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OCT 26 2009

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop OP1-17
Washington, DC 20555

**SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-388/2009-002-00
LICENSE NO. NPF-22
PLA-6578**

Docket No 50-388

Attached is Licensee Event Report (LER) 50-388/2009-002-00. This event was determined to reportable under 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by plant Technical Specifications (TS). The Unit 2 'C' Residual Heat Removal (RHR) pump was determined to be inoperable due to cooling water not being available to the Unit 2 'C' RHR Pump Unit Cooler and Motor Oil Cooler for approximately four months. As such, the Completion Time for TS Limiting Condition for Operation 3.5.1, Action C was not met.

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

No commitments are associated with this LER.

A handwritten signature in black ink, appearing to read "T. S. Rausch", is written over a faint, dotted grid background.

T. S. Rausch
Senior Vice President and Chief Nuclear Officer

Attachment

Copy: NRC Region I
Mr. R. R. Janati, DEP/BRP
Mr. F. W. Jaxheimer, NRC Sr. Resident Inspector
Mr. B. K. Vaidya, NRC Project Manager

JEAD
NRR

LICENSEE EVENT REPORT (LER)

(See reverse 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 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.

1. FACILITY NAME Susquehanna Steam Electric Station Unit 2	2. DOCKET NUMBER 05000388	3. PAGE 1 OF 4
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4. TITLE Emergency Service Water Cooling Valves Found Closed Resulting in the Unit 2 'C' Residual Heat Removal Pump being Inoperable for Approximately 4 Months

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
04	28	2009	2009	- 002 -	00	10	26	2009		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 5	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)										
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)							
10. POWER LEVEL 0%	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)							
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)							
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)							
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER								
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 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)
Brenda W. O'Rourke, Senior Engineer - Nuclear Regulatory Affairs	(570) 542-1791

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

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

On August 25, 2009, while performing pre-start checks to place Unit 2 Residual Heat Removal (RHR) loop in Suppression Pool Cooling, a field operator identified that Unit 2 Emergency Service Water (ESW) cooling valves 211193 and 211194 were unlocked and in the closed position. These valves, which supply ESW cooling water from the 'B' ESW loop to Unit 2 'C' RHR pump unit cooler and motor oil cooler, are required to be locked open. Investigation revealed that ESW cooling valves 211193 and 211194 were closed on April 28, 2009, following restoration of a clearance order associated with a modification to install new stainless steel and cross-tie piping from the 2C motor cooler to the 'A' loop of ESW. Because the valves had been closed since April 28, 2009, the Unit 2 'C' RHR pump was rendered inoperable for approximately 4 months. As such, TS LCO 3.5.1, action statements were not met. This event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), for a condition prohibited by Technical Specifications.

The cause of the event was human performance error by station personnel for failure to follow the guidance in procedure NDAP-QA-0302. This resulted in a loss of status control for ESW cooling valves 211193 and 211194 for a period of 4 months.

Corrective actions taken included verification that all Unit 1 and 2 locked open ESW valves going to any ECCS equipment were in the correct position. A written communication was provided to all operators regarding this event. Planned corrective actions include incorporating procedure NDAP-QA-0302 into annual pre-outage training for all operators.

The actual consequence of this event is the Unit 2 'C' RHR pump was inoperable for approximately 4 months, which resulted in TS LCO 3.5.1 action statement not being met. The potential consequences, given the worst case single failure for the ESW and RHR Service Water (SW) systems is that with no cooling water to the Unit 2 'C' RHR pump unit cooler and motor cooler, the pump would be expected to eventually fail resulting in SSES not having the minimum ECCS equipment required for long term cooling of Unit 2.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Susquehanna Steam Electric Station Unit 2	05000388	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2009	- 002 -	00	

NARRATIVE

CONDITIONS PRIOR TO EVENT

Unit 2 - Mode 5, 0 percent Rated Thermal Power

EVENT DESCRIPTION

On August 25, 2009, while performing pre-start checks to place Unit 2 Residual Heat Removal (RHR) loop in Suppression Pool Cooling, a field operator identified that Unit 2 Emergency Service Water (ESW) cooling valves 211193 and 211194 appeared to be unlocked and in the closed position. These valves, which supply ESW cooling water from the 'B' ESW loop to Unit 2 'C' RHR pump unit cooler and motor oil cooler, should have been locked open. Operations personnel were dispatched to the area and confirmed that cooling valves 211193 and 211194 were unlocked and closed.

An investigation revealed that ESW cooling valves 211193 and 211194 were closed on April 28, 2009, following restoration of a clearance order. During the recent 2009 Unit 2 refueling outage, a modification to install new stainless steel and cross-tie piping from the 2C motor cooler to the 'A' loop of ESW was completed. A clearance order for this modification required valves 211193 and 211194 to be closed for blocking. This modification and associated testing were found to be the most likely time period for the mispositioning event to have occurred. Upon completion of the modification on April 28, 2009, the clearance order was removed (i.e., the valves were placed in the locked open position). Subsequently, control room personnel ordered valves 211193 and 211194 to be unlocked and re-closed to perform post-modification testing and to separate the new untested piping from the rest of the system until the modification could be closed out.

On April 29, 2009, procedure TP-054-076, ESW Mini Flow Balance, was performed. Test results were as expected. Although the recorded flow rates during the ESW flow balance test imply that valves 211193 and 211194 were open, there is no documentation to show how these valves were opened for the test or ultimately re-closed following the test.

When the Unit 2 ESW cooling water valves 211193 and 211194 were found mispositioned on August 25, 2009, the Unit 2 'C' RHR pump was declared inoperable and Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.1 was entered. However, because the valves had been closed since April 28, 2009, the Unit 2 'C' RHR pump was rendered inoperable on April 28, 2009. TS LCO 3.5.1, Action B.1 requires the inoperable pump to be restored to an operable status within 7 days, or take Action C.2, which is to be in Mode 4 (i.e., hot shutdown) within 36 hours. Because the TS LCO 3.5.1, Action B.1 and C.2 were not met with the TS required time, this event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), for a condition prohibited by Technical Specifications.

An evaluation also concluded that the Unit 2 'C' RHR pump would eventually fail due to a lack of cooling water to the pump motor. Because the Unit 2 pump is required for long-term cooling (in the particular accident scenario discussed in this LER), Unit 2 would not be able to satisfy the minimum available ECCS equipment required for long-term cooling. Therefore, in accordance with 10 CFR 50.73(a)(2)(v)(D), this event is also reportable as a condition that could have prevented the fulfillment of a safety function.

CAUSE OF THE EVENT

The cause of the event was human performance error because station personnel did not follow procedure NDAP-QA-0302, System Status and Equipment Control. This loss of status control prevented personnel from accurately tracking the position of the ESW cooling valves. As a result, status control of the ESW valves was lost for a period of approximately 4 months.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Susquehanna Steam Electric Station Unit 2	05000388	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 4
		2009	-002-	00	

ANALYSIS/SAFETY SIGNIFICANCE

Actual Consequences

The status control of valves 211194 and 211193 in the ESW system was lost for approximately 4 months. Normally, both loops of ESW cooling are available to the Unit 2 'C' RHR pump motor oil cooler. One of the loops was isolated due to the cooling valves being closed. Under the specific failure scenario discussed below, the other loop would also be unavailable and ultimately lead to a failure of the RHR system to perform its design basis function. However, the RHR system was not called upon to perform its design basis function during this time.

Potential Consequences

The design basis mission time for the ESW system to provide cooling water to RHR pumps and room coolers is 30 days, without makeup to the spray pond. The design basis mission time for the RHR system is considered to be 30 days. With no cooling water to the Unit 2 'C' RHR pump motor and associated room cooler, it is anticipated that the RHR pump would fail within the 30 day time period. At Susquehanna, there have been instances where the RHR pumps were run without cooling water (Reference SOOR 2-88-156). In SOOR 2-88-156, it was reported that the Unit 2 'D' RHR pump was run without cooling water for approximately 4 hours. Thrust bearing temperatures exceeded design values, but there was no damage to the pump bearings and the pump was considered fully operable. During the 1982 time-frame, test procedure TP-49-001 was run which demonstrated that it is acceptable to run the RHR pumps without cooling water for 10 minutes. No attempt was made to run the pumps longer than 10 minutes without cooling water. It is concluded that the RHR pump would not fail immediately, but would be expected to fail before reaching its mission time.

An evaluation was performed to determine if the assumed failure of this pump could prevent the safe shutdown of both units, considering an additional single failure at the start of a design basis Loss of Coolant Accident (LOCA)/Loss of Offsite Power (LOOP) accident involving a dual unit shutdown. The minimum Emergency Core Cooling System (ECCS) equipment required for long term cooling of both the reactor and containment is at least one loop of Core Spray (CS) in each unit and at least on RHR pump with one heat exchanger available in each unit.

The worst case single failure for the ESW/RHR Service Water (SW) systems is failure of either the 'A' or 'B' Emergency Diesel Generator (DG), which results in failure of either division I or division II of the ESW pumphouse HVAC. This results in failure of an entire division (i.e., loop) of ESW/RHRSW and the loss of all equipment cooled by the failed ESW/RHRSW loop. The failure of the 'B' DG would be most limiting with the assumed additional failure of the Unit 2 'C' RHR pump. As a consequence of the failure of the 'B' DG and the resulting loss of ESW/RHRSW cooled equipment, operators would be required to select specific RHR pumps (1A and 2C) in order to provide adequate cooling to the affected RHR rooms to maintain operation of the selected RHR pumps in those rooms. In this scenario, no 'B' loop RHR heat exchangers were available since no 'B' loop RHRSW pumps were available. The 1A, 2A, 1D and 2D room coolers are available and the 1A, 2A, 1C and 2C RHR pumps would be available. The Unit 2 'C' RHR pump is required to be selected in this scenario in order to provide room cooling via the Unit 2 'A' RHR pump room cooler since the Unit 2 'A' RHR pump room fan initiates on high room temperature. If any other combination of remaining RHR pumps were selected in this scenario, there would be no room cooling available in one of the units RHR pump rooms and the associated pump would be expected to fail.

Because the Unit 2 'C' RHR pump is required for long-term cooling in this specific accident scenario, and since the pump would be expected to eventually fail due to lack of cooling water to the pump motor (via the mispositioned ESW cooling valves), the eventual failure of the Unit 2 'C' RHR pump would result in SSES not satisfying the minimum available ECCS equipment required for long-term cooling (i.e., there would be no RHR pump available in Unit 2 for long-term cooling).

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Susquehanna Steam Electric Station Unit 2	05000388	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 4
		2009	-002-	00	

CORRECTIVE ACTIONS

Completed Actions -

- Verified that all Unit 1 and Unit 2 ESW valves going to any ECCS equipment were in the required locked open position.
- A written communication was provided to all operators regarding this event.
- Coached and counseled those personnel involved with operation of the Unit 2 cooling valves 211193 and 211194 regarding the requirements of procedure NDAP-QA-0302.

Planned Corrective Actions -

- Include procedure NDAP-QA-0302 as part of the annual pre-outage training for all operators.
- Perform benchmarking to identify gaps in SSES's implementation and control of system check-off lists. Implementation of actions to address identified gaps will ensure that check-off list are performed accurately and control of components are maintained.

ADDITIONAL INFORMATION

None