Commonwealth Edison
Quad Cities Nuclear Power Station
22710 206 Avenue North
Cordova, Illinois 61242-9740
Telephone 309/654-2241

STM-94-006

November 7, 1994

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 is Licensee Event Report (LER) 94-011, Revision 00, for Quad Cities Nuclear Power Plant Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(i)(A). The licensee shall report completion of any shutdown required by Technical Specifications.

There are no additional commitments being made by this letter.

- The SYSE shall investigate the feasibility of rebuilding a spare RHRSW rotating element up to the point of installing the housing and bearings, and of having a spare RHRSW pump case available that is qualified.

- SEC shall ensure that their expectations associated with observing pipe movement upon disassembly of the RHRSW piping flanges is clearly communicated to the MMD personnel performing the maintenance task.

- SEC shall ensure Site Engineering Service Request (SESR) associated with the RHRSW pumps are generic and may be applied to any pump train to avoid redundant paperwork and delays.

- SEC shall ensure that the RHRSW system design documentation corresponds to the system as-built condition, and that preliminary solutions to engineering issues from past RHRSW maintenance activities are addressed prior to entering a voluntary RHRSW LCO.

If there are any questions or comments concerning this letter, please refer them to Nick Chrissotimos, Regulatory Assurance Administrator at 309-654-2241, ext. 3100.

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Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION

E. S. Kraft, Jr.
Site Vice President
and Acting Station Manager

ESK/TB/plm
Enclosure

cc: J. Schrage
C. Miller
INPO Records Center
NRC Region III

LICENSEE EVENT REPORT (LER) Form Rev. 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Quad Cities Unit Two	0 5 0 0 0 2 6 5	1 of 0 7

Title (4)
Thirty Day Limited Condition Of Operation Exceeded For The 2B Residual Heat Removal Service Water Pump Due To Inadequate Work Planning And Scheduling.

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 5 0 0 0
1 0	0 6	9 4	9 4	-- 0 1 1	-- 0 0	1 1	0 7	9 4		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)				
4		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)	
POWER LEVEL (10)	0 9 5	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)	
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	Other (Specify in Abstract below and in Text)	
		20.405(a)(1)(iii)	X 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)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Dan Brigl, Regulatory Assurance, Ext. 3115	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
E										

SUPPLEMENTAL REPORT EXPECTED (14)

		Expected Submission Date (15)	Month	Day	Year
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

ABSTRACT:

At about 2320 hours on 09/06/94, Unit-2 was in the Run mode at 95% power, and the 2B Residual Heat Removal Service Water (RHRSW) pump was taken out of service for scheduled maintenance. A voluntary, 30 day Limited Condition of Operation (LCO) was entered.

At 2320 hours, on 10/06/94, the 2B RHRSW pump train exceeded the LCO. The cause of the pump train exceeding the LCO was due to inadequate work planning, and scheduling, and poor communication.

At the time the LCO was exceeded, both Quad Cities units were shutdown by station management due to declining station performance with respect to this job and other events. A Work Control Task Force to improve the station's work control process was started, and a root cause investigation was initiated in response to events leading up to the decision to shutdown Quad Cities Unit-2. A meeting was held with all individuals associated with this event to identify lessons learned, develop an action plan, and develop corrective actions needed to prevent recurrence.

Corrective actions to be completed are, evaluating inventory of major RHRSW pump parts, improved communication with respect to pipe movement, and issuance of engineering requests prior to entering an RHRSW LCO. The RHRSW system design will be reviewed to validate as-built condition, and preliminary solutions to engineering issues from past RHRSW maintenance activities, shall be addressed prior to voluntarily entering an RHRSW LCO.

PLANT AND SYSTEM IDENTIFICATION:

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

EVENT IDENTIFICATION: Thirty Day Limited Condition of Operation exceeded for the 2B Residual Heat Removal Service Water Pump due to inadequate work planning and scheduling.

A. CONDITIONS PRIOR TO EVENT:

Unit: Two Event Date: 10/06/94 Event Time: 2320
Reactor Mode: 04 Mode Name: RUN Power Level: Run

This report was initiated by Licensee Event Report LER 265\94-011.

RUN (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).

B. DESCRIPTION OF EVENTS:

At approximately 2320 hours on 09/06/94, with Unit-2 in the Run mode at approximately 95% rated thermal power, the 2B Residual Heat Removal Service Water (RHRSW) [BI] pump train was taken out of service for scheduled maintenance. The pump train consists of a low pressure (LP) and a high pressure (HP) pump with a common motor. The scheduled maintenance activities on the pump were directed at enhancing pump operation by alleviating chronic seal leakage, alleviating vibration concerns, and improving operation through the addition of a cut water modification.

The scheduled maintenance activities included; replacement of the rotating elements for the HP and LP pumps; rerouting the seal cooling water line; and installation of new spring can and strut supports on the pump trains suction, discharge, and cross over piping.

A voluntary, 30 day Limited Condition of Operation (LCO) was entered per Technical Specifications due to the pump being taken out of service (OOS).

During the course of the scheduled maintenance, from 09/10/94 to 09/29/94, several emergent work activities developed which added significant time to the 30 day LCO, and is included below.

- The LP pump casing required replacement due to a measured minimum wall thickness of 0.482 inches. This replacement activity required the removal of the RHRSW room bulk head door.

- The HP and LP pump discharge flange needed weld repairs because of flange weld erosion.

- Installation of correct sway struts, per plant design, was required on the discharge of the HP pump piping because vibration struts had been previously installed.

- The design and manufacture of a strut for the LP pump suction piping was required to alleviate nozzle loading.

- As a result of dimensional differences for the HP pump casing, the outboard stuffing box throttle bushing had to be machined.

At 1940 hours, on 09/29/94, the System Engineering Department (SED) performed a vibration test for the 2B RHRSW LP pump motor during an uncoupled test run. The vibration results were found acceptable.

At 0440 hours, on 10/01/94, the Operations Department valved in the 2B RHRSW pump train to pressurize the pump casings. The Mechanical Maintenance Department (MMD) reported that the pumps had no observed leakage.

At 0746 hours, on 10/01/94, the MMD started final alignment of the 2B RHRSW pumps and motor. At 1713 hours, the 2B RHRSW pump train was returned to service (RTS). At 1802 hours, the Control Room started the 2B RHRSW pump train, in accordance with interim procedure #880 (QCOS 1000-4), and leakage was noted at the inboard HP pump seal [SEAL] area. At 2000 hours, the decision was made to take the 2B RHRSW pump train OOS to identify and fix the leak.

On 10/02/94, it was determined that a new pump bearing would be required due the maintenance process to replace the gland to casing gasket. The casing gasket was identified as the leak source.

At approximately 1600 hours on 10/03/94, the 2B RHRSW HP pump had the bearing replaced, was reassembled, and was ready for casing pressurization associated with to leak checking it.

At 0230 hours, on 10/05/94, the 2B RHRSW pump train modification tests and operability test run were completed. The HP pump failed the operability test due to a measured leakage of 12 drops per minute from the inboard pump seal gland to pump casing gasket area. This leakage only occurred at elevated pressure associated with the modification test requirements. This type of leakage has been accepted in the past, but due to higher work practice standards, this leakage was determined to be unacceptable.

At 2320 hours, on 10/05/94, the 2B RHRSW pump train 30 day LCO was exceeded. The System Engineer (SYSE) initiated Problem Identification Form (PIF) 94-2570 to document and investigate the event.

The LP pump casing to seal gland mating surface (inboard) was resurfaced and the gasket again replaced.

At 1410 hours on 10/07/94, the 2B RHRSW pump train was test run successfully with no leakage.

At 2210 hours, the 2B RHRSW pump train was verified operable with acceptable test run and vibration testing.

C. CAUSE OF THE EVENT:

This event is being reported in accordance with 10CFR50.73(a)(2)(i)(A): The licensee shall report any completion of any nuclear plant shutdown by the plant's Technical Specifications.

The following is a summary of conclusions and Causal Factors (C/F) relating to problems which may have influenced human performance and/or contributed to equipment malfunctions.

C/F: Verbal Communication
Work Organization/Planning
Change Management
Resource Management
Managerial Methods
Design Configuration and analysis

1. The cause of the 2B RHRSW pump train exceeding the 30 day LCO was due to work planning with respect to the station not identifying the complete task scope, task interruptions, and other special circumstances associated with the task. The planning by the station was performed without taking into account all lessons learned from previous RHRSW maintenance activities. It was approximately 7 to 14 days into the RHRSW 30 day LCO before all emergent issues were identified to complete the scheduled maintenance and repair work to the 2B RHRSW pump. Some of the emergent issues that required significant time to complete are listed in the description section of this report.

C/F: Work Schedule
Work Organization/Planning
Change Management
Managerial Methods

2. **The cause of the 2B RHRSW pump train exceeding the 30 day LCO was due to the station scheduling work with insufficient time allotted to complete the task.** The scheduling of the work did not take into account all the issues that had been experienced with previous RHRSW work, and failed to take into account all lessons learned from these previous jobs.

   Scheduling did not take into account the emerging programs such as Radiation Protection Improvement Plan, and the Foreign Material Exclusion program, that would require additional time to complete the RHRSW task.

   C/F: **Resource Management**
   Managerial Methods

3. **The process whereby the station allocated manpower and material for the 2B RHRSW job was not sufficient to provide timely resolution of the task.** Due to inadequate resource scheduling, there was approximately 4 days of work lost within the 30 day LCO. Incomplete task analysis of this job did not identify all the required parts prior to entering the LCO.

   C/F: **Verbal Communication**
   Work Organization/Planning
   Change Management
   Managerial Methods
   Design And Configuration Analysis

4. **The coordination of activities associated with relieving the existing piping stress when the pump pipe flanges were disassembled on the 2B RHRSW pump, was not clearly communicated to the MMD or witnessed by Site Engineering and Construction (SEC).** The point at which the pipe flanges were disassembled from the 2B RHRSW pump involved pipe deflection measurements with cribbing in place to support the piping. After spring can type supports were installed, and the cribbing removed, the piping moved significantly. This piping deflection uncertainty added significantly to timely resolution of required piping support.

D. SAFETY ANALYSIS:

At no time during this event were the station personnel or the public at risk. The safety significance of this event was minimal due to the RHRSW system being capable of performing it's design safety function at all times during this event.

The inoperability of the 2B RHRSW pump would not prevent the containment cooling mode of RHR from meeting design requirements. The remaining three RHRSW pumps were available and proven operable.

The leakage from the 2B pump seal was not sufficient to pose an operability concern, a flooding concern, or reduce the ability of the RHRSW system to provide required flow for the containment cooling system.

The 2B pump LCO was entered voluntarily to perform work that would fix the leaking seal concern, and enhance operation of the pump through addition of a cut water modification.

E. CORRECTIVE ACTIONS:

Prior to the 2B RHRSW pump LCO being exceeded, the Quad Cities Station management shutdown Unit-1 at 1715 hours, on 10/02/94, and Unit-2 at 1128 hours, on 10/03/94. The units were shutdown due to declining station performance with respect to this and other events. The station pursued a program of self assessment to improve the performance of the facility prior to restarting the units.

Part of the station's self assessment was to form a Work Control Task Force to improve the station's work control process. The cumbersome administrative burden associated with the process will be minimized such that work can be done more efficiently, and timely.

There is a root cause (Level 2) investigation in progress that will review the results of this event (and other related events) to determine common causal factor and inappropriate action relationships. The investigation will provide recommendations for additional corrective actions if warranted. The team will expand the scope of it's investigation to include other issues that have potential impact on unit startup and continued error free operations.

On 10/13/94, the SED held a meeting with all individuals associated with the 2B RHRSW event. The goal was to identify all lessons learned from this event, develop an action plan, and develop corrective actions prior to the next scheduled RHRSW maintenance activity.

Corrective actions to be completed are;

1. The SYSE shall investigate the feasibility of rebuilding a spare RHRSW rotating element up to the point of installing the housing and bearings, and of having a spare RHRSW pump case available that is qualified. (NTS #2651809401101)

2. SEC shall ensure that their expectations associated with observing pipe movement upon disassembly of the RHRSW piping flanges is clearly communicated to the MMD personnel performing the maintenance task. (NTS #2651809401102)

3. SEC shall ensure Site Engineering Service Request (SESR) associated with the RHRSW pumps are generic and may be applied to any pump train to avoid redundant paperwork and delays. (NTS #2651809401103)

4. SEC shall ensure that the RHRSW system design documentation corresponds to the system as-built condition, and that preliminary solutions to engineering issues from past RHRSW maintenance activities are addressed prior to entering a voluntary RHRSW LCO. (NTS #2651809401104)

F. PREVIOUS OCCURRENCE:

A Nuclear Plant Reliability Data System (NPRDS) search found one failure of the 2B RHRSW pump since 01/01/94. Review of the failure indicated that it was unrelated to this event.

After review of the Nuclear Tracking System data base, there were no LER's generated in the past four years which involved the RHRSW system, and exceeding an LCO.

A four year search of the NTS database for LER's involving the station exceeding an LCO found one which involved the Reserve Auxiliary Transformer (RAT). LER 2-91-005 involved RAT repairs lasting greater than the required 7 day LCO. A review was performed of the concerned LER, and there was no similarities to this event.

G. COMPONENT FAILURE DATA:

The 2B RHRSW pumps were made by the Ingersoll-Dresser Pump Company. The pump train consists of a low pressure and high pressure pump with a common motor. The low pressure pump is a single stage centrifugal, double volute case Model Number #8X23SF. The high pressure pump is a two stage centrifugal, double suction, volute type Model Number 8GT.

Licensee Event Report
Reviewer Assignment Form

Revised 08/10/94

LER # 265\94-011 Date: October 6, 1994

Subject: 30 Day Limited Condition of Operation Exceeded for the Residual Heat Removal Service Water Pump Due to Inadequate Work Planning and Scheduling.

Signatures of reviewers indicating review and approval of item:

Systems Eng. Supv:		11/1/94 Date	Dan Bing	10/26/94 Date
Operating Eng.:	Alex L. Misak	11/2/94 Date	[illegible]	10/27/94 Date
Technical Supt.:	Pam C. Attn	11/2/94 Date		/ Date
		11-2-94 Date		/ Date

Approved: _____ 11-7-94
PORC Chairman (If not Station Manager) Date

Approved: E.A. Kraft Jr. 11/7/94
Station Manager Date