

EXPIRES 04/30/98

## LICENSEE EVENT REPORT (LER)

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)

Dresden Nuclear Power Station, Unit 2

DOCKET NUMBER (2)

05000237

PAGE (3)

1 of 4

TITLE (4)

High Pressure Coolant Injection System Declared Inoperable Due to Closure of the Turbine Stop Valve Above Seat Drain Valve Caused by Design Deficiency of the Operator Diaphragm

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
01	28	98	98	003	00	02	27	98	N/A	N/A
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)							
1			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)			20.2203(a)(2)(i)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
99			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

D. S. Smith, System Engineer

TELEPHONE NUMBER (Include Area Code)

(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
B	BJ	VLV	C635	YES					

## SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On January 28, 1998, at 1725, the high pressure coolant injection (HPCI)[BJ] turbine stop valve above seat drain valve (2-2301-64) was identified to be in the closed position. The 2-2301-64 valve is an air operated valve that is open while HPCI is in standby. Local inspection of the valve indicated that the valve had failed closed due to a ruptured diaphragm in the valve's operator. Due to the inability to maintain a drain path for the area above the HPCI turbine stop valve seat as a result of the 2-2301-64 valve failing closed, the HPCI system was isolated by closing the inboard steam isolation valve (2-2301-4) at 1834. An ENS notification was made at 1922 and HPCI system LCO actions were entered, effective at 1725. The 2-2301-64 valve air operator diaphragm was replaced with an upgraded diaphragm and the valve cycled and timed satisfactorily. The HPCI system was returned to standby and declared operable at 0847 on January 29, 1998. The 2-2301-64 valve diaphragm failed due to wear. The cause of this event was manufacturer's design deficiency of the 2-2301-64 valve diaphragm. The safety significance of this event was minimal since all other emergency core cooling systems were available while HPCI was inoperable. Corrective actions from this event include: replacement of the 2-2301-64 valve operator diaphragm, and maintenance review and schedule revision of other similar valve air operator diaphragms. 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.

## LICENSEE EVENT REPORT (LER)

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

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

Energy Industry Identification System (EII) 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.

## High Pressure Coolant Injection System Declared Inoperable Due to Closure of the Turbine Stop Valve Above Seat Drain Valve Caused by Design Deficiency of the Operator Diaphragm

Unit: 2	Event Date: 1-28-98	Event Time: 1725 CST
Reactor Mode: 1	Mode Name: Run	Power Level: 99
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.

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 January 28, 1998, at 1725, the Unit 2 Nuclear Station Operator (NSO) noted that the high pressure coolant injection (HPCI)[BJ] turbine stop valve above seat drain valve (2-2301-64) indicated closed by remote indication on control room panel 902-3. The valve was last noted open at approximately 1700 during normal control room panel walkdown. The 2-2301-64 valve is an air operated valve that is open while HPCI is in standby. The valve is opened by instrument air pressure and closes by spring pressure. The function of the 2-2301-64 valve is to maintain the area above the HPCI turbine stop valve seat drained. Condensate drained through the valve goes to the HPCI room sump. The valve closes upon a HPCI system initiation. Local inspection of the valve indicated that the valve had failed closed due to a ruptured diaphragm in the valve's operator. A work package was prepared for replacement of the ruptured diaphragm.

Due to the inability to maintain the area above the HPCI turbine stop valve drained as a result of the 2-2301-64 valve failing closed, the HPCI system was isolated by closing the inboard steam isolation valve (2-2301-4) at 1834. An ENS notification was made at 1922 and HPCI system LCO actions were entered, effective at 1725.

The 2-2301-64 valve air operator diaphragm was replaced and the valve cycled and timed satisfactorily. The HPCI system was returned to standby and declared operable at 0847 on January 29, 1998.

**LICENSEE EVENT REPORT (LER)**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Dresden Nuclear Power Station, Unit 2	05000237	98	003	00	3 OF 4

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

**C. CAUSE OF EVENT:**

Inspection of the ruptured diaphragm indicated wear around the entire outer perimeter of the diaphragm at the point where the diaphragm makes contact with the diaphragm plate. The diaphragm rupture was approximately one inch long at a location that had slightly more wear than the remainder of the worn periphery of the diaphragm. No rough or damaged areas were noted on the diaphragm plate that would have accelerated the wear of the diaphragm.

The root cause of this event was manufacturer's design deficiency of the valve operator's diaphragm (NRC Cause Code B). The diaphragm which failed, has the embedded reinforcing fiber layer too close to the surface on the lower side of the diaphragm. This significantly increases the susceptibility of the diaphragm to a mechanical abrasion failure due to rubbing between the diaphragm and the actuator plate, essentially, the diaphragm wears out. This failure mechanism was also documented by the ComEd System Materials Analysis Department (SMAD) for three (3) other failed diaphragms of the same make and model from the Quad Cities Nuclear power plant during detailed laboratory examinations. In 1996 the valve manufacturer (Copes Vulcan) upgraded the diaphragm design by increasing the amount of rubber on the side of the diaphragm in contact with the diaphragm plate.

**D. SAFETY ANALYSIS**

Failure of the 2-2301-64 valve in the closed position will prevent the draining of the HPCI turbine stop valve above seat area. The diaphragm is not a safety-related part. The failure of this part allowed the valve to reposition to its safety position, which is closed. Any steam leakage past the normally closed HPCI steam admission valve (2-2301-3) will condense in this area. In the event of a HPCI system initiation during the time that the 2-2301-64 valve was closed, water entrapment in the steam could have resulted in turbine and/or turbine exhaust line rupture disc damage. Because of the potential of water entrapment, the HPCI system was declared inoperable. The HPCI system is designed to provide make up coolant to the reactor in the event of a small break Loss Of Coolant Accident. The safety significance of this event was minimal since all other emergency core cooling systems were available at the time that the HPCI system was declared inoperable.

**E. CORRECTIVE ACTIONS:**

The 2-2301-64 valve operator diaphragm was replaced with an upgraded diaphragm and the valve satisfactorily cycled and timed. (Complete)

The maintenance history of the 3-2301-64 valve (Unit 3), was reviewed and it was determined that the diaphragm was last replaced in March, 1995. Based on the service life of the Unit 2 valve diaphragm, it is expected that the Unit 3 diaphragm will provide reliable service through its next refueling outage. Valve maintenance will be scheduled to replace the diaphragm with an upgraded diaphragm by the next refueling outage. (237-180-98-00301)

A comprehensive review of all critical Copes Vulcan D100 operators will be performed. The review will focus on diaphragm maintenance history, service performance, and importance to safety. Upon completion of the review, a plan will be established to replace "at risk" diaphragms and to revise the preventative maintenance schedules as determined by the results of the review. (237-180-98-00302) (Note: the schedule review & revision portion of this action supersedes the schedule provided in LER 95-004, docket number 05000249.)

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Dresden Nuclear Power Station, Unit 2	05000237	98	003	00	4 OF 4

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

F. PREVIOUS OCCURRENCES:

<u>LER/Docket</u>	<u>Title</u>
95-004-00/05000249	HPCI System Declared Inoperable Due to Steam Line Drain Valve Diaphragm Failure

On March 8, 1995, dual indication was noted on air operated valve 3-2301-64 (Unit 3), HPCI stop valve above seat drain valve. The valve was examined and found to have a leaking diaphragm. During the development of the repair package the diaphragm leak worsened causing the valve to close fully on March 9, 1995. The HPCI system was declared inoperable. The diaphragm was replaced and system was declared operable on March 9, 1995. The corrective action was to replace the diaphragm and time the valve. The Cause of Event section of the LER stated that the scheduled frequency for replacement of the 2(3)-2301-64 and 2(3)-2301-65 diaphragms was increased from every two refueling outages to every refueling outage, with implementation to begin in D2R15 and D3R14 refuel outages. The corrective actions reported in LER 95-004 would not have prevented the event reported in the current LER because the action was scheduled to be performed during D2R15. D2R15 was rescheduled from 1997 to be performed in 1998, thus, the action would not have been completed prior to the failure reported in the current LER.

Additionally, in November 1995, the frequency for the diaphragm replacement for the 2(3)-2301-64 and 2(3)-2301-65 valves was revised to every 3 refueling outages. This revision was based on the Performance Centered Maintenance (PCM) program guidelines which considers component performance history. This revision appears to have been appropriate based on the information available at the time of the change.

G. COMPONENT FAILURE DATA:

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model Number</u>	<u>Part Number</u>
Copes-Vulcan	Air Operated Valve	D100-60	075514

Review of the NPRDS/EPICs data base identified 13 industry failures between 1991 and 1996. The cause is generally attributed to aging or 'worn out', which is consistent with the findings of this report.

The maintenance history for the 2-2310-64 valve was reviewed and no previous diaphragm failures were identified. The 2-2301-64 valve diaphragm was replaced during preventative maintenance on February 15, 1989 and May 10, 1993. Additionally, the diaphragm was replaced on December 20, 1990 during corrective maintenance for a non-diaphragm related issue.