



NRC-00-041

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
Kewaunee Nuclear Power Plant
North 490, Highway 42
Kewaunee, WI 54216-9511
920-388-2560

May 22, 2000

10 CFR 50.73

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

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Reportable Occurrence 2000-005-00

In accordance with the requirements of 10 CFR 50.73, "Licensee Event Report System," the attached Licensee Event Report (LER) for reportable occurrence 2000-005-00 is being submitted. This report does not contain any new commitments.

Sincerely,

A handwritten signature in black ink that appears to read "Tom Wohl".

for
Mark L. Marchi
Vice President-Nuclear

DLR

Attach.

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

IE22

RGW-001

LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an 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.

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TITLE (4)
Main Steam Isolation Valve Exceeds Technical Specification Acceptance Criteria and Design Basis for Valve Closure Time

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 NAME	DOCKET NUMBER
04	22	2000	2000	-- 005	-- 00	05	22	2000	FACILITY NAME	DOCKET NUMBER
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)										
OPERATING MODE (9) N		20.2201(b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/>		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10) 000		20.2203(a)(1)		20.2203(a)(3)(i)		<input checked="" type="checkbox"/>		50.73(a)(2)(ii)		50.73(a)(2)(x)
		20.2203(a)(2)(i)		20.2203(a)(3)(ii)				50.73(a)(2)(iii)		73.71
		20.2203(a)(2)(ii)		20.2203(a)(4)				50.73(a)(2)(iv)		OTHER
		20.2203(a)(2)(iii)		50.36(c)(1)				50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)		50.36(c)(2)				50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME Dennis L. Rozell	TELEPHONE NUMBER (include Area Code) (920) 388-8766
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	SB	ISV	S0750	Y					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE).		X NO		MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 22, 2000, while the plant was in intermediate shutdown condition, during the performance of surveillance procedure (SP) 55-167-8, "Hot/Intermediate Shutdown Valve Tests - IST", the as found closing time for the main steam isolation valve for the B steam generator (MS-1B) exceeded the test acceptance criteria. Technical Specification 4.7 requires that the valve close within 5 seconds. The valve actually closed in 6 seconds.

The valve was immediately declared out of service. A root cause investigation was initiated to determine the cause of the event. The cause is believed to be excess friction associated with aging of the valve packing. The valve packing was replaced with an improved design. The valve was tested to ensure it met all requirements prior to being returned to service.

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

DESCRIPTION OF EVENT

On April 22, 2000, while the plant was in intermediate shutdown condition, during the performance of surveillance procedure (SP) 55-167-8, "Hot/Intermediate Shutdown Valve Tests – IST", the as found closing time for the main steam [SB] isolation valve [ISV] for the B steam generator [HX] exceeded the test acceptance criteria.

The main steam isolation valves are swing-disc isolation check valves which close by steam flow (aided by a spring) upon receipt of a signal from the steam line break protection system [JB] or containment pressure signal. The isolation valve is designed to close within five seconds after a trip signal is received.

The main steam isolation valves (MSIV) are tested to verify that they can close within the time required by Technical Specification (TS) 4.7. TS 4.7 requires that the valve closes in 5 seconds or less. SP 55-167-8 states that the valve closure be timed from the time that the Main Steam Isolation Initiate pushbutton [20] is depressed until the red (open) indicating light [ZI] on the control board [CBD] goes out. This procedure is performed using an operator with a stopwatch to time the interval between depressing the isolation pushbutton and the red indicating light goes out. When this test was performed for the train B MSIV, valve MS-1B, the recorded closing time was 6 seconds.

MS-1B was declared out of service at 0803 CDT. Kewaunee Assessment Process (KAP) 00-001039 was written to evaluate the problem. A work request (work order 00-001016-000) was written to investigate and repair the valve.

CAUSE OF THE EVENT

The cause of this event is believed to be excess friction associated with aging valve packing.

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Immediately prior to performing maintenance to replace the valve packing, the valve closure time was measured at 4.3 seconds. As expected, the closure time was an improvement due to conditioning from the previous surveillance testing performed on April 22. The packing was replaced on May 18, 2000 with an improved design to reduce friction. The post maintenance test measured a closing time of 3.8 seconds. This is a .5 second improvement in valve performance and meets all performance requirements.

ANALYSIS OF THE EVENT

This event is being reported under 10CFR50.73(a)(2)(i)(B), "any event or condition prohibited by the plant's Technical Specifications" and also being reported under 10CFR50.73(a)(2)(ii)(B), as a condition that was outside the design basis of the plant.

Kewaunee TS Section 4.7 requires that "the main steam isolation valves shall be tested once per operating cycle. A closure time of 5 seconds or less shall be verified." MS-1B closed in 6 seconds which is outside the closure time required by TS 4.7.

The Main Steam Line Break (MSLB) accident analysis assumes that each MSIV will close in 5 seconds. An additional 2.5 seconds is assumed in the accident analysis to account for MSIV closure signal and instrumentation delays. The accident analysis therefore uses a closure time of 7.5 seconds for main steam isolation during a MSLB accident. The as found valve closure time of 6 seconds plus the assumed 2.5 seconds for instrumentation delays, exceeds the accident analysis assumptions and therefore is outside of the design basis of the plant.

This event was previously reported via the emergency notification system (ENS) on April 22, 2000 at 1008 CDT as a degraded condition found while the plant was shutdown.

Several key differences between test conditions and actual expected accident conditions (and the associated accident analysis assumptions) exist.

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1) Valve closure during an accident would be much faster than the closure time that occurs during surveillance testing. The surveillance test is performed when the plant is in hot or intermediate shutdown conditions. The velocity of the main steam at hot or intermediate shutdown has been calculated to be approximately 0.8 ft/sec. During actual accident conditions, there would be a significantly higher main steam velocity in the steam line, which will cause the MSIV disc to seat more rapidly. The velocity of the main steam during the MSLB analysis most limiting case, at 0% power operation with flow from the intact steam generator and a fault in the opposite main steam line, has been calculated to be approximately 329 ft/sec. Once the MSIV disc enters the steam flow stream, the disc will immediately close due to the steam force on it. This would greatly improve the response time of the valve when compared to the response time seen during testing.

2) The method of measuring the closing time of the valve could have contributed measurement error that would not normally be part of actual valve closure time. The 5 second closure time requirement for the surveillance test includes more than the MSIV closure time. Signal delays and circuit delays are included in the timed value, as are human response delays associated with stopwatch timing. The signal delays and circuit delays are accounted for with separate assumptions in the MSLB analysis. The MSLB analysis assumes a 2.5 second delay for these instrumentation delays. The surveillance testing method therefore includes the additional error associated with human response variation associated with collecting the closing time data.

3) The plant computer system [CPU] sequential event recorder (SER) [XR] records a time stamp for various events in the plant. The SER system records two parameters associated with MSIV valve movement using limit switches [ZIS]. The first point measures when the valve has moved from the open position to 3 degrees of movement in the closed direction. The second point measures when the valve has reached the closed position. For this event, the recorded closing time for MS-1B, from 3 degrees to close, was recorded as 4.4 seconds.

As part of the investigation into this event, a sensitivity study was performed to determine the effects of the measured delay in MSIV closure on the MSLB accident analysis results.

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The analysis of a steam line break is performed to demonstrate that: 1) assuming a stuck RCCA, with or without offsite power, and assuming a single failure in the engineered safety features, there is no consequential damage to the primary system and the core remains in place and intact, 2) energy release to the containment from the worst steam line break does not exceed the containment design pressure, and 3) there will be no return to criticality after the reactor trips for an analyzed steam line break equivalent to the spurious opening, with failure to close, of the largest of any single steam bypass, relief or safety valve.

The results of the sensitivity study showed, using a closure time of 6 seconds plus the 2.5 seconds associated with instrumentation delays, that a peak containment pressure 61.0 psia would result. This is 0.5 psi above the current MSLB analysis of record (60.5 psia) and is 0.3 psi above the containment design pressure limit (60.7 psia).

Because of these differences discussed above and the accident analysis sensitivity to MSIV closure time, the actual safety significance of this event was minimal.

CORRECTIVE ACTIONS

Immediate actions:

- 1) MS-1B was declared out of service,
- 2) KAP 00-001039 was written to evaluate the problem,
- 3) WR 00-001043 was written to investigate and repair the valve.

Other actions:

- 1) The valve packing was replaced with an improved design on May 18, 2000.
- 2) The valve was retested and verified that its performance meets all requirements.

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ADDITIONAL INFORMATION

Letter dated April 15, 1998 from W.O. Long (NRC) to M.L. Marchi (WPSC) - Changed the MSIV closure time assumption stated in the basis for TS 4.7. The original assumption was 10 seconds and was changed to refer to USAR Section 14.2.5 (MSLB accident analysis section) which states a closure time assumption of 5 seconds.

SIMILAR EVENTS

Incident Report 92-034 – On March 7, 1992, MS-1B failed the timing test during cold shutdown testing. The valve was repacked and the actuators were rebuilt.

Incident Report 95-059 – On April 1, 1995, MS-1A and MS-1B failed their timing tests. The cause was attributed to sticking limit switches associated with valve indicator lights.

EQUIPMENT FAILURES

30 inch, Main Steam Isolation Check Valve, Schutte & Koerting Co., Model # 828-ADC