

June 19, 2003  
NG-03-0444

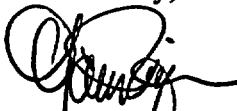
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station 0-P1-17  
Washington, D.C. 20555-0001

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License No: DPR-49  
Licensee Event Report #2003-004-00  
File: A-120

Dear Sirs:

Please find attached the subject Licensee Event Report (LER) submitted in accordance with 10CFR50.73. There are no new commitments contained within this report. Should you have any questions regarding this report, please contact this office.

Sincerely,



Mark Peifer,  
Site Vice President

cc: Mr. James Dyer  
Regional Administrator, Region III  
U.S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60532

NRC Resident Inspector – DAEC  
IRMS

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

<b>FACILITY NAME (1)</b> Duane Arnold Energy Center	<b>DOCKET NUMBER (2)</b> 05000331	<b>PAGE (3)</b> 1 of 4
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**TITLE (4)**  
Unplanned High Pressure Coolant Injection (HPCI) Limiting Condition for Operability (LCO) Caused by HCPI Seal Water Line Crack and Class 2 Leakage

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	20	2003	2003	- 004	- 00	06	19	2003		
<b>OPERATING MODE (9)</b>		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 3: (Check all that apply) (11)							
<b>POWER LEVEL (10)</b>		18								
			OTHER Specify in Abstract below or in NRC Form 366A							

**LICENSEE CONTACT FOR THIS LER (12)**

<b>NAME</b> Clara Rushworth, Regulatory Affairs	<b>TELEPHONE NUMBER (Include Area Code)</b> 319-851-7157
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**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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 April 20, 2003, the plant was in the process of starting-up after completion of Refueling Outage (RFO) 18. During the performance of a surveillance test procedure, a small leak was detected on the seal water line on the main High Pressure Coolant Injection (HPCI) System pump. At approximately 1513 CDT, at about 18% power, the HPCI system was isolated and Technical Specification LCO 3.5.1, Condition F, HPCI System Inoperable, was entered.

The piping was replaced. The HPCI system was restored to an operable status on April 21, 2003 at about 0436. Visual inspection confirmed that the leak was due to a narrow through-wall opening, approximately 1/4" long, at the root of a thread. The pipe appeared to have failed due to excessive bending stresses. The stresses may have been a result of applying torque to the pipe unions to vent the system or by stepping on the piping system.

There were no actual safety consequences associated with this event. There was no affect on public health and safety as a result of this event. This event is reportable under 10CFR50.73(a)(2)(v)(D).

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 4
		2003	-- 004 --	00	

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

**I. Description of Event:**

On April 20, 2003, the plant was in the process of starting-up after completion of Refueling Outage (RFO) 18. During the performance of Surveillance Test Procedure (STP) 3.5.1-09, High Pressure Coolant Injection (HPCI) System Post-Startup Operability Test, a small leak (about 30 drops per minute) was detected on the seal water line on the main HPCI pump. The leak was at the 1/2" threaded pipe connection between the seal purge water line and the pump case at the gearbox end of the pump. The joint continued to leak (at about 2 drops per minute) after the pump was secured (due to static head from the Condensate Storage Tanks).

This piping is ASME Class 2 piping; Section 3.7.3 of the Technical Requirements Manual (TRM) requires that structural integrity of this piping be maintained in accordance with ASME Section XI. At approximately 1337 CDT, TRM (T) Limiting Condition for Operation (LCO) T3.7.3 Condition A (Requirements of the LCO not met for Class 1 or Class 2 component in MODES 1, 2, and 3) was entered. Condition A is not applicable for components that are isolated from service. At approximately 1513 CDT, at about 18% power, the HPCI system was isolated and Technical Specification LCO 3.5.1, Condition F, HPCI System Inoperable was entered.

This unplanned HPCI System inoperability was reported under 10CFR50.72(b)(3)(v)(D) as a single train failure that could have prevented the fulfillment of a safety function of structures or systems designed to mitigate the consequences of an accident.

A work order was written, the leaking pipe and adjacent piping were replaced, the surveillance test was successfully completed, and the system was restored to an operable status on April 21, 2003 at about 0436.

**II. Cause of Event:**

The HPCI main pump is a centrifugal pump with mechanical seals at each end. Water from a purge system flows past the seals to remove heat generated at the faces. The leak occurred at the 1/2" threaded pipe connection (nipple) between the seal purge water line and the pump case at the gearbox end of the pump. The nipple extends upward and is connected to a horizontal line with elbows. A pipe union is in the horizontal pipe to facilitate assembly and disassembly; this union is also manipulated to vent air from the seal cavity. The union is loosened and tightened with the use of two pipe wrenches in an effort to minimize stress on the adjoining piping. Any unbalanced force is resisted by the piping system. Since the threaded connection into the pump case is not well suited for bending stresses, damage could occur at the connection while venting at the union. Stepping on the horizontal run of piping would also produce high bending stresses on the piping joint.

Visual inspection showed the leak was due to a narrow through-wall opening, approximately 1/4" long, at the root of a thread. The pipe appeared to have failed due to excessive bending stresses. The pipe nipple was apparently overstressed and cracked due to external forces being applied to the pipe system. As discussed above, these forces could have been a result of applying torque to the pipe unions to vent the system or stepping on the pipe system.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 4
		2003	-- 004	-- 00	

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

**II. Cause of Event: (continued):**

The seal water lines on the HPCI main and booster pumps have experienced small leaks in the past. A leak was reported at this same joint in 1998 and Work Order A39900 was written to replace the leaking nipple. However, before it was replaced, the fitting stopped leaking and the work order was voided.

The purge line on the opposite side of the HPCI main pump (turbine end) is of similar configuration. This line had similar damage and was repaired in 1998 by Work Order A34492. At that time, "NO STEP" signs were affixed to the piping in an effort to eliminate the potential for damage.

The seal water supply piping from the HPCI booster pump experienced similar leaks that were repaired during RFO 18 (Work Order A62318). Those leaks are thought to have been caused by manipulating a union to vent the seal chamber. The week prior to the leak in the HPCI main pump seal water line, CAP 026970 was initiated to evaluate the installation of vent valves on the HPCI main pump and booster pump seal water lines.

**III. Assessment of Safety Consequences:**

The leak was found during surveillance testing of the HPCI system. The Automatic Depressurization System (ADS) and the Reactor Core Isolation Cooling (RCIC) system remained operable during the duration of the HPCI LCO. At the time the leak was identified, there was a Low Pressure Coolant Injection LCO in effect due to operation of the Residual Heat Removal system in the Suppression Pool Cooling mode of operation. The LCO was exited prior to isolating the HPCI system. This event did not affect the availability of other systems needed to maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

A leak in the seal purge water lines will not significantly reduce the output of the HPCI pump. In addition, the pressure stress at the root of the pipe threads is very low. Once a crack first appears and a leak is visible, the pressure load would have very little influence in causing the defect to grow. An external bending moment, such as standing on the pipe or using pipe wrenches to loosen the unions, would be required to cause further damage.

Therefore, there were no actual safety consequences associated with this event. There was no affect on public health and safety as a result of this event.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		2003	-- 004	-- 00	4 of 4

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

**IV. Corrective Actions:**

The leaking pipe and adjacent piping were replaced (Work Order A62490).

An Action Request was initiated to consider improving the joint connection between the seal purge water line and the pump case, or reducing the forces applied to the joint (OTH 027734).

A previously initiated Action Request will evaluate the installation of vent valves on the HPCI main and booster pump seal water lines (CAP 026970).

**V. Additional Information:**

**Previous Similar Occurrences:**

A review of LERs at the DAEC over the last 3 years identified three LERs concerning HPCI – LERs 2001- 002, 2001-004 and 2001-007. The corrective actions from those events are not expected to have prevented this event.

**EIIS System and Component Codes:**

High Pressure Coolant Injection System: BJ

**Reporting Requirements:**

A 10CFR50.72(b)(3)(v)(D) notification was made on April 20, 2003, and is listed as event number EN 39775. This report is being submitted pursuant to 10CFR50.73(a)(2)(v)(D).