Jon A. Franke
Site Vice President

PPL Susquehanna, LLC
769 Salem Boulevard
Berwick, PA 18603
Tel. 570.542.2904 Fax 570.542.1504
jfranke@pplweb.com

APR 0 7 2014

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-387(388)/2014-001-00
UNIT 1 LICENSE NO. NPF-14
UNIT 2 LICENSE NO. NPF-22 **Docket Nos. 50-387**
PLA-7146 **50-388**

Attached is Licensee Event Report (LER) 50-387(388)/2014-001-00. The LER reports operation of the Unit 1 and Unit 2 Susquehanna Steam Electric Station Reactor Pressure Vessels at less than zero pounds per square inch gauge resulting in a violation of Technical Specification (TS) 3.4.10, "Reactor Coolant System Pressure and Temperature Limits."

Using the NRC precedent established in Perry Non-Cited Violation 05000440/2013007-01, "Failure To Comply With Technical Specification 3.4.11," and the guidance in NUREG-1022 Revision 3, this event was determined to be reportable under 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by TSs due to the non-compliance with TS 3.4.10.

There were no actual or potential consequences to the health and safety of the public as a result of these events.

This letter contains no new regulatory commitments.

J. A. Franke

Attachment: LER 387(388)/2014-001-00

Copy: NRC Region I
Mr. J. Greives, NRC Sr. Resident Inspector
Mr. J. Whited, NRC Project Manager
Mr. L. Winker, PA DEP/BRP

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)

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Susquehanna Steam Electric Station – Unit 1	05000387	1 OF 3

4. TITLE Operation of the Reactor Pressure Vessel at Less Than 0 psig Resulting in a Violation of Technical Specification 3.4.10, Reactor Coolant System Pressure and 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
									Susquehanna Unit 2	05000388
02	06	2014	2014	- 001	- 00	04	07	2014	FACILITY NAME	DOCKET NUMBER 05000

9. OEPRATING 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)
10. POWER LEVEL	☐ 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)
	☐ 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 NUMER *(Include Area Code)*
Brenda W. O'Rourke, Senior Engineer – Nuclear Regulatory Affairs	(570) 542-1791

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 15. 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 February 6, 2014, Susquehanna Steam Electric Station (SSES) discovered a previously unrecognized failure to enter Technical Specification (TS) LCO 3.4.10 when on 27 occasions during the past 3 years, the Reactor Pressure Vessel (RPV) pressure dropped below 0 psig during past reactor startups and shutdowns. At the time of discovery, both units were operating in Mode 1 at 100 percent thermal power. All systems were performing as designed. This LER is being submitted to the NRC in accordance with 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by TS 3.4.10 since the condition existed for a time longer than permitted by the TS.

The apparent cause of the failure to enter the LCO was the condition was procedurally allowed and aligned with training provided to the licensed operators. As a result, operating with the RPV being below 0 psig was not recognized as a condition prohibited by TS until the receipt and evaluation of INPO OE 309129. There were no actual or potential consequences to the health and safety of the public as a result of this event. The 27 instances did not challenge any design or safety limit. Nuclear safety was not compromised because the negative (vacuum) internal pressures identified do not invalidate any analyses for the SSES RPVs.

Completed Action: 1) The Unit 2 operating procedure for reactor startup and heatup has been revised to proceduralize plant start-up with the MSIVs closed and then opening them between 10 and 40 psig RPV pressure. Startup in this manner maintains RPV pressure above 0 psig at all times and minimizes level transients caused by pressure changes when opening the MSIVs, and 2) Operators were trained on the revised reactor startup and heatup procedure.
Planned Action: Prior to startup from the 2014 Unit 1 refueling outage, the Unit 1 operating procedure for reactor startup and heatup will be revised to be consistent with the changes that were made to the corresponding Unit 2 procedure.

NARRATIVE

CONDITIONS PRIOR TO THE EVENT

Unit 1 - Mode 1, 100 percent Rated Thermal Power
Unit 2 - Mode 1, 100 percent Rated Thermal Power

There were no systems, structures, or components that were inoperable at the start of the event and contributed to the event.

EVENT DESCRIPTION

On February 6, 2014, Susquehanna Steam Electric Station (SSES) discovered a previously unrecognized failure to enter Technical Specification (TS) LCO 3.4.10 when on 27 occasions, the Reactor Pressure Vessel (RPV) (EIIS: RPV) pressure dropped below 0 psig during past reactor startups and shutdowns. At the time of discovery, both units were operating in Mode 1 at 100 percent thermal power. All systems were performing as designed.

This LER is being submitted to the NRC in accordance with 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by TS 3.4.10 since the condition existed for a time longer than permitted by the TS.

CAUSE OF THE EVENT

The apparent cause of the failure to enter the LCO was the condition was procedurally allowed and aligned with training provided to the licensed operators. Since the P-T limit curves do not include values for pressure and temperature below 0 psig, operating with the RPV being below 0 psig was not recognized as a condition prohibited by TS until the receipt and evaluation of INPO OE 309129.

ANALYSIS / SAFETY SIGNIFICANCE

There were no actual or potential consequences to the health and safety of the public as a result of this event. The 27 instances did not challenge any design or safety limit. Nuclear safety was not significantly compromised because the negative (vacuum) internal pressures do not adversely impact the structural integrity of the vessels. Further, operation at a vacuum does not reduce any design margin to non-ductile failures.

SSES operated in an analyzed condition and within established margins for brittle fracture of the RPV. There are no safety significant issues created by this condition. During this condition the RPV steam dome operates with a vacuum of approximately -14 to -6 psig during startup with the RPV metal temperatures at approximately 160 degrees Fahrenheit (°F) to 170°F. Operation below 0 psig on the pressure/temperature (P-T) limit curves has been evaluated and determined to be acceptable. When the RPV experiences a vacuum, there will be a uniform compressive membrane loading across the vessel wall caused by the ambient external pressure being larger than the internal pressure. Consequently, the driving force acting on the tip of a postulated flaw in any location will be reduced from that calculated for the 0 psig point on the P-T limit curves. In other words, the applied stress intensity factor at the postulated crack tip, when the RPV experiences a vacuum, is less than the applied stress intensity

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NARRATIVE

factor when the RPV experiences a positive internal pressure. Thus, the RPV metal temperature required for an internal pressure of 0 psig on the P-T limit curves is bounding for RPV operation with a vacuum.

CORRECTIVE ACTIONS

Completed Actions:

- The Unit 2 operating procedure for reactor startup and heatup has been revised to proceduralize plant start-up with the MSIVs closed and then opening them between 10 and 40 psig RPV pressure. Startup in this manner maintains RPV pressure above 0 psig at all times and minimizes level transients caused by pressure changes when opening the MSIVs.
- Operators were trained on the revised reactor startup and heatup procedure.

Planned Actions:

- Prior to startup from the 2014 Unit 1 refueling outage, the operating procedure for reactor startup and heatup will be revised to be consistent with the changes made to the corresponding Unit 2 procedure.
- Prepare a change to the P-T limit curves.

PREVIOUS SIMILAR EVENTS

There were no previous similar events identified at SSES in the past three years relative to RPV P-T limit curve limitations.