

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

ACCESSION NBR:8808150383 DOC.DATE: 88/08/05 NOTARIZED: NO DOCKET #  
 FACIL:50-331 Duane Arnold Energy Center, Iowa Electric Light & Pow 05000331  
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SUBJECT: LER 88-006-00:on 880709,RWCU isolated due to failure of  
 riley panalarm temp switch.

W/8 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 5  
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

## NOTES:

RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
PD3-3 LA	1 1	PD3-3 PD	1 1
HALL,J.R.	1 1		
INTERNAL: ACRS MICHELSON	1 1	ACRS MOELLER	2 2
AEOD/DOA	1 1	AEOD/DSP/NAS	1 1
AEOD/DSP/ROAB	2 2	AEOD/DSP/TPAB	1 1
ARM/DCTS/DAB	1 1	DEDRO	1 1
NRR/DEST/ADS 7E	1 0	NRR/DEST/CEB 8H	1 1
NRR/DEST/ESB 8D	1 1	NRR/DEST/ICSB 7	1 1
NRR/DEST/MEB 9H	1 1	NRR/DEST/MTB 9H	1 1
NRR/DEST/PSB 8D	1 1	NRR/DEST/RSB 8E	1 1
NRR/DEST/SGB 8D	1 1	NRR/DLPQ/HFB 10	1 1
NRR/DLPQ/QAB 10	1 1	NRR/DOEA/EAB 11	1 1
NRR/DREP/RAB 10	1 1	NRR/DREP/RPB 10	2 2
NRR/DRIS/SIB 9A	1 1	NUDOCS-ABSTRACT	1 1
REG FILE 02	1 1	RES TELFORD,J	1 1
RES/DSIR DEPY	1 1	RES/DSIR/EIB	1 1
RES/DSR DEPY	1 1	RGN3 FILE 01	1 1
EXTERNAL: EG&G WILLIAMS,S	4 4	FORD BLDG HOY,A	1 1
H ST LOBBY WARD	1 1	LPDR	1 1
NRC PDR	1 1	NSIC HARRIS,J	1 1
NSIC MAYS,G	1 1		

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Duane Arnold Energy Center		DOCKET NUMBER (2) 0 5 0 0 0 3 1 3 1 1	PAGE (3) 1 OF 0 4
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TITLE (4)  
Reactor Water Cleanup Isolation Due to Failure of Riley Panalarm Temperature Switch

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 NAMES		DOCKET NUMBER(S)
0 7	0 9	8 8	8 8	0 0 6	0 0 0	0 8	0 5	8 8	None		0 5 0 0 0

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)										
POWER LEVEL (10) 0 9 7	20.402(b)			20.405(c)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)			73.71(b)	
	20.405(a)(1)(i)			50.38(c)(1)			<input type="checkbox"/> 50.73(a)(2)(v)			73.71(c)	
	20.405(a)(1)(ii)			50.38(c)(2)			<input type="checkbox"/> 50.73(a)(2)(vii)			OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
	20.405(a)(1)(iii)			50.73(a)(2)(i)							
	20.405(a)(1)(iv)			50.73(a)(2)(ii)							
	20.405(a)(1)(v)			50.73(a)(2)(iii)							
			50.73(a)(2)(ix)			<input type="checkbox"/> 50.73(a)(2)(x)					

LICENSEE CONTACT FOR THIS LER (12)											
NAME William W. Douglass, Technical Support Specialist										TELEPHONE NUMBER 3 1 9 8 5 1 1 - 1 7 3 1 0 1 6	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	
B	C	E	I	T	S	P	0	5	5	Yes	

SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO				

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

On July 9, 1988 at 1332 hours the Reactor Water Cleanup (RWC) System isolated due to an erroneous signal from the RWC Steam Leak Detection instrumentation. TS-2742C, a Riley/Ametek Panalarm Model 86 temperature switch monitoring RWC heat exchanger room ambient air temperature, was found to be reading above its trip setpoint. Other instrumentation in the area gave no indication of elevated temperatures or cleanup system leakage. The system responded as designed with the isolation of the RWC inboard isolation valve. Approximately two minutes after the event, TS-2742C returned to its normal temperature range. A visual inspection of the heat exchanger room was performed. As no leakage was detected, the system was unisolated, reinspected, and returned to service at 1416 hours.

TS-2742C was installed on May 12, 1987 after being purchased and remaining in warehouse stock since 1978. Post-failure bench testing of the temperature switch verified deterioration of capacitors within the internal power supply circuitry. This possibility had been specified in General Electric Service Information Letter No. 443. DAEC response to SIL 443 included study of all installed Riley/Ametek Panalarm switches and developing a program for their replacement. Upgraded switches presently in manufacture are to be shipped in August, 1988 with installation to be completed during the Fall 1988 Refueling Outage.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Duane Arnold Energy Center (DAEC)	05000331	88	006	00	02	OF	04

TEXT (If more space is required, use additional NRC Form 308A's) (17)

## I. DESCRIPTION OF EVENT:

On July 9, 1988 at 1332 hours, with the reactor at 97% power, the Reactor Water Cleanup (RWCU, EIIS System Code CE) inboard supply isolation valve M0-2700 (EIIS Code CE-ISV) automatically closed upon receiving a spurious isolation signal from the Steam Leak Detection System (SLDS, EIIS System Code JM). The remaining two RWCU isolation valves are operated by an unactivated separate logic and were manually closed by the control room operator as a precaution. The cause of the isolation was found to be a signal from TS-2742C, a Riley/Ametek Panalarm Model 86 temperature switch. TS-2742C monitors the RWCU heat exchanger room ambient air temperature. Immediately after the isolation event, TS-2742C was seen to be reading 140 degrees Fahrenheit, ten degrees above its trip setpoint of 130 degrees. Other switches in the area were reading approximately 115 to 124 degrees Fahrenheit. Two minutes after the isolation, the temperature reading at TS-2742C dropped to 120 degrees Fahrenheit. An Operator sent to the RWCU heat exchanger room saw no indications of steam leakage.

At 1416 hours the same day the RWCU system was unisolated and repressurized to 1000 psig. An inspection of the RWCU heat exchanger room was performed after repressurization and since no evidence of leakage existed, the system was returned to service.

## II. CAUSE OF EVENT:

The cause of this event was a spurious isolation signal from RWCU SLDS temperature switch TS-2742C. An inspection of the area and the readings from other switches in the room showed an actual isolation was not required. A contributing factor may have been high temperatures within the RWCU heat exchanger area due to the extreme summer weather and poor ventilation, combined with setpoint drift of TS-2742C.

The root cause of the event is internal failure of the Riley/Ametek Panalarm temperature switch, specifically the loss of capacitance within the internal power supply for integrated circuits.

Design deficiencies of Riley/Ametek Panalarm temperature switches are a well documented industry problem. An analysis of the performance of all installed Riley/Ametek Panalarm temperature switches completed in March, 1988 identified TS-2742C as a potential problem switch. A program for replacement of Riley/Ametek Panalarm switches was in progress prior to this event and will be completed during the Cycle 9/10 Refuel Outage.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Duane Arnold Energy Center (DAEC)	0 5 0 0 0 3 3 1	8 8	- 0 0 6	- 0 0	0 3	OF	0 4

TEXT (If more space is required, use additional NRC Form 308A's) (17)

## III. ANALYSIS OF EVENT:

The RWC System steam leak detection logic includes six temperature differential switches and six temperature switches. These switches receive inputs from temperature elements in areas containing RWC equipment. Any of these switches reaching their designated setpoints will result in isolation of the RWC System from the reactor. The RWC System is used to reduce impurities in the reactor water and to drain excess reactor water during certain operational modes. The only safety-related function associated with the RWC system is primary containment isolation. The RWC system is not needed to safely shutdown the plant, nor is it needed to maintain the plant in a shutdown condition. Therefore, this event had no effect on the safe operation of the plant. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as an actuation of an Engineered Safety Feature (ESF).

## IV. CORRECTIVE ACTIONS:

TS-2742C automatically reset two minutes after the isolation, and was observed to be reading normally at that time. TS-2742C was reading temperatures corresponding to those seen by other instruments in the room when monitored over the next few days. Communication with the vendor was established to ascertain if updated switches for the outage replacement program were available. Since an additional three week wait would have been required, TS-2742C was scheduled for replacement with on-hand stock. Installation was completed on July 22, 1988.

TS-2742C was installed in May, 1987 from warehouse stock (1978) to replace a switch which was noted to be oscillating. Two RWC isolations in July, 1987 were traced to TS-2742C (see LER 87-024). Following tightening of the lead screws at the temperature element feeding TS-2742C, no further spurious trips were noted. The instrument setpoint remained within one to two degrees of its design value as noted by monthly surveillance tests. In May, 1988, the TS-2742C contacts were seen to be chattering when at their setpoint, but the switch was successfully calibrated.

The defective TS-2742C was removed and visually examined for evidence of deterioration. Capacitor leakage was present possibly due to long shelf life prior to installation (from 1978 to 1987) or to heating. No other evidence of excessive heating was present. Bench testing of integral power supply capacitors indicated the following:

	Desired	Actual
C1	1400 microfarads	580 microfarads
C2	100 microfarads	11.5 nanofarads

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 308A's) (17)

The replacement of these commercial grade capacitors with computer grade high temperature, long life capacitors to improve off-the-shelf life was a modification specified in SIL 443. No modification of TS-2742C had been performed since the Engineering evaluation of SIL 443 was still in progress at the time of its installation. (That evaluation resulted in the program presently in progress for replacement of all Riley/Ametek Temperature switches).

Operating voltages within the integrated circuits of the Fairchild 709 and 741 operational amplifiers varied by as much as 33% from design voltages. This condition contributed both to switch chattering and the temporary trip condition which occurred.

General Electric Service Information Letter 443 discusses modifications to correct the persistent failure problems of the Riley/Ametek Panalarm temperature switches. DAEC LER 88-024 stated the recommendations of the SIL would be reviewed. Based upon that review, new switches with all current upgrades have been ordered from Ametek. The manufacture of these switches is in progress with scheduled shipping date of August, 1988. Installation shall be initiated as systems become available and completed during the Cycle 9/10 refuel outage in October-November 1988.

A test of cooling air flow paths in the RWCU heat exchanger room was conducted for three days commencing on July 22, 1988. The purpose was to verify proper heat exchanger room air flow patterns and RWCU isolation differential temperature settings. Test results included the lowering of heat exchanger ambient air temperature by 5 degrees Fahrenheit which would increase the margin between the Technical Specification setpoint of 130 degrees Fahrenheit and room temperature. Further testing is to be performed to reconcile these with test results performed in support of DAEC LER 87-024.

## V. ADDITIONAL INFORMATION:

## A. Failed Component Identification

TS-2742C RWCU Steam Leak Detection System Temperature Switch,  
Riley/Ametek Panalarm Division), Model 86PTGF

## B. Previous Similar Events

Isolations of the Reactor Water Cleanup System from SLDS signals have occurred in the past, and most recently have been discussed in LERs 84-019, 84-024, 84-039, 85-001, 85-013, 86-004, 86-006, 86-012, 86-021, 87-001, 87-003, and 87-024. These isolations have had a variety of causes, including a number of unwarranted signals from the temperature monitoring logic of the Steam Leak Detection System. TS-2742C was the cause of two isolations in 1987 reported in LER 87-024.

2-0

Iowa Electric Light and Power Company

August 5, 1988  
DAEC-88- 0550

Mr. A. Bert Davis  
Regional Administrator  
Region III  
U. S. Nuclear Regulatory Commission  
799 Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License DPR-49  
Licensee Event Report #88-006

Gentlemen:

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

Very truly yours,

*Dane Wilson for*

Rick L. Hannen  
Plant Superintendent - Nuclear

RLH/WWD/go

cc: U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

NRC Resident Inspector - DAEC

File A-118a

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