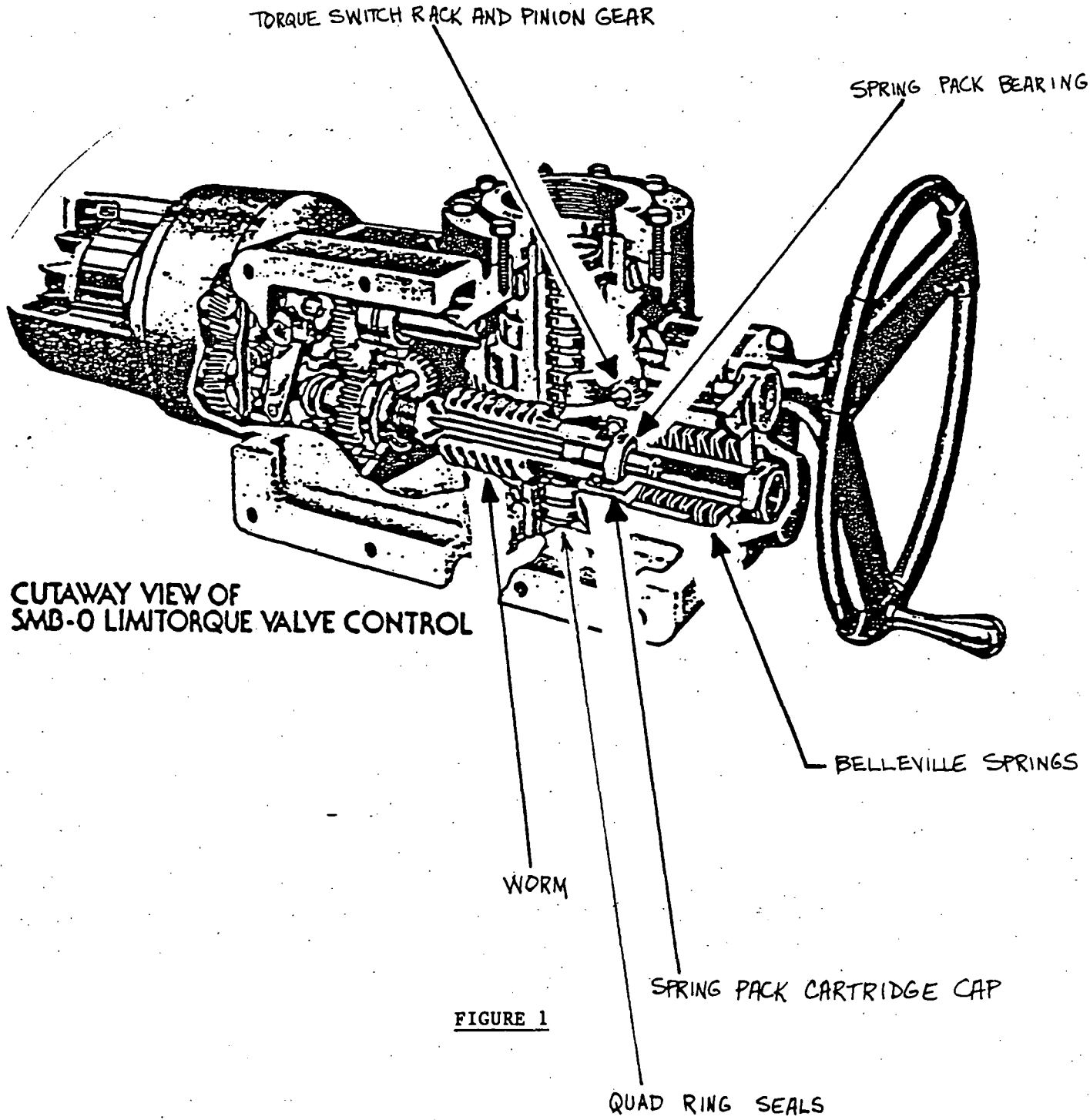


FIGURE 1



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October 14, 1987

EDE LTR #87-689

U.S. Nuclear Regulatory Commission
Document Control Desk
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Licensee Event Report #87-015-0, Docket #050249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR 50.73(a)(2)(v)(D).

E.D. Eenigenburg
Station Manager
Dresden Nuclear Power Station

EDE/kjl

Enclosure

cc: A. Bert Davis, Regional Administrator, Region III
File/NRC
File/Numerical

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