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MAY 03 2016

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

10 CFR 50.73

**SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-387/2016-007-00
UNIT 1 LICENSE NO. NPF-14
PLA-7465**

Docket No. 50-387

Attached is Licensee Event Report (LER) 50-387/2016-007-00. The LER reports an event involving inoperability of a swing bus transfer switch. This event was determined to be reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications and 10 CFR 50.73(a)(2)(v)(D) as a condition that could have prevented fulfillment of a safety function.

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.

Jon A. Franke for J.A. Franke

J. A. Franke

Attachment: LER 50-387/2016-007-00

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

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 Infocollections.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 Susquehanna Steam Electric Station Unit 1	2. DOCKET NUMBER 05000387	3. PAGE 1 of 5
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Inoperability of Swing Bus Transfer Switch Due to Deformed Bolt on Linkage

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
03	05	2016	2016	- 007	- 00	05	03	2016	FACILITY NAME	DOCKET NUMBER 05000388
									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	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)	
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)	
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)	
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A	

LICENSEE CONTACT

C. E. Manges, Jr., Senior Engineer - Nuclear Regulatory Affairs

TELEPHONE NUMER (Include Area Code)
(570) 542-3089

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	ED	ASU	R413	Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

On March 5, 2016 during surveillance testing, Automatic Transfer Switch (ATS), 1ATS229, failed to close in on the alternate supply resulting in a loss of the Division 2 Class 1E Engineered Safeguards System (ESS) 480V Motor Control Center (MCC) 1B229 and entry into Technical Specifications 3.3.3.1, 3.5.1, and 3.6.1.3. Based on the cause of the failure, Susquehanna believes that there is firm evidence that the transfer switch would have failed on its next actuation following testing on February 5, 2016. Based on this conclusion, the condition existed for a period longer than allowed by Technical Specifications. As a result, this condition is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. Susquehanna also determined that work associated with the Division 1 transfer switch (1ATS219) was performed while the Division 2 switch was unknowingly inoperable resulting in simultaneous inoperability of both divisions. Since both divisions were inoperable for a period of time between February 5, 2016 and March 5, 2016, this is also considered a condition that could have prevented fulfillment of a safety function and is reportable in accordance with 10 CFR (a)(2)(v)(D).

The direct cause was determined to be a deformed bolt on the upper linkage. The apparent cause was the upper linkage rod being too long causing the deformation of the bolt. Corrective actions include revising the preventive maintenance activities for the transfer switch.

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

NRC FORM 366A
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018



LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Susquehanna Steam Electric Station, Unit 1	05000387	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	- 007	- 00

NARRATIVE

CONDITIONS PRIOR TO EVENT

Unit 1 – Mode 1, approximately 87 percent Rated Thermal Power

Based upon the failure mode of the transfer switch, the switch is considered to have been inoperable since the last time it was tested on February 5, 2016.

EVENT DESCRIPTION

Background Information/System Description:

Two redundant Class 1E 480 V Isolation Swing Buses (1B219 and 1B229) [EIS System/Function Identifier: ED/BU] provide power for the Residual Heat Removal (RHR) Injection Valves [EIS System/Function Identifier: BO/INV], RHR Minimum Flow Valves [EIS System/Function Identifier: BO/V], Recirculation Loop Bypass Valves [EIS System/Function Identifier: AD/V], and Recirculation Discharge Valves [EIS System/Function Identifier: AD/V]. The preferred power source to the isolation swing bus is from the A and B 480 VAC ESS Bus Load Groups via motor-generator set [EIS Function Identifier: MG], and the alternate power is supplied directly from the C and D 480 VAC ESS Bus Load Groups, respectively. The transfer will occur automatically upon reduction or loss of voltage from the preferred source.

Event Timeline:

On March 5, 2016 during surveillance testing, Automatic Transfer Switch (ATS) [EIS Function Identifier: ASU], 1ATS229, failed to close in on the alternate supply resulting in a loss of the Division 2 Class 1E ESS 480V MCC 1B229 and entry into Technical Specifications 3.3.3.1, 3.5.1, and 3.6.1.3.

The detailed timeline is as follows:

February 5, 2016

12:00 – 1ATS229 was successfully tested.

February 8, 2016

01:45 – Technical Specification 3.5.1 was entered for a Division 1 RHR system outage window. Work associated with 1ATS219 was performed during this window.


February 10, 2016


17:43 – The RHR system outage window was completed and Technical Specification 3.5.1 was exited.

March 5, 2016

21:25 - 1ATS229 failed to close in on the alternate supply. Testing was stopped and 1B229 was de-energized.

21:30 – The Field Unit Supervisor (FUS) reported that the ATS transfer motor was very hot to the touch and had an acrid odor.

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<p>NARRATIVE</p> <p>March 6, 2016</p> <p>00:45 - Electrical Maintenance personnel arrived to assess the status of 1ATS229.</p> <p>04:05 - The MG set output breaker was closed and power was restored to 1B229</p> <p>04:06 – Operations exited Technical Specifications 3.3.3.1 and 3.6.1.3 with valve power and indication restored. Technical Specification 3.5.1 for RHR Low Pressure Coolant Injection (LPCI) mode was maintained due to 1ATS229 still being inoperable to transfer to alternate power.</p> <p>March 7, 2016</p> <p>03:33 – Operations entered Technical Specifications 3.3.3.1 and 3.6.1.3 due to de-energizing 1B229 for troubleshooting.</p> <p>15:27 – Troubleshooting, repairs, and swing bus surveillance were satisfactorily completed.</p> <p>16:57 – Operations exited Technical Specifications 3.3.3.1, 3.5.1, and 3.6.1.3.</p> <p>Troubleshooting/Investigation</p> <p>Engineering completed a troubleshooting plan and a Failure Mode Analysis. Prior to investigating the internals of the transfer switch, Electrical Maintenance attempted to swap the transfer switch in its alternate position and as expected the switch cycled continuously without swapping. All the hardware on the transfer switch was checked for tightness, but nothing abnormal was identified. The transfer switch linkage was observed while in the upward normal position, but no abnormalities were found. The transfer switch was then manually manipulated to the alternate (down) position and the linkage was observed again. It was determined that in this position the shaft of the motor had a great deal of downward force applied to it indicating that the upper linkage rod was too long. The bolt attaching the rod to the mounting plate was removed and it was discovered that the bolt was slightly deformed. The bolt was removed and the rod was pulled up to the proper position on the mounting plate, which revealed that the rod was approximately ¼ inch too long resulting in the continuous cycling of the switch without latching in the alternate position. An adjustment was made to the rod to align it with the mounting plate. During adjustment it was noted that all nuts attaching the upper rod were tight eliminating the possible cause of a loose connection on the upper rod linkage. The rod was reinstalled with the deformed bolt and then the transfer switch was tested. It successfully transferred to the alternate position with the deformed bolt; however, since the bolt being deformed over time in addition to the rod being too long caused the failed transfer, the bolt was replaced to eliminate any concern. No other issues were found and all additional attempts to place the transfer switch in the alternate position were successful.</p>				

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NARRATIVE**Reportability**

Based on the cause of the failure, Susquehanna believes that there is firm evidence that the transfer switch would have failed on its next actuation following testing on February 5, 2016. Based on this conclusion, the condition existed for a period longer than allowed by Technical Specifications. As a result, this condition is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. Since Division 1 was inoperable from February 8, 2016 at 01:45 through February 10, 2016 at 17:43 and this timeframe is enveloped by the time that Division 2 was unknowingly inoperable, this is also considered a condition that could have prevented fulfillment of a safety function and is also reportable in accordance with 10 CFR (a)(2)(v)(D).

CAUSE OF EVENT

The direct cause was determined to be a deformed bolt on the upper linkage.

The apparent cause was the upper linkage rod being too long causing the deformation of the bolt. The previous preventive maintenance (PM) activity inspected the linkage, but did not provide criteria for the inspection specifically with regard to linkage rod length.

ANALYSIS/SAFETY SIGNIFICANCE**Actual Consequence**

The actual consequence was failure of 1ATS229 to transfer to its alternate supply causing ESS Swing Bus 1B229 to de-energized and resulting in entry into Technical Specifications 3.3.3.1, 3.5.1, and 3.6.1.3.

Potential Consequence

In the event of a Unit 1 LOCA, LPCI would be required to inject to the Reactor Pressure Vessel (RPV). If this had occurred during the time that 1ATS229 was affected (2/5/16 to 3/5/16), and concurrent with a loss of power to the primary source for 1ATS229, then transfer to the alternate power supply would have failed and bus 1B229 would have lost power. Since the LPCI injection valve HV151F015B receives power from 1B229, it would not open and LPCI injection from Division 2 RHR would not have occurred as required. Recirculation Pump B discharge and discharge bypass valves HV143F031B and HV143F032B also receive power from 1B229 and are required to close on a LPCI injection signal to ensure the LPCI flow is directed into the RPV. Additionally, during the period when the Division 1 transfer switch (1ATS219) was out of service for scheduled maintenance, LPCI injection from Division 1 RHR would also not have occurred.

Since HV151F015B, HV151F017B and HV151F007B are powered from 1B229 and are used to establish the necessary RHR system alignment for Shutdown Cooling (a non-safety mode of operation), this RHR mode of operation would have been prevented.

The RHR minimum Flow valve HV151F007B receives power from 1B229 and would not have closed as required after a Division 2 RHR pump start when system flow is established. This would result in diversion of some RHR flow back to the suppression pool via the minimum flow line. While this would not prevent operation of Division 2 RHR in other modes, it could result in reduced flowrate due to the flow diversion.

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NARRATIVE

CORRECTIVE ACTIONS

Revise applicable PM activities associated with the transfer switch to include the following:

1. Inspect the upper and lower linkage for any abnormalities such as deformed bolts that connect the upper and lower rods to the motor or mounting plates and replace any deformed or damaged equipment as necessary.
2. Establish criteria for rod length and adjustment.

COMPONENT FAILURE INFORMATION

Automatic Transfer Switch Information

- Manufacturer – RUSSELECTRIC
- Model Number – RMT4004CEF
- Voltage Characteristics – 480VAC, 400A, 3Ø

PREVIOUS SIMILAR EVENTS

Condition Report 2013-03361: On November 10, 2013, 1ATS229 failed to close on the alternate supply. The cause was vibrations during monthly testing that caused the transfer switch motor mounting bolts to loosen.