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AUG 0 3 2016

U. S. Nuclear Regulatory Commission Attn: Document Control Desk Washington, DC 20555-0001

SUSQUEHANNA STEAM ELECTRIC STATION LICENSEE EVENT REPORT 50-387/2016-019-00 **UNIT 1 LICENSE NO. NPF-14 PLA-7505**

Docket No. 50-387

Attached is Licensee Event Report (LER) 50-387/2016-019-00. The LER reports a condition concerning Reactor Coolant Pressure Boundary leakage. This condition was determined to be reportable in accordance with 10 CFR 50.73(a)(2)(ii)(A), 10 CFR 50.73(a)(2)(i)(A), and 10 CFR 50.73(a)(2)(i)(B), as a condition resulting in a principal safety barrier degradation, plant shutdown required by Technical Specifications, and as a condition prohibited by Technical Specifications.

There were no actual consequences to the health and safety of the public as a result of this event.

This letter contains no new regulatory commitments.

For J. A. Franke aussi J. A. Franke

Attachment: LER 50-387/2016-019-00

Copy: NRC Region I Mr. J. E. Greives, NRC Sr. Resident Inspector Ms. T. E. Hood, NRC Project Manager Mr. M. Shields, PA DEP/BRP

10 CFR 50.73

NRC FORM 366 U.S. NUCLEAR REGULATO					JLATC	ORY COMMISSION				APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/3						2018	
(11-2015) LICENSEE EVENT REPORT (LER) (See Page 2 for required number of digits/characters for each block)								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.									
1. FACILITY NAME								2. DOCKET NUMBER				. PAGE					
Susquehanna Steam Electric Station Unit 1							05000387				1 of 4						
4. TITLE Pressure Boundary Leakage from an Inadequate Weld Repair in Small Bore Pump Seal Vent Piping																	
5. EVEN	T DATE		6. L	ER NUM	BER		7. REPORT DAT			TE		8.	ITIES INVOLVED				
MONTH DA'	Y YEA	AR	YEAR	SEQUEN NUMBI	ITIAL ER	REV NO.	MONTH	DAY	YE	AR	FACI	LITY NAME			DOCК 0500	et numbei)0	R
06 06	201	6	2016	- 019) -	00	08	03	20	16	FACI	ACILITY NAME DOCKET NUMBER 05000				R	
9. OPERAT		DE L	11. Th	IS REPO	RTISS	UBMIT	TED PUR	SUANT	TOTH	IE RE	QUIR	EMENTS OF 10	CFR §: (Check a	ll that apply)		
□ 20.2201(b)					20.2203(a)(3)(i)				🛛 50.73(a)(2)	□ 50.	☐ 50.73(a)(2)(viii)(A)						
2			20.2201(d)				20.2203(a)(3)(ii)					50.73(a)(2)	□ 50.	☐ 50.73(a)(2)(viii)(B)			
			20.2203(a)(1)				20.2203(a)(4)				50.73(a)(2)	50.	50.73(a)(2)(ix)(A)				
			20.2203(a)(2)(i)				50.36(c)(1)(i)(A)					50.73(a)(2)(iv)(A)			☐ 50.73(a)(2)(x)		
10. POWER	LEVEL		20.2203(a)(2)(ii)				50.36(c)(1)(ii)(A)					50.73(a)(2)	73.	71(a)(4)		
			20.2203(a)(2)(iii)				□ 50.36(c)(2)					50.73(a)(2)	(v)(B)	73.	71(a)(5)	
009			20.2203(a)(2)(iv)				☐ 50.46(a)(3)(ii)					50.73(a)(2)	(v)(C)	🔲 73.77(a)(1)			
			20.2203(a)(2)(v)				⊠ 50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)		(v)(D)	73.77(a)(2)(i)				
			20.2203(a)(2)(vi)				⊠ 50.73(a)(2)(i)(B)					50.73(a)(2)	☐ 73.77(a)(2)(ii)				
					50.73(a)(2)(i)(C)					OTHER Specify in Abstract below or in NRC Form 366A				66A			
						12.	LICENS	EE CON	TAC	r FO	RTH	S LER					
LICENSEE CONTA	JCENSEE CONTACT							TELEPHONE NUMER (Include Area Code)									
Regina G	enovese	e - Nu	uclear l	Regulat	tory At	ffairs							(570)	542-2980			
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																	
CAUSE SYSTEM		ГЕМ	COMP	ONENT	MAN FACTU	IU- IRER	REPORTABLE TO EPIX		C,	CAUSE		SYSTEM	COMPONENT	MANU FACTUR	ER	REPORTAL TO EPIX	3LE (
В	A	D		P	Flows	erve	Y										
14. SUPPLEMENTAL REPORT EXPECTED								15. EX	PECTED	MONTH	DAY	YEA	R				
YES (If yes, complete 15. EXPECTED SUBMISSION DATE)							NC		SUB D	MISSION ATE							
ABSTRACT (Lim	it to 1400 sp	oaces, i	i.e., approx	kimately 15	single-s	paced t	ypewritten	lines)		NOC	rond	orted on the	Linit 1 D D	antor D	ooire	lation	

On June 6, 2016, at 0556 hours during a drywell entry, a leak was reported on the Unit 1 B Reactor Recirculation Pump Lower Seal Vent Line. The leak was identified at the inboard pipe-to-union weld and required replacement prior to returning to service. The affected piping weld is for 3/4-inch piping, Quality Class Q (ASME Class 2) and is part of the Reactor Coolant Pressure Boundary.

The cause of the event was determined to be the result of a crack in the pipe-to-union weld on the pump side of the connection. The crack was determined to have initiated and propagated as a result of an undetectable lack of fusion at the weld root along with an unrecognized cyclic or vibratory loading. A complete replacement of the pump seal cooler assembly to remove the welded connection was completed prior to the restart of Unit 1.

The condition was immediately reported as a plant shutdown required by Technical Specifications (TS) pursuant to 10 CFR 50.72(b)(2)(i) and degraded condition pursuant to 10 CFR 50.72(b)(3)(ii)(A) (EN 51983). This event is being reported pursuant to 10 CFR 50.73(a)(2)(ii)(A), 10 CFR 50.73(a)(2)(i)(A), and 10 CFR 50.73(a)(2)(i)(B), as a condition resulting in a principal safety barrier degradation, plant shutdown required by Technical Specifications, and as a condition prohibited by Technical Specifications.

					Pa	ge 2 of 4					
NRC FORM 366A	U.S. NUCLEAR REGULATORY COMM	IISSION	APPROVED BY OMB: NO. 3150-010	04	EXPIRES:	10/31/2018					
(11-2015)	LICENSEE EVENT REPORT (L CONTINUATION SHEET	.ER)	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.								
1. FACILITY NAME			2. DOCKET NUMBER		3. LER NUMBER						
Susquehanna Steam Electric Station, Unit 1				YEAR	SEQUENTIAL	REV					
			05000387	2016	- 019	- 00					
NARRATIVE	NARRATIVE										
CONDITION	IS PRIOR TO EVENT										
Unit 1 – Mode 2, 9 percent Rated Thermal Power Unit 2 – Mode 1, 100 percent Rated Thermal Power											
There were no other structures, systems, or components that were inoperable at the start of the event that contributed to the event.											
EVENT DESCRIPTION											
Susquehanna Unit 1 commenced a manual shutdown on June 5, 2016 for a maintenance outage to investigate an increasing trend in unidentified drywell leakage. On June 6, 2016, at approximately 0556, with Unit 1 in Mode 2, leakage was identified from the inboard (pump-side) pipe-to-union weld on the Lower Seal Vent Line [EIIS Component Identifier: PSP] for Unit 1 Reactor Recirculation [EIIS System Identifier: AD] Pump [EIIS Component Identifier: P] 1B. The piping is classified as American Society of Mechanical Engineers (ASME) Class 2 and is part of the Reactor Coolant Pressure Boundary. The leak location is within the Reactor Recirculation loop isolation valves and is isolable from the reactor vessel [EIIS Component Identifier: RPV]. The reactor was in Mode 2 at the time of discovery.											
A timeline of relevant events follows:											
November 2015 Unit 1 Scram as a result of a Main Steam Isolation Valve (MSIV) [EIIS Component Identifier: ISV] closure. During drywell walk-downs, a leak was identified on the Reactor Recirculation Pump B Lower Seal Vent Line. The pipe-to-union connection was replaced.											
<i>I</i> arch-April 2016 During Unit 1 Refueling and Inspection Outage (RIO), follow-up pipe support inspections were conducted and a welded shim was installed to prevent movement of Lower Seal Vent Line.											
June 2016	June 2016 Unit 1 was down-powered to investigate an increasing trend in unidentified drywell leakage. Actual unidentified drywell leakage prior to shutdown was approximately 0.53 GPM. The inboard (pump-side) pipe-to-union weld on Lower Seal Vent Line for the Reactor Recirculation Pump B was identified as leaking.										
This event was r Licensee Event 50.73(a)(2)(i)(A) degradation, pla Specifications.	eported pursuant to 10 CFR 50. Report (LER) is being communic , and 10 CFR 50.73(a)(2)(i)(B), a nt shutdown required by Technic	72(b)(2 cated pu as a cor cal Spe)(i) and 10 CFR 50.72(b)(ursuant to 10 CFR 50.73(a ndition resulting in a princi cifications, and as a condi	3)(ii)(A) (a)(2)(ii)(A pal safety tion proh	EN 51983). Th), 10 CFR ⁄ barrier ibited by Techı	iis nical					

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NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2018 (11-2015) 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 LICENSEE EVENT REPORT (LER) 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 CONTINUATION SHEET 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. 1. FACILITY NAME 2. DOCKET NUMBER 3. LER NUMBER SEQUENTIAL REV YEAR NUMBER NO. Susquehanna Steam Electric Station, Unit 1 05000387 2016 -019 - 00

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NARRATIVE

CAUSE OF EVENT

The cause of the Reactor Coolant Pressure Boundary leakage at the Reactor Recirculation Pump B Lower Seal Vent Line was determined to be a result of a crack in the pipe-to-union weld on the pump side of the connection. Based on investigation and laboratory testing, the crack was determined to have initiated and propagated as a result of an undetectable lack of fusion at the weld root along with an unrecognized cyclic or vibratory loading. Additionally, during the previous repairs on the pipe-to-union weld location, cold-working grinding was performed, inducing a compressive stress which contributed to crack initiation.

ANALYSIS/SAFETY SIGNIFICANCE

Technical Specification Limiting Condition for Operation (LCO) 3.4.4, RCS Operational Leakage, requires zero pressure boundary leakage and less than or equal to 5 gallons per minute (GPM) unidentified drywell leakage when operating in Modes 1, 2 and 3. At the time of discovery of the Reactor Coolant Pressure Boundary leak on the Lower Seal Vent Line, Unit 1 was in Mode 2. As such, the associated condition for Technical Specification (TS) 3.4.4 was not met, requiring operator actions to initiate a plant shutdown.

The 5 GPM Technical Specification limit for unidentified leakage is a small fraction of the calculated flow from a critical crack in the primary system piping. Crack behavior from experimental programs show that leakage rates of hundreds of gallons per minute will precede crack instability. As such, the Technical Specification limit allows time for corrective action to be taken before the Reactor Coolant Pressure Boundary could be significantly compromised. Prior to commencing the down-power to investigate the increasing trend in unidentified drywell leakage, the actual leakage was approximately 0.53 GPM. There was no evidence available to plant operators at the time to substantiate that leakage was from the Reactor Coolant Pressure Boundary. Based on the visual inspection and the size of the crack on the Lower Seal Vent Line, the leakage from this location was likely the primary contributor to the unidentified drywell leakage. Given the actual unidentified drywell leakage prior to shutdown, relative to the TS limit of 5 GPM, there was no actual consequence to public health or safety.

CORRECTIVE ACTIONS

Completed corrective actions include replacement of the pump seal cooler assembly, eliminating the union weld connection and preventing reoccurrence of this type of failure by use of a one-piece forged pipe-to-union fitting. Additionally, the Lower Seal Vent Line configuration was modified to be more flexible in order to alleviate pipe stresses from vibration. Lastly, a procedure change will be completed to provide guidance on preventing potential cold-working through grinding on small-bore piping.

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Susquehanna Steam Electric Station, Unit 1		05000387	YEAR	SEQUENTIAL NUMBER	REV NO.			
		0000007	2016	- 019	- 00			
COMPONENT INFORMATION								
Pump Manufacturer:FLOWSERVE (Formerly EVent Line:¾-inch pipe to 1-inch sockVent Line Material:ASME Class II SA312	3W/IP) tet coni	nection						
PREVIOUS SIMILAR EVENTS								
LER 50-387/2015-009-00, PLA-7419, "Pressure Bore Pump Seal Vent Piping." January 11, 2016	Bound	ary Leakage from an Inade	equate W	eld Repair in S	Small			
LER 50-388/2015-004-00, PLA-7337, "Degraded Leakage Caused by Vibration and Stiff Pipe Con	d Condi inectior	tion Due to Reactor Coola n." June 10, 2015.	nt Pressu	re Boundary				
LER 50-387/2014-011-00, PLA-7286, "Degraded Leakage Caused by an Inadequate Weld." Febru	l Condi Jary 11	tion Due to Reactor Coolar , 2015.	nt Pressu	re Boundary				
			r					
NRC FORM 366 (11-2015)								