Commonwealth Edison
Dresden Nuclear Power Station
6500 North Dresden Road
Morris, Illinois 60450
Telephone 815/942-2920

August 30, 1994

RLBLTR 94-0005

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Licensee Event Report 92-023-02, Docket 50-249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10CFR50.73(a)(2)(ii).

Sincerely,

Richard L. Bax
Unit 3 Station Manager
Dresden Station

RLB/RS/cfq

Enclosure

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

rlb94\0005.94

IE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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): LPCI System Not Properly Filled Due to Failed LPCI Pump Discharge Check 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 NAME	DOCKET NUMBER
12	01	92	92	-- 023 --	02	08	12	94	None	
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	077

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(iii)		73.71(b)
	20.2203(a)(1)		20.2203(a)(3)(ii)		50.73(a)(2)(iv)		73.71(c)
	20.2203(a)(2)(i)		20.2203(a)(4)		50.73(a)(2)(v)	X	OTHER
	20.2203(a)(2)(ii)		50.36(c)(1)		50.73(a)(2)(vii)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(viii)(A)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)		50.73(a)(2)(viii)(B)		
	20.2203(a)(2)(v)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Reino E. Salmi, Plant Support Engineer Ext. 2348	(815) 942-2920

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	BO	V	C238	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 December 1, 1992 at 1300 hours after securing the Unit 3 "A" Low Pressure Coolant Injection (LPCI) pump (pump was running to support the monthly High Pressure Coolant Injection (HPCI) system surveillance), the "LPCI Header Low Pressure" alarm was received. The shift supervisor was dispatched to check the LPCI system pressure at the LPCI heat exchangers and discovered that the LPCI system was not properly filled. At 1615 hours LPCI was determined to be inoperable based on Technical Specification 3.5.H, and Unit 3 entered a 24 hour Limited Condition for Operation (LCO) starting at 1300 hours. It was discovered that the cause of this condition was that the discharge check valve of the 3A LPCI pump was not sealing. The check valve was isolated and the LPCI header was filled. An inspection of the check valve revealed that the rubber seat had peeled away from the valve, eliminating a portion of the sealing area. The check valve was replaced and a potential 10 CFR Part 21 investigation was initiated on the failed valve. This failure was determined by Engineering not to be 10 CFR Part 21 reportable. After a second failure of this type of check valve (same manufacturer and same model) on Unit 2 approximately ten months later, a further investigation revealed improper seat bonding by the manufacturer, C & S Valve Co. At this time, these check valve failures were considered to be 10 CFR Part 21 reportable. LER 93-021/050-237 describes the second failure and its corrective actions.

EVENT IDENTIFICATION:

LPCI System Not Properly Filled Due to Failed LPCI Pump Discharge Check Valve

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: 12/1/92 Event Time: 1300 Hours

Reactor Mode: N Mode Name: Run Power Level: 77%

Reactor Coolant System Pressure: 976 psig

B. DESCRIPTION OF EVENT:

On December 1, 1992 at 1300 hours after securing the Unit 3 "A" LPCI [BO] pump (pump was running to support the monthly High Pressure Coolant Injection (HPCI) [BJ] system surveillance), the "LPCI Header Low Pressure" alarm was received in the Control Room. At this time operators were dispatched to check for proper operation of the ECCS keep-fill pump. The operators reported that the pump appeared to be in good condition and showing a discharge pressure of 75 psig. At 1340 hours, the control room received a "Core Spray [BM] System Low Pressure" alarm (control room indication was showing 50 psig). The shift supervisor was dispatched to check the LPCI system pressure at the LPCI heat exchangers. Local pressure indication at both LPCI heat exchangers was reading zero. The shift supervisor opened the drain valves on the LPCI heat exchangers and verified water flow through the sight glass. However, the flow through the sight glass was significantly less than normal compared to when the system is pressurized. This indicated that the LPCI system was not properly filled. At 1615 hours, LPCI was determined to be inoperable based on Technical Specification 3.5.H, and Unit 3 entered a 24 hour LCO starting at 1300 hours on December 1, 1992 when the "LPCI Header Low Pressure" alarm was initially received. In an attempt to identify which LPCI loop was causing the problem, LPCI loop cross-tie valve MOV 3-1501-32A was closed and the following was observed: pressure on both Core Spray [BM] loops increased to normal (low pressure alarm cleared), pressure on "B" LPCI loop increased to 60 psig, and pressure on "A" LPCI loop remained at 0 psig. Since the 3A LPCI pump was the operating pump during the HPCI surveillance it was suspected that its discharge check valve was not sealing. The control switch for the 3A LPCI pump was placed in pull-to-lock, suction valve 3-1501-5A was closed, minimum flow valve 3-1501-13A was closed, the keep-fill pump was valved out, condensate transfer [KA] was valved in, and the "A" LPCI loop was vented and filled. This yielded a LPCI "A" loop pressure of 80 psig. Next, the following actions were taken while noting the effect on loop pressure:

ACTION	EFFECT
Opened suction valve 1501-5A	pressure down to 7 psig.
Closed suction valve 1501-5A	pressure up to 80 psig.
Opened min flow valve 1501-13A	pressure down to 7 psig.
Closed min flow valve 1501-13A	pressure up to 80 psig.

This information confirmed that the 3A LPCI pump discharge check valve was not sealing.

The 3A LPCI pump was manually isolated and the LPCI and Core Spray systems were vented. At 2001 hours venting was completed and LPCI was declared operable (24 hour LCO was terminated). The 3A LPCI pump being inoperable, resulted in the unit being in a 30 day LCO. The ECCS keep-fill pump was placed back in operation and condensate transfer was secured.

C. CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(i)(B), which requires the reporting of any operation or condition prohibited by the plant's Technical Specification.

The loss of pressure in the LPCI "A" Loop header was due to failure of the "A" LPCI pump discharge check valve. The volume depressurized through the seats of the 3-1501-63A check valve, "A" LPCI pump, and into the "A" LPCI pump suction.

The cause for leakage through the seats was determined during an inspection of the check valve performed under work request (WR) D14474. The inspection revealed that the rubber seat of the valve had peeled away from the body, eliminating a portion of the sealing area. This check valve is a dual disk type manufactured by C & S Valve Company. A field engineer from the valve manufacturer was present and assisted during the inspection. Further inspection of the check valve revealed that the rubber (Viton) seat was in good condition, except for a tear halfway through the loose portion. This tear was probably caused by flow after the seat had peeled away from the body.

After a second failure of this type of check valve on Unit 2 approximately ten months later (same manufacturer, same model), a further investigation of the root cause was initiated (LER 93-021). This investigation revealed that the root cause of the separation of the Viton seat was determined to be adhesive failure. This was evidenced by no rubber remaining on the valve body. Four factors collectively were the cause of the seat separation. The manufacturer had no controls over these four critical factors, and one or more of these factors is likely to occur during the bonding process. These four factor are:

1. Improper surface preparation.

   Surface preparation (grit blasting) removes oxidation and provides a larger surface area for the adhesive, which allows the adhesive to strongly bond to the metal.

2. Excessive time delays between surface preparation and adhesive application, and between application of adhesive coatings.

   Long delays in the bonding process lead to oxidation, moisture absorption by the adhesive and adhesive self-curing.

3. Improper adhesive coating thickness.

   The adhesive was not being applied at a specified thickness, which lead to improper bonding.

4. Improper control of moisture absorption by the adhesive.

   Moisture from humidity in the atmosphere reduces the effectiveness of the bond.

This cause for failure of the Viton seats is considered to be 10 CFR Part 21 reportable, and a notification was made by Corporate Engineering. LER 93-021/050-237 was written to address these new concerns and provide new corrective actions.

D. SAFETY ANALYSIS:

Technical Specification 3.5.H. states that whenever core spray, LPCI, or HPCI are required to be operable, the discharge piping from the pump discharge of these systems to the last check valve shall be filled. The basis for this requirement is that if the discharge piping of these systems were not filled, a water hammer could develop in this piping when the pump and/or pumps are started.

During this event, only the LPCI system on Unit 3 did not maintain its discharge piping filled. This condition existed for a period of approximately 7 hours. During this period all other ECCS were operable and available for injection into the reactor vessel. Additionally, all LPCI system components (with the exception of the 3A pump discharge check valve) were in a condition to perform their intended safety function although the increased risk of water hammer existed. For these reasons, along with the short period of time this condition existed, the safety significance of this event is considered minimal.

E. CORRECTIVE ACTIONS:

The check valve was replaced with a new one of the same type and manufacturer under WR D14474. The system was run after the installation of the new check valve, and the "A" LPCI Loop was observed for depressurization. The system operated satisfactorily after the new check valve was installed.

A potential Part 21 Investigation was initiated on the failed check valve per DAP (Dresden Administrative Procedure) 02-22 to determine if the check valve failure was due to a manufacturing defect. At this time, it was determined that the failure is not a 10 CFR Part 21 reportable.

The failed check valve was replaced with one of the same type and manufacturer for the following reasons:

1. The valve manufacturer (C & S Valve) has not reported any other occurrences of this nature. The valve representative stated that this type of failure has not occurred previously.

2. The root cause is not believed to be system-induced (i.e. flow turbulence or cavitation).

3. The valve representative performed a test on the new check valves in the station storeroom, similar to a construction test performed at the manufacturer's site. The valve representative stated the rubber seats of both valves are satisfactory.

4. The new check valves are of a different batch number that of the failed check valve.

Another check valve of the same type, size, manufacturer, and batch number is installed on the 3 "B" LPCI pump. An inspection of this check valve, 3-1501-63B, was performed on April 28, 1994 under WR 14546. During the inspection, the rubber seat was found to be separated from the valve body in a section 1/8" by 1/2", which still allowed the check valve to properly seal. An acceptable replacement was installed.

After the 10 CFR Part 21 notification was made due to the second failure on Unit 2 (LER 93-021), WR 21400 was written to replace the defective check valve on 3-1501-63A. The check valve was replaced on April 26, 1994.

F. PREVIOUS OCCURRENCES:

No previous occurrence of this type was found.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
C & S Valve Co.	Check Valve Dual Plate	90-1314-030-02	

An industry wide NPRDS data base search revealed no failures of this type were found.