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Dresden Nuclear Power Station
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GFSLTR 94-0057

U.S. Nuclear Regulatory Commission
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Licensee Event Report 94-004, Docket 50249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR 50.73(a)(2)(ii).

Gary F. Spedl
Station Manager
Dresden Station

GFS/JW/maf

Enclosure

cc: J. Martin, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

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IE22

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Dresden Nuclear Power Station, Unit 2 and 3	0 5 0 0 0 2 3 7	1 of 0 4

Title (4)

High Pressure Coolant Injection System Steam Drain Line Isolation Valves Installed Backwards Due to Construction Error

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 1 2	2 1 4	9 1 4	9 4	--- 0 0 4	--- 0 0	0 2	2 2	9 4	UNIT 3	0 5 0 0 2 4 9
									N/A	

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIRMENTS OF 10CFR (Check one or more of the following) (11)					
POWER LEVEL (10)	0 8 8	20.402(b)	20.405(c)		50.73(a)(2)(iv)		73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vii)		Other (Specify in Abstract below and in Text)
		20.405(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(viii) (A)		
		20.405(a)(1)(iv)	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
		20.405(a)(1)(v)	50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Aras Lintakas, Plant Support Engineer Ext. 2245	8 1 5 9 4 2 - 2 9 2 0

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)	NO			

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

On January 24, 1994 at 1140 hours, with Unit 2 at 88% and Unit 3 at 74% rated core thermal power, it was determined that the HPCI steam drain line isolation valves would not open under LOCA conditions. The unit 3 valve was replaced on January 15, 1994 as a result of leakage through the valve. During this valve replacement, the original valve was discovered to be installed backwards. When the valve was replaced, it was installed in the proper direction. The installed orientation of the Unit 2 valve was verified to be incorrect on January 17, 1994 at approximately 0800 hours. An engineering evaluation determined that, since a stronger spring had been installed on May 5, 1993, the Unit 2 valve would perform its design function. Prior to these dates, the valves would not have functioned as required. The safety significance was minimal because the HPCI system was capable of initiation during an event. A nuclear work request to re-orient the unit 2 valve has been initiated.

PLANT AND SYSTEM IDENTIFICATION:

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

Nuclear Tracking System (NTS) tracking code numbers are identified in the text as (XXX-XXX-XX-XXXXX)

EVENT IDENTIFICATION:
High Pressure Coolant Injection System Steam Drain Line Isolation Valves Installed Backwards Due to Construction Error.

A. CONDITIONS PRIOR TO EVENT:

Unit: 2 (3) Event Date: 01/24/94 Event Time: 1140

Reactor Mode: N (N) Mode Name: RUN (RUN) Power Level: 88% (74%)

Reactor Coolant System Pressure: 1000 (1000)

B. DESCRIPTION OF EVENT:

On January 24, 1994 at 1140 hours, with unit 2 at 88% and unit 3 at 74% rated core thermal power, it was determined that the High Pressure Coolant Injection (HPCI) [BJ] steam drain line isolation valves (2301-28) on both units would not operate under LOCA conditions. These valves had been found to have been installed improperly during initial plant construction. These valves are designed to open with system pressure assisting, i.e. flow under the plug. With the valves installed backwards, the flow is from over the plug, so the system pressure inhibits the valve from opening. This condition would have prevented the valves from opening under LOCA conditions.

The improper orientation of the valves was discovered while the unit 3 valve was disassembled for repair of leakage through the valve. The best repair for the leakage was determined to be to replace the valve, at which time, on January 15, 1994, a new valve was installed in the proper direction.

Because of this discovery on Unit 3, the orientation of the unit 2 valve was questioned. The orientation of the Unit 2 valve could not be immediately ascertained, because there are no distinguishing marks on the outside of the valve body. On January 17, 1994, upon closer, more detailed scrutiny, barely perceptible engraved markings were found on the valve body which showed that the 2-2301-28 was also installed backwards. An engineering analysis was performed which determined that the valve would operate when required as a result of the installation of stiffer springs, as described later. The assumptions for this analysis, which included packing friction and actuator spring capability, were verified by testing the valve on January 20, 1994.

The Unit 2 valve was replaced in December 1990 under nuclear work request D82665. The existing valve was removed and the new valve was oriented to the same position. Additionally, the valve manufacturer was contacted for approval to install a stiffer actuator spring. This approval was obtained and the new spring was installed in May 1993 under nuclear work request D08593.

C. APPARENT CAUSE OF EVENT:

This event is being reported in accordance with 10CFR50.73(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 systems that are needed to mitigate the consequences of an accident. It should be noted, however, that this condition would not have prevented initial HPCI initiation for core injection, but on subsequent HPCI initiations, potential equipment damage may have occurred.

The apparent cause of the events is that the valves were improperly installed during original plant construction, and this orientation was maintained during subsequent maintenance activities. The history for unit 2 reveals 15 work requests, while the history for unit 3 reveals 9. The valves demonstrated signs of re-occurring packing leakage, valve sticking and binding, and constantly requiring stem lubrication, defective diaphragm replacement, valve internal work, and spring tension adjustment to make the valves perform their function with load on them. It is apparent now that these symptoms are a result of the valve being installed backwards with pressure applied to the top of the valve plug. In summary, a more effective root cause analysis would have identified the potential for the valve being improperly installed.

D. SAFETY ANALYSIS OF EVENT:

The 2301-28 valve is a normally closed valve, it is maintained closed by air pressure, and it fails open due to spring force. Upon HPCI initiation, the valve is signalled to open. If the 2301-28 valve fails to open during an event in which HPCI is initiated, moisture could not drain from the HPCI steam line and would eventually back up through the drain line and the steam trap. Subsequently, if the HPCI turbine were tripped, upon re-initiation, any moisture collected at the HPCI Turbine Steam Inlet valve, 2301-3, would be introduced into the HPCI turbine steam chest. In either situation, moisture would be introduced into the HPCI turbine presenting potential impingement damage to the turbine blading. In addition, if sufficient water were to collect upstream of the 2301-3 valve, and the system were to re-initiate, a slug of water would become entrained in steam flowing through the turbine. The HPCI turbine design is capable of ingesting a water slug without casing damage occurring. The amount of water which would have actually entered the turbine in this event is unknown.

The safety significance of these events is minimal. In either event, the HPCI system would initiate and provide cooling to the core. Moisture impingement, which could occur during HPCI restart, would shorten the life of the turbine blades, but would present no problems for the operation of the system.

E. CORRECTIVE ACTIONS:

The Unit 3 valve was replaced under WR D23704. An operability evaluation was performed on the Unit 2 valve and it was determined to be operable with the stiffer springs installed, and will be replaced by D2R14. (NTS 237-180-94-00401)

The Integrated Reporting Program (IRP) has been implemented at Dresden since the installation of these valves. Had IRP been effectively

implemented at the time, it could have identified the recurring problems with these valves, and it could have prevented the subsequent ineffective root cause analysis performed.

Dresden is in the process of developing a matrix to establish the training recommended for investigators, team leaders, and reviewers, and this matrix will be completed by 10/01/94. (NTS 237-180-94-00402)

In addition, the IRP procedure will be revised to contain requirements to determine the reason the past corrective actions failed. These actions will be completed by 10/01/94. (NTS 237-180-94-00403)

F. PREVIOUS OCCURRENCES:

LER/Docket Numbers	Title

No previous occurrences were noted.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number

None