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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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Form 366	LICENSEE EVE	NT REF	PORT	(LER)	U.S. NL	CLEAR F APPROV EXPIRES	EGULA ED OM 8/31/8	TORY COMMIS 8 NO. 3150-0104 8	BION
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uane Arnold Energy Center ™ Age-Related Failure o	(DAEC) f a Governor Dri	ntod (<u></u>		0 5 0 0	013	131	1 1 OF (014
<u>Coolant Injection Sys</u>	tem Inoperabilit	nteu (Y	LITC	uit Board	Results	in F	igh	Pressu	re
EVENT DATE (5) LER NUMBER (E (7)		OTHER	ACILITIES INVO	VED (8)			
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YES (If ver complete EXPECTED SUBMISSION DATE)	Χ ΝΟ				DATE (15)		1		, [
Injection System (HPCI) we monthly surveillance test steam supply high flow st malfunction of the turbin adequately control steam component, or components, Governor Company EG-M con- valve control signal. For was determined to be an un- circuit board's component approximately a decade, a comperatures in the HPCI replaced, and the HPCI sy lanuary 29, 1989. As a co- low scheduled for replace the HPCI room was added du	vas declared inop t, a HPCI steam s ignal. The high ne governor elect flow. The inter on the converter introl box, which ollowing consulta unanticipated age s due to long-te and possibly envi room. All printer stem was success orrective action ment at eight ye uring the 1988 rej	erablic supply flow ronic media proin provi tions rela rm con ronmed cir fully , the ar inf fully	e. conc conc s. ted des ted nsta ntal cuit EG- terva terva	r, the Hig During the olation vas The gover ause was circuit bo the HPCI h the veno response of nt energi: effects of boards w ted and de M printed als. Addi itage and	n Pressu e perform lve clos caused nor did failure o bard of t turbine o dor, the of the pr zation ov due to el ithin the eclared o circuit itional o is now fu	re Co ance ed do by a not of a he Wo root root root evat evat evat soor ooli ncti	oola of ue t nor ca d d ble ds ang on i	nt the o a ard use ere on are of	
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NRC Form 366A (9-83) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104 EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER(6)					PAGE(3)			
		YEAR		SEQUENTIAL NUMBER	Π	REVISION NUMBER				
Duane Arnold Energy Center	0 5 0 0 0 3 3 1	89	-	002	-	00	2	OF	4	
TEXT (II more space is required, use additional NRC Form 366A's) (17)										

I. DESCRIPTION OF EVENT:

On January 26, 1989, with the reactor at 90% power, the monthly operability test of the High Pressure Coolant Injection System (HPCI, EIIS Code BJ) commenced. At 1322 hours, the HPCI turbine was started for automatic operation as part of the test. As the pump was nearing the required 3000 gallons per minute output HPCI Outboard Steam Supply Isolation Valve MO2239 (EIIS System Code JM-ISV) closed. This resulted in a turbine trip. The isolation was due to a steam supply high flow signal. HPCI was considered inoperable at that time. A review of HPCI system pressure instrumentation, and conditions in the turbine area shortly after the system was considered inoperable determined the steam supply high flow was not due to a steam leak in the HPCI system. The HPCI turbine was restarted at 1333 hours, and again it tripped when the same steam supply valve closed on a high steam flow signal.

A seven day Limiting Condition for Operation (LCO) was entered in accordance with Technical Specification 3.5.D.2. Required testing was initiated to verify the operability of the redundant systems: the Automatic Depressurization System (ADS, EIIS System SB), the Low Pressure Coolant Injection System (LPCI, EIIS System BO), the Core Spray System (CS, EIIS System BM), and the Reactor Core Isolation Cooling System (RCIC, EIIS System BN).

Following troubleshooting and replacement of printed circuit boards within the HPCI governor control circuitry, the HPCI turbine was successfully tested, and declared operable at 1630 hours on January 29, 1989.

This event is being reported in accordance with 10 CFR 50.73(b)(2)(iv).

II. CAUSE OF EVENT:

Routine observation of the HPCI steam flow rate instrumentation during the surveillance test indicated that an actual high flow condition was a likely possibility. Additional monitoring of HPCI turbine control instrumentation and visual observation of the turbine during subsequent test runs was undertaken for verification and to establish the reason for this condition.

The high flow condition in the HPCI steam supply line was caused by a malfunction of turbine governor equipment. The intermediate cause was an electronic component failure or failures within the converter printed circuit board of the governor control circuitry which resulted in an erroneous high speed demand signal. This in turn led to the turbine steam supply governor valve maintaining a full open position during the entire startup sequence. Normally the governor valve reaches a full open position during the beginning of the startup

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION APPROVED OMB NO. 3150-0104 EXPIRES: 8/31/88											
FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUM	MBER(6)			PAGE(3)				
Russe Annold Franky Center	015101010131311	YEAR S	SEQUENTIAL NUMBER				4				
DUANE ATTIVIA ETTETYY CETLET TFXT (If more space is required, use additional NRC Form 366A's) (17)				00			¥				
sequence, but as the turbine gai travel in the closed direction to needed to maintain adequate turb response of the turbine governor demand signal were noted during	ns speed and momen o reduce the steam ine speed control. valve and the err troubleshooting ru	tum the v flow to The abn oneous hi ns.	alve wil that flo ormal gh speed	1 √₩							
The converter printed circuit bo governor EG-M control box (EIIS by the Woodward Governor Company turbine speed, the automatic sta controller. It provides a speed actuator (Woodward EG-R), which	ard is located with Component Code BJ- . The EG-M receiven rtup rate, and a s demand signal to a controls the turbi	hin the t 65), manu es inform ignal fro an electro ne govern	urbine factured ation on m the fl o-hydrau or valve	ow lic							
It was noted during troubleshoot failure of the converter printed times the speed demand signal wa to an inaccurate high signal wou troubleshooting run this step ch system had been at rated conditi Removal and reinstallation of th resulted in resetting of the sig examination of the card found no	ing runs of the HPC circuit board was s appropriate, but ld occur. In one ange did not occur ons for approximat e converter printe nal to an appropri poor connections.	CI turbing intermit then a s instance, until the ely three d circuit ate level	e that t tent. A tep chan during e HPCI minutes board . Visua	he ge a							
There are three printed circuit b circuit boards remain energized Discussions with the vendor indic reduce life expectancy. There an periodic changeouts of these comp board had not been changed out s exposure to excessive heat during HPCI room temperatures may have located on the turbine pedestal it was moved to a nearby wall. converter in January, 1989, was of the printed circuit board's converter	oards within the Wo when HPCI is in sta cate such constant re no vendor recomments. The conver- ince the mid-seven g turbine operatio also been a factor until the 1987 ref The root cause of an unanticipated a omponents due to 1 nmental factors.	bodward EC andby cond current nendation rter print ties. Lou n and from . The EG ueling ou the failu ge-related ong term	3-M. The dition. flow cou s for ted circu ng term m elevat -M was tage, wh re of th d respon constant	≥se ld uit ed en e se	ч.,						
III. ANALYSIS OF EVENT:											
The inoperability of the HPCI sys operation of the plant. Redundar this event and the previous surve in Run mode, the worst case effect HPCI system to operate would be 1 vessel inventory after small line depressurize the vessel. ADS, in systems, provides full redundancy available to mitigate the loss of redundant to HPCI.	stem had a minimal nt systems were ope eillance interval. ct of the failure (oss of the ability e breaks that do no n conjunction with y for HPCI. The RU f HPCI, but is not	impact of erable the With the or inabil to mainta ot rapidly the LPCI CIC system considere	n the sa roughout e reacto ity of t ain react y or CS m was al ed fully	fe r he cor so							

NRC Form	366A U.S.	NUCLEAR	REGULATORY	COMMISSION
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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104 EXPIRES: 8/31/88

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER N	UMBER(6)			PAGE(3	3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Duane Arnold Energy Center	0 5 0 0 0 3 3 1	89-	002 -	- 00	4	OF	4
TEXT (If more space is required, use additional NRC Form 366A's) (17) IV. CORRECTIVE ACTIONS: The EG-M converter printed ci determination that it was the condition. The other two pri also replaced to try to precl These printed circuit boards eight year interval, as will The vendor does not have a sp replacements, but believes th for the HPCI room was added u functioning. This should aid temperatures. An INPO Networ plants of this event. V. ADDITIONAL INFORMATION: A. Failed Component Iden: Woodward Governor Comp Converter Printed Circ	rcuit board was replac cause of the turbine s nted circuit boards wi ude further possible a will be scheduled for the ones in the RCIC g ecific recommendation f is would be adequate. Fring the 1988 refueling in the reduction of h k entry has been made tification bany EG-M Control Assemi- cuit Board 5430-229 A.	ed foll team li thin th ging pr replace overnor for lif Additi g outag igh amb to noti	lowing the ne high f ne EG-M we roblems. ement at a r circuith e expecta onal cool le and is oient ify other	e low ere an ry. ncy ing now	· ·		
The HPCI Turbine is a Turbine Company. B. Previous Similar Even There had been no prev EG-M converter printed printed circuit board outage when calibratio preventive maintenance speed or output pressu components in the EG-M Other LERs reporting H 77-77, 77-95, 77-96, 7 trip on high flow due in LER 88-01.	Type CS, manufactured ts dious documented failur dicircuit board. The E was replaced during th on problems developed d e. Failure of the HPCI ure requirements due to were reported in LER 8 HPCI starting problems 78-25, 83-22, 83-56, and to a test circuit prob	es at [G-M tac e 1987 uring r turbir out of 3-18 ar were 75 d 88-04 lem was	DAEC of the chometer refueling restualing calibrate d LER 86- 5-57, 76-8 1. A turb s document	he g ain -10. 89, oine ted		·	
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Iowa Electric Light and Power Company

February 24, 1989 DAEC-89-0154

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 #89-002

Gentlemen:

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

Very truly yours,

Cure 2. 24-89 Rick L. Hannen

Plant Superintendent - Nuclear

RLH/JRP/go

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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