

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8710140274 DOC. DATE: 87/10/12 NOTARIZED: NO DOCKET #
 FACIL: 50-331 Duane Arnold Energy Center, Iowa Electric Light & Pow 05000331
 AUTH. NAME AUTHOR AFFILIATION
 PROBST, J. R. Iowa Electric Light & Power Co.
 HANNEN, R. L. Iowa Electric Light & Power Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-027-00: on 870910, primary containment isolation valve (PCIV) cycled to fail-safe closed position due to loss of power. Caused by loose terminal connections at power supply breaker. Terminal connections tightened. W/871012 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
	PD3-1 LA	1 1	PD3-1 PD	1 1
	CAPPUCCI, A	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/TRAB	1 1
	ARM/DCTS/DAB	1 1	DEDRO	1 1
	NRR/DEST/ADS	1 0	NRR/DEST/CEB	1 1
	NRR/DEST/ELB	1 1	NRR/DEST/ICSB	1 1
	NRR/DEST/MEB	1 1	NRR/DEST/MTB	1 1
	NRR/DEST/PSB	1 1	NRR/DEST/RSB	1 1
	NRR/DEST/SGB	1 1	NRR/DLPQ/HFB	1 1
	NRR/DLPQ/GAB	1 1	NRR/DOEA/EAB	1 1
	NRR/DREP/RAB	1 1	NRR/DREP/RPB	2 2
	NRR/DRIS/SIB	1 1	NRR/PMAS/ILRB	1 1
	<u>REG FILE</u> 02	1 1	RES DEPY GI	1 1
	RES TELFORD, J	1 1	RES/DE/EIB	1 1
	RGN3 FILE 01	1 1		
EXTERNAL:	EG&G GROH, M	5 5	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 (DAEC)	DOCKET NUMBER (2) 0 5 0 0 0 3 3 1	PAGE (3) 1 OF 0 4
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TITLE (4)
RCIC Primary Containment Valve Closure From Loose Breaker Connections; RCIC Remains Op.

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		
									None		
0	9	1	0	8	7	8	7	8	0 5 0 0 0		
									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 1 8 8	20.402(b)	20.406(a)(1)(i)	20.406(a)(1)(ii)	20.406(a)(1)(iii)	20.406(a)(1)(iv)	20.406(a)(1)(v)	20.406(c)	80.36(c)(1)	80.36(c)(2)	80.73(a)(2)(I)	80.73(a)(2)(II)	80.73(a)(2)(III)	80.73(a)(2)(IV)	80.73(a)(2)(V)	80.73(a)(2)(VI)	80.73(a)(2)(VII)(A)	80.73(a)(2)(VII)(B)	80.73(a)(2)(X)	73.71(b)	73.71(c)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)		

LICENSEE CONTACT FOR THIS LER (12)										TELEPHONE NUMBER	
NAME James R. Probst, Technical Support Engineer										AREA CODE	
										3 1 1 9 8 5 1 1 - 1 7 3 0 8	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

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

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

On September 10, 1987, with the plant in power operation, a Primary Containment Isolation Valve (PCIS) in the Reactor Core Isolation Cooling (RCIC) System cycled to its fail-safe closed position due to a loss of power. The power to the controlling solenoid valve of air-operated valve CV2411 was lost due to loose terminal connections at the power supply breaker. The root cause of the loose connections is unknown. CV2411 is designed to isolate the RCIC steam line condensate drain path upon RCIC initiation. The other, non-PCIS, valve powered from this breaker also cycled to its fail-safe position. The position indications for both valves in the Control Room were lost, as would be expected on a loss of valve control power.

The unplanned isolation on September 10, 1987 did not render RCIC inoperable. Power was restored after nine minutes at approximately the time the closed-in breaker switch was touched during investigation into the cause of the PCIS isolation. The breaker was later examined and terminal connections tightened. A previous intermittent power event from a breaker on the same panel occurred in May of 1987. Preventive maintenance recently performed on these breakers may have contributed to the loose connections. Plant Training has been informed.

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Handwritten initials and numbers, possibly "1122" and "1/2".

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 7 -	0 2 7 -	0 0	0 2	OF	0 4

TEXT (if more space is required, use additional NRC Form 366A's) (17)

I. DESCRIPTION OF EVENT:

On September 10, 1987, with the reactor at 88% power, a Reactor Core Isolation Cooling (RCIC) System (EIIS System Code BN) Group VIII Isolation valve (EIIS System JM) cycled to its fail-safe closed position due to a loss of power. There were no inoperable components or systems which would have had an effect on this event.

At 0940 hours the "RCIC Turbine Inlet Steam Line Drain Pot Hi Level" annunciator was received in the Control Room. The RCIC steam line drain pot is the collection point for the steam condensate which forms within the RCIC steam supply line up to the RCIC turbine inlet steam supply valve. This piping is normally open to the reactor. A drain pot high level is indicative of a closed drain path, and therefore the potential for excessive buildup of condensate within the RCIC lines. Upon investigating the cause of the annunciator activation, Operators in the Control Room noted the position indicating lights were not lit for a drain valve, CV2411, downstream of the drain pot. CV2411 is a Primary Containment Isolation System (PCIS) valve (Component Code JM-ISV). In addition, the position indicating lights were also not lit for CV2436, a RCIC condensate discharge to radwaste valve (BN-ISV) which is not a PCIS valve.

By design, CV2411 automatically closes upon RCIC initiation to prevent diversion of steam from the RCIC turbine (BN-TRB). This valve is air operated, with the air pressure regulated by a solenoid valve. The valve is normally open, with its controlling solenoid valve energized (SV2411, JM-PSV). When the solenoid valve is de-energized, air pressure is removed from CV2411 and this valve closes. This isolation valve is considered fail-safe in that a loss of either power to its controlling solenoid valve or instrument air pressure results in its cycling to and remaining in its system isolation position. CV2436 shares the same power source and is controlled in the same manner. Instrument air was not lost at the time of this event.

An Operator was dispatched to the RCIC room to verify the valves' position and to see if some condition within the room might have caused the valves to cycle to their fail-safe closed position. He found the valves de-energized and in the closed position, and no activities or conditions within the RCIC turbine area which could have resulted in the isolation.

An Operator was dispatched to the 125 VDC panel (EIIS System Code EF) from which the power for the two valves' controlling solenoids and indication originates. The breaker for the valves' circuit was found in the "On" or "closed-in" position. This breaker is a Westinghouse "EHB" model. The Operator received permission from the control room to push the breaker switch in the "On" direction. At 0949 hours the same day, approximately the time the switch was pushed, the valves' control circuitry and controlling solenoid valves regained power, and CV2411 and CV2426 cycled back open. This was noted by the Operator in the RCIC room. Valve indication was again observed in the Control Room. The valves were then cycled several times from the Control Room to insure operability.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

II. CAUSE OF EVENT:

The cause of the closure of PCIS valve CV2411 and loss of its indication in the Control Room was a loss of power to the valves' control and indication circuitry and controlling solenoid valves. The intermediate cause of the loss of power was determined to be loose terminal connections on the supplying breaker. This was established as follows in the next two paragraphs:

The solenoid valves and valve indication for CV2411 and CV2436 in the Control Room share the same power source. There are no other loads on this circuit. The power for both valves is carried to the Control Room via one cable, and then is split into separate sources for each valve and carried to the RCIC room in separate cables. It is unlikely anything within the RCIC room itself would have caused loss of power to both solenoid valves. There is no evidence of ongoing activities (such as surveillance tests) in the Control Room which would have effected the power source to both solenoid valves and the control and indication circuitry.

The 125 VDC breaker for the two solenoid valves was found in the "On" position. This breaker is located in an essential switchgear room in the turbine building, which is a mild environment. Power was restored at approximately the same time the breaker switch was pushed in the "On" direction. The Operator who worked with the breaker reported there was little or no additional movement in the "On" direction when he pushed the breaker switch. An on-line examination of the breaker after this event disclosed no "black marks" or evidence of an open circuit but some connection screws on the breaker were found slightly loose. In May of 1987 a loose terminal wire was determined to be the cause of intermittent power from another breaker in the same panel. These are molded-case circuit breakers for which internal failure at normal power ranges is highly unlikely. Breakers on this panel were fully tested in April, 1987 as part of the plant preventive maintenance schedule and no problems were found. The breaker for CV2411 and the one repaired in May of 1987 have both continued to function normally since their terminals were tightened. Therefore, it appears highly likely the cause of the loss of power to CV2411 was loose terminal connections at the breaker. The reason for terminals being loose, which is the root cause of this event, is unknown.

III. ANALYSIS OF EVENT:

There was no effect on the safe operation of the plant from this event. Closure of the RCIC steam supply condensate drain valve is a fail-safe condition, which would have occurred had RCIC been initiated. The RCIC steam supply drain pot is automatically bypassed on high level to ensure adequate line drainage. Condensate drained to Radwaste when the RCIC turbine is not being operated is otherwise returned to the RCIC system.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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The worst-case effect of this event would have occurred if the drain pot bypass had not worked correctly (an additional failure) and the time required to repair the circuit and reopen the drain pot drain line had been greater. Greatly excessive condensate buildup within the RCIC steam supply line would then have had the potential for damaging the RCIC turbine should it have initiated at that same time. The worst case effect of the RCIC inoperability with the reactor in run mode is to lose this system's ability to maintain reactor vessel inventory during events which do not depressurize the vessel. RCIC is not an Emergency Core Cooling System (ECCS) and the High Pressure Coolant Injection (HPCI) system (EIS System Code BJ) provides full redundancy during RCIC inoperability.

CV2411 is considered part of the Primary Containment Isolation System. Isolation of this valve constitutes the RCIC portion of a Group VIII Isolation. As previously stated, this isolation normally occurs upon RCIC initiation. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv) as the actuation of an Engineered Safety Feature.

IV. CORRECTIVE ACTION:

Following resumption of valve indication and power to the controlling solenoids, the valves were cycled several times to insure operability. The breaker was examined and some terminal connections tightened. It has remained fully functional since that time.

The event has been discussed with Training, as the possibility exists that the April, 1987 inspection and testing of this breaker may have contributed to the loose connections. Greater care when performing this type of work may need to be emphasized.

V. ADDITIONAL INFORMATION:

A. Failed Component Identification:

There were no components found to have failed during the course of this investigation.

B. Previous Similar Events:

A review of plant history found one previous case of intermittent power supply from breakers on this type. This is the aforementioned event in May of 1987, when loose terminals were found as the cause. A grounded breaker was found on this panel in 1984. It was due to deterioration of the breaker terminal block. Overall, plant records indicate this type of breaker has been a very reliable component.

Iowa Electric Light and Power Company

October 12, 1987

DAEC-87-1005

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

Subject: Duane Arnold Energy Center
Docket No. 50-331
Op. License DPR-49
Licensee Event Report No. 87-027

Gentlemen:

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

Very truly yours,

Rick L. Hanhen for
Rick L. Hanhen
Plant Superintendent - Nuclear

RLH/JRP/go

Attachment - LER 87-027

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

NRC Resident Inspector - DAEC

File A-118a