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November 18, 2005
PY-CEI/NRR-2921L

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Perry Nuclear Power Plant
Docket No. 50-440

Ladies and Gentlemen:

Enclosed is Licensee Event Report (LER) 2005-003, Lack of Suction Flow Path Causes High Pressure Core Spray to be Inoperable. The root cause investigation is still undergoing management review. We will provide further correspondence if there are any substantive changes to the information provided to date.

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. Jeffery J. Lausberg, Manager – Regulatory Compliance, at (440) 280-5940.

Very truly yours,

Enclosure: LER 2005-003

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6/30/2007

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 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)

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4. TITLE

Lack of Suction Flow Path Causes High Pressure Core Spray to be Inoperable

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
09	20	2005	2005	- 03 -	00	11	18	2005	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

1

10. POWER LEVEL

100

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

12. LICENSEE CONTACT FOR THIS LER

	TELEPHONE NUMBER *(Include Area Code)*
Henry Kelly, Compliance Engineer, Regulatory Compliance	(440) 280-5116

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

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 September 20, 2005, with the Perry Nuclear Power Plant operating in Mode 1 at 100 per cent power, a review of the High Pressure Core Spray (HPCS) Pump and Valve Operability test instruction revealed that steps in the instruction closed both suction valves and caused a loss of HPCS pump suction flow path without declaring HPCS inoperable. While the valve stroking sequence is appropriate for the system design, the inappropriate action was not declaring the system inoperable. It was also determined that the manual shifting of HPCS suction flow path from the Suppression Pool (SP) to the Condensate Storage Tank (CST) per the System Operating Instruction (SOI) would result in the same condition. Both conditions would only occur for a short (less than 5 minutes) duration during valve timing for the quarterly testing or during manual shifting of the HPCS suction source.

The cause of this event was determined to be a long-standing procedure and knowledge deficiency. Since the inoperability was only for a very short duration during actual valve stroking, the increase in risk is very small. The SOI and the test instruction have been revised to include entry into the required TS LCO. The training program for licensed operators is being revised.

This issue is considered to be a condition that could have prevented the fulfillment of a safety function of a system needed to mitigate the consequences of an accident in accordance with *10CFR50.73(a)(2)(v)(D).*

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

I. Introduction

The Perry Nuclear Power Plant High Pressure Core Spray System (HPCS) [BG] is one of six Emergency Core Cooling subsystems. The HPCS System consists of a single motor driven pump, a spray sparger above the core, and piping and valves to transfer water from the suction source to the sparger. Suction piping is provided from the CST and the suppression pool. Pump suction can be aligned to either the suppression pool or the CST. However, only the capability to take suction from the suppression pool is required for OPERABILITY. If the CST volume is low or the suppression pool level is high, an automatic transfer to the suppression pool water source ensures a water supply for continuous operation of the HPCS System. The HPCS System is designed to provide core cooling over a wide range of RPV pressures (0 psid to 1200 psid, vessel to suction source). Upon receipt of an initiation signal, the HPCS pump automatically starts after AC power is available and then valves in the flow path begin to open. Since the HPCS System is designed to operate over the full range of expected RPV pressures, HPCS flow begins as soon as the necessary valves are open. Full flow test lines are provided to route water from and to the suppression pool or CST to allow testing of the HPCS System during normal operation without spraying water into the RPV. HPCS is a high pressure, low volume system for small line breaks and a low pressure, high volume system for large Loss of Coolant Accidents (LOCA).

II. Event Description

During review of surveillance instructions as part of an assessment of the Test Control Program performed in September 2005, the HPCS Pump and Valve Operability test instruction was reviewed. This document specifies criteria for pump and valve operability testing (stroke timing of various HPCS system valves) to meet applicable Inservice Testing requirements of the ASME Boiler and Pressure Vessel Code (ref. Technical Specification 5.5.6). One step of the test instruction addresses stroke-time testing of HPCS Suction Valves (i.e., Condensate Storage Tank, CST, Suction Valve and Suppression Pool, SP, Suction Valve). Upon completion of that step and prior to performance of the next step, both of these suction valves are in the 'closed' position. There is no declaration of inoperability specified for this condition.

Review of SOI High Pressure Core Spray System also revealed a condition in which these HPCS suction valves are both closed when shifting HPCS suction from SP to CST during Standby Readiness or Secured Status. There is no declaration of inoperability specified for this condition either.

An inadvertent manual start or non-time-delayed automatic start of the HPCS Pump (e.g., initiated as a result of a Loss Of Offsite Power/Loss-Of-Coolant Accident) during those periods when both suction valves are closed could prevent the HPCS System from performing its intended function or could result in equipment damage. The HPCS pump could receive a 'start' signal and the CST Suction Valve could receive an 'open' signal. However, the CST Suction Valve can take more than a minute to fully open, making it questionable as to whether the HPCS Pump could deliver fully-rated flow at full reactor pressure within 27 seconds of initiation (including the time for the Division 3 HPCS Diesel Generator to start and supply the necessary power). Although the Suppression Pool Suction Valve is a faster-opening valve (fully open within 24 seconds maximum), it does not receive an 'open' signal in a LOCA (it opens automatically only if Condensate Storage Tank level is low or Suppression Pool level is high).

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

III. Cause of Event

The cause of the event was determined to be a knowledge deficiency by personnel involved and lack of sufficient procedure guidance. The operating instruction and the test instruction did not require inoperability for the performance of the manual suction source shift or stroke timing of the CST suction valve. The description of the HPCS System as an 'automatic system designed to auto-initiate' during the specified modes of plant operation in the event of an accident was reinforced by the initial operator training and qualification process and continues into current training. This has resulted in the failure to recognize and declare the HPCS System 'inoperable' during the shift of suction source from the Suppression Pool to the Condensate Storage Tank.

A second root cause was inadequate resolution of a finding identified during a HPCS System Functional Capability Review performed in 1984 prior to plant operation. The finding identified the same potential inoperability of the HPCS System with both suction sources isolated. The resolution that was implemented only addressed the Condensate Storage Tank-to-Suppression Pool suction source shift, not the reverse.

IV. Event Analysis

To ascertain the total amount of time that HPCS was inoperable for this condition a review of control room narrative logs was conducted back to October 27, 2002. Based on this review a total of one hundred fifty-eight occurrences of shifting HPCS suction from the SP to the CST using the SOI were recorded. Additionally the surveillance test was performed fourteen times during the same time period. Applying the same time duration for HPCS unavailability as noted below in the risk analysis of this event, the total additional inoperable time would be 14.33 hours over the past three years.

A risk evaluation was performed by increasing the value for HPCS unavailability due to maintenance and testing. Approximately five minutes of unavailability was assumed for each occurrence, with one occurrence assumed every three days. This increase in HPCS unavailability resulted in an increase of 1.1E-07 events per year in the core damage frequency (CDF). Increases in risk associated with temporary changes to the plant are acceptable if the CDF increase is less than 1.0E-06 events per year and the large early release frequency (LERF) increase is less than 1.0E-07 events per year. The increase in LERF associated with this small increase in HPCS unavailability was quantified to be 1.0E-10 events per year. Both of the calculated increases in risk are categorized as very small in accordance with Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant Specific Changes to Licensing Basis". These small increases in risk are considered to be acceptable for temporary changes to the plant.

As an extent of condition, all Emergency Core Cooling Systems and the Reactor Core Isolation Cooling (RCIC) System, were evaluated similarly to the evaluation of the HPCS System (with emphasis on Surveillance Instructions and System Operating Instructions). As a result of this evaluation, only RCIC was found to have similar condition during certain valve stroke testing activities. Since no credit is taken in Perry's safety analysis for the RCIC system, this issue for RCIC is not reportable. A condition report was initiated to address this system separately so as to avoid any conflicts with HPCS System corrective actions. All other ECCS Systems were found to be adequately protected from this condition, either because of system configuration or the methods used for system component testing. No additional action is required other than the HPCS System-related corrective actions noted herein.

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

V. Corrective Actions

The SOI for HPCS has been revised to require maintenance rule, inoperability actions, and independent verification for shifting suction sources. The change was effective September 29, 2005.

Emphasize the importance of the requirements of procedure, Operability of Plant Systems, in an Operations Continuing Training session, including the importance of a questioning attitude and specific review of Definitions 3.5 (Operability), 3.8 (Standby Readiness), and Section 4.1 (Operability Determination). Also, this CR will be added to the HPCS Combined System Lesson Plan.

Revise Updated Final Safety Analysis Report (UFSAR) to clarify the HPCS 'suction valve interlock' statement when using operator intervention.

The test instruction has been revised to add actions to declare the system inoperable during suction-valve stroke testing. The change was effective November 11, 2005.

Evaluate the System Functional Capability Review of the High Pressure Core Spray (HPCS) System (performed in 1984) to determine if all conditions identified as 'findings' or 'unresolved items' have been appropriately dispositioned and resolved.

VI. Previous Similar Events

None identified

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].