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L-14-096

10CFR50.73(a)(2)(i)(B)

ATTN: Document Control Desk
U. S. 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 Licensee Event Report (LER) 2014-001, "Failure to Comply With Technical Specification 3.4.11, Reactor Coolant System Pressure/Temperature Limits." There are no regulatory commitments contained in this submittal.

If there are any questions or if additional information is required, please contact Mr. Nicola Conicella, Manager – Regulatory Compliance, at (440) 280-5415.

Sincerely,

Ernest J. Harkness

Enclosure:
LER 2014-001

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22
NRR

NRC FORM 366 (01-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@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 Page 2 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 4

4. TITLE

Failure to Comply with Technical Specification 3.4.11 - Reactor Coolant System Pressure/Temperature Limits

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
										05000
1	3	2014	2014	001	00	3	4	2014	FACILITY NAME	DOCKET NUMBER
										05000

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

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Perry Nuclear Power Plant, David Lockwood, Regulatory Compliance	(440)280-5200

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THS REPORT

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

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSSION DATE	MONTH	DAY	YEAR
YES (*If yes, complete 15. EXPECTED SUBMISSION DATE*) NO				

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

On January 3, 2014, it was determined that the Perry Nuclear Power Plant had not complied with Technical Specification (TS) 3.4.11, Reactor Coolant System (RCS) Pressure and Temperature (P/T) Limits, between June 2011 and September 2013, during cooldown and start-up of the plant to support plant outages. Technical Specification Figure 3.4.11-1 contains P/T limit curves for heatup, cooldown, and inservice leak and hydrostatic testing. The heatup curve provides limits for both heatup and criticality. Each P/T limit curve defines an acceptable region for normal operation. The P/T curves do not graphically go below 0 psig.

PNPP typically starts up under a slight vacuum with main steam valves open to the condenser. This is done to minimize the impact to systems that might see a pressure surge if the main steam isolation valves were kept closed during startup and then opened under pressure from the vessel.

The cause is a lack of effective leadership intrusiveness, specifically related to work prioritization supporting the timely resolution of deficiencies associated with TS 3.4.11. Corrective actions include training and submittal of a license amendment to revise TS 3.4.11.

Engineering analysis concluded there is no adverse hardware condition created from the vacuum used during start-up and the associated risk from the probabilistic standpoint is considered to be small.

NARRATIVE

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

INTRODUCTION

On January 3, 2014, it was determined that the Perry Nuclear Power Plant (PNPP) had not complied with Technical Specification (TS) 3.4.11, Reactor Coolant System [AD] (RCS) Pressure and Temperature (P/T) Limits, between June 2011 and September 2013, during cooldown and start-up of the plant to support plant outages.

EVENT DESCRIPTION

Technical Specification (TS) 3.4.11, RCS Pressure and Temperature (P/T) Limits, ensures that limits are met on RCS pressure, temperature, and heatup and cooldown rates. This TS limits the pressure and temperature changes during RCS heatup and cooldown, within the design assumptions and the stress limits for cyclic operation.

Technical Specification Figure 3.4.11-1 contains P/T limit curves for heatup, cooldown, and inservice leak and hydrostatic testing. The heatup curve provides limits for both heatup and criticality. Each P/T limit curve defines an acceptable region for normal operation. The usual use of the curves is operational guidance during heatup or cooldown maneuvering, when pressure and temperature indications are monitored and compared to the applicable curve to determine that operation is within the allowable region. The P/T curves do not graphically go below 0 psig.

Action A to TS 3.4.11 requires: with the requirements of the Limiting Condition for Operation (LCO) not met in MODES 1, 2, and 3, restore parameter(s) to within limits in 30 minutes, and determine the RCS is acceptable for continued operation within 72 hours. Action C to TS 3.4.11 requires: with the requirements of the LCO not met in other than MODES 1, 2, and 3, initiate actions to restore parameter(s) within limits immediately, and determine the RCS is acceptable for operation prior to entering MODE 2 or 3.

PNPP typically starts up under a slight vacuum with main steam valves open to the condenser. This has been the practice since initial licensing of PNPP in 1986.

In the prior three years PNPP operated the Reactor Pressure Vessel [RCT] (RPV) under a slight vacuum during cold startups on June 5, 2011, October 18, 2011, March 3, 2012, June 18, 2012, May 11, 2013, and September 8, 2013; and during a cooldown on June 16, 2013, resulting in a noncompliance with TS 3.4.11. The Bases of TS 3.4.11 Surveillance Requirement (SR) 3.4.11.1 states that "verification that operation is within limits (i.e., to the right of the appropriate limit line, and within the applicable rate of temperature change limit) is required every 30 minutes, even when defueled, when RCS pressure or temperature conditions are undergoing planned changes (when operator actions, inclusive of maintenance activities, can directly influence vessel pressure or temperatures)."

The fact that the negative gauge pressure in the RPV was never previously questioned is most likely due to the criteria in procedure SVI-B21-T1176, RCS Heatup and Cooldown Surveillance, which provides the determination for whether or not the RCS Heatup, Cooldown or Inservice Leak and Hydrostatic Testing evolution is satisfactory with regards to compliance with the P/T curve in accordance with TS Surveillance Requirement (SR) 3.4.11.1. With regards to RCS Heatup per Section 5.2 of SVI-B21-T1176, Step 1 provides direction for demonstrating compliance with the P/T curves via utilization of the Integrated Computer System (ICS). This step states that if the cursor is to the right of the Pressure/Temperature curve, then enter satisfactory in the associated data collection table. Note that ICS and the associated P/T curve is configured such that if a negative pressure is actually read from the associated instrumentation, the cursor will indicate a pressure of 0 psig, and as long as the temperature is above 70 degrees F, the reading will subsequently be recorded as satisfactory. This same methodology applies to Section 5.3 for RCS Cooldown and Section 5.4 for Inservice Leak and Hydrostatic Testing.

Condition Report 2011-03864 was generated on October 17, 2011, to document NRC resident inspector questions on starting the plant with the Main Steam Isolation Valves (MSIV) open and vacuum being drawn on the RPV when the P/T curves do not graphically go below 0 psig. An engineering analysis provided the technical justification concluding that starting the plant with the RPV under a vacuum had no adverse impact on the RCS. An evaluation of TS compliance was not conducted. A corrective action was created to track the resolution of the issue with generation of a new P/T curve that graphically went below 0 psig (i.e., changing the y-axis from psig to psia). Implementation of the corrective action has not been completed. PNPP continued to conduct plant start-ups with the MSIV open and a vacuum being drawn on the RPV.

During the Problem Identification and Resolution (PI&R) inspection in November 2013, condition report 2013-18689 was initiated to address NRC questions regarding a lack of literal compliance with TS for starting the plant with the Reactor Pressure Vessel under a vacuum (less than 0 psig) as the P/T curves do not graphically exist below 0 psig. On January 3, 2014, based on the results PI&R inspection it was determined that a noncompliance with TS 3.4.11 had occurred.

CAUSE OF EVENT

Prior to the initiation of Condition Report CR-2011-03864, the drawing of a vacuum on the RPV during plant startup activities had not been questioned in regards to compliance with the associated P/T curves in TS 3.4.11. This a result of a lack of effective leadership intrusiveness, specifically related to work prioritization supporting the timely resolution of deficiencies associated with TS 3.4.11.

Direction provided in procedures, and reinforced during training, stressed that compliance with the governing TS P/T curves is preserved as long as the conditions within the RPV are maintained to the right of the effective curve (i.e., greater than 70 degrees F, regardless of pressure). This mind-set was fostered by numerous factors such as the current and historical interpretation of the TS and Bases, engineering analysis that no technical concern existed, and industry experience, reinforcing the belief that staying to the right of the P/T curve was acceptable.

EVENT ANALYSIS

The RPV is designed following the rules of ASME Section III Subsection NB Class 1 components. From the Chicago Bridge and Iron ASME Code Design Report, D-1, the vessel head is 4 19/32 inch thick with an inner radius of 119 inches and the vessel wall below the flange is 6 inches thick with an inner radius of 120 inches. The dimensions of these components are identified to provide indication of the robustness of the design.

The materials from which the vessel is constructed require fracture toughness properties to assure that a catastrophic failure of the pressure vessel does not occur. Examination of the P/T curve indicates that the controlling component at the bottom of the curve is the vessel flange region. From GE Report, "Pressure - Temperature Curves for First Energy Corporation, Using the Kic Methodology", Section 4.1.2, values of initial test temperature (RTndt) and Lowest Service Temperature (LST) provide identification of the fracture toughness results for the various vessel materials. The LST for the main closure flange studs is the test temperature + 60 degrees F or 70 degrees F. The highest RTndt in the closure flange region is 10 degrees F for the top head and upper shell materials. Thus, the higher of the LST and the RTndt + 60 degrees F is 70 degrees F and is the bolt-up limit in the closure flange region. The limiting temperature of 70 degrees F is arrived at from the material properties without consideration of operating pressure.

The P/T curves are established based on the requirements of 10CFR50, Appendix G to assure that brittle fracture of the reactor vessel is prevented. Pressure - Temperature limits and minimum temperature requirements for the reactor vessel are given in Table 1, and are defined by operating condition (leak tests, normal operation and including anticipated occurrences). In Table 1, the vessel pressure is defined as a percentage of the pre-service system hydrostatic test pressure.

The plant typically starts up under a slight vacuum with the MSIV open to the condenser. The minimum pressure expected is 2.46 psia. The P/T curves are influenced by the material lowest service temperature (i.e., RPV studs) or the highest temperature of the material in the closure flange region. There is no pressure affect associated with these limits other than being less than 20% of the hydrostatic test pressure (312.5 psig). Based on the above, it is concluded that, there is no adverse hardware condition created from the vacuum used during start-up with temperature to the right of the 70 degree F value.

The issue presented within this event report was evaluated from a probabilistic risk perspective. As the identified conditions were administrative in nature, and no safety or operational concerns were identified that would have affected any risk modeled attribute, the associated risk from the probabilistic standpoint is considered to be small.

CORRECTIVE ACTIONS

A Standing Order was implemented for control room personnel prohibiting plant evolutions with a vacuum being drawn on the RPV until all associated issues with TS 3.4.11 have been resolved.

PNPP will submit a license amendment request to revise the P/T curves in TS 3.4.11 to allow operations with a vacuum on the vessel.

The Operations Training Lesson Plan and Presentation related to TS 3.4.11 was revised to include lessons learned from this event.

PREVIOUS SIMILAR EVENTS

A review of Licensee Event Reports and the corrective action database for the past three years determined that one similar event had occurred.

LER 2011-002-01, Condition Prohibited by Technical Specifications and Plant Shutdown due to Unit 1 Startup Transformer Issues, documented a misinterpretation of TS resulting in the conclusion that the backfeed lineup could not be credited as a qualified off-site circuit to comply with TS. Corrective actions were focused on resolving the issues with crediting the backfeed lineup and could not be reasonably expected to prevent the event in LER 2014-001.

COMMITMENTS

There are no regulatory commitments contained in this LER. Actions described in this document represent intended or planned actions, are described for the NRC information, and are not regulatory commitments.