

LICENSEE EVENT REPORT (LER)

Form Rev. 2 0

Facility Name (1) Quad Cities Unit Two	Docket Number (2) 0 5 0 0 0 2 6 5	Page (3) 1 of 0 5
-------------------------------------------	----------------------------------------------------	----------------------------

Title (4)
RCIC Failed To Meet The Technical Specification Flow And Pressure Requirements

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)	
0 1	2 6	9 4	9 4	-- 0 0 1	-- 0 0	0 2	2 1	9 4		0 5 0 0 0	
									0 5 0 0 0		

OPERATING MODE (9) 03

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

POWER LEVEL (10) 0 8	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.71(b)	<input type="checkbox"/> 73.71(c)	<input type="checkbox"/> Other (Specify in Abstract below and in Text)
------------------------	------------------------------------	------------------------------------------	-------------------------------------------	--------------------------------------------	-------------------------------------------	------------------------------------------	------------------------------------	--------------------------------------	--------------------------------------	-----------------------------------------	------------------------------------------	-------------------------------------------	------------------------------------------	----------------------------------------------------	-------------------------------------------	-----------------------------------------------	-----------------------------------------------	-----------------------------------------	-----------------------------------	-----------------------------------	------------------------------------------------------------------------

LICENSEE CONTACT FOR THIS LER (12)

NAME Dale Thayer, Regulatory Assurance Ext. 3109	TELEPHONE NUMBER AREA CODE 3 0 9 6 5 4 - 2 2 4 1
-----------------------------------------------------	---------------------------------------------------------------------

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
X	D N	P	B 2 6 0	Y					

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)

Unit 2 was in the STARTUP mode at 8% of rated core thermal power at 0430 hours on 01/26/94, at which time the quarterly Reactor Core Isolation Cooling (RCIC) [BN] pump [P] operability test was being performed in accordance with procedures QCOS 1300-5 in order to satisfy the 920 psig Reactor pressure operability requirement during startup. The Technical Specification of 400 gpm flowrate for the RCIC pump could not be obtained.

The Unit 2 RCIC system was declared inoperable. Additional testing was performed and the rotating element in the RCIC pump was replaced.

The cause of the event was increased clearances between the pump shaft throttle sleeve and throttle bushing, and the wear rings which reduced the margin of the pump's performance.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev. 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Quad Cities Unit Two	0 5 0 0 0 2 6 5	9 4	- 0 0 1	- 0 0	2 OF 0 5

TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 Mwt rated core thermal power.

EVENT IDENTIFICATION: RCIC failed to meet the technical specification flow and pressure requirement.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: January 26, 1994 Event Time: 0430
 Reactor Mode: 03 Mode Name: Startup Power Level: 08

This report was initiated by Licensee Report 265\94-001.

STARTUP (3) - In this position, the reactor protection scram trips, initiated by condenser low vacuum and main steamline isolation valve closure are bypassed, the low pressure main steamline isolation valve closure trip is bypassed and the reactor protection system is energized, with IRM and APRM neutron monitoring system trips and control rod withdrawal interlocks in service.

B. DESCRIPTION OF EVENT:

On 01/26/94, the quarterly Reactor Core Isolation Cooling (RCIC) [BN] pump [P] operability test procedure (QCOS 1300-5) was being performed in order to satisfy the 920 psig reactor pressure operability requirement during startup. The reactor was in the STARTUP mode at 8% of rated core thermal power. At 0430 hours on 01/26/94, the RCIC pump failed to meet the Technical Specification (3.5.E.2/4.5.E.2) flow and pressure requirements. The RCIC system was declared inoperable, and the RCIC Outage Report (QCOS 1300-2) was initiated.

Additional troubleshooting testing was performed later on 01/26/94, and again on 01/27/94. The results of this additional testing indicated a continued degradation in the pump flowrate and indicated the root cause was probably within the pump. After the test on 01/27/94 and discussions with a representative from Sulzer Bingham (the pump manufacturer) the determination was made to disassemble the pump for inspection, determination of the cause, and performance of the necessary repairs in order to restore the margin of safety for the RCIC pump.

On 01/30/94 and 01/31/94, the rotating element was removed from the pump and a new rotating element was installed. The clearances measured between the throttle sleeve and throttle bushing, and the wear rings on the old pump shaft were recorded and sent to the vendor. A discussion with a representative from Sulzer Bingham resulted in the representative indicating that clearances measured could cause a head degradation of up to 3%.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev. 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)						PAGE (3)
		Year		Sequential Number		Revision Number		
Quad Cities Unit Two	0 5 0 0 0 2 6 5	9 4	-	0 0 1	-	0 0	3 OF 0 5	

TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]

A diagnostic test was successfully performed on the system on 02/03/94 and new pump curves were established. On 02/05/94 at 1940 hours, the RCIC slow start test was completed in accordance with Interim Procedure number IP 474, Procedure Field Change number PFC 330. On 02/05/94 at 2200 hours, the Quarterly RCIC Pump Operability Test was completed in accordance with QCOS 1300-5, IP 473, which established a new baseline for the RCIC pump. On 02/06/94 at 0330 hours, the RCIC fast start test and the manual initiation test were completed in accordance with the RCIC Manual Initiation Test procedure QCOS 1300-7 and IP 475 with satisfactory results.

The RCIC Outage Report (QCOS 1300-2) was closed out and the Limiting Condition for Operation (LCO) was exited on 02/06/94 at 0400 hours.

C. APPARENT CAUSE OF EVENT:

The cause of the event was degradation of the RCIC pump rotating element. Specifically, the clearances between the shaft throttle sleeve and the throttle bushing, and wear rings had increased. The measured clearances are the result of normal wear as the rotating element had been in service since 1978. These clearances reduced the margin of the pump's performance.

D. SAFETY ANALYSIS OF EVENT:

The purpose of the reactor core isolation cooling (RCIC) system is to provide cooling water to the reactor in the event of a postulated isolation of the reactor from the main condenser with a loss of reactor feedwater. To achieve this purpose, the RCIC system is designed to supply 400 gal/min of makeup water to the reactor core over a reactor pressure range of 1135 to 165 psia.

All components necessary for initiating operation of the RCIC system are completely independent of auxiliary ac power, plant service air, and external cooling water. The system requires only dc power from the station battery to operate its valves.

During the time that RCIC was not available, the high pressure coolant injection (HPCI) system was available. The HPCI system also is independent of auxiliary ac power, plant service air, and external cooling water. HPCI also only requires dc power from the station battery to operate its valves. The HPCI system capacity is much larger than RCIC (5600 gpm as opposed to 400 gpm). In addition, the Safe Shutdown Makeup Pump was available for injection into the reactor core with the same 400 gpm capacity as RCIC. This system requires emergency ac power to operate. This is provided from two redundant independent emergency diesel generators.

This event, therefore, had minimal impact on the safety or the ability of the unit to achieve cold shutdown.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev. 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)						PAGE (3)
		Year		Sequential Number		Revision Number		
Quad Cities Unit Two	0 5 0 0 0 2 6 5	9 4	-	0 0 1	-	0 0	4 OF 0 5	

TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

E. CORRECTIVE ACTIONS:

1. CORRECTIVE ACTIONS COMPLETED:

- a. The rotating element in the RCIC pump was replaced with a new element.
- b. A diagnostic test was performed on the rebuilt pump and new baseline data was established.
- c. The IST procedure was revised (interim procedure) to test the pump at 4400 rpm and at 1140 psid. The baseline established a flowrate of 462 gpm with these parameters. (The previous IST procedure required the pump to be tested at 4500 rpm and at 1230 psid with a flowrate of 400 gpm. These parameters were the same as required by the Technical Specifications. Using this method, useful trending of pump degradation was not possible, because any degradation resulted in the pump being declared inoperable in accordance with the Technical Specifications.) Using the revised procedure will provide for meaningful trending of the pump degradation over the life of the pump, and will provide for appropriate corrective actions to be accomplished as a result of an adverse trend prior to exceeding the Technical Specification limits.
- d. The in-service test (IST) for the RCIC pump was performed with acceptable results, and the operability test was performed with satisfactory results.

2. CORRECTIVE ACTIONS TO BE COMPLETED:

- a. Permanently revise the IST procedure to incorporate the interim procedure requirements (NTS# 2651809400101).
- b. Test the Unit 1 RCIC pump using the revised IST procedure in order to establish a new baseline. Since the next scheduled flowrate test for the Unit 1 RCIC is during the second quarter of 1994, and Unit 1 will be in a refuel outage, the Unit 1 RCIC will be tested upon unit startup. Using the revised procedure will provide for meaningful trending of the pump degradation over the life of the pump, and will provide for appropriate corrective actions to be accomplished as a result of an adverse trend prior to exceeding the Technical Specification limits (NTS# 2651809400102).

F. PREVIOUS EVENTS:

Eight (8) previous events relating to RCIC flow problems (from 1988 to present) were reviewed. None of these events involved problems with the pump rotating element, nor could they be used to identify a degradation of the pump.

A search of the NPRDS data base was performed, and no events were noted relating to RCIC flow problems as a result of a degraded pump rotating element.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

Form Rev. 2.0

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential Number	Revision Number	
Quad Cities Unit Two	0 5 0 0 0 2 6 5	9 4	- 0 0 1	- 0 0	5 OF 0 5

TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

G. COMPONENT FAILURE DATA:

Component Description: Reactor Core Isolation Cooling (RCIC)
 Pump 2-1302
 5-stage centrifugal, turbine driven

Manufacturer / Type: Bingham / 4 x 6 x 9B MSD

Pump Serial Number: 270606

Ratings: 2250 - 4500 RPM
 416 GPM
 Head 525 / 2800