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United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Licensee Event Report 2006-01

Ladies and Gentlemen:

Enclosed is Licensee Event Report (LER) 2006-01, Incorrect Wiring in the Remote Shutdown Panel Results in a Fire Protection Program Violation.

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.

Very truly yours

Enclosures: LER 2006-01

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

JE22

NRC FORM 366 (6-2004)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 Estimated burden per response to comply with this mandatory collection request: 50 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 infocollect@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.		EXPIRES 6/30/2007		
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="margin: 5px 0 0 40px;">(See reverse for required number of digits/characters for each block)</p>								
1. FACILITY NAME Perry Nuclear Power Plant				2. DOCKET NUMBER 05000440		3. PAGE 1 OF 4		
4. TITLE Incorrect Wiring in the Remote Shutdown Panel Results in a Fire Protection Program Violation								
5. EVENT DATE			6. LER NUMBER		7. REPORT DATE		8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR
1	17	2006	2006 - 01 - 00			3	19	2006
						FACILITY NAME		
						DOCKET NUMBER		
						FACILITY NAME		
						DOCKET NUMBER		
9. OPERATING MODE <div style="text-align: center; font-size: 1.2em;">1</div>			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)					
			<div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"><input type="checkbox"/> 20.2201(b)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(3)(i)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(i)(C)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(vii)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2201(d)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(3)(ii)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(ii)(a)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(viii)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(1)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(4)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(ii)(B)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(viii)(B)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(i)</div> <div style="width: 33%;"><input type="checkbox"/> 50.36(c)(1)(i)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(iii)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(ix)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(ii)</div> <div style="width: 33%;"><input type="checkbox"/> 50.36(c)(1)(ii)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(iv)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(x)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(iii)</div> <div style="width: 33%;"><input type="checkbox"/> 50.36(c)(2)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(v)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 73.71(a)(4)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(iv)</div> <div style="width: 33%;"><input type="checkbox"/> 50.46(a)(3)(ii)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(v)(B)</div> <div style="width: 33%;"><input type="checkbox"/> 73.71(a)(5)</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(v)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(i)(A)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(v)(C)</div> <div style="width: 33%;"><input checked="" type="checkbox"/> OTHER</div> <div style="width: 33%;"><input type="checkbox"/> 20.2203(a)(2)(vi)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(i)(B)</div> <div style="width: 33%;"><input type="checkbox"/> 50.73(a)(2)(v)(D)</div> </div>					
10. POWER LEVEL <div style="text-align: center; font-size: 1.2em;">84%</div>			Specify in Abstract below or in NRC Form 366A					
12. LICENSEE CONTACT FOR THIS LER								
Kenneth Russell, Compliance Engineer, Regulatory Compliance							TELEPHONE NUMBER (Include Area Code) (440) 280- 5580	
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT								
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	REPORTABLE TO EPIX
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE		
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).						<input checked="" type="checkbox"/> NO		
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)						MONTH DAY YEAR		
<p>On January 17, 2006, at about 1000 hours, with the plant operating at 84% power, an internal wiring jumper on a switch in the Remote Shutdown Panel (RSP) was found to be installed incorrectly. The jumper was identified as a result of surveillance testing. The switch contact has the function of isolating control room circuitry from the RSP circuitry for the Reactor Core Isolation Cooling (RCIC) turbine exhaust valve. Complete isolation of the control room circuitry for the RCIC valve would not have been established by transferring control switches to the emergency position. Although no actual fire occurred, this was a violation of the fire protection program, which is a violation of the Operating License condition 2.C.6.</p> <p>The cause of the event was determined to be a wiring drawing error during manufacture of the panel that resulted in the switch being incorrectly wired. The cause of the wiring error was determined to be a less than adequate vendor drawing review that failed to discover a drawing error on a wiring diagram and less than adequate testing. A contributing cause was determined to be less than adequate understanding of fire protection related design functions and testing requirements of the RSP. Completed corrective actions were to rewire the switch correctly and to inform the manufacturer of the drawing and wiring error in the supplied RSP. Additional corrective actions will be to revise the necessary surveillances and the Updated Safety Analysis Report to clarify fire protection program testing requirements and to present lessons learned from this investigation to the Design Engineering Section.</p> <p>This event is reportable as a violation of the Operating License, paragraph 2.C.6, Fire Protection. This event was determined to be of very low safety significance.</p>								

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

INTRODUCTION

The Division 1 remote shutdown panel (RSP)[PL] is designed to control the required shutdown systems from outside the control room irrespective of shorts, opens, or grounds in the control circuit in the control room that may have resulted from an event or fire causing an evacuation of the control room. The functions needed for Division 1 remote shutdown control are provided with manual transfer switches [HS] at the remote shutdown panel which override controls from the control room and transfer the controls to the Division 1 Remote Shutdown Panel (RSP)

Redundant remote shutdown capability is provided using the Division 2 remote shutdown controls. These controls are designed to parallel the controls from the control room. An indicating panel for the Division 2 remote shutdown system is located in the Division 2 switchgear room. The Division 2 remote shutdown is controlled by pull-to-lock switches [HS] mounted on the electrical switchgear.

Manual activation of safety relief valves [RV] and the initiation of the reactor core isolation cooling (RCIC)[BN] system will maintain reactor water inventory and bring the reactor to a hot shutdown condition after scram. In the case of the Division 2 remote shutdown system, credit is taken for automatic initiation of high pressure core spray HPCS [BG], thereby providing for RCIC system backup. During this phase of shutdown, the suppression pool will be cooled by operating the residual heat removal (RHR) [BO] system in the suppression pool cooling mode. Reactor pressure will be controlled and core decay and sensible heat rejected to the suppression pool by relieving steam pressure through the relief valves.

Operating procedures provide guidance to cool the reactor and reduce its pressure at a controlled rate until reactor pressure becomes so low that the RCIC system is unable to sustain operation. The RHR system will then be operated in the shutdown cooling mode using the RHR system heat exchanger to cool reactor water and bring the reactor to the cold low pressure condition.

EVENT DESCRIPTION

On January 17, 2006, at about 1000 hours, with the plant operating at 84% power, an internal wiring jumper on a switch in the Division 1 RSP was found to be installed incorrectly. The jumper was identified as a result of surveillance testing. The switch contact has the function of isolating control room circuitry from the RSP circuitry for the RCIC turbine exhaust valve [V]. Complete isolation of the control room circuitry for the RCIC valve would not have been established by transferring control switches to the emergency position. The RSP was pre-wired and supplied by a vendor.

The DC powered motor operated control valve for the RCIC turbine exhaust to the suppression pool, is normally open and must remain open to support RCIC operation for reactor inventory control. The existing configuration of the controls for the exhaust valve bypassed the control room isolation on the positive side of the "Open" control circuits for the valve. The control room isolation on the negative side of the "Open" logic and both sides of the "Close" logic was correctly wired and would have provided isolation. This configuration would expose the controls for the exhaust valve at the Division 1 RSP to the effects of fire induced faults on the "Open" logic circuits in the control room after the isolation is initiated. A hot short from an energized circuit in the control room of the correct polarity could open the fuses in the emergency (alternate) power supply for the exhaust valve.

The exhaust valve had the potential for spurious operation to the closed position caused by fire induced hot shorts prior to isolation from the control room. It would then be necessary to reopen this valve at the Division 1 RSP. However, the power supply for the valve could be made unavailable by fire induced hot shorts occurring in the control room. If the open fuses were replaced, the existing or new hot shorts in the control room could continue to interrupt the power. Power could not be reliably reestablished until the positive side of the "Open" control circuits in the control room is isolated. This would require a "repair" to the Division 1

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RSP. The malfunctioning exhaust valve could also be corrected if the valve was manually opened using operator actions if this can be accomplished before unrestorable conditions occurred. However, these repairs and operator actions are not currently identified in the Fire Protection Safe Shutdown Analysis or associated operating procedures. Therefore, for this issue the plant does not comply with the Perry Plant Fire Protection Program. Although no actual fire occurred, this was determined to be a violation of the fire protection program, which is also a violation of the Operating License paragraph 2.C.6, Fire Protection. Violation of the Operating License is reportable as a Licensee Event Report.

CAUSE OF EVENT

The wiring error in the RSP was determined to be the result of a drawing error in the original vendor supplied drawing. The same vendor supplied the pre-wired RSP with the latent wiring error which went undetected until the surveillance instruction was performed on January 17, 2006.

The cause of the wiring error was determined to be a less than adequate vendor supplied drawing review that failed to discover a drawing error on a wiring diagram resulting in the RSP containing a wiring error.

An additional cause was determined to be less than adequate testing of design/licensing basis functions. Functional testing was not thorough enough to discover incorrect wiring or failed contacts that could lead to loss of isolation functions.

A contributing cause was determined to be less than adequate understanding of fire protection related design functions and testing requirements of the RSP that resulted in inadequate testing being performed.

EVENT ANALYSIS

The consequence of a fire in the Emergency Closed Cooling System Panel in the control room is postulated as the worst case to cause both RCIC and Low Pressure Core Spray (LPCS) to be unavailable. Per Off-Normal Instruction, Evacuation of the Control Room, if the Unit Supervisor deems it necessary to evacuate the Control Room, the operator at the controls will manually perform a reactor SCRAM. The operating staff will report to the RSP to control the cooldown of the plant. In accordance with Integrated Operating Instruction, Shutdown from Outside the Control Room, the staff would use the system necessary to accomplish a controlled cooldown to cold shutdown. This would include, HPCS, RHR-A, RHR-B, RHR-C, relief valves, and others. Additionally, other sources of inventory (e.g., CST Pumps) are available in accordance with Emergency Instructions, as well as other methods to remove heat from the containment building (i.e., sprays, venting).

Furthermore, other mitigating factors include, 1) a fire in the panel may be detected and extinguished prior to causing failure of the RCIC and LPCS systems, 2) the fire may be extinguished prior to requiring a reactor SCRAM and a Control Room evacuation, and 3) a hot short may or may not cause the RCIC exhaust valve to close.

As such, qualitatively, the defense in depth remains to control the cooldown of the reactor given the condition failures associated with the described scenario. Therefore, using the Counting Rule Worksheet (reference Inspection Manual Chapter 0609 Appendix A, Attachment 1), the event is considered to have a very low safety significance.

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CORRECTIVE ACTIONS

The mis-wired jumper in the RSP was corrected on January 17, 2006.

The investigation team contacted the vendor's Engineering Manager, and informed him of the drawing error and the wiring error in the vendor supplied RSP. The Engineering Manager responded that the vendor had opened a potential safety concern in their system (precursor to their 10CFR21 evaluation).

RSP surveillances will be revised to include testing to verify correct isolation and transfer functions of the Normal/Emergency switches on the RSP to ensure the circuits meet the unique testing requirements for double isolation of the Fire Protection Program.

The Updated Safety Analysis Report will be revised to clarify information for the RSP that was difficult to locate and information that conflicted with the Supplement to the Safety Evaluation Report (SSER).

Design Engineering Section (DES) personnel will review this event with respect to the deficiency of inadequate vendor drawing review and less than adequate understanding of the fire protection related design functions and testing requirements of the RSP. Also these two issues will be discussed at the DES Curriculum Review Committee to determine if additional training is warranted.

PREVIOUS SIMILAR EVENTS

A search of Licensee Event Reports and the corrective action program over the past 3 years from the PNPP found that no similar events had been reported.

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