

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Duane Arnold Energy Center	DOCKET NUMBER (2) 0 5 0 0 0 3 3 1 1	PAGE (3) 1 OF 0 1 3
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TITLE (4)  
HPCI Inoperability Due to Stuck Pilot on HPCI Stop 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		
0	1	28	8	5	0	0	2	27	None		
0	1	28	8	5	0	0	2	27	DOCKET NUMBER(S) 0 5 0 0 0		

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
POWER LEVEL (10) 0.810	20.402(b)	20.406(e)	50.73(a)(2)(iv)	73.71(b)		
	20.406(a)(1)(i)	50.38(e)(1)	50.73(a)(2)(v)	73.71(e)		
	20.406(a)(1)(ii)	50.38(e)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
	20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)			
	20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)			
20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)				

LICENSEE CONTACT FOR THIS LER (12)	
NAME James R. Probst, Technical Support Engineer	TELEPHONE NUMBER AREA CODE: 3 1 9 8 5 1 1 - 7 4 5 8

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	BLJ	IFLSIV	SI 2112	Yes						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO						

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

On 01/28/85 at 0250 hours, with the reactor in normal power operation, the High Pressure Coolant Injection System (HPCI) was declared inoperable due to the failure of the HPCI Turbine Stop Valve to open during the course of a monthly surveillance test. Per Technical Specifications 3.5.D.2 and 4.5.D.2, Duane Arnold Energy Center entered a seven day Limiting Condition of Operation (LCO). After cycling and flushing with oil the HPCI Turbine Stop Valve pilot oil Trip Solenoid Valve, the Turbine Stop Valve was found to function as per design. HPCI was declared operable on 1/29/85 and the seven day LCO canceled.

The root cause of the inoperability of HPCI was the pilot oil Trip Solenoid Valve for the Turbine Stop Valve being stuck in the open position. Upon examination on 2/8/85, with the reactor shutdown for a refuel outage, the diaphragm of the Trip Solenoid Valve was found to have some disintegration, resulting in the valve's plunger being stuck above the seat. Discussions with the manufacturer, Skinner Valve, indicate the cause of the diaphragm disintegration was end-of-life failure. The valve was replaced, and preventive maintenance to replace the valve's expendable parts is scheduled for every third refuel outage. No periodic replacement requirements for this valve previously had been identified by the turbine vendor, Terry Steam Turbine Co. The vendor will be informed of the details of this LER, and an INPO "NETWORK" entry is being prepared.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 5	0 0 2	0 0	0 2	OF	0 3

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

On 01/28/85 at 0250 hours, with the reactor in normal power operation, the High Pressure Coolant Injection System (BJ) was declared inoperable due to the failure of the HPCI Turbine Stop Valve (BJ-SHV-2201) to open during the course of a monthly surveillance test. The valve was successfully opened on a repeat attempt during the surveillance test. Per Technical Specifications 3.5.D.2 and 4.5.D.2, Duane Arnold Energy Center entered a seven day Limiting Condition of Operation (LCO), and verified Reactor Core Isolation Cooling (BN), Low Pressure Coolant Injection (BO), Core Spray (BG), and Automatic Depressurization System operability immediately and thereafter as required during the two days HPCI was inoperable.

The root cause of the failure of the hydraulically controlled HPCI Turbine Stop Valve to open initially was its pilot oil Trip Solenoid Valve (BJ-FSV-2259) being stuck in the open position. This prevented the Stop Valve from opening by allowing the control oil access to the drain. The Trip Solenoid Valve is normally closed and de-energized, and was last opened during the previous performance of the monthly surveillance test on 12/27/84. The Trip Solenoid Valve is reclosed during this test, but there is no indication for this valve's position.

On 01/28/85, a maintenance procedure was performed on the HPCI system, and in particular the Trip Solenoid Valve, which by analysis was judged the source of the Stop Valve's failure to open. With the auxiliary oil pump running, oil pressure immediately before the Trip Solenoid Valve was noted to be much lower than other points in the oil system, which were at normal pressure. The valve was cycled several times, and then held energized (open) for approximately twenty seconds to allow for oil flow past the valve seat. When it was de-energized, oil pressure at all points in the system returned to normal and the Turbine Stop Valve opened on command. A HPCI operability test was then performed and the system functioned as per design. Based on the aforementioned, HPCI was declared operable at 1145 on 1/29/85 (two days prior to a planned refuel outage shutdown), and the seven day LCO canceled. A commitment was made to examine the Trip Solenoid Valve prior to or during HPCI overhaul in the upcoming refuel outage. During the course of the reactor shutdown procedure, the HPCI turbine was successfully run on two occasions, illustrating further that HPCI had been operable following the maintenance procedure.

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

On 02/08/85, with the reactor in shutdown for a refueling outage, the Trip Solenoid Valve was disassembled for inspection. The valve is a two-way, normally closed diaphragm valve, Skinner Valve (S212) No. L2DB5150. At the center of the diaphragm is a spindle assembly with a plunger that seats to seal the valve closed. Equal oil pressure is maintained on both sides of the diaphragm via small ports in the assembly. A greater surface area on top of the diaphragm results in a net downward force, pushing the plunger into the seat. Springs are provided for additional force. The diaphragm was found to have some disintegration, with the result that small particles of diaphragm material had separated from the diaphragm and dispersed throughout the valve. It is surmised that the small diaphragm particles either clogged an oil port or ports causing a pressure imbalance, or more likely, lodged in the spindle assembly, resulting in the plunger being stuck above the seat. Discussions with the manufacturer, Skinner Valve, indicate the cause of the diaphragm disintegration was end-of-life failure. The valve was replaced with a like replacement. As preventative maintenance, replacement of the valve's expendable parts is now scheduled for every third refuel outage. No periodic replacement requirements for this valve previously had been identified by the turbine vendor, Terry Steam Turbine Co. (T147). The vendor will be informed of the details of this LER, and an INPO "NETWORK" entry is being prepared.

Iowa Electric Light and Power Company

February 27, 1985  
DAEC-85- 0171

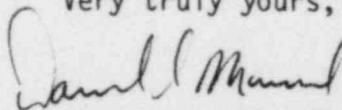
U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D. C. 20555

Subject: Duane Arnold Energy Center  
Docket No. 50-331  
Op. License DPR-49  
Licensee Event Report No. 85-002

Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

Very truly yours,



Daniel L. Mineck  
Plant Superintendent - Nuclear  
Duane Arnold Energy Center

DLM/JRP/kp

attachment

cc: Mr. James G. Keppler  
Regional Administrator  
Region III  
U. S. Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

NRC Resident Inspector - DAEC

File A-118a