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March 14, 2008  
L-08-103

10CFR50.73

ATTN: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

**SUBJECT:**

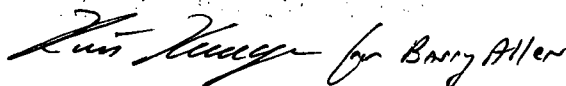
Perry Nuclear Power Plant  
Docket No. 50-440, License No: NPF-58  
Licensee Event Report Submittal

Enclosed is Licensee Event Report (LER) 2008-001, "Condition Prohibited by Technical Specifications Due to Unrecognized Reactor Core Isolation Cooling Inoperability." The root cause analysis associated with the RCIC flow controller performance is still under management review at the time of this report. A supplemental report will be issued, if required, if any additional causes and corrective actions are identified.

There are no regulatory commitments contained in this letter. Any actions discussed in this document that represent intended or planned actions are described for the NRC's information, and are not regulatory commitments.

If you have questions or require additional information, please contact Mr. Jeffrey J. Lausberg, Manager – Regulatory Compliance, at (440) 280-5940.

Sincerely,



Barry S. Allen

Enclosure:  
LER 2008-001

cc: NRC Project Manager  
NRC Resident Inspector  
NRC Region III

IE22

1122

# LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory collection request: 80 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 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.

<b>1. FACILITY NAME</b> Perry Nuclear Power Plant	<b>2. DOCKET NUMBER</b> 05000 440	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Condition Prohibited by Technical Specifications Due to Unrecognized Reactor Core Isolation Cooling Inoperability

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	14	2008	2008	- 001	- 00	03	14	2008	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> <i>(Check all that apply)</i>									
<b>10. POWER LEVEL</b>  100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(a)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A						

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Kenneth Russell, Compliance Engineer, Regulatory Compliance	TELEPHONE NUMBER <i>(Include Area Code)</i> (440) 280- 5580
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

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

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>			<b>15. EXPECTED SUBMISSION DATE</b>		
<input type="checkbox"/> YES <i>(If yes, complete EXPECTED SUBMISSION DATE).</i>			<input checked="" type="checkbox"/> NO		

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

On January 14, 2008, the plant was operating at approximately 100 percent power with the Reactor Core Isolation Cooling system (RCIC) considered operable and in standby readiness. Plant staff performed a review of the RCIC flow controller output on a computer point in preparation for planned maintenance. The flow controller output, monitored on a computer point, had changed from approximately 102.9 percent to approximately 100.2 percent without an observed change on the output meter.

Further review of the flow controller output history identified additional instances of similar changes. Based on this information the RCIC system was determined to have been inoperable for about 35 days. Technical Specification Limiting Condition for Operation 3.5.3 was not met since the condition had been previously unrecognized. This condition is reportable as a Condition prohibited by Technical Specifications, 10CFR50.73(a)(2)(i)(B).

The most probable cause of the observed flow controller anomaly was identified as an intermittent failure of the connector. The Bailey 701 flow controller and connector, the power supply, the ramp generator/signal converter, and the computer input circuit board were replaced. Planning is in process to replace the obsolete Bailey flow controllers. Additional changes will be made to improve system reliability through improved monitoring of the flow controller output.

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**NARRATIVE**

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

**INTRODUCTION**

On January 14, 2008, at 1800 hours, the Reactor Core Isolation Cooling system (RCIC) [BN] was declared inoperable due to flow controller [TC] instability as observed on a computer point. At the time of the event, the plant was operating at approximately 100 percent of rated thermal power. The RCIC system was in standby readiness and all Emergency Core Cooling Systems were operable. Subsequent investigations determined that similar instability had occurred on the computer point dating back to December 10, 2007 (i.e. 35 days).

**EVENT DESCRIPTION**

On January 14, 2008, the plant was operating at approximately 100 percent power with the Reactor Core Isolation Cooling system (RCIC) in standby readiness. Plant operating staff performed a review of the RCIC Bailey 701 flow controller output signal on a computer point in preparation for a planned maintenance outage for the motor-driven feed water pump. The indicated flow controller output had changed from approximately 102.9 percent to approximately 100.2 percent, the normal value, without an observed change on the flow controller output meter. The output signal had shifted from 100.2 percent to 102.9 percent just prior to the condition being identified. Flow controller output should remain steady at 100 percent when in standby readiness. Following review of this information, the RCIC system was declared inoperable at 1800 hours due to the flow controller instability on January 14, 2008. This condition is reportable as a Condition prohibited by Technical Specifications, 10CFR50.73(a)(2)(i)(B)

A problem solving team was assembled to address this condition. During the review of the flow controller output history, additional instances of similar changes dating back to December 10, 2007 were identified. Based on this information the RCIC system was determined to have been inoperable for about 35 days.

Efforts to isolate the cause of the flow controller anomaly were complicated since the flow controller output had returned to the expected value at the time of discovery and remained there during the troubleshooting activities. The problem solving team developed a failure modes and effects problem solving plan and methodically investigated each component that could result in the output fluctuations. When all in-place testing was completed without identifying the hardware cause, plant management made the decision to remove all potentially contributing components and replace them with new or refurbished components. The replaced components included the flow controller and connector, the power supply [RJX], the ramp generator/signal converter [CNV], and the computer input circuit board. The removed components were sent to the FirstEnergy Beta Lab for further testing. All were tested by the lab with no distinct failure noted.

Following replacement of the above components, the RCIC system was monitored, retested successfully and returned to service on January 21, 2008, at 0454 hours.

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Additional monitoring of the flow controller output since that time has not identified any additional occurrences of the flow controller output anomaly.

**CAUSE OF EVENT**

The flow controller output change is likely the result of an intermittent failure of one of the four replaced components (flow controller and connector, the power supply, the ramp generator/signal converter, or the computer input circuit board). The failure does involve the output of the flow controller but is most likely the connector.

Failure to closely monitor flow controller output following previous flow controller replacement contributed to the failure to identify the fluctuations more promptly.

Equipment Reliability Issues also contributed to this failure. Subsequent to the replacement of the flow controller and connector, the power supply, the ramp generator/signal converter and the computer input circuit board, the condition has not reoccurred.

The root cause analysis associated with the RCIC flow controller performance is still under management review at the time of this report. A supplemental report will be issued, if required, if any additional causes and corrective actions are identified.

**EVENT ANALYSIS**

The RCIC system provides core cooling automatically or manually following Reactor Pressure Vessel (RPV) isolation. The RCIC system provides cooling for reactor pressures from 165 to 1215 pounds per square inch absolute (psia) (rated flow is 700 gallons per minute at 1118 psia). The RCIC system is designed to initiate and discharge, within 30 seconds, to provide the specified flow into the RPV at the specified pressure.

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.3 requires that the system be operable, in Mode 1. With the RCIC system inoperable, the Required Action is to verify High Pressure Core Spray is Operable within an hour and to restore the RCIC system to operable status in 14 days or be in hot shutdown within the following 12 hours. Since the condition had been unrecognized from December 10, 2007, until January 14, 2008, these requirements were not completed within the required time.

The RCIC system response is credited for several plant transients to provide RPV level control and decay heat removal until Residual Heat Removal systems are capable of providing decay heat removal. A conservative estimation of RCIC mission time is 24 hours (maximum required operating duration based upon credited transient sequences and assumed in the Probabilistic Risk Assessment model).

The immediate investigation noted that the Flow Controller Output anomaly was repeating and the first occurrence was on December 21, 2007. The follow-up root cause investigation identified additional occurrences dating back to December 10, 2007. The anomaly has therefore been known to be present for 35 days. The investigation team

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believes that the anomaly was most likely introduced into the system during the numerous flow controller changes that were performed to address RCIC flow controller tuning concerns during November and December 2007.

A bounding evaluation was performed assuming automatic operation of RCIC has been unavailable for 48 days (November 28, 2007, through January 14, 2008). Operation of the RCIC system using manual control was available and demonstrated following the plant shutdown in November. The probability of the RCIC manual control failure as a result of human error was included in the evaluation. The resulting Incremental Conditional Core Damage Probability (ICCDP) was determined to be 1.84E-08. The Incremental Conditional Large Early Release Probability (ICLERP) by definition can not be greater than the ICCDP.

Configurations with a core damage probability of less than 1.0E-06 and a large early release probability of less than 1.0E-07 are not considered to be risk significant events, therefore this event is considered to be of very low risk significance.

**CORRECTIVE ACTIONS**

The Bailey 701 flow controller and connector, the power supply, the ramp generator/signal converter, and the computer input circuit board were replaced.

Plant operating staff is currently monitoring the flow controller output via the plant computer on a daily basis. This check has been included in the control room operator rounds.

The Bailey 701 Flow Controllers will be replaced with new controllers no later than the end of Refuel Outage 12, scheduled for the spring of 2009.

The RCIC Control System Tuning procedure will be revised to specify the use of the plant computer to monitor RCIC flow controller output following replacement or adjustment to a controller.

**PREVIOUS SIMILAR EVENTS**

Two LERs, Automatic Reactor Protection System Actuation Due to Feedwater Control Power Supply Failure, 2007-004-1 and Plant Startup With Inoperable Reactor Core Isolation Cooling System, 2007-005 document events in 2007. Both conditions were related to improper tuning of the RCIC Bailey 701 flow controller. While both conditions resulted in the flow controller being replaced, the purpose of replacement was to minimize the out of service time for the tuning and not the result of a component failure. For the January 14, 2008, event described in this LER the failure cause is considered a component failure therefore the cause is different than the previous tuning issues. Since the cause is different, the corrective actions from LER 2007-004-1 and LER 2007-005 would not have been expected to prevent this event.

Condition Report 06-00318 documents an event in which the RCIC pump did not respond properly when placed in Automatic. The cause of that event was determined to be dirty contacts on the balance resistor causing the Bailey flow controller to drift low. The issue in

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LER 2008-001 is that the component failure is intermittent and does not appear to have been due to failure of a flow controller component. The corrective actions from Condition Report 06-00318 include replacing the Bailey flow controller with a new flow controller from another manufacturer. This corrective action has not yet been completed and is being tracked for completion in Refuel Outage 12.

**COMMITMENTS**

There are no regulatory commitments contained in this letter. Any actions discussed in this document that represent intended or planned actions are described for the NRC's information, and are not regulatory commitments.