

Iowa Electric Light and Power Company

April 12, 1990  
DAEC-90-0293

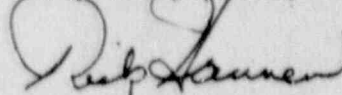
Mr. A. Bert Davis  
Regional Administrator  
Region III  
U. S. Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License DPR-49  
Licensee Event Report #90-001

Gentlemen:

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

Very truly yours,



4-12-90

Rick L. Hannen  
Plant Superintendent - Nuclear

RLH/BKS/gt

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

Dr. William R. Jacobs, Jr.  
GDS Associates, Inc.  
Suite 720  
1850 Parkway Place  
Marietta, GA 30068-8237

File A-118a

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**LICENSEE EVENT REPORT (LER)**

EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 300 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-330) U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON DC 20548 AND TO THE PAPERWORK REDUCTION PROJECT (3150-0184) OFFICE OF MANAGEMENT AND BUDGET WASHINGTON DC 20503

FACILITY NAME (1) **Duane Arnold Energy Center** DOCKET NUMBER (2) **0 5 0 0 0 3 3 1** PAGE (3) **1 OF 0 4**

TITLE (4) **Auto Start of Standby Emergency Diesel Generators Due to Switchyard Component Failure**

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)
03	15	90	90	001	00	04	12	90	None		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 5 (Check one or more of the following) (11)

POWER LEVEL (10) <b>0.50</b>	20.402(b)	20.402(a)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
	20.402(a)(1)(ii)	50.30(a)(1)	<input type="checkbox"/>	50.73(a)(2)(iv)	73.71(a)
	20.402(a)(1)(iii)	50.30(a)(2)	<input type="checkbox"/>	50.73(a)(2)(iv)	OTHER (Specify in Abstract below and in Text NRC Form 308A)
	20.402(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(v)(i)(A)	
	20.402(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(v)(i)(B)	
	20.402(a)(1)(iv)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(i)	

LICENSEE CONTACT FOR THIS LER (12)

NAME **Brian K. Smith, Technical Support Specialist** TELEPHONE NUMBER **319 851-7456**

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
X	F,K	CAP	W,1,2,0	N					

SUPPLEMENTAL REPORT EXPECTED (14) YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15) MONTH DAY YEAR

ABSTRACT (Limit to 1400 spaces. Use approximately 1/3 inch single-space typewritten lines) (16)

On March 15, 1990, the plant was operating at 50% power. At 2102 hours, multiple annunciators alarmed in the Control Room and both Standby Emergency Diesel Generators (SBDGs) auto-started. However, the 4160 VAC busses remained powered from normal sources (a loss of off-site power had not occurred). Investigation revealed that a Coupling Capacitor Potential Device (CCPD) associated with a 161KV transmission line in the offsite switchyard had failed, causing a small fire and a momentary voltage dip sensed on one phase of the 4160 VAC busses. This caused both SBDGs to auto-start. The failed CCPD was immediately isolated by two 161KV circuit breakers and once deenergized, the small fire burned itself out. The CCPD failed as a result of internal arcing due to a loss of oil in the capacitor. That CCPD and another were replaced. A multi-division effort to develop a formal plan for improving switchyard maintenance activities has been initiated.

This event is being reported pursuant to 10CFR50.73 (a)(2)(iv) as an Engineered Safety Feature actuation.

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

EXPIRES: 6/30/92

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)  Duane Arnold Energy Center	DOCKET NUMBER (2)  05000331	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		90	-001	-00	2	OF 4

TEXT (if more space is required, use additional NRC Form 306A's) (17)

**I. DESCRIPTION OF EVENT:**

On March 15, 1990, the plant was operating at 50% power. At 2102 hours, multiple annunciators alarmed in the Control Room (EIIS System Code NA) and both Standby Emergency Diesel Generators (SBDGs, EIIS System Code EK) automatically started. Immediate investigation revealed that a voltage disturbance had been sensed on the 4160 VAC busses (EIIS System Code EB). However, the busses remained powered from their normal sources (off-site power had not been lost). Further investigation revealed that the Reactor Water Cleanup (RWCU) system (EIIS System Code CE) 'A' pump had tripped and that one of the two divisions of the Instrument AC system (EIIS System Code EF) had auto-transferred to its alternate power source.

Concurrent with this, Security personnel contacted the Control Room and notified the Shift Supervisor of a reported small fire in the switchyard (EIIS System Code FK) and that the offsite Fire Department had been contacted per plant procedures. Security also informed the Shift Supervisor that minor problems had occurred to three multiplexors in the Security system (EIIS System Code IA) and that some offsite communication (EIIS System Code FI) capabilities had been lost. Security immediately placed compensatory measures in effect and there was no compromise to plant security. Investigation in the offsite switchyard revealed that a Coupling Capacitor Potential Device (CCPD) associated with a 161 KV transmission line had failed. Subsequent investigation revealed that the failed CCPD had been automatically isolated by adjacent 161 KV circuit breakers. Once the CCPD had been deenergized, the small fire burned itself out. After the fire was verified out, investigation into the cause for the failure of the CCPD was initiated.

**II. CAUSE OF THE EVENT:**

A CCPD is a Class A voltage transforming device connected to a high voltage transmission line through a coupling capacitor to provide low voltage for the operation of instruments and relays. The CCPD consists of two main parts; an assembly of several stacked porcelain coupling capacitor units that are filled with oil which is then mounted on a base housing which contains a transformer and associated circuitry. This CCPD was connected to a 161 KV transmission line to provide several switchyard relays with power. The CCPD capacitor had catastrophically failed such that the entire capacitor had disintegrated. This caused a momentary voltage dip sensed on one phase of the 4160 VAC busses. Once the two 161 KV switchyard circuit breakers tripped, the failure was isolated and the 4160 VAC busses returned to normal voltage. The voltage transient sensed on the 4160 VAC busses was determined to have caused the plant equipment responses previously discussed. Subsequent investigation into the failure of the CCPD was conducted by plant personnel, two other separate divisions of the utility, and the CCPD vendor. Due to the extent of damage, the



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

EXPIRES: 4/30/92

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

the ability to troubleshoot the CCPD was greatly limited. Investigation identified oil deposits on the CCPD base housing and where the CCPD was mounted in the switchyard. Based on engineering judgement, the cause for the failure is attributed to the loss of oil in the capacitor. A loss of oil would cause internal arcing of the capacitor. We have concluded that this arcing caused the capacitor to fail as it did. Per the vendor, this type of CCPD failure has occurred three or four times previously in the industry.

### III. ANALYSIS OF THE EVENT:

The purpose of the SBDGs is to provide emergency power to safety related loads in the event of a loss of offsite power. The SBDGs are normally in standby. Upon receipt of an auto-start signal, the SBDGs will start, come up to speed, and, if conditions allow, assume loads off the 4160 VAC busses. In this event, the SBDGs sensed the momentary voltage dip on both startup and standby transformer (EIIS System Code EL) secondaries due to the failed CCPD and that caused the SBDGs to auto-start. However, the failure was quickly isolated and the SBDGs did not assume loads. Once Operations Department personnel verified that plant conditions and offsite power were stable, the SBDGs were shutdown and returned to standby at 2120 hours.

The momentary voltage dip caused the RWCU system 'A' pump solid state adjustable speed motor drive motor controller to sense a fault which tripped the pump. The fault did not latch-in and the controller automatically reset after an approximate three minute time delay by design. The RWCU system 'A' pump was restarted and the RWCU system returned to service at 2126 hours.

The Instrument AC system consists of two separate divisions that supply a source of uninterruptible AC power to various components. The momentary voltage dip sensed on 4160 VAC busses resulted in one division of the Instrument AC system auto-transferring to its alternate power source. This transfer did not impair the Instrument AC system or effect any supplied components. Subsequently, the Instrument AC system was returned to its normal lineup later that same day.

The momentary voltage dip also effected three multiplexors in the Security system. However, this did not impair the system or reduce its ability to perform its function. There was also a short-term loss of some offsite communication capabilities. Security immediately placed compensatory measures in effect and there was no compromise to plant security. Offsite communications and the Security system were both returned to their full operational status on March 16, 1990.

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

EXPIRES 4/30/92

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FACILITY NAME (1)  Duane Arnold Energy Center	DOCKET NUMBER (2)  05000331	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 386A's) (17)

The auto-start of the SBDGs due to the sensed loss of offsite power is an analyzed event. Although this was not an actual loss of offsite power, the SBDGs functioned as designed. The response of other plant equipment to the failure of the CCPD did not adversely effect the safe operation of the respective systems or the overall safe operation of the plant.

**IV. CORRECTIVE ACTIONS**

Several corrective actions were identified:

1. The failed CCPD, and a second CCPD also exhibiting oil leakage, have been replaced.
2. Maintenance Engineering performed a complete Thermographic inspection of switchyard components in an attempt to detect any problems. No degradation of any components was identified.
3. A preventive maintenance action has been established that requires Maintenance Engineering to perform a periodic Thermographic inspection of switchyard components to identify component degradation.
4. An additional corrective action to develop a formal plan for improving switchyard maintenance activities has been initiated. The development of this plan will be a coordinated effort between plant Engineering and Maintenance personnel, utility Transmission Department personnel, and utility System Protection personnel. This action will be completed by December 31, 1990.

**V. ADDITIONAL INFORMATION**

1. Previous events have occurred that have caused an auto-start of one or both SBDGs; however, none of these events involved switchyard failures.
2. Component Information  

Manufacturer - Westinghouse Electric  
 Type - Coupling Capacitor Potential Device  
 Model - PCM
3. This event is being reported pursuant to 10CFR50.73(a)(2)(iv).