

Iowa Electric Light and Power Company

October 18, 1993
NG-93-4416

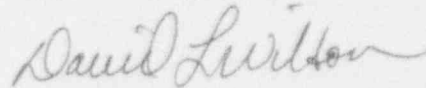
Mr. John B. Martin
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #93-008

Gentlemen:

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

Very truly yours,



David L. Wilson
Plant Superintendent - Nuclear

DLW/LS/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

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Duane Arnold Energy Center • 3277 DAEC Road • Palo, Iowa 52324 • 319/851-7611

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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 INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 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)

Duane Arnold Energy Center

DOCKET NUMBER (2)

05000 331

PAGE (3)

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TITLE (4)

'B' Standby Diesel Generator Output Breaker Failure to Close

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
09	16	93	93	008	00	10	18	93		05000
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		000	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		X 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)		X 50.73(a)(2)(i)		50.73(a)(2)(viii)(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)(viii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

Leonard L. Sueper, Principal Technical Support Engineer

TELEPHONE NUMBER (Include Area Code)

(319) 851-7365

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
D	EB	52	G080	YES					

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE)

X

NO

EXPECTED
SUBMISSION
DATE (15)

MONTH DAY YEAR

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

On September 16, 1993, the 'B' Standby Diesel Generator (SBDG) output breaker, 1A411, failed to close during the performance of the Loss of Offsite Power - Loss of Coolant Accident (LOOP-LOCA) surveillance test. The cause was an improper clearance between the breaker plunger and the switchgear stationary auxiliary switch mechanism on the Standby Transformer feeder breaker, 1A401, to essential bus 1A4. This improper clearance disabled one of the closure permissives for 1A411.

The corrective actions included readjusting the gap between the breaker plunger and the stationary auxiliary switch to within the specifications intended by the breaker vendor and testing.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES: 5/31/95

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER(6)			PAGE(3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Duane Arnold Energy Center	05000331	93	- 008	- 00	2	OF 7

TEXT (If more space is required, use additional NRC Form 386A) (17)

I. DESCRIPTION OF EVENT:

On September 16, 1993, with the plant in cold shutdown for a refueling outage, the 'B' SBDG output breaker, 1A411, failed to close during the performance of the LOOP-LOCA surveillance test, STP 48A002-CY.

Troubleshooting conducted by the plant Electrical Maintenance and Systems Engineering groups pinpointed the source of the problem to the 7-8 contacts on the stationary auxiliary switch mechanism in the switchgear cubicle for the Standby Transformer feeder breaker to essential bus 1A4, 1A401. The stationary auxiliary switch is operated by a plunger on the breaker (see figure 1) that causes the 'a' switch contacts to close when the breaker is closed and causes the 'b' contacts to close when the breaker is open. Contacts 7-8 are 'b' contacts and should have closed during the LOOP-LOCA test when 1A401 opened to provide a signal to the logic that bus 1A4 was disconnected from the Standby Transformer and that the 'B' SBDG output breaker could safely close on the bus. In situ testing of contacts 7-8 indicated that continuity existed between them but that they failed to pass sufficient current to energize one of the logic's relay coils. The switch was removed, its contacts were burnished, and the switch was reinstalled. When the LOOP-LOCA test was rerun on September 22, breaker 1A411 again failed to close. At that time it was discovered that, with breaker 1A401 racked in and open, the breaker plunger was depressing the stationary auxiliary switch operating rod approximately 3/16 inches. This caused enough rotation in the switch mechanism to cause contacts 7-8 to be partially open and maintain poor contact as identified during testing described above.

A review of plant records revealed that during the performance of periodic maintenance on breaker 1A401 on July 21, 1993, a spacer had been added to raise the plunger. The addition of the spacer restored one of the breaker's dimensions to within the vendor's specifications, but caused the relationship between the breaker plunger and the auxiliary switch operating rod gap to fall outside acceptable limits. The breaker plunger was readjusted and the LOOP-LOCA test was successfully completed on September 24.

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TEXT (If more space is required, use additional NRC Form 386A) (17)

II. CAUSE OF THE EVENT

The cause of this event was procedural inadequacy. The General Electric maintenance manual for Magne-Blast AM-4,16-350-2 circuit breakers (GEK-7320) states, under Auxiliary Devices-Plunger Interlock, that the distance from the top of the plunger bolt to the bottom of the lifting rail should be 11-7/32 to 11-11/32 inches with the breaker closed (see figure 2). The manual also states that washers should be added or removed from the plunger as necessary to achieve this dimension. This dimension assures that the 'a' contacts on the auxiliary switch will close when the breaker is closed and also establishes uniformity between individual breakers to make them interchangeable. Iowa Electric's maintenance procedure is based largely on GEK-7320 and it was this dimension that was being restored when the washer was added to the plunger on 1A401 on July 21.

In addition, the General Electric maintenance manual for Metal Clad switchgear (GEH-1802) states that, with the breaker racked in and open, that the gap between the breaker plunger and the operating rod on the stationary auxiliary switch mechanism should be from 0 to 1/8 inches and that any adjustment in this dimension must be made on the auxiliary switch setting. This measurement is a final check to make sure that the plunger and auxiliary switch perform as intended. However, the auxiliary switch is pinned in place and is not adjustable. General Electric has stated that removing this pin is inappropriate. Establishing this gap can only be accomplished by adding or removing washers from the plunger. The Duane Arnold Energy Center's maintenance manual did not address the need to establish this gap.

III. ANALYSIS OF EVENT

Two Technical Specification violations resulted from the inoperability of the 'B' SBDG output breaker for the period from July 21 to September 24. The period from July 21 to July 31 when the plant was shutdown for a refueling outage was longer than the seven day Limiting Condition for Operation allowed and was a violation of Technical Specification 3.5.G.1. The second violation (Technical Specification 3.9.D) occurred during the four day period during the refueling outage when fuel was removed from the reactor vessel with the 'A' SBDG also inoperable for maintenance.

In the event a Loss of Offsite Power event would have occurred between July 21, 1993 and September 24, the 'B' SBDG output breaker, 1A411 would have failed to close automatically on essential bus 1A4. However, plant procedures would have directed control room operators to perform the steps necessary to allow breaker 1A411 to be closed manually from the control room.

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A probabilistic risk assessment (PRA) of the core damage frequency (CDF) was performed for the period from July 21 when maintenance was performed on 1A401 until July 31 when the plant was placed in cold shutdown for its 12th refueling outage. The analysis conservatively assumed that the control room operators would be unable to close the 'B' SBDG output breaker and determined that the instantaneous CDF for this period was $6.00\text{E-}05/\text{year}$. This was a 21-fold increase but was still below the Proposed Safety Goal CDF of $1.00\text{E-}04/\text{year}$.

The Safety Analysis Group also evaluated the plant shutdown risk for the period from July 30 to September 24 to determine the effect on the reactor core boiling frequency. This time frame includes a four day period when fuel was being moved out of the reactor vessel at the same time the 'A' Standby Diesel Generator was inoperable for maintenance. Again assuming no operator action to manually close breaker 1A411, the frequency of core boiling was increased 2% for the most limiting 24 hour period. This increase is considered minimal. A refueling accident, combined with a loss of offsite power event would have resulted in appropriate Reactor Building ventilation isolations. Manual operator action would have been necessary to ensure proper Standby Gas Treatment and Standby Filter Unit systems operation by restoring electrical power to essential busses. Throughout this period, offsite power sources were available.

IV. CORRECTIVE ACTIONS

1. The proper gap between the 1A401 auxiliary switch operating rod and the breaker plunger was established on September 23 and the LOOP-LOCA surveillance test, STP 48A002-CY was successfully completed on September 24.
2. Plant procedures have been revised to address the need to establish the auxiliary switch - breaker plunger gap.
3. A review was completed on all of the stationary auxiliary contacts in the essential busses and RPT breakers to identify those contacts with functions important to plant safety. All such contacts were either tested or verified to have been tested since the last time the breaker plunger had been adjusted. No failures were identified.

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4. Measurements were taken on all essential and nonessential 4160 volt switchgear to assess conformance to vendor acceptance criteria. In thirteen of the essential breakers, the gap fell outside the vendor's criteria. Of the 13, the stationary auxiliary contacts on three of these breakers perform no safety related or significant plant functions and were not reworked prior to plant startup. The remaining 10 were adjusted to within vendor specifications. If a breaker plunger was adjusted downward (spacers removed), its 'a' contacts were functionally tested after the adjustments were made.
5. Six non-essential 4160 volt breakers with functions important to plant operation were also adjusted to within specification and were functionally tested if spacers were removed.
6. Special Order 93-48 was issued due to the concerns over 4160 volt breakers. The Special Order requires the Electrical Maintenance Supervisor or his designee to authorize and witness any exchanges between 4160 volt breakers. Any exchange will be documented on a Corrective Maintenance Action Request (CMAR) describing the condition which necessitates the exchange and the serial numbers of the breakers involved.

V. ADDITIONAL INFORMATION

- A. The industry was informed of Iowa Electric's concerns over the establishment of the plunger-to-switch gap on General Electric Magne-Blast circuit breakers. As a result of feedback from various utilities, Iowa Electric has been made aware of inconsistencies within the industry on how the plunger-to-switch gap is established, if at all. An NPRDS search did not indicate any instances of breaker failure that were attributed to an insufficient plunger-to-auxiliary-switch gap.

B. Previous Similar Events

No previous LERs were found that documented the failure of a SBDG output breaker to close.

C. EIIS System and Component Codes

Diesel Generator--EK-DG
Emergency Onsite Power Supply--EK

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

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TEXT CONTINUATION

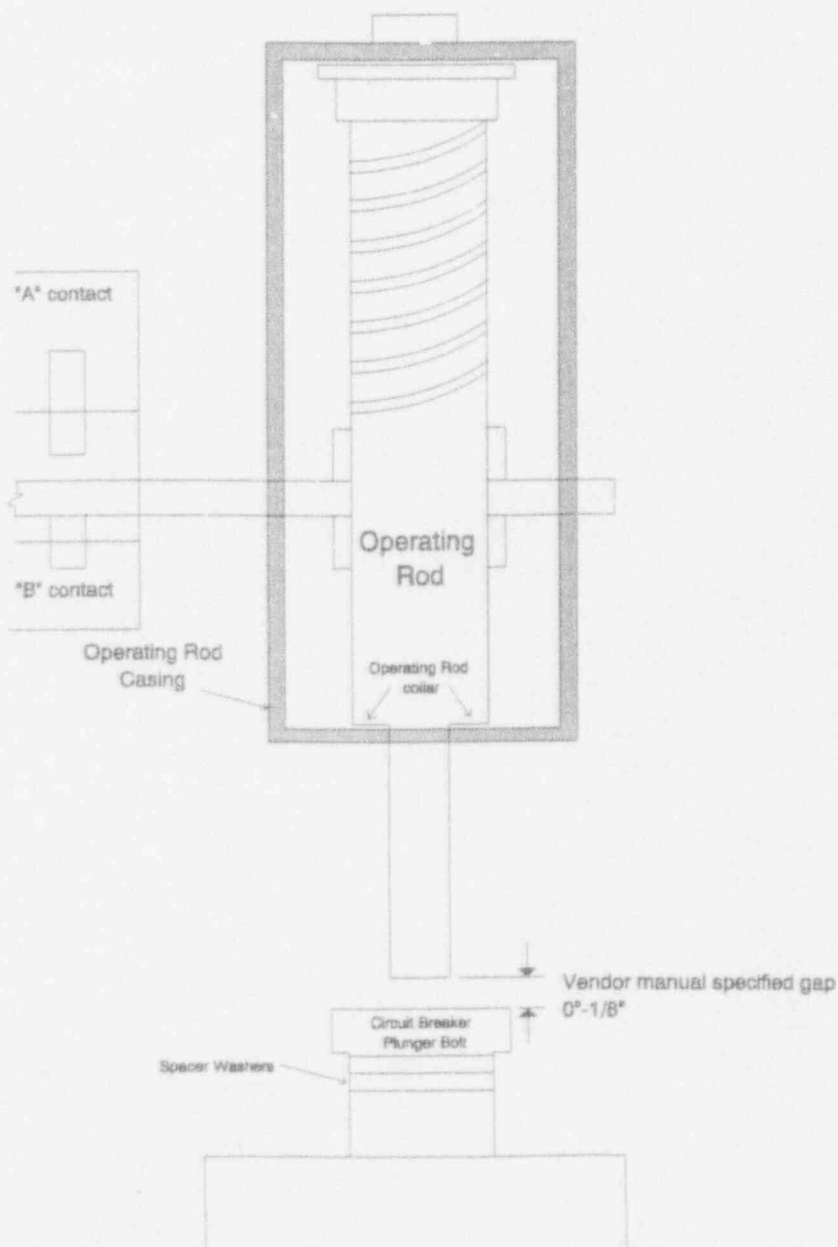
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LER 93-008 Figure 1

Breaker Open Position



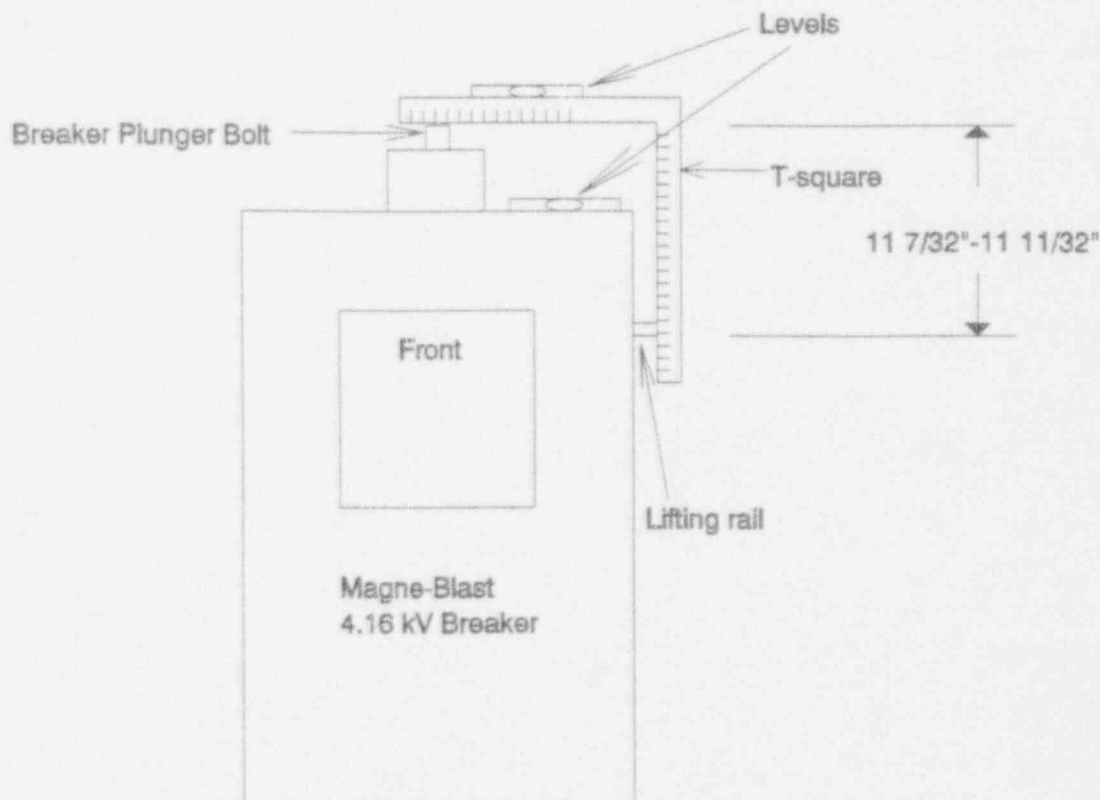
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LER 93-008 Figure 2



Breaker Lifting Rail-to-Plunger Bolt Measurement