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May 14, 2008
L-08-166

ATTN: Document Control Desk
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

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

Enclosed is Voluntary Licensee Event Report (LER) 2007-008, "Single Recirculation Loop Operation Results In Planned Reactor Shutdown."

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

If there are any questions concerning this matter, please contact Mr. Jeffrey J. Lausberg, Manager – Regulatory Compliance, at (440) 280-5940.

Sincerely,

Mark B. Bezilla

Enclosure:

LER 2007-008

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 8/31/2010

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.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Perry Nuclear Power Plant	05000 440	1 OF 5

4. TITLE

Single Recirculation Loop Operation Results In Planned Reactor Shutdown

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
6	29	2007	2007	- 008	- 00	05	14	2008	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

58

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(a)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☒ OTHER
  Specify in Abstract below or in NRC Form 366A

Voluntary Report

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Thomas Stec, Compliance Engineer, Regulatory Compliance	(440) 280- 5163

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
E	AD	MO	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete EXPECTED SUBMISSION DATE).* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On June 29, 2007, at approximately 1426 hours, with the plant in Mode 1 (i.e., Power Operation), the plant operating in single loop, and the reactor operating at approximately 58 percent rated thermal power, shutdown of the plant was initiated by a manual actuation of the Reactor Protection System. The purpose of the shutdown was to repair, or replace reactor recirculation system (RRC) pump motor A which tripped from fast speed operation on June 27, 2007.

The cause of the RRC Pump Motor A trip was an electrical fault in the motor. The motor was past due for replacement at the time of failure. The work management preventative maintenance process for RRC motors had not yet been initiated. A contributing cause of the event was the plant accepting a less than adequate risk assessment for the large motors maintenance program.

The RRC pump motor A was replaced with a refurbished motor. PM tasks were initiated for motors to meet refurbishment frequency recommendations as stated on the motor templates. Critical motors not having spares available were identified. An assessment will determine the effectiveness of the PM template implementation process. Critical large motors exceeding template rewind intervals will be identified and scheduled.

This is a Voluntary Report submitted as a condition of generic interest to the industry.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Perry Nuclear Power Plant	05000 440	2007	-- 008 --	00	2 OF 5

NARRATIVE

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

INTRODUCTION

On June 29, 2007, at approximately 1426 hours, with the plant in Mode 1 (i.e., Power Operation), the plant operating in single loop, and the reactor operating at approximately 58 percent rated thermal power (RTP), shutdown of the plant was initiated by a manual actuation of the Reactor Protection System (RPS) [JC]. The purpose of the shutdown was to repair or replace a reactor recirculation system (RRC) [AD] motor [MO].

Review of the regulations, guidance, and the circumstances associated with the scram has determined that the June 29, 2007, shutdown was not reportable in accordance with 10 CFR 50.72 or 10 CFR 50.73. This Voluntary Report is being submitted as a condition of generic interest to the industry.

EVENT DESCRIPTION

On June 27, 2007, at approximately 2348 hours, while operating at 86 percent reactor power, RRC pump motor A experienced a fault and tripped. As a result, the plant entered single loop operation and power ran back to 55 percent RTP. The plant continued to operate in single loop operation in compliance with Technical Specification Limiting Condition for Operation 3.4.1, "Recirculation Loops Operating," Integrated Operating Instruction (IOI)-3, "Power Changes," and the Operations Requirements Manual's section, "Single Recirculation Loop Operation."

Prior to plant shutdown, a reactivity plan had been developed to operate the plant in single loop and included a contingency to shutdown if required.

In preparation for plant shutdown and in accordance with IOI-8, "Shutdown By Manual Reactor Scram," the following actions were taken by the plant operators:

- station loads were shifted to the startup transformer,
- recirculation flow was lowered,
- reactor water level operator setpoint was raised to 198.5 inches above top of active fuel (TAF),
- hydrogen water chemistry was shut down,
- ESW pumps were started,
- emergency closed cooling pumps were started,
- turning gear oil pump and lift pumps were started,
- motor suction pump was started,
- steam seal evaporator was shutdown,
- automatic transfer feature of the motor feed pump controller was disabled, and
- motor feed pump was started.

On June 29, 2007, at approximately 1426 hours, with the plant in Mode 1 and the reactor operating at approximately 58 percent RTP and level and pressure stable, shutdown of the plant was completed by a manual actuation of the RPS. The mode switch was placed in shutdown to manually actuate the RPS per IOI-8. The manual actuation of the RPS was inserted with "all rods in" following a pre-planned sequence in accordance with IOI-8. The plant was not in a technical specification required shutdown action statement. The purpose of the shutdown was to support repairs to, or replacement of, the RRC pump motor A.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Perry Nuclear Power Plant	05000 440	2007	-- 008 --	00	3 OF 5

NARRATIVE

Following the manual RPS actuation, reactor water level lowered to below level 3 (actuation scram signal at 177.7 inches above TAF) as expected. The lowest reactor water level reached was 157.6 inches above TAF. When reactor water level lowered to below reactor water level 3, containment isolation [JM] signals were appropriately received by the residual heat removal system [BO] valves [ISV]. The valves were already closed due to plant conditions. Level was recovered automatically by the feedwater system to greater than 178 inches TAF.

The turbine and generator tripped as expected. No automatic emergency core cooling system (ECCS), or reactor core isolation cooling (RCIC) system response was required and no ECCS or RCIC systems were used for level control. Overall, level control systems responded as expected and anticipated. Control of level following the scram was performed as practiced in the training simulator, which was part of the pre-planned sequencing for the manual RPS actuation.

CAUSE OF EVENT

The cause attributed to the RRC Pump Motor A tripping was an electrical fault in the RRC pump motor (General Electric, vertical shaft, totally enclosed, air-water cooled induction motor, model number 264X776). The motor was past due for replacement at the time of failure. The work management preventative maintenance (PM) process for RRC motors had not yet been initiated.

Contributing causes of the event include the plant accepting a less than adequate risk assessment of the large motors program, and that long-range equipment and component planning is not integrated into the budget process.

EVENT ANALYSIS

The RRC system provides a forced coolant flow through the core to remove heat from the fuel to allow operation at significantly higher power than would otherwise be possible. The system consists of two recirculation pump loops external to the reactor vessel.

A bounding evaluation of the event was performed, assuming a manual reactor RPS actuation occurred with all risk significant equipment available. Configurations with a core damage probability (CDP) of less than 1.0E-06 and a large early release probability (LERP) of less than 1.0E-07 are not considered to be risk significant events. CDP of 5.5E-07, being less than 1.0E-06, and a LERP of 8.2E-08, being less than 1.0E-07 is considered to be of low risk significance.

CORRECTIVE ACTIONS

The RRC pump motor A (1B33-C001A) was replaced with a refurbished spare motor. Replacement of the RRC pump motor B will take place during the next refueling outage (number 12) scheduled to occur February to April 2009.

PM tasks were initiated for motors to ensure that the templates for the large electric motors at Perry are implemented to meet refurbishment frequency recommendations as stated on the motor templates.

Specific motors, designated as "critical" under the category of Critical Large Motor Applications, not having spares were identified. Acquisition of spare motors has been approved by the Plant Health

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Perry Nuclear Power Plant	05000 440	2007	-- 008 --	00	4 OF 5

NARRATIVE

Committee (PHC) in support of the Major Equipment Reliability Program.

The PHC members performed a documented review of the PHC procedure and the value rating methodology procedure to ensure that membership understands the proper methods for identifying, ranking, approving, prioritization, value rating, and disposition of material condition issues that are submitted to the PHC. It was determined that until the equipment reliability database is fully implemented, capital spares, required to support the plant, will be identified in budget allocations and presented to the PHC with associated value ratings.

Corrective actions to be completed include: 1.) The engineering program owner will monitor the action plan for equipment reliability to ensure completion of PM template implementation. 2.) An assessment will be completed for an overall status of the work management PM program. The assessment will determine the effectiveness of the PM template implementation process and whether the templates are effective in reducing failures of critical components. 3.) Critical large motors exceeding templates for rewind intervals will be identified along with completion of PM deferrals.

PREVIOUS SIMILAR EVENTS

A review of Licensee Event Reports and the Corrective Action Program database for the past three years was completed for conditions written for RRC pumps tripping from fast speed and failure of large motors. LER 2005-001, "Manual reactor scram following unexpected RRC pump trip," describes a condition where the RRC system pumps A and B unexpectedly downshifted from fast to slow speed on January 6, 2005. While operators were inserting control rods, RRC pump A unexpectedly tripped from slow speed to off followed by a manual reactor scram initiated by operations personnel. Downshifting of the pumps was caused by a degraded optical isolator in the RRC logic circuitry. The RRC A tripping from slow speed to off was caused by a failure of an amplifier circuit on the voltage regulator card in the low-frequency motor-generator.

LER 2004-002, "Unplanned automatic oscillation power range monitor scram," describes a condition where both RRC pumps unexpectedly downshifted from fast to slow speed December 23, 2004. This was followed by a reactor scram due to core oscillations detected by the oscillation power range monitor. The cause was determined to be an optical isolator intermittent failure as a result of an inadequate surge suppression network in the control circuit for the RR pumps.

LER 2007-007, "Reactor recirculation pump failure results in manual reactor protection system actuation," describes a condition where RRC pump B failed to transfer to slow speed and subsequently tripped on June 22, 2007. This was followed by shutdown of the plant by manual actuation of the RPS. The cause of the RRC pump B failure to transfer to slow speed was a malfunction of the low-frequency motor-generator set control and interlock circuit Agastat time-delay relay.

A review of corrective action program documents over the last three years found only condition reports associated with this event (LER 2007-008) and the events reported under LER 2005-001, LER 2004-002 and LER 2007-007. The corrective actions taken for these three previous events could not reasonably be expected to prevent the occurrence of this event.

COMMITMENTS

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Perry Nuclear Power Plant	05000 440	2007	-- 008 --	00	5 OF 5

NARRATIVE

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