

REGULATOR INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8705270503 DOC. DATE: 5/7/05/20 NOTARIZED: NO DOCKET #  
 FACIL: 50-331 Duane Arnold Energy Center, Iowa Electric Light & Power 05000331  
 AUTH. NAME AUTHOR AFFILIATION  
 THOMAS, B. N. Iowa Electric Light & Power Co.  
 MINECK, D. L. Iowa Electric Light & Power Co.  
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-007-00: on 870402, during cycle 8/9 refuel outage, disassembly & insp of HPCI turbine revealed visual cracks on two steam chambers. Cause unknown. Two reversing chambers in stock to different heat treatment process. W/870520 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 4  
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES		RECIPIENT ID CODE/NAME	COPIES	
		LTTR	ENCL		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
	AEOB/DOA	1	1	AFOD/DSP/ROAB	2	2
	AEOB/DSP/TPAB	1	1	DEURO	1	1
	NRR/DEST/ADE	1	0	NRR/DEST/ADS	1	0
	NRR/DEST/CEB	1	1	NRR/DEST/ELB	1	1
	NRR/DEST/ICSB	1	1	NRR/DEST/HEB	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/QAB	1	1
	NRR/DOEA/EAB	1	1	NRR/DREP/RAB	1	1
	NRR/DREP/RPB	2	2	NRR/PMAS/ILRB	1	1
	NRR/PMAS/PTSB	1	1	<del>REG FILE</del> 02	1	1
	RES DEPY GI	1	1	RONG 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, C	1	1

TOTAL NUMBER OF COPIES REQUIRED: LTR 42 ENCL 40

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 3
--	--------------------------------------	----------------------

TITLE (4)  
High Pressure Coolant Injection (HPCI) Turbine Reversing Chamber Failures

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 4	0 2	8 7	8 7	0 0 7	0 0	0 5	2 0	8 7	DOCKET NUMBER(S) 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 0 1 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.38(c)(1)	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(iii)	50.38(c)(2)	50.73(a)(2)(vii)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)							
	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)(ix)								

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

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		
B	BIJ	ITRIB	T1147	NO							

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

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

On April 2, 1987 during the cycle 8/9 refuel outage, disassembly and inspection of the High Pressure Coolant Injection (HPCI) turbine revealed visual cracks on two of the ten steam reversing chambers. In addition, two of the six chamber attachment bolts were slightly backed out of chamber #5 as their locking tabs were partially missing, and a linear indication was found using liquid penetrant testing on another chamber.

Cracking of these chambers has been discovered during each previous refueling outage dating back to 1978. The root cause of the continual reversing chamber cracking is unknown. As stated by the turbine manufacturer and verified by a review of past HPCI system performance at DAEC these cracked reversing chambers do not affect the HPCI turbine/system in its ability to perform its design function.

A heat treatment process performed by DAEC (with concurrence from the turbine vendor) was performed on two in-stock reversing chambers. These two chambers have been installed in the HPCI turbine along with replacement of the remaining cracked reversing chambers and missing bolt locking tabs. The HPCI turbine will again be internally inspected during the next refuel outage.

This LER is being submitted to document Iowa Electric's continuing efforts to resolve cracking problems with HPCI turbine reversing chambers.

8705270503 870520  
PDR ADOCK 05000331  
S PDR

1627

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Duane Arnold Energy Center (DAEC)	05000331	87	007	00	02	OF	03

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

On April 2, 1987 during the cycle 8/9 refuel outage, disassembly and inspection of the High Pressure Coolant Injection (HPCI, EIIS Identifier System Code BJ) turbine (Terry Turbine (T147) type CS) revealed cracks on two of the ten steam reversing chambers. The HPCI turbine reversing chambers serve to redirect the steam back onto the HPCI turbine blades thus utilizing more of the available energy and increasing turbine efficiency. Two of the ten reversing chambers (#4 & #5) had visual cracks, with two of the six chamber attachment bolts slightly backed out of chamber #5 and their locking tabs partially missing. Liquid penetrant examinations performed by Iowa Electric Quality Control (QC) personnel on April 3, 1987 also revealed that chamber #8 had a linear indication. This occurrence has been discovered during previous outages/turbine inspections (See Unique Reports 78-1, 80-1, 81-3, Iowa Electric letter DAEC-83-681, and LER 85-07).

The chambers found cracked (#4 & #5) have a history of cracking problems. They are located such that they receive the initial HPCI steam impact during turbine startup and continually receive steam during turbine operation.

The intermediate cause for the continual chamber cracking is believed to be pressure pulsing fatigue and thermal fatigue from the cyclic duty experienced by the HPCI turbine. Iowa Electric engineering also believes that metallurgical properties of the reversing chambers are a contributing factor.

A review of the HPCI system performance during cycle 8 (July 23, 1985 through March 12, 1987) reveals no turbine performance degradation which can be attributed to cracked reversing chambers or broken bolt locking tabs. As previously stated by the turbine vendor (Terry Turbine) and confirmed by a review of past HPCI system performance, cracked reversing chambers and small pieces breaking out of chambers or locking tabs are not considered to affect the operability of the HPCI turbine in performing its intended function.

Prior to being accepted by Iowa Electric all reversing chambers received from the vendor must successfully pass liquid-penetrant (PT), and radiography (RT) testing.

As a continuing effort to resolve the HPCI turbine reversing chamber cracking problems, Iowa Electric subjected two reversing chambers already in-stock to a heat treatment process different than the process used by Terry Turbine in hopes of decreasing the material hardness values along with improving material ductility properties. Terry Turbine was consulted and had no objections to this additional treatment being applied. These two chambers have recently been installed in positions #3 & #4. Locations #3 & #4 were selected due to the low (#3) and high (#4) probability of cracking. The chamber that was in location #3 passed QC inspection and is currently being used as an in-stock spare. In addition, chambers #5 & #8 were replaced with in-stock replacements, and the two broken bolt locking tabs were replaced on chamber #5 bolts.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  Duane Arnold Energy Center (DAEC)	DOCKET NUMBER (2)  0   5   0   0   0   3   3   1	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8   7	-   0   0   7	-   0   0	0   3	OF	0   3

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

The partially missing bolt locking tabs do not present a problem with respect to entering the Reactor Vessel and damaging the fuel, as these two pieces would fall under the same arguments made during the loose parts analysis performed by General Electric during our 1981 refuel outage, which concluded that these parts would be discharged into the torus and would not cause a threat to any safety related equipment.

The HPCI turbine will again be inspected during the next refuel outage as the HPCI/RCIC task force will continue to track chamber location and the history of all HPCI reversing chambers. In addition, a metallurgist has been consulted to help resolve future reversing chamber problems.

This LER is being submitted to document Iowa Electric's continuing efforts to resolve cracking problems with the HPCI turbine reversing chambers.

Iowa Electric Light and Power Company

May 20, 1987  
DAEC-87-0548

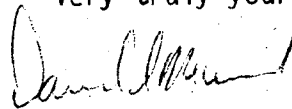
U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

Subject: Duane Arnold Energy Center  
Docket No. 50-331  
Op. License DPR-49  
Licensee Event Report No. 87-007

Gentlemen:

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

Very truly yours,



Daniel L. Mineck  
Plant Superintendent - Nuclear

DLM/BNT/go

Attachment - LER 87-007

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

IE22  
1/1