

LICENSEE EVENT REPORT (LER)

Facility Name (1) QUAD-CITIES, NUCLEAR POWER STATION, UNIT Two										Docket Number (2) 0 5 0 0 0 2 6 5				Page (3) 1 of 0 5	
Title (4) RCIC Inoperable Due to Modification Design Error															
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 2	8 7	8 7	0 0 2	0 1		0 3	2 2	8 8				0 5 0 0 0 1 1		
OPERATING MODE (9) 3			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)												
POWER LEVEL (10) 0 1 5			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 (Specify			
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)			in Abstract below			
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)			and in Text)			
20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)									
LICENSEE CONTACT FOR THIS LER (12)															
Name K. J. Hill, Technical Staff Engineer, Ext. 2150										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	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS					
B	B N	T R B	T 1 4 7	Y											
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 fifteen single-space typewritten lines) (16)															

ABSTRACT

On January 22, 1987, at 0905 hours, Quad Cities Unit Two was overspeed testing the Reactor Core Isolation Cooling (RCIC) system when it was noted that the RCIC turbine outboard bearing was flooded with oil and the turbine inboard bearing oil level was too low. The RCIC system was isolated and declared inoperable. The inboard and outboard bearing drain piping was therefore replaced per modification M-4-2-86-28 and this corrected the RCIC oil system problem. At 0350 hours on January 26, 1987, RCIC overspeed testing was again in progress. It was observed during this testing that the outboard bearing oil slinger ring was not spinning at lower turbine speeds and therefore RCIC was again isolated and declared inoperable. The bearing was replaced, and during this replacement, it was noted that an oil inlet orifice was plugged. The orifice was cleaned and then reinstalled. At 1135 hours, the RCIC turbine was overspeed tested successfully and at 1935 hours, RCIC operability testing was satisfactorily completed. RCIC was then declared fully operable.

The cause for the oil flooding of the outboard bearing was a modification design deficiency that was installed during the refuel outage and an original installation of a thermowell that caused a partial oil flow blockage. The slinger ring problem was due to a manufacturing error. The plugged oil orifice was due to poor oil cleanliness.

This is submitted to comply with 10 CFR 50.73 (a)(2)(v).

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PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 Mwt rated core thermal power. Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

EVENT IDENTIFICATION:

Unit Two RCIC System was inoperable because of a modification design deficiency of the lubricating oil system.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two
Reactor Mode: 4

Event Date: 1/22/87
Mode Name: RUN

Event Time: 0905
Power Level: 15%

This report was initiated by Deviation Report D-4-2-87-007

RUN Mode(4) - In this position the reactor system pressure is at or above 825 psig, and the reactor protection system is energized, with APRM protection and RBM interlocks in service (excluding the 15% high flux scram).

3. DESCRIPTION OF EVENT:

On January 22, 1987, Quad Cities Unit Two was in the process of starting up following a refueling and maintenance outage per Normal Unit Startup Procedure, QGP 1-1. At 0905 hours, Unit Two was in the RUN mode at approximately 15 percent core thermal power and 920 psig reactor pressure with two turbine bypass valves [TA] open. Overspeed testing was in progress on the Unit Two Reactor Core Isolation Cooling (RCIC) [BN] turbine. During this testing, it was noticed by Operating personnel near the RCIC turbine that oil from the turbine lube oil system was flooding the turbine outboard bearing while the oil level in the turbine inboard bearing was dropping below the bottom level in the bearing oil level sightglass. This was accompanied by a decrease in oil pressure and a resulting "RCIC Low Lube Oil Pressure" alarm in the control room [NA]. At this time, the RCIC turbine was isolated and declared inoperable. High Pressure Coolant Injection (HPCI) [BJ] operability surveillances had been completed at 0755 hours to satisfy the requirements of Technical Specification 3.5.E.2. The station then contacted representatives of General Electric and Terry Steam Turbine. In discussions with the representatives, it was determined that to eliminate the flooding of the turbine outboard bearing, the drain pipes from the inboard and outboard bearing casings to the lube oil header would have to be enlarged from 1 inch to 1.5 inch. A meeting at the station was held in the afternoon of January 22, 1987, involving members of the Operating, Mechanical Maintenance, and Technical Staff, along with the Station Manager. In this meeting, it was decided to replace the drain pipes on the outboard and inboard bearings. Mechanical Maintenance estimated the time needed to complete the work at 2 days. At 1030 hours on January 23, 1987, Quad Cities Unit Two began shutting down per Normal Unit Shutdown Procedure, QGP 2-1, due to unrelated high conductivity in the condensate [SD] system.

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At 1918 hours on January 25, 1987, Unit Two startup was again initiated per Normal Unit Startup Procedure, QGP 1-1. The inboard and outboard drain pipes of the RCIC turbine had been replaced per modification M-4-2-86-28, and the RCIC turbine was uncoupled in preparation for overspeed testing. At 0350 hours on January 26, 1987, Unit Two was in the STARTUP mode at approximately 1 percent core thermal power and 800 psig reactor pressure. Overspeed testing was in progress on the Unit Two RCIC turbine. During this testing, it was noted that flooding did not occur in either the outboard or inboard turbine bearing and oil levels in each remained unchanged. However, close inspection of the outboard bearing by Mechanical Maintenance personnel revealed that the oil slinger ring was not spinning at low turbine speeds and that the bearing was not getting adequate oil. At this time, the RCIC turbine was isolated and declared inoperable. The required HPCI operability surveillances were initiated and HPCI was determined to be operable at 920 psig reactor pressure.

The outboard bearing of the RCIC turbine was removed by Mechanical Maintenance personnel. Inspection of this bearing and comparison to one obtained from the storeroom revealed that the diameter of the track in the bearing in which the slinger ring must rotate was smaller than the diameter of the slinger ring. This resulted in the bearing "pinning" the slinger ring against the turbine shaft. This area of the new bearing obtained from the storeroom had been machined by the supplier to allow ample clearance for the slinger ring to spin freely. Additionally, while the RCIC System was isolated, the oil piping on the inlet to the RCIC turbine outboard bearing was removed, and it was discovered that the orifice which controls the oil flow to the bearing had become plugged. The RCIC turbine outboard bearing was replaced and the orifice on the oil inlet piping was cleaned and reinstalled. At 1135 hours on January 26, 1987, Quad Cities Unit Two was in the RUN mode at approximately 21 percent core thermal power. Overspeed testing was in progress on the Unit Two RCIC turbine following the aforementioned repairs. During this testing, personnel near the turbine noted that the oil levels in both the outboard and inboard bearings were constant, the slinger ring on the outboard bearing rotated freely, and an adequate oil film could be seen on the outboard bearing. Upon completing the overspeed testing, the RCIC turbine was recoupled to the pump. At 1935 hours on January 26, 1987, with Unit Two still at approximately 21 percent core thermal power, Operating personnel successfully completed RCIC Flow Rate Test, QOS 1300-1, and RCIC Pump Operability Test, QOS 1300-2. At this time, the RCIC turbine was declared operable.

C. APPARENT CAUSE OF EVENT:

This report is submitted in accordance with the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(v)(B and D), which requires the reporting of "any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat or mitigate the consequences of an accident."

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The problem of oil flooding of the RCIC turbine outboard bearing has been attributed to a modification of the oil piping which was installed during the Unit Two refuel outage. Station modification M-4-2-86-1 removed a small section of oil piping connecting the RCIC turbine governor actuator and the lube oil header. The governor actuator is mounted on a vertical shaft, along with the lube oil pump, at the outboard end of the turbine. An internal orifice in the bottom of the actuator discharges oil from the actuator into the outboard bearing casing. The oil supply to the actuator was previously modified under station modification M-4-2-78-19. This modification added a second supply line from the lube oil header to the governor actuator along with an oil sump mounted near the actuator per General Electric's Field Disposition Instruction (FDI) 231/73510. The intent of the oil sump is to provide an immediate supply of oil to the actuator during startup of the RCIC turbine and prevent overspeed trips. The redundant oil supply line to the actuator was to be removed upon installation of the oil sump, but was not done as part of modification M-4-2-78-19. Therefore, modification M-4-2-86-1 was initiated in order to complete the FDI. Testing criteria for modification M-4-2-86-1 required successful completion of RCIC Flow Rate Test, QOS 1300-1, prior to approving the RCIC turbine for operation. Therefore, the problem was detected prior to obtaining final completion approval for modification M-4-2-86-1. The station feels that removing the redundant oil supply line resulted in an increase in oil being discharged from the actuator into the outboard bearing casing. In addition, a minor contributing cause to the oil flooding of the outboard bearing was a thermowell installed in the drain piping. This original installation caused a partial blockage in the oil drain piping and coupled with the removal of the redundant oil supply line caused the flooding of the outboard bearing.

The problem with the slinger ring on the outboard bearing has been attributed to an error in the manufacturing of the bearing. The plugging of the lube oil supply line to the outboard bearing has been attributed to poor oil cleanliness.

D. SAFETY ANALYSIS OF EVENT:

The safety of the public and plant personnel was never affected during this event. Upon finding that the RCIC system is inoperable, the station must restore RCIC to an operable condition within seven days provided that the HPCI system is proven operable, per Technical Specifications 3.5.E. For each day that the RCIC system was inoperable and the reactor pressure was greater than 150 psig, HPCI was tested and found to be operable.

E. CORRECTIVE ACTIONS:

There is no further action necessary to prevent oil flooding of the turbine bearings. The repairs described previously have solved the oil flooding problem. In addition, as part of modification M-4-2-86-28, the thermowell was changed so that it did not block the oil flow path. The defective bearing was replaced with a new one. The slinger rings on both the outboard and inboard bearings were inspected during overspeed testing and were verified to be spinning freely.

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To prevent blockage of the oil lines, a maintenance procedure (QMPM 1300-1, RCIC Refuel Preventive Maintenance) has been developed which will require that the lube oil be drained once per cycle, the oil filter cleaned or replaced, and the governor actuator oil sump drained and cleaned. A sample of the lube oil will be taken for analysis. If the analysis or inspection detects an excessive amount of particulates in the oil system, then the oil orifices will be inspected and cleaned.

F. PREVIOUS EVENTS:

There has been no previous occurrence of flooding of the RCIC turbine bearings. There has been no previous occurrence of a slinger ring not moving or a plugged orifice causing the RCIC turbine to be inoperable.

G. COMPONENT FAILURE DATA:

The RCIC turbine is manufactured by Terry Steam Turbine Company, type GS-1. The governor actuator is manufactured by Woodward Governor Company, type EGR.



Commonwealth Edison

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RLB-88-103

March 22, 1988

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Reference: Quad-Cities Nuclear Power Station
Docket Number 50-265, DPR-30, Unit Two

Enclosed please find Licensee Event Report (LER) 87-002, Revision 01, for Quad-Cities Nuclear Power Station.

This report is submitted to you in accordance with the requirements of the Code of Federal Regulations, Title 10, Parts 50.73(a)(2)(v)(B and D), which requires the reporting of any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat or mitigate the consequences of an accident.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD-CITIES NUCLEAR POWER STATION

R. L. Bax
Station Manager

RLB/MSK/kmb

Enclosure

cc: I. Johnson
R. Higgins
INPO Records Center
NRC Region III

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