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ACCESSION NBR: 9312130370 DOC. DATE: 93/12/06 NOTARIZED: NO DOCKET #
 FACIL: 50-305 Kewaunee Nuclear Power Plant, Wisconsin Public Service 05000305
 AUTH. NAME AUTHOR AFFILIATION
 WEBB, T.J. Wisconsin Public Service Corp.
 SCHROCK, C.A. Wisconsin Public Service Corp.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 93-019-00: on 931101, RHR Pump 1A declared inoperable w/
 plant at 100% power, when through wall leak identified on
 pump casing. Caused by void in pump casing wall. Insp
 performed & pump repaired & returned to svc. W/931206 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 7
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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600 North Adams • P.O. Box 19002 • Green Bay, WI 54307-9002

December 6, 1993

10 CFR 50.73

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

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reportable Occurrence 93-019-00

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report for reportable occurrence 93-019-00 is being submitted.

Sincerely,

C. A. Schrock
Manager-Nuclear Engineering

TJW/cjt

Attach.

cc - INPO Records Center
US NRC Senior Resident Inspector
US NRC, Region III

LER\COVERLTR.WP

100045

9312130370 931206
PDR ADDCK 05000305
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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Kewaunee Nuclear Power Plant	DOCKET NUMBER (2) 05000 305	PAGE (3) 1 OF 6
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TITLE (4) Casting Void in Residual Heat Removal Pump Results in a Through Wall Leak

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	04	93	93	-- 019 --	00	12	06	93	N/A	05000
										05000

OPERATING MODE (9) N/A	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)	
POWER LEVEL (10) 100		<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)	
		<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER	
		<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> X	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
		<input type="checkbox"/> 20.405(a)(1)(iv)		<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
		<input type="checkbox"/> 20.405(a)(1)(v)		<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Thomas J. Webb	TELEPHONE NUMBER (include Area Code) (414) 388-2560, Ext. 2537
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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	CFF	Pump	B580	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> X	NO	<input type="checkbox"/>	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

This report describes a violation of Kewaunee Technical Specification 3.3.b.2.B, which allows one residual heat removal (RHR) pump to be inoperable for 72 hours. The 1A RHR pump was declared inoperable at 1841 hours on November 1, 1993, with the plant at 100% power, when a through wall leak was identified on the pump's casing. Since the scheduled repair time would exceed 72 hours, Wisconsin Public Service Corporation requested and received a notice of enforcement discretion from the Nuclear Regulatory Commission prior to exceeding the 72 hour limiting condition of operation action statement.

The flaw, resulting in the leak, originated in a void in the pump casing wall. The void appears to have been caused by non-uniform cooling of the pump casing when it was originally cast. Service induced stresses resulted in crack propagation to the inner and outer diameters of the pump casing.

Corrective actions included visually inspecting the redundant pump and repairing the 1A RHR pump. The pump was repaired and returned to service prior to exceeding the extension provided in the Nuclear Regulatory Commission's notice of enforcement discretion.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 6
		93	- 019 -	00	

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

Description of the Event

- References:
1. Letter to J. B. Martin (USNRC) from C. A. Schrock (WPSC) dated November 3, 1993
 2. Letter to J. B. Martin (USNRC) from C. A. Schrock (WPSC) dated November 4, 1993
 3. Letter to C. A. Schrock (WPSC) from J. B. Martin (USNRC) dated November 5, 1993

This report describes a violation of Kewaunee Technical Specification 3.3.b.2.B, which allows one residual heat removal (RHR) pump [P] to be inoperable for 72 hours. Prior to exceeding the 72 hour Limiting Condition of Operation (LCO) action statement, Kewaunee requested and received a notice of enforcement discretion from the Nuclear Regulatory Commission (NRC), refer to references 1, 2, and 3.

On October 26, 1993, with the plant operating at 100% power, a member of the plant staff conducted a visual inspection of the 1A RHR pump. The inspection was part of Kewaunee's self-initiated safety system functional inspection (SSFI) of the RHR system. The inspection identified a small deposit of boric acid residue on the floor of the pump pit beneath the pump. A mirror was used to inspect the underside of the pump which is approximately four inches off the floor. This inspection identified an area approximately 1 inch in diameter of crystallized boric acid on the suction nozzle of the pump casing.

The boric acid was removed from the floor of the pump pit and the pump casing was cleaned. Twenty minutes following removal of the boric acid, the pump casing was visually inspected by a Quality Control (QC) Inspector (certified to Level III VT). This inspection did not identify any moisture or boric acid crystallization. At this time, it was believed that the boric acid residue was the result of a previous pump seal [SEAL] leak. However in order to confirm this belief, it was decided to re-examine the pump several days later.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant		05000305		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
				93	- '019 -	00	

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

On November 1, 1993, at approximately 1030 hours, a QC Inspector (certified to Level III VT) identified an area approximately 1/32 of an inch in diameter of crystallized boric acid on the underside of the pump. Due to the minute size of the crystals, the inspector was not confident that he was observing crystals due to leakage from the RHR pump casing. The inspection was made more difficult by the location of the potential leak. Due to the limited clearance between the pump casing and the floor, inspections had to be performed using a mirror. To resolve the concern, WPSC planned to hydrostatically test the RHR pump at 125% of its design pressure and observe for leakage.

WPSC also notified Kewaunee's NRC Senior Resident Inspector that if the hydrostatic test verified the existence of a through wall leak, pump repairs would require more than the 72 hours allowed by the LCO action statement. Preliminary schedules indicated that an additional 4 days would be required to repair and return the pump to service.

In addition to the planned hydrostatic test, the area was prepared for a dye penetrant examination. After the area was buffed and cleaned, a QC Inspector visually examined the area of concern. The visual examination identified that a drop of liquid (half of a sphere with an approximate diameter of 1/32 of an inch) formed approximately five seconds after the area was wiped clean. However, the drop did not fall after 25 minutes of observation. During normal operations the static head from the Refueling Water Storage Tank [TK] (RWST) provides a constant RHR system pressure of approximately 30 psig. At approximately 1841 hours, the QC Inspector notified the control room of the confirmed pressure boundary leakage and the pump was immediately declared out-of-service.

Since a through wall leak was verified, the planned hydrostatic test was cancelled and provisions were made to drain the system to allow repair of the pump.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant		05000305		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
				93	- 019 -	00	

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

On Wednesday, November 3, WPSC submitted a request for enforcement discretion (refer to reference 1). This request was supplemented on November 4 (refer to reference 2). The NRC provided verbal approval of the request at approximately 1430 hours on November 4. Written approval from the NRC was received on November 5 (refer to reference 3). The notice of enforcement discretion allowed the Kewaunee plant an additional 7 days to make the necessary repairs without initiating a plant shutdown.

The pump repairs and retest were completed and the pump was returned to service at 0316 on Monday, November 8, 1993. At this time the LCO was immediately exited.

Cause

Prior to and during excavation of the pump's leaking area, visual inspections, ultrasonic testing, and radiographs were used to identify the source and cause of the leakage. As a result of these efforts, a casting defect was found and identified as the most probable initiation point of the through wall flaw.

The defect was a casting void approximately 2 1/2 inches long by 1/2 inch wide, by 3/8 inch deep. The void was located between 19/32 and 30/32 of an inch from the outside diameter of the 1 inch thick pump casing.

The location of the flaw, i.e., directly under a splitter vane located inside the pump, suggests that the void formed as the result of non-uniform cooling as the pump casing solidified when it was originally cast. The pump was installed approximately twenty years ago during original plant construction. Service induced stress resulted in crack propagation from the void to the outer and inner diameters of the pump eventually resulting in a through wall leak.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 6
		93	- 019	- 00	

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

Both of Kewaunee's RHR pumps are made of cast stainless steel. It is difficult to obtain accurate results from radiography or ultrasonic testing of cast stainless steel. Furthermore, the location of the flaw made the indication even more difficult to detect with radiography and ultrasonic testing. Consequently, the flaw was not identified during original receipt inspection of the pump's radiographs. Additionally, the radiography and ultrasonic testing that was performed in an effort to characterize the through wall flaw identified on November 1, 1993, did not fully quantify the size and location of the flaw.

Analysis of the Event

This event is being reported in accordance with 10 CFR 50.73 (a)(2)(i)(B) as a violation of Kewaunee TS 3.3.b.2.B, which allows 1 RHR pump to be inoperable for 72 hours. The pump was actually inoperable for approximately 152 hours and 35 minutes. Prior to exceeding the 72 hour LCO action statement, WPSC requested and received a notice of enforcement discretion from the NRC. The notice of enforcement discretion provided Kewaunee with an additional 7 days (168 hours) of allowed out-of-service time resulting in a total allowed out-of-service time of 10 days (240 hours).

Although one RHR pump was inoperable for greater than 72 hours, this event had no safety significance for the following reasons:

1. 1B RHR pump was operable throughout the event and was capable of fulfilling all of the safety functions provided by the 1A pump
2. Compensatory measures, as described in reference 1, were taken that assured the operability of the 1B RHR pump, minimized the likelihood of a plant transient, and provided added assurance of the availability of emergency electrical power.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant		05000305		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 6
				93	- , 019 -	00	

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

Corrective Actions

1. As part of the RHR SSFI, an inspection was performed to verify that there was no similar leakage associated with the 1B RHR pump.
2. Pump repair procedures were developed and used in accordance with ASME Section IX criteria.
3. Following repair of the pump in accordance with the procedures, the pump was retested and returned to service at 0316 on November 8, 1993.
4. During the repair of the pump, a boat sample was removed from the outer diameter of the pump in the area of the leak. WPSC is currently reviewing the practicality of performing metallurgical analysis on this sample. However, due to the contamination levels, further analysis may not be practical.

Additional Information

Equipment Failures: 6" x 10" x 18" V DSM Byron-Jackson centrifugal pump manufactured from cast 304 stainless steel.

Similar Events: None.