



NRC-04-013

10 CFR 50.73

February 10, 2004

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

KEWAUNEE NUCLEAR POWER PLANT  
DOCKET 50-305  
LICENSE No. DPR-43

**REPORTABLE OCCURRENCE 2003-006-00**

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report (LER) for reportable occurrence 2003-006-00 is being submitted.

This letter contains no new commitments and no revisions to existing commitments.

Thomas Coutu  
Site Vice-President, Kewaunee Nuclear Power Plant

GIH

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

Attachment

Estimated burden per response to comply with this mandatory information collection request 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**LICENSEE EVENT REPORT (LER)**

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

FACILITY NAME (1) <b>Kewaunee Nuclear Power Plant</b>	DOCKET NUMBER (2) <b>05000305</b>	PAGE (3) <b>1 of 4</b>
--	--------------------------------------	---------------------------

TITLE (4)  
**Component Cooling System R-17 Radiation Detector Pipe Assembly Leakage**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	12	2003	2003	-- 006 --	00	02	10	2004	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)		100	20.2201(b)	20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)		
			20.2201(d)	20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)		
			20.2203(a)(1)	50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)		
			20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)		
			20.2203(a)(2)(ii)	50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A		
			20.2203(a)(2)(iii)	50.46(a)(3)(ii)		50.73(a)(2)(v)(C)				
			20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)				
			20.2203(a)(2)(v)	50.73(a)(2)(i)(B)		X 50.73(a)(2)(vii)				
			20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)				
			20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)				

LICENSEE CONTACT FOR THIS LER (12)

NAME <b>Jack Brunner</b>	TELEPHONE NUMBER (Include Area Code) <b>(920) 388-8803</b>
-----------------------------	---

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
--	---	----	-------------------------------	-------	-----	------

**ABSTRACT**

On December 10, 2003, with the plant operating at 100% power, Instrumentation & Control (I&C) Procedure (ICP)-45.47 (Channel R-17 Component Cooling Liquid Radiation Monitor Calibration) was being performed. As the bolts were loosened to remove the top shield piece, the I&C Technician observed water bubbling at the bolt hole. An inspection of the area indicated that an active water leak was not observed to be present. The detector lead shield was removed, and it was observed that the bottom of the lead shield was wet but the detector and its cavity were dry. Further examination resulted in discovery of possible evidence of leakage at an air test hole (residue noted) that is part of the pipe assembly (studding outlet) for R-17. On December 12, 2003 at 1224 hours, both trains of the Component Cooling Water (CCW) System were declared inoperable. This condition was based upon the discovery of less than one half of one millimeter of liquid in the cavity of the studding outlet of the R-17 detector housing. Chemistry analyses of the residue and liquid supported the conclusion of CCW leakage. This evidence of leakage was associated with Section XI Class 3 piping, and thus rendered both trains of component cooling inoperable, due to this being in a common header. A Technical Specifications guided power reduction was commenced at 1315 hours. The root cause of the pipe assembly flaw or confirmation that there is an actual flaw is not known at this time, because the inner weld to the studding outlet that is suspected to be flawed is not accessible during power operation. The corrective action taken was to move the pressure boundary, by means of installing a plug in the air test hole per Temporary Change Request 03-036. The CCW System was declared operable, the unit shutdown was terminated, and the reactor was returned to 100 percent power. This report does describe a safety system (CCW) functional failure.

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Nuclear Power Plant	05000305	2003	-- 006	-- 00	2 of 4

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

**DESCRIPTION**

On December 10, 2003, with the plant operating at 100% power, Kewaunee Nuclear Power Plant (KNPP) Instrument & Control (I&C) personnel were performing I&C Procedure (ICP)-45.47, RM – Channel R-17 Component Cooling Liquid Radiation Monitor Calibration. As the bolts were loosened to remove the top shield piece of the monitor [MON][IL] assembly, the I&C Technician observed water bubbling at the bolt hole. Work was stopped, and the Shift Manager was informed. An inspection of the area indicated that an active water leak was not observed to be present, and work then continued. The detector [DET] lead shield was removed. The bottom of the lead shield was wet but the detector and its cavity were dry.

I&C Engineering was requested to investigate the condition. During inspection of the area, a residue was noticed at an air test hole in the "sample chamber" (pipe assembly or studding outlet), and further residue on the top of the component cooling [CC] heat exchanger [HX], which is under the R-17 detector assembly. The heat exchanger had been replaced during the Spring 2003 Refueling Outage and painted this past summer. The residue had occurred since the painting.

Chemistry was requested to take a sample of the residue on the component cooling pipe near the air test hole to determine if it was from Component Cooling Water (CCW). Residue was scraped from the pipe and tests confirmed that the residue contained the same chemicals as those used in CCW. It was unclear where the water was coming from, since there was no water leaking at this time.

Review of American Society of Mechanical Engineers (ASME) Code requirements, Nuclear Regulatory Commission (NRC) guidance, and design documents continued on December 11, 2003. At approximately 1130 hours on December 12, 2003, about one half of one milliliter of water was obtained from the air test hole of the studding outlet. This evidence of water supported the potential for a possible through wall leakage path into the air gap between the studding outlet and the pipe wall. There is a very small cavity between the studding outlet and the outer wall of the pipe. The water was tested. The residue and water sample chemical analyses supported the conclusion of a through wall leak.

On December 12, 2003, at 1224 hours, both trains of the CCW System were declared inoperable. The governance by the KNPP Technical Specifications (3.3.d) requires that actions commence within an hour to shutdown the plant. It was determined that this leak rendered the piping system inoperable, due to evidence of through-wall leakage of Section XI Class 3 piping and thus rendered both trains of component cooling inoperable. The location of the R-17 monitor assembly is on a common CCW piping header. Therefore, both trains of CCW were affected. A Technical Specifications guided power reduction was commenced at 1315 hours on December 12, 2003.

It was determined that the course of action to correct this apparent through-wall leak in the pipe assembly was to move the pressure boundary, by means of installing a plug in the air test hole per Temporary Change Request (TCR) 03-036. This action would restore the pressure boundary of the studding outlet in compliance with ASME Code Section XI requirements.

The work to install the plug in the air test hole was performed under the jurisdiction of TCR 03-036 and according to 10CFR50.59. This temporary modification was completed at approximately 1700 hours on December 12, 2003. The CCW System was declared operable at 1829 hours, the unit shutdown was terminated, and the reactor [RCT] was returned to 100 percent power.

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 4
		2003	-- 006 --	00	

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

The leak at the R-17 detector shield mounting bolts was subsequently re-checked. The bolts were loosened to inspect for evidence of leakage. This inspection indicated no leakage, which allowed the CCW System to remain operable.

**CAUSE OF THE EVENT**

The root cause of this event is not known at this time. The cause of the pipe assembly flaw or confirmation that there is an actual flaw is not known, because the inner weld to the studding outlet that is suspected to be flawed is not accessible during power operation. Based on fabrication history and evaluation of degradation mechanisms, the most likely cause of this through-wall flaw is a fabrication defect. During original construction, the studding outlet was re-bored from an inside diameter of 12.0" to 13.2" to accommodate the radiation detector. The inner weld was then performed and acceptably inspected by liquid penetrant examination. The cause will be further investigated during the Fall 2004 Refuel Outage, when the flaw in question will be accessible for characterization.

Discussion with I&C Engineering indicates that there are no other pipe and detector assemblies like those used for R-17. Other process liquid radiation monitors (R-16, R-18, R-19 and R-20) do not have similar mounting design that would use a pipe assembly like the one used for R-17. Also the extent of condition review included a review of other Inservice Inspection (ISI) inspections based on the following criteria:

1. Most recent inspection results for all items in the ISI program.
2. Examination of results would look for documented residue on pipe and pipe fixtures versus flanges, stems, packing, etc.

The examination of the ISI records resulted in no documented items like R-17. There are no other reports of residue at a "weep" hole or any other wording that would suggest piping components versus flanges, packing, stems, drain caps, or surface rust on valve bodies, etc. The conclusion from this review is that circumstances related to the potential flaw in the pipe assembly for R-17 are unique.

**ANALYSIS OF THE EVENT**

This event was determined to be reportable under 10CFR50.73(a)(2)(vii) – Any event where a single cause or condition caused two independent trains to become inoperable in a single system designed to remove residual heat.

The safety consequences of this event were minor because there was no active leak observed in the pipe. CCW System operation and performance were not degraded. The probability of an actual catastrophic failure is considered small. The flaw growth studies performed for the area of concern indicate a very slow growth rate. In consideration of a postulated event whereby an undetected flaw might eventually cause a failure, adverse consequences to public health and safety would have been low, since the unit can be safely shutdown to the Hot Shutdown condition without component cooling water by use of the steam generators.

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

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Kewaunee Nuclear Power Plant	05000305	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 of 4
		2003	-- 006	-- 00	

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

**CORRECTIVE ACTIONS**

Initial corrective actions that have been completed:

1. Temporary design change (TCR 03-036) was installed to move the pressure boundary for the R-17 pipe assembly by installation of a plug in the air test hole.
2. An ultrasonic examination was performed of the base metal near the fillet weld of the studding outlet on the pipe, and a magnetic particle examination was performed of the fillet weld of the studding outlet. One minor indication was identified during the magnetic particle examination which was removed by light filing.

Corrective actions to be taken:

1. An examination of the R-17 studding outlet will be conducted during the Fall 2004 Refueling Outage.
2. Following this examination, a repair and/or replacement activity will be performed in compliance with ASME Section XI Code requirements.
3. The cause will be further investigated when the flaw in question will be accessible for characterization.

**SIMILAR EVENTS**

None.