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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9111250036 DOC. DATE: 91/11/18 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylvania 05000387
 AUTH. NAME AUTHOR AFFILIATION
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 STANLEY, H.G. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 91-013-00: on 911018, susceptibility to motor-generated valve pressure-locking phenomenon existed for RHR/LPCI & core spray sys injection valves. Potential has existed since plant const. Operability evaluation performed. W/911118 ltr.

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NOTES: LPDR 1 cy Transcripts.

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November 18, 1991

U.S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 91-013-00
FILE R41-2
PLAS -506

Docket No. 50-387
License No. NPF-14

Attached is Licensee Event Report 91-013-00. This condition was determined reportable per 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant, per a previous agreement between PP&L and NRC NRR for conditions of this nature. This LER describes a potential for a valve pressure locking phenomenon on the injection valves of the Residual Heat Removal Low Pressure Coolant Injection and the Core Spray systems. This potential phenomenon has no impact on the continued safe operation of the Susquehanna units and the valves remain operable.


H.G. Stanley
Superintendent of Plant - Susquehanna

RRW/mjm

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Susquehanna Steam Electric Station - Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 8 7	PAGE (3) 1 OF 0 4
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TITLE (4)
Potnt.al For Pressure - Locking of RHR LPCI and Core Spray System Injection Valves

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)										
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)									
1	0	1	9	1	0	1	3	0	0	1	1	1	8	9	1	SSES - Unit 2	0 5 0 0 0 3 8 8		
1	0	1	8	9	1	9	1	0	1	3	0	0	1	1	1	8	9	1	0 5 0 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

OPERATING MODE (9) 1	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	20.405(a)(1)(i)	50.38(c)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.38(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	50.71(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Richard R. Wehry - Power Production Engineer	TELEPHONE NUMBER AREA CODE: 7 1 7 5 4 2 - 3 6 6 4
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On October 18, 1991, with both Unit 1 and Unit 2 in Condition 1 at 100% power, PP&L Engineering determined that a susceptibility to a motor-operated valve pressure-locking phenomenon exists for the Residual Heat Removal - Low Pressure Coolant Injection System (RHR-LPCI) and Core Spray System injection valves. Based on PP&L's operability evaluation, this deficiency has no impact on the continued safe operation of the Susquehanna units since the injection valve response times remain well within those required by the accident analyses contained in the FSAR. Although the overall system response time limits are not affected, the margin of safety is reduced. Per a prior agreement between PP&L and NRC NRR for conditions of this nature, this event is being reported pursuant to 10CFR50.73(a)(2)(ii)(B). PP&L has implemented precautions to provide additional assurance against the potential pressure locking scenarios and is evaluating modifications to resolve the pressure locking concern as well as a schedule for implementation.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Unit 1 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 7	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
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TEXT (If more space is required, use additional NRC Form 368A's) (17)

DESCRIPTION OF EVENT

On October 18, 1991, with both Unit 1 and Unit 2 in Condition 1 at 100% power, PP&L Engineering determined that a susceptibility to a motor-operated valve pressure-locking phenomenon exists for the Residual Heat Removal - Low pressure Coolant Injection System (RHR-LPCI; EIIS Code: B0) and the Core Spray System (EIIS Code: BM) injection valves.

Based on PP&L's operability evaluation, this deficiency has no impact on the continued safe operation of the units for the following reasons:

- 1) The RHR-LPCI injection valves will open when required, although a delay of one (1) second may occur during LOCA scenarios in which the valves are actuated concurrent with an RHR pump motor start voltage transient.
- 2) The Core Spray injection valves will open although a delay of four (4) seconds may occur due to initial locked rotor condition during LOCA scenarios in which the valves are actuated concurrent with an RHR and Emergency Service Water (EIIS Code: BI) pump motor start voltage transient.

Although the overall response time limits of the systems per the FSAR are not affected, the margin of safety is reduced. Per a prior agreement between PP&L and NRC NRR for conditions of this nature (PLA-3449, dated 10-22-90), this event is being reported pursuant to 10CFR50.73(a)(2)(ii)(B).

The pressure locking phenomenon could occur if inboard isolation check valves leaked, allowing the Core Spray and RHR injection valve bonnets to potentially pressurize to reactor pressure and recirculation loop pressure, respectively. Following a rapid depressurization during a DBA-LOCA, this trapped pressure could lead to pressure locking of the valve, increasing the torque required to open the valve.

CAUSE OF EVENT

As part of a continuing thorough evaluation of all SSES Unit 1 and Unit 2 safety-related air and motor operated valve potentially susceptible to pressure locking and/or thermal binding (relative to INPO SOER 84-7) (208 valves), a potential for pressure locking of the RHR LPCI and Core Spray injection valves was identified. This potential has existed since plant construction as part of its original design.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Unit 1 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 7	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

REPORTABILITY/ANALYSIS

As part of an extensive review of the pressure-locking phenomenon of motor-operated valves on safety systems, PP&L has determined that a susceptibility to this phenomenon exists for the RHR-Low Pressure Injection System and the Core Spray system valves. Per a prior agreement between PP&L and NRC NRR for conditions of this nature (see PLA-3449 dated 10-22-90), this event is being reported pursuant to 10CFR50.73(a)(2)(ii)(B). This conclusion was reached because the margin of safety was reduced, although the overall FSAR required response time limits of the systems were not affected.

Based on our Operability evaluation, this deficiency has no impact on the continued safe operation of the units for the following reasons:

1. The RHR-LPCI injection valves will open when required, although a delay of 1 second may occur during LOCA scenarios in which the valves are actuated concurrent with an RHR pump motor start voltage transient. This remains well within the required response time for the system as contained in the FSAR.
2. The Core Spray injection valves will open although a delay of 4 seconds may occur due to initial locked rotor condition during LOCA scenarios in which the valves are actuated concurrent with an RHR and ESW pump motor start voltage transient. Again, this timing remains within the required ECCS response times.

PP&L has implemented additional precautions and has concluded that they provide additional assurance.

1. The speed of the Rx recirc pumps is limited to less than or equal to 88% by procedure, which effectively reduces post accident recirculation loop pressure.
2. Manual operator actions are in place to address any system voltage degradation below 96.5%.

In conclusion, the RHR-LPCI and Core-Spray systems at SSES units 1, and 2 are OPERABLE and no degraded conditions exist at the station.

A review of valve history for the RHR LPCI and Core Spray injection valves was performed. Only one incident (documented by Significant Operating Occurrence Report (SOOR) 1-87-205 on July 10, 1987) was identified where pressure locking may have caused the Unit 1 RHR 'A' injection valve to not open when proceeding into Shutdown Cooling. However, there was no firm evidence to attribute the cause of that incident to the pressure locking phenomenon.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Unit 1 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 7	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Since the response times of the subject injection valves remain well within the required system response time limits contained in the FSAR, there are no safety consequences or compromise to public health or safety as a result of this condition.

In accordance with the guidelines provided in NUREG 1022 Supplement 1 Item 14.1 and 10CFR50.4(d), the required submission date for this report was determined to be November 18, 1991.

CORRECTIVE ACTIONS

An operability evaluation was performed and concluded that this condition has no immediate impact on the continued safe operation of the Susquehanna units.

PP&L has implemented additional precautions and has concluded that they provide additional assurance.

1. The speed of the Rx recirc pumps is limited to less than or equal to 88% by procedure, which effectively minimizes post accident recirculation loop pressure.
2. Manual operator actions are in place to address any system voltage degradation below 96.5%.

PP&L is evaluating two options for resolving the potential valve pressure locking phenomenon (as well as a schedule for implementation):

1. Providing a pressure relief path from the valve cavities to prevent an internally pressurized condition.
2. Upgrading the valve actuators to overcome any potential valve bonnet pressurized condition.

ADDITIONAL INFORMATION

Failed Components Identification: Not applicable.

Previously Reported Similar Events: None.