



July 20, 2001  
NG-01-0891

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 #2001-002-00  
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,

Rob Anderson,  
Plant Manager - Nuclear

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

NRC Resident Inspector - DAEC  
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**LICENSEE EVENT REPORT (LER)**

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

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.

**FACILITY NAME (1)**  
Duane Arnold Energy Center

**DOCKET NUMBER (2)**  
05000331

**PAGE (3)**  
1 of 3

**TITLE (4)**  
Unplanned High Pressure Coolant Injection Inoperability Due to Erroneous Flow Controller Reading Caused by Air Entrapment and Unfavorable Instrument Sensing Line Design Configuration

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
05	24	2001	2001	- 002	- 00	07	20	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
2	001	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
		20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	X 50.73(a)(2)(v)(D)	
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

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

NAME John W. Karrick, Nuclear Licensing	TELEPHONE NUMBER (Include Area Code) 319-851-7901
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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 May 24, 2001, after extensive system maintenance during a refuel outage, the High Pressure Coolant Injection (HPCI) system was declared inoperable at the end of a HPCI system low pressure surveillance test. The flow indicating controller, which functions to control HPCI turbine speed, was found reading an erroneous value of approximately 500 gpm with no actual flow in the system. The cause of the incorrect reading was air entrapment in the instrument lines for the flow transmitter that provides input to the controller. The root cause is an unfavorable design configuration of the flow instrument sensing lines that makes venting difficult. Corrective actions include a proposed modification to the instrument lines and a review of operating and maintenance procedures to take additional steps (as needed) for system venting after evolutions that have the potential to introduce air into the system. There were no actual safety consequences associated with this event. There was no impact on public health and safety as a result of this event.

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Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 3
		2001	- 002	- 00	

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

**I. Description of Event:**

On May 24, 2001, the plant was being started up after completion of Refueling Outage (RFO) 17. With the plant in Mode 2, (Startup) and reactor pressure less than 160 psig, a surveillance test for the High Pressure Coolant Injection (HPCI) system was performed. Upon completion of the surveillance, a flow-indicating controller (FIC2309) failed to return to zero as it should have. This controller receives input from a flow transmitter (FT2309) and transmits a speed demand signal to the HPCI turbine. With the controller reading between 400-500 gallons per minute (gpm) with no actual system flow, operators (utility-licensed operators) declared the HPCI system inoperable at 1809 hours and entered the 14 day completion time associated with Condition F of Technical Specification 3.5.1.

A work order was written, the instrument line vented, the surveillance test successfully completed, and the system was declared operable at 0120 hours on May 25, 2001.

**II. Cause of Event:**

During RFO-17, extensive maintenance was performed on the HPCI pump, which resulted in complete draining of the system, which is not normally done during an outage. As part of system restoration, actions were taken to fill and vent the system prior to performing the surveillance test. Also, the outage schedule included an activity to fill and vent the HPCI instrument lines, which was completed prior to the surveillance test. Since the controller functioned satisfactorily during the test then stuck as system flow and pressure were decreasing, it has been concluded that not all air had been vented out of the HPCI system piping. It is believed that flow through the system during the test allowed any remaining air to accumulate in system high points. Then, as flow and pressure dropped during completion of the test, the accumulated air impacted the instrument lines (instrument tap is a local high point) resulting in the false indication on the flow-indicating controller.

The root cause is the unfavorable design configuration (Design/Design Specs/Problem Not Anticipated) of the HPCI flow instrument sensing lines which makes venting difficult. The instrument sensing lines for the flow transmitter (FT2309) are installed on the side of the HPCI pump discharge piping, but are then routed upward to approximately 2 feet above the discharge piping. The lines are then routed back down with a U-shaped bend and are then sloped downward to the flow transmitter on instrument rack 1C-120 in the HPCI room. This configuration creates a local high point in the instrument line making it susceptible to air entrapment. Also, with the flow transmitter located approximately 11 feet below the connection to the discharge piping, venting the instrument does not guarantee complete venting of the instrument lines.

**III. Assessment of Safety Consequences :**

This event was discovered during low pressure operability testing of the HPCI system with reactor pressure less than 160 psig. The Automatic De-pressurization system was operable at the time. There were no systems, structures, or components that were inoperable at the start of the event that contributed to the event. There was a Low Pressure Coolant Injection Limiting Condition for Operation

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**III. Assessment of Safety Consequences (continued):**

(LCO) in effect at the time of the event due to operation of the Residual Heat Removal system in the Suppression Pool Cooling mode of operation. Variations in plant operating mode would not have impacted the safety significance of this event. 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. The HPCI system is designed to mitigate the consequences of an accident and though technically inoperable for 7 hours and 11 minutes, was considered available for use if needed. 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.

**IV. Corrective Actions:**

An Action Request (AR) to pursue a design modification to the HPCI flow instrument lines has been initiated. (AR 26631, Engineering).

A review of procedures applicable to HPCI system maintenance and operations will be performed and caution statements added where needed to assure additional system venting is performed after evolutions that drain the system or otherwise have the potential to introduce air into the system. (AR 26632, due October 31, 2001, Engineering).

**V. Additional Information:**

Previous Similar Occurrences:

A review of LERs at DAEC over the last 3 years did not find any previous similar events.

EIIS System and Component Codes:

High Pressure Coolant Injection System: BJ  
 Flow Transmitter: FT  
 FT2309: Rosemount Inc./Emerson Electric (R369) model 1152DP5L22T1805PB

A 10CFR50.72(b)(3)(v)(D) notification was made on May 24, 2001, and is listed as event number EN 38029. This report is being submitted pursuant to 10CFR50.73(a)(2)(v)(D).