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June 25, 1997  
NG-97-1077

Mr. A. Bill Beach  
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 #97-06  
File: A-118a

Dear Mr. Beach:

Please find attached a copy of the subject Licensee Event Report in accordance with 10CFR50.73. There are no new commitments made in this letter.

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  
DOCU

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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: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO  
THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING  
BURDEN ESTIMATE TO THE 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 5

TITLE (4)

Inadequate Functional Test of the High Pressure Coolant Injection System Steam Leak Detection Time Delay

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
5	30	97	97	-- 06	-- 00	6	29	97	FACILITY NAME	DOCKET NUMBER
										05000-331
										05000-331
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
POWER LEVEL (10)		40	20.2201(b)		20.2203(a)(2)(v)		X		50.73(a)(2)(i)	50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(ii)				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)				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

Hai Tran, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

(319) 851-7491

## 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)

EXPECTED  
SUBMISSION

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 30, 1997, the plant was operating at approximately 40% power and increasing. During a review of a quarterly functional surveillance test procedure (STP 42A024-Q, Suppression Pool Steam Leak Detection Functional Test) for its adequacy of testing to meet future Improved Technical Specifications (ITS) requirements, it was discovered that the procedure did not fully meet the current Technical Specifications (TS) surveillance requirements. The cause of the event was the procedure contained an incorrect instruction which directed personnel to depress the override hand switch after a timer started but before it timed out to activate the contacts of the time delay relay. In this condition, the contacts were not tested to determine if they would activate when required. The incorrect instruction had existed in the original procedure written in 1974. The root cause of this event is inadequate previous technical reviews which did not identify the incorrect instruction and was subsequently carried on into the current procedure. Corrective actions included revising the procedure, re-performing the functional test, and reviewing other functional test procedures for testing time delays required by the current TS. As a long term corrective action and as part of an ongoing effort for converting to ITS, all future ITS required STPs are receiving or will receive an equivalent level of review to ensure they meet all requirements.

This event had no effect on the safe operation of the plant as all logic performed as required when tested.

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

## I. DESCRIPTION OF EVENT:

On May 30, 1997, the plant was returning to power operation from a maintenance outage. The plant was operating at approximately 40% power and increasing. At approximately 0900 hours, during a review of a quarterly functional test procedure (STP 42A024-Q, Suppression Pool Steam Leak Detection Functional Test) for its adequacy of testing to meet future Improved Technical Specifications (ITS) requirements, it was identified that the procedure may not fully functionally test the High Pressure Coolant Injection (HPCI) Steam Leak Detection (SLD) time delay as required by the current Technical Specifications (TS), Table 4.2-A.

At 0920 hours, the condition was determined to be reportable because the plant had been operated in a condition prohibited by the TS due to inadequate testing of the HPCI SLD time delay function. The contacts of the time delay relays in channels 'A' and 'B' were not tested under the quarterly tests to determine if they would activate (see Figure 1). The HPCI Suppression Pool SLD logic was declared inoperable and a one-hour Limiting Condition for Operation (LCO) per Section 3.2.A.1.b and a six-hour LCO per Section 3.2.A.1.a were entered. The test procedure was revised and re-performed. At 1000 hours, the 'A' channel was tested satisfactorily and restored to operable condition and the associated LCO exited per Section 3.2.A.1.b. At 1022 hours, all the necessary testing was completed satisfactorily on the remaining channel for the HPCI Suppression Pool SLD time delay and the associated LCO exited per Section 3.2.A.1.a.

## II. CAUSE OF EVENT:

The cause of this event was the functional test procedure for testing the HPCI SLD time delay which contained an incorrect instruction. The procedure directed personnel to depress the "HPCI Auto Isolation Time Delay Override" switch (HS-2267A) on Panel 1C21 after the "HPCI Auto Isolation Timer" started but before it timed out. In this condition, the contacts were not allowed to activate to energize the time delay relay (B21B-K4A), instead, the relay was energized by the hand switch which bypassed the time delay relay contacts.

Per definition 1.0, Item 22, in the Duane Arnold Energy Center (DAEC) TS, an instrument channel is an arrangement of a sensor and associated components used to evaluate plant variables and produce discrete outputs used in the logic. An instrument channel functional test means the injection of a simulated signal into the sensor to verify the proper response, alarm and/or initiating action. Initiating means a logic that receives signals from channels and produces decision outputs to the actuation logic. In this event, the contacts in the time delay relay were not tested to determine if they would be activated during the quarterly functional test because the procedure directed personnel to depress the hand switch after the timer started, thus, bypassing the contacts. The procedure did not meet its intended requirement.

A search of the functional test procedure history discovered that the incorrect instruction had existed in the original procedure written in 1974. The incorrect instruction was not recognized during the technical reviews and was subsequently carried on into the current test procedure. The root cause of this event is inadequate previous technical reviews which did not identify the incorrect instruction in the procedure.



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Although the HPCI SLD Time Delay logic was not functionally tested properly by the quarterly test procedure (STP 42A024-Q), it was tested and calibrated properly by the channel calibration procedure which is performed annually (STP 42A024-A, Suppression Pool Steam Leak Detection Functional Test and Calibration). The channel calibration procedure does not contain the same incorrect instruction to direct personnel to depress the hand switch after the timer starts, instead, it directs personnel to wait for the timer to time out and then verify the relay is energized. In this condition, the contacts were tested for proper activation. The last scheduled functional test and calibration had been performed satisfactorily on December 16, 1996. DAEC TS allows the use of combination of sequential or overlapping steps and procedures to satisfy surveillance requirements. In this instance, the reliance on the annual calibration to check the condition of these contacts was not judged to be adequate to eliminate the requirement for a quarterly functional test. This subtlety of the test requirements was not recognized during previous test reviews.

## III. ANALYSIS OF EVENT:

Indication of leakage into the suppression pool area is detected by sensing the differential temperature between the inlet and outlet ducts that ventilate the suppression pool area, and by sensing the ambient temperature in the pool area. If a high differential (higher than 50 degree Fahrenheit differential) or a high ambient temperature (higher than 150 degree Fahrenheit) occurs, isolation of the HPCI system does not occur immediately, but a timer is initiated and if the temperature in the pool area is not reduced below the trip point before the timer times out, the HPCI steam line is isolated. The high differential temperature and ambient temperature isolation settings are selected far enough above the expected normal operational levels to avoid spurious isolation, but low enough to provide timely detection of an HPCI turbine steam-line break.

The HPCI SLD Time Delay function for the suppression pool area is designed to allow time (fifteen minutes) for Operations personnel to identify leakage from other systems that may be leaking into the pool area and isolate them before the HPCI system is automatically isolated. This ensures maximum HPCI system availability by preventing an unnecessary isolation due to leaks in other systems. The two time delay relays in the two channels for the HPCI SLD Time Delay function are available and are required to be operable to ensure that no single instrument failure can preclude the isolation function. Isolation of the HPCI system turbine steam line prevents the excessive loss of reactor coolant and the release of significant amounts of radioactive material from the nuclear system process barrier.

Although the two logic channels for the HPCI SLD Time Delay Function were not tested properly during the quarterly functional test, they were tested and calibrated properly during the annual channel test and calibration, which was last successfully performed on December 16, 1996. When tested properly on May 30, 1997, the contacts were found fully operable. Test results from the annual calibration were reviewed for the life of the plant. No failures of these contacts have occurred. In addition, the SLD logic allows the HPCI system to be isolated manually when a high suppression pool area temperature condition exists, and before the timer times out, by depressing the hand switch (HS-2267A or B) on Panel 1C21 in the Control Room. This event did not have any effect on the safe operation of the plant.

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## IV. CORRECTIVE ACTIONS:

The quarterly test procedure was revised upon the discovery and re-performed satisfactorily without complications by 1022 hours on both channels of the HPCI SLD Time Delay logic. In addition, the logic channels had been tested and calibrated satisfactorily on December 16, 1996 during the annual channel test and calibration. The procedure for the annual channel test and calibration was reviewed and confirmed to not contain the incorrect instruction.

To ensure generic test deficiencies do not exist for time delay relays, functional test procedures for testing time delays required by the current TS have been reviewed and confirmed to not contain the same incorrect instruction.

As a long term corrective action for this event and as part of an ongoing effort at the DAEC for converting to the ITS, all ITS required test procedures are receiving or will receive an equivalent level of review to ensure they meet all requirements. This corrective action will be completed in accordance with the schedule of the ITS submittal dated October 30, 1996. It should be noted that this event was discovered during the review process for future ITS required test procedures.

## V. ADDITIONAL INFORMATION:

## A) Previous Similar Events

A review of the DAEC LERs since 1986 did not identify any previous reports of the HPCI Steam Leak Detection Time Delay for Suppression Pool not being functionally tested properly.

## B) EISS System and Component Codes

Suppression Pool Steam Leak Detection System -- IJ  
High Pressure Coolant Injection System -- BJ

## C) Equipment Information

There were no failed components associated with this report.

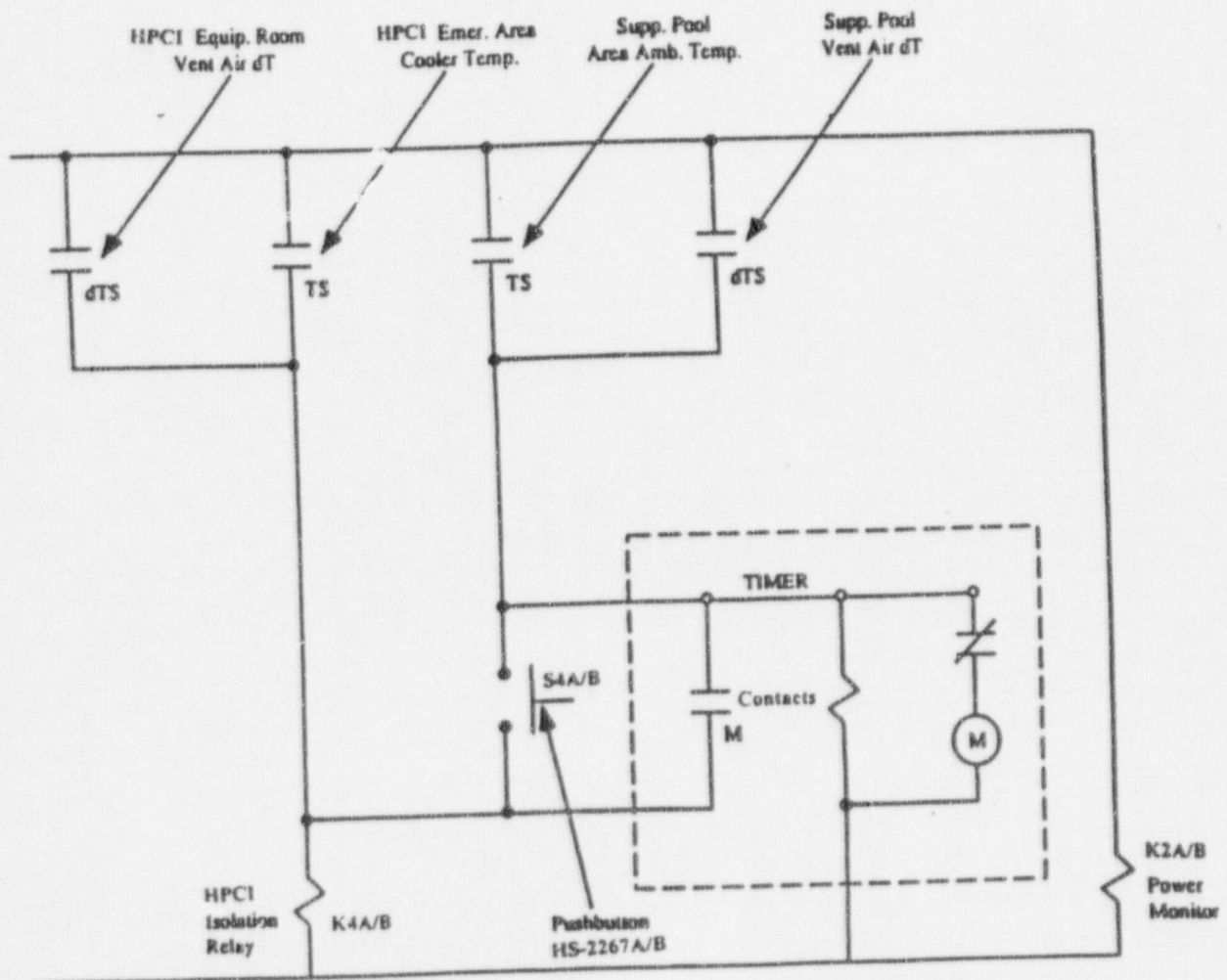
This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B)

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Figure 1. Simplified HPCI Timer Circuit, Channel 'A/B'



Reference: APED-B21-017<3>  
Revision 14, dated 5/26/94