

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9010220257      DOC. DATE: 90/10/12      NOTARIZED: NO      DOCKET #  
 FACIL: 50-331 Duane Arnold Energy Center, Iowa Electric Light & Pow      05000331  
 AUTH. NAME      AUTHOR AFFILIATION  
 AXLINE, J.      Iowa Electric Light & Power Co.  
 HANNEN, R.L.      Iowa Electric Light & Power Co.  
 RECIP. NAME      RECIPIENT AFFILIATION

SUBJECT: LER 90-016-00: on 900918, reactor scram on three main steam lines less than 90% open. W/901012 ltr.

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	HALL,	J.R.	1	1					
INTERNAL:	ACNW		2	2	ACRS		2	2	
	AEOD/DOA		1	1	AEOD/DSP/TPAB		1	1	
	AEOD/ROAB/DSP		2	2	NRR/DET/ECMB 9H		1	1	
	NRR/DET/EMEB 7E		1	1	NRR/DLPQ/LHFB11		1	1	
	NRR/DLPQ/LPEB10		1	1	NRR/DREP/PRPB11		2	2	
	NRR/DST/SELB 8D		1	1	NRR/DST/SICB 7E		1	1	
	NRR/DST/SPLB8D1		1	1	NRR/DST/SRXB 8E		1	1	
	<del>REG-FILE</del> 02		1	1	RES/DSIR/EIB		1	1	
	RGN3	FILE 01	1	1					
EXTERNAL:	EG&G	BRYCE, J.H	3	3	L ST LOBBY WARD		1	1	
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DCD

Iowa Electric Light and Power Company

October 12, 1990  
DAEC-90-0839

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

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License DPR-49  
Licensee Event Report #90-016

Gentlemen:

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

Very truly yours,

*Rick L. Hannen* 10-12-90

Rick L. Hannen  
Plant Superintendent - Nuclear

RLH/JSA/sjo

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

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File A-118a

9010220257 901012  
PDR ADDCK 05000331  
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OCT 16 1990

IE22

**LICENSEE EVENT REPORT (LER)**

EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1) <b>Duane Arnold Energy Center</b>	DOCKET NUMBER (2) <b>0 5   0 0   0 3   3 1</b>	PAGE (3) <b>1 OF 03</b>
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TITLE (4) **Reactor Scram on Three Main Steam Lines Less Than 90% Open Due to Loose Electrical Connection Coincident With Surveillance Test Performance**

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		
09	18	90	90	016	001	01	29	90	DOCKET NUMBER(S) <b>0 5   0 0   0 0</b>		

OPERATING MODE (8) <b>N</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) <b>0 5   0</b>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(c)	<input checked="" type="checkbox"/> 80.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.406(a)(1)(i)	<input type="checkbox"/> 80.38(c)(1)	<input type="checkbox"/> 80.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.406(a)(1)(ii)	<input type="checkbox"/> 80.38(c)(2)	<input type="checkbox"/> 80.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.406(a)(1)(iii)	<input type="checkbox"/> 80.73(a)(2)(i)	<input type="checkbox"/> 80.73(a)(2)(vii)(A)							
	<input type="checkbox"/> 20.406(a)(1)(iv)	<input type="checkbox"/> 80.73(a)(2)(ii)	<input type="checkbox"/> 80.73(a)(2)(viii)(B)							
<input type="checkbox"/> 20.406(a)(1)(v)	<input type="checkbox"/> 80.73(a)(2)(iii)	<input type="checkbox"/> 80.73(a)(2)(ix)								

LICENSEE CONTACT FOR THIS LER (12)

NAME <b>Jeff Axline, Technical Support Engineer</b>	TELEPHONE NUMBER
	AREA CODE: <b>3 1   9 8   5 1 - 7 6   0 0</b>

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

CAUSE	SYSTEM	COMPONENT	MANUFAC. TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC. TURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On September 18, 1990, with the plant operating at approximately 50% power, a reactor scram occurred when three inboard Main Steam Isolation Valves (MSIVs) closed unexpectedly. Just prior to the MSIVs closing, the 'A' side of the Main Steam Line Radiation Monitor (MSLRM) surveillance test had been satisfactorily completed with isolation signals reset. Upon initiating the 'B' side test, the 'B', 'C', and 'D' inboard MSIVs closed resulting in the scram.

The cause of this event was a loose wiring connection in the inboard MSIV control logic which effectively put the 'B', 'C', and 'D' inboard MSIVs in a half (A side) tripped condition (AC solenoids de-energized) even though the logic was reset. During performance of the MSLRM surveillance, when the 'B' logic trip was inserted, the DC solenoids on the inboard MSIVs de-energized causing the 'B', 'C' and 'D' inboard valves to go closed.

Immediate corrective actions were to repair the connection and perform an extensive inspection of appropriate control room panels for additional loose connections. Long term corrective action will involve periodic inspections of appropriate panels.

This event had no effect on the safe operation of the plant. Safety systems responded as designed in response to the scram signal and the plant was quickly brought to a stable condition.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

EXPIRES: 4/30/92

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FACILITY NAME (1)  Duane Arnold Energy Center	DOCKET NUMBER (2)  0   5   0   0   0   3   3   1	LER NUMBER(6)			PAGE(3)		
		YEAR 9 0	SEQUENTIAL NUMBER - 016	REVISION NUMBER - 00			

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

**I. DESCRIPTION OF EVENT:**

On September 18, 1990, with the plant operating at approximately 50% power, a reactor scram (EIIS System Code JC) occurred when three inboard Main Steam Isolation Valves (MSIVs) (SB-ISV) closed unexpectedly. The scram automatically initiated at 01:31:52 in response to the MSIV closure to less than 90% open on three of four main steam lines (EIIS System Code SB). Just prior to the MSIVs closing, the 'A' side of the Main Steam Line Radiation Monitor surveillance test had been satisfactorily completed. Performance of the test causes a Primary Containment Isolation System (PCIS) (EIIS System Code JM) half Group I (MSIV) isolation signal. The signal had been reset prior to proceeding to the 'B' side of the test. Upon initiating the 'B' side test, the 'B', 'C', and 'D' inboard MSIVs closed resulting in the scram.

**II. CAUSE OF EVENT**

The inboard MSIVs are each controlled by two solenoids on a single valve. One AC solenoid which is controlled by the 'A' isolation logic and one DC solenoid which is controlled by the 'B' isolation logic. Both the AC and DC solenoids must de-energize to cause an MSIV to close. During investigation of the event, it was determined that the power (EIIS System Code EF) which feeds the AC solenoids is wired in a daisy chain format. Inspection of the connections in the daisy chain identified a loose connection at HS-4415A (SB-HS), the handswitch associated with the 'B' inboard MSIV. A reduction in voltage to this point due to the loose connection caused 'B', 'C', and 'D' inboard MSIV AC solenoids to de-energize, effectively putting the 'B', 'C', and 'D' inboard MSIVs in a half (A side) tripped condition even though the logic was reset. (NOTE: MSIV SOLENOID ENERGIZED LEDs were verified to be lit after resetting trip logic and prior to proceeding to the 'B' side of the surveillance test. This indicates that the AC solenoids de-energized after the LEDs were checked or enough voltage was available to light the LEDs but not energize the 'B', 'C', and 'D' AC solenoids.) The 'A' MSIV AC solenoid is wired prior to the loose connection in the daisy chain and therefore was unaffected by the loose connection. During performance of the Main Steam Line Radiation Monitor surveillance, when the 'B' logic trip was inserted, the DC solenoids on the inboard MSIVs de-energized causing the 'B', 'C' and 'D' inboard valves to go closed.

The cause of the loose connection could not specifically be identified, however, it appears that vibration during panel modifications and general modification work within the panel may have been contributing factors over a period of time.

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TEXT CONTINUATION**

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FACILITY NAME (1)  Duane Arnold Energy Center	DOCKET NUMBER (2)  0   5   0   0   0   3   3   1	LER NUMBER(S)			PAGE(S)	
		YEAR 9 0	SEQUENTIAL NUMBER - 016	REVISION NUMBER - 00	3	OF 3

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

**III. CORRECTIVE ACTIONS:**

Immediate corrective actions for the loose connection on HS-4415A were to initiate a maintenance request to replace the loose spade lugs with ring lugs. In addition, an extensive inspection of appropriate control room panels was performed to check for additional loose connections. As a long term corrective action, appropriate control room and plant panels will be periodically inspected for loose connections via the Preventive Maintenance Program.

**IV. EFFECT ON SAFE OPERATION:**

This event had no effect on the safe operation of the plant. All rods fully inserted in response to the scram signal. Shortly following the scram, vessel level decreased due to core void reduction as expected to approximately 157 inches. Reduction of level below 170 inches caused Group II-V PCIS isolations to occur as designed. No automatic Emergency Core Cooling System (ECCS) actuations occurred or were required as vessel level was maintained well above 119.5 inches (the point at which ECCS systems initiate) with feedwater (EIIS System Code SJ). As Group I isolation logic had not been completed and a Group I isolation was not required, the 'A' steam line was not manually closed. This greatly improved the operators' ability to control vessel pressure and dissipate residual heat. Safety Relief valve actuation was not required to maintain pressure within acceptable limits.

A full Group I isolation as well as a single MSIV closure are analyzed events without unacceptable safety consequences. As this event had only three of four main steam lines close, it is considered a subset of these analyzed events and therefore would have no effect on the safe operation of the plant under any operating conditions.

**V. ADDITIONAL INFORMATION**

A review of plant history did not identify any previous events in which a loose electrical connection resulted in a reactor scram. The review did identify one scram which occurred due to loose mounting screws on a Reactor Protection System (RPS) relay auxiliary switch. In addition, two LERs (87-027, 90-008) and five Deviation Reports associated with loose electrical connections were identified. None of these had significant consequences.

This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv).