

IES
UTILITIES INC.

June 28, 1994
NG-94-2386

Mr. John B. Martin
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 DPR-49
Licensee Event Report #94-007

Gentlemen:

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

The following new commitments are made in this letter:

1. An Engineering review of the Residual Heat Removal (RHR) Shutdown Cooling Group IV valve control and isolation logic will be completed by August 26, 1994.
2. The RHR and Plant Shutdown procedures will be revised by August 30, 1994 to include a caution to ensure that reactor pressure is low enough before initiating shutdown cooling to prevent an inadvertent isolation of the RHR System.

Very truly yours,

David L. Wilson

David L. Wilson
Plant Superintendent - Nuclear

DLW/PC/eah

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D. C. 20555

NRC Resident Inspector - DAEC

9407080005 940628
PDR ADOCK 05000331
S PDR

LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 300 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MMRB 7718), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545-0001, 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

TITLE (4)

Residual Heat Removal System (RHRS) Shutdown Cooling Partial Isolation

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	29	94	94	007	00	06	28	94		05000
OPERATING MODE (9)		3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 43. (Check one or more) (11)							
POWER LEVEL (10)		0	20.402(b)		20.405(c)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER	
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(vii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)	
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(vii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

Paul Collingsworth, Principal Engineer

TELEPHONE NUMBER (Include Area Code)

(319) 851-7481

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)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
--	--	-------------------------------	-------	-----	------

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 29, 1994, while proceeding to cold shutdown to repair a leak in the Electro-Hydraulic Control (EHC) system, a partial Primary Containment Isolation System (PCIS) Group IV actuation isolated the Residual Heat Removal (RHR) system suction piping. The RHR Shutdown Cooling (SDC) outboard isolation valve auto-closed when the RHR SDC inboard isolation valve was opened. This evolution was required in order to flush and warm the RHR piping and heat exchanger prior to initiating SDC. When the RHR SDC inboard isolation valve was opened, a pressure surge was sensed at one of the three pressure switches which resulted in a partial PCIS Group IV isolation. There was no adverse effect on the RHR system or plant. Corrective actions will include a review of the RHR SDC isolation valve control and isolation logic and procedure changes.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES: 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MRRB 7714) 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)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (3)

Duane Arnold Energy Center

05000331

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

94

- 007

- 00

2

OF

4

TEXT (If more space is required, use additional NRC Form 360A) (7)

I. DESCRIPTION OF EVENT:

On May 29, 1994, the plant was in Hot Shutdown (Plant Mode 3) with the reactor steam dome pressure at 105 psig. Operations personnel were preparing to flush and warm the Residual Heat Removal (RHR) piping and heat exchanger prior to initiating shutdown cooling.

As part of this process, the RHR shutdown cooling outboard isolation valve was opened and the Condensate Service Water system was aligned to the RHR suction piping to ensure the RHR suction piping was full. The Condensate Service Water flow was monitored and the Condensate Service Water system was isolated from the RHR suction piping once flow to the RHR system had stopped. The RHR shutdown cooling piping suction pressure indicated a pressure of approximately 110 psig. The operator then opened the inboard RHR shutdown cooling isolation valve. As the inboard Shutdown Cooling (SDC) isolation valve was opened, the outboard SDC isolation valve auto-closed due to a Primary Containment Isolation System (PCIS) Group IV logic actuation. This Engineering Safety Feature (ESF) actuates when reactor pressure is greater than a nominal 135 psig in the Reactor Vessel steam dome. Reactor pressure as sensed in the Reactor Vessel steam dome was 105 psig before and after the event. The operator immediately closed the inboard SDC isolation valve.

There are three pressure switches which provide a closure signal to the two RHR SDC Group IV PCIS valves. The inboard SDC isolation valve receives a closure signal from two separate pressure switch signals in parallel in a 1-out-of-2 logic. The outboard SDC isolation valve receives a closure signal from one pressure switch in a 1-out-of-1 logic. Both SDC isolation valves receive an input from pressure switches installed in the "B" Recirculation Pump loop suction piping. The inboard SDC isolation valve receives an additional input from a pressure switch installed on the Reactor Vessel level reference leg sensing line. All pressure switches were verified to be within calibration.

II. CAUSE OF EVENT:

The cause of the event was a pressure surge in the "B" Recirculation Pump suction piping. This was indicated by the actuation of one of the three SDC PCIS Group IV pressure switches for the 135 psig safety limit.

Since saturation conditions were present at the time of the event, the most likely source for the pressure surge was steam formation and collapse in the "B" Recirculation Pump suction piping when the inboard RHR SDC isolation valve was initially opened.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST 30.0 HRS. FORWARD
COMMENTS REGARDING BURDEN ESTIMATE TO THE
INFORMATION AND RECORDS MANAGEMENT BRANCH
(MNRB 7714) 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)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

Duane Arnold Energy Center

05000331

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

94

- 007

- CJ

3 OF 4

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

III. ANALYSIS OF EVENT:

The partial PCIS Group IV isolation is not a safety concern. All automatic actions for the isolation were verified to have occurred as designed. Shutdown cooling was successfully initiated following this event.

The Safety Limit in Technical Specification (TS) 1.2.2, states that "... The Reactor Vessel Dome pressure shall not exceed 135 psig at any time when operating the Residual Heat Removal (RHR) pump in the shutdown cooling mode. ..." The T.S. basis for section 2.2 states that the "... design pressure of the SDC piping of the RHR system is not exceeded with the Reactor Vessel steam dome pressure less than 135 psig..".

The Reactor Vessel Dome pressure during and after the event was 105 psig which is below the Safety Limit of 135 psig. In addition, only one of the two redundant pressure sensors which provide input to the PCIS Group IV logic from the "B" Recirculation Pump suction piping actuated. The pressure sensor for the Reactor Vessel Dome pressure and the redundant "B" Recirculation Pump suction piping did not actuate. The RHR SDC suction piping pressure indicator showed a pressure below 135 psig. Based on the results of this analysis, it can be concluded that no safety limit was exceeded.

IV. CORRECTIVE ACTIONS:

A engineering review of the RHR SDC PCIS Group IV valve control and isolation logic has been initiated. The purpose of this review is to identify potential system enhancements which would prevent or minimize the effects of momentary surges in the RHR SDC suction piping. This evaluation will be completed by August 26, 1994.

Changes to the RHR and Plant Shutdown procedures have been initiated to include a caution to ensure that reactor pressure is low enough (90 psig is recommended) to prevent an inadvertent isolation of the RHR system. These changes will be completed by August 26, 1994. The necessity for this caution will be re-evaluated upon completion of the engineering review (and any potential actions) described above.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES: 5-31-95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST 30.0 HRS. FORWARD
COMMENTS REGARDING BURDEN ESTIMATE TO THE
INFORMATION AND RECORDS MANAGEMENT BRANCH
(MNB 7714) 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)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (3)

Duane Arnold Energy Center

05000331

YEAR

SEQUENTIAL
NUMBERREVISION
NUMBER

94

- 007

- 00

4

OF

4

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

V. ADDITIONAL INFORMATION:

1. Previous Plant Events:

- a. A partial RHR PCIS Group IV isolation occurred on December 10, 1990 (LER 90-022). In that event, the partial isolation occurred when the inboard valve was opened causing the outboard isolation valve to go closed. The corrective action for that event included a procedural enhancement of filling the RHR System suction line via the Condensate Service Water system prior to performing the flush of the RHR suction piping.
- b. A partial RHR PCIS Group IV isolation occurred on June 23, 1991 (LER 91-005). In that event, a pressure surge while starting the RHR pump resulted in the outboard RHR SDC suction isolation valve closing. The corrective actions for that event included installation of instrument line snubbers and testing analysis for the RHR SDC system.
- c. RHR system testing (LER 91-005, Rev 1) was performed on February 28, 1992, when entering the shutdown cooling mode. This mode was successfully entered without a PCIS Group IV actuation. The testing revealed no system perturbations.

2. Related Plant System Reviews

- a. Separate from this event, a corrective action document was issued to review the design and licensing basis for the PCIS Group IV instrumentation set points.

3. Applicable EIIIS System / Components Codes

System

System Code

Primary Containment Isolation System

JM

Reactor Heat Removal System

BO

Reactor Recirculation System

AD

Condensate Service Water System

KA

Component

Component Code

RHR SDC Inboard and Outboard Isolation Valve

ISV

RHR Pumps

P

Pressure Switches

PS

4. Reportability

This event is being reported pursuant to 10 CFR 50.73 (a)(2)(iv).