NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0	1 OF 0 3

TITLE (4) Oversensitive Flow Control Valves Result In Indicated High Differential Flow And Reactor Water Cleanup System Containment Isolation

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)
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0 1	0 3	8 8	8 8	—	0 0 2	—	0 0	0 2	0 2	8 8		0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)											
POWER LEVEL (10)	0 0 0		20.402(b)		20.405(c)	X	50.73(a)(2)(iv)		73.71(b)				
			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, NRC Form 366A)				
			20.405(a)(1)(iii)		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
Gregory A. Dunn, Compliance Engineer, Extension 6484	2 1 1 6 — 2 5 9 - 3 7 3 7

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	

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)

On January 3, 1988 at 1401, an unexpected Reactor Water Cleanup (RWCU) inboard containment isolation occurred due to indicated high differential flow. The cause of this event is oversensitive flow control valves. During RWCU system manipulations, difficulties in adjusting and maintaining the required flow conditions results in flow oscillations. The plant operators are not always able to recover from the flow oscillations before the system isolates on high differential flow. As a result of the isolation, plant operators verified that no actual system leakage existed and returned the RWCU system to service at 1404.

Oversensitive RWCU flow control valves have been identified in previous RWCU containment isolations. An engineering design change to replace the RWCU flow control valves had been initiated. However, due to operational constraints, this engineering design change is not expected to be implemented until the first refueling outage. Additionally, as a result of previous events, an increase of the differential flow trip setpoint and/or time delay has been under evaluation to allow additional operating margin for the RWCU indicated differential flow.

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

On January 3, 1988 at 1401, an unexpected Reactor Water Cleanup (RWCU) [CE] inboard containment isolation occurred due to indicated high differential flow. At the time of the event, the plant was in Operational Condition 4 (Cold Shutdown) following a reactor shutdown (see LER 88-001). Reactor coolant temperature was approximately 196 degrees and reactor vessel [RPV] pressure was atmospheric.

On January 3 at 1344, the plant had entered Operational Condition 4 following a reactor shutdown. RWCU was operating in the reduced feedwater temperature mode with one pump and one filter/demineralizer in service. Discharge flow was being directed to the feedwater [SJ] line. While restoring from the reduced feedwater temperature mode, indicated differential flow for Leak Detection [IJ] Channels A and B increased to above the trip setpoint. Indicated differential flow for Leak Detection Channel A decreased to below the trip setpoint and was reset prior to the end of the isolation time delay. However, indicated differential flow for Leak Detection Channel B remained above the trip setpoint and resulted in a RWCU inboard containment isolation at 1401. Plant operators verified that no actual system leakage existed and returned the RWCU system to service at 1404.

This event was caused by oversensitive flow control valves. During RWCU system manipulations, difficulties in adjusting and maintaining the required flow conditions results in flow oscillations. The plant operators are not always able to eliminate the flow oscillations before the system isolates on high differential flow. These conditions had been previously identified during preoperational testing activities. At that time, the valves were modified to change the valve trim and throttling characteristics. However, the valve modification was only partially successful in correcting the flow control problem.

Oversensitive RWCU flow control valves have been identified in previous RWCU containment isolations (see LERs 86-039, 86-056, 86-085, and 87-001). An engineering design change to replace the flow control valves had been initiated following the RWCU isolations documented in LER 86-039. However, due to operational constraints, this engineering design change is not expected to be implemented until the first refueling outage.

Other events involving RWCU containment isolations include LERs 86-068, 87-013, 87-026, and 87-074. As the result of the previous RWCU containment isolations, several corrective actions have been completed to improve the accuracy of the RWCU indicated differential flow. These include relocation of the blowdown flow element and a change in circuitry and calibration methodology to compensate for water density at non-rated conditions. Flow indication inaccuracies during low RWCU flow conditions due to detector low flow inaccuracies and a low voltage clip at the square root converters have been identified during three previous RWCU containment isolations. However, there is no evidence that indication inaccuracies contributed to this isolation. Nonetheless, an engineering design change has been implemented to replace the square root converters with a style that has a lower low voltage clip. This change increases the margin to the low flow clipping while operating with low flows as required during the reduced feedwater temperature mode.

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An RWCU high differential flow signal indicates the suction flow entering the system is not being discharged via normal flowpaths (reactor vessel, and blowdown to radwaste or main condenser), which could be the result of a line break in the RWCU system. High differential flow for a duration of 45 seconds generates an isolation signal from the Leak Detection system. The 45 second time delay normally allows for system flow transients when changing operational configurations. If an RWCU containment isolation were to occur at high reactor power, the loss of the RWCU system may cause reactor coolant conductivity to slowly increase until the system is returned to service. In addition, during shutdown with little or no internal recirculation flow, reactor vessel thermal stratification may also occur. However, the time out-of-service for RWCU would be short and these effects minimal. Additionally, the Leak Detection System for RWCU is not required to be operable during Operational Condition 4. Since no actual RWCU high differential flow existed and the fact that the system did respond as designed to the indicated high differential flow isolation, the event is not considered safety significant.

As a result of this and previous events, an increase of the differential flow trip setpoint and/or time delay has been under evaluation to allow additional operating margin for the RWCU indicated differential flow. This evaluation will include design RWCU line break analysis. Additionally, the engineering design change to replace the RWCU flow control valves will be implemented during the first refueling outage.

Energy Industry Identification System Codes are identified in the text as [XX].