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January 11, 1996
NG-96-0067

Mr. Hubert J. Miller
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Licensee Event Report #95-012
File: A-118a

Gentlemen:

Please find attached a copy of the subject Licensee Event Report in accordance with 10CFR50.73. The following new commitment is made in this letter:

An evaluation of the suitability of using "HGA" type relays in the High Pressure Coolant Injection (HPCI) turbine control system and other similar low current-low voltage applications is being conducted. This evaluation will be completed by March 31, 1996.

Sincerely,

Gary Van Middlesworth
Plant Manager - Nuclear

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U. S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D. C. 20555-0001

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 REQUIRES REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FEED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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.

FACILITY NAME (1) Duane Arnold Energy Center	DOCKET NUMBER (2) 05000/331	PAGE (3) 1 OF 4
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TITLE (4)
High Pressure Coolant Injection System turbine manually tripped following receipt of low flow alarm during testing

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	12	95	95	012	00	01	11	96	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)									
POWER LEVEL (10) 100	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)						
	20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)						
	20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71						
	20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER						
	20.2203(a)(2)(iii)	50.36(c)(1)	X 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A						
	20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)							

LICENSEE CONTACT FOR THIS LER (12)

NAME Bruce Klotz, Licensing Specialist	TELEPHONE NUMBER (Include Area Code) (319) 851-7599
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO	EXPECTED SUBMISSION	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (15)

On December 12, 1995, at 13:49, during the performance of Surveillance Test Procedure (STP) 45D001Q, "High Pressure Coolant Injection (HPCI) System Quarterly Operability Test," HPCI pump flow dropped unexpectedly and the "LO FLOW" alarm was received. At that time, the HPCI turbine was manually tripped by the operator and the system declared inoperable. A fourteen day Limiting Condition for Operation (LCO) was entered. While extensive troubleshooting failed to conclusively determine a cause for the event, concern over the suitability of a HPCI turbine control system relay in a low current-low voltage application was identified. A temporary modification to lower the overall contact resistance in this application was installed. Monitoring equipment was installed on the HPCI control system and a schedule of increased operability testing (every 10 days) was initiated. Following successful completion of STP 45D001Q on December 15, 1995, the HPCI System was declared operable. The HPCI turbine has been operated 4 times since December 12, 1995, with no recurrence of the problem.

This event had no effect on the safe operation of the plant.

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		95	-- 012	-- 00		

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

I. DESCRIPTION OF EVENT

On December 12, 1995, the plant was operating at 100% power. The plant was in day 1 of a 7 day Limiting Condition for Operation (LCO) due to the Post Accident Sampling System (PASS) being out of service for scheduled maintenance. At 13:49, during the performance of Surveillance Test Procedure (STP) 45D001Q, "High Pressure Coolant Injection (HPCI) System Quarterly Operability Test," HPCI pump flow dropped (from approx. 3000 gpm) unexpectedly and the "LO FLOW" alarm (less than 300 gpm) was received. At that time, the HPCI turbine was manually tripped by the operator and the system declared inoperable. A fourteen day LCO (per Technical Specification requirements) was entered. Both Core Spray subsystems, the Low Pressure Coolant Injection (LPCI) System, Automatic Depressurization System (ADS), and Reactor Core Isolation Cooling (RCIC) System were verified to be operable.

A review of the transient strip chart traces for the event showed that approximately 15 minutes into the run, HPCI inadvertently shutdown from a turbine control system signal. Less than a second later, the ramp generator reinitiated and the turbine returned to its previous operating condition. No alarms were received in the Control Room (flow did not drop below alarm setpoint). Approximately 6 minutes later, the turbine again shutdown and did not restart. The "Lo Flow" alarm was received and the turbine was manually tripped.

II. CAUSE OF EVENT

Troubleshooting of this event centered around potential malfunctions of the HPCI turbine control system. Possible causes investigated included:

- Spurious limit switch faults in the turbine stop and steam admission valves
- Control system relay failures (contacts and coils). Contact surfaces were burnished, even though surfaces appeared good and resistance values were acceptable.
- Loose terminations
- Control System power supply failure
- Spurious internal failures in either the Ramp Generator Signal Converter (RGSC) unit or the Electronic Speed Controller (EGM)

In all cases, the components were found to be within specifications and functioning properly (by themselves and in conjunction with the other components).

A review of the Nuclear Plant Reliability Data System (NPRDS) for similar problems at other plants was conducted. No intermittent spurious types of failures were found. Contact with component and system vendors failed to provide additional information.

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One possible area of concern was identified during troubleshooting. A relay (E41A-K054) in the low voltage switching circuit of the ramp generator is a General Electric 125VDC HGA type with "fine" silver contacts. The current being switched by the relay contacts is approximately 4 ma at 36VDC which is low for a relay of this type. However, with proper contact wipe to clean the naturally occurring oxide layer off the contacts, this relay should work acceptably in this application.

Temporary instrumentation has been installed on the HPCI turbine control system to more completely monitor component actions/reactions during HPCI runs. The HPCI turbine has been operated 4 times since December 12, 1995 with no recurrence of the problem.

III. ANALYSIS OF EVENT

The shutdown of the HPCI turbine had no effect on the safe operation of the plant. Per Technical Specification 3.5.D.2, inoperability of the HPCI system is a 14 day LCO, contingent upon the verified operability of both Core Spray (CS) subsystems, the Low Pressure Coolant Injection (LPCI) System, Automatic Depressurization (ADS) System, and Reactor Core Isolation Cooling (RCIC) System. The worst case effect of the HPCI inoperability with the reactor in the Run mode would be the loss of the ability to maintain reactor vessel water inventory after small line breaks that do not rapidly depressurize the vessel. ADS, in conjunction with the LPCI and CS Systems, provides full redundancy for HPCI. The operability of the ADS, LPCI, RCIC, and CS systems were subsequently verified to be operable.

IV. CORRECTIVE ACTIONS

Temporary instrumentation was installed on the HPCI turbine control system to more completely monitor component actions/reactions during HPCI runs.

A temporary modification has been installed on relay E41A-K054. A spare set of contacts on the same relay has been connected in parallel with the existing set of contacts in this circuit. This modification results in lowering overall contact resistance, as well as helping insure that the circuit is completed through a set of contacts that have been cleaned by proper contact wipe. In conjunction with this modification, an evaluation of the suitability of using an "HGA" relay in this and other similar low current-low voltage applications is being conducted. This evaluation will be completed by March 31, 1996.

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

V. ADDITIONAL INFORMATION

A. Previous similar events:

There is no history of previous similar events.

B. EHS System and Component Codes:

- BJ: High Pressure Coolant Injection System
- SC: Control Speed
- FI: Flow Indicator
- JX: Power Supply
- RLY: Relay