PSEG Nuclear LLC
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PSEG
Nuclear LLC

LR-N16-0085

10 CFR 50.73

April 18, 2016

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

Salem Nuclear Generating Station Unit 2
Renewed Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: LER 311/2016-004-000
Auxiliary Feedwater Pump Auto Start

Licensee Event Report, "Auxiliary Feedwater Pump Auto Start" is being submitted pursuant to 10 CFR 50.73 (a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

Should you have any questions or comments regarding the submittal, please contact Mr. Thomas Cachaza of Regulatory Affairs at 856-339-5038.

There are no regulatory commitments contained in this letter.

Sincerely,

John F. Perry
Site Vice President – Salem Generating Station

pjd

Enclosure – LER 311/2016-004-000

cc Mr. D. Dorman, Administrator – Region 1, NRC
Mr. T. Wengert, Licensing Project Manager – Salem, NRC
Mr. P. Finney, USNRC Senior Resident Inspector, Salem (X24)
Mr. R. Braun, President and Chief Nuclear Officer – Nuclear
Mr. P. Mulligan, Manager IV, NJBNE
Bureau of Nuclear Engineering
PO Box 415
Trenton, NJ 08625
Mr. T. Cachaza, Salem Commitment Tracking Coordinator
Mr. L. Marabella, Corporate Commitment Tracking Coordinator

NRC FORM 366 (02-2014) 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)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE Auxiliary Feedwater Pump Auto Start

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 05000
02	14	2016	2016	004	000	04	18	2016	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
2	☐ 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)
	☐ 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)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
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

LICENSEE CONTACT	TELEPHONE NUMER *(Include Area Code)*
Thomas J. Cachaza, Senior Regulatory Compliance Engineer	856 - 339 - 5038

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
X				Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

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

On 2/16/16 at 0827 22 Steam Generator Feed Pump (SGFP) tripped while operators were transferring the steam supply to the pump from heating steam to main steam. Trip of 22 SGFP initiated emergency safeguard feature (ESF) actuation for start of the 21 and 22 Auxiliary Feedwater (AFW) Pumps. This event occurred during Unit 2 start-up following a unit trip from generator protection.

This report is being made in accordance with 10CFR50.73 (a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," for this event actuation of the Auxiliary Feedwater System. Notification of this event was provided via ENS report 51738.

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NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor {PWR/4}

Feedwater / Digital Control System {SJ/DCC}

*Energy Industry Identification System (EIIS) codes and component function identifier codes appear as {SS/CCC}.

IDENTIFICATION OF OCCURRENCE

Event Date: 02/16/2016
Discovery Date: 02/16/2016

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Mode 2 (Startup) at 4 percent rated thermal power (RTP).

DESCRIPTION OF OCCURRRENCE

On 2/16/16 at 0827 22 Steam Generator Feed Pump (SGFP) tripped while operators were transferring the steam supply to the pump from heating steam to main steam. Trip of 22 SGFP initiated emergency safeguard feature (ESF) actuation for start of the 21 and 22 Auxiliary Feedwater (AFW) Pumps. This event occurred during Unit 2 start-up following a unit trip from generator protection.

The digital feedwater control system (DFCS) {SJ/DCC} indicated a trip on overspeed. Review of the Plant Computer and the Control Console did not indicate an overspeed trip.

SGFP speed lowered during the swap from heating steam to main steam. SGFP condensate flow momentarily decreased, causing an increase in steam demand to 22 SGFP. At 08:27:17 22 SGFP speed rapidly increased from 2170 to 2450 RPM. The sudden increase in SGFP speed appears to be coincident with opening of the poppet valve, allowing a sudden increase in steam supply to 22 SGFP. Data downloaded from the digital feedwater control system showed a 400 RPM speed increase occurred in 300 milliseconds with all three speed pick up relays indicating a overspeed rate change trip (SGFP acceleration rate trip). 22 SGFP speed slows from 2450 to < 300 RPM due to a SGFP trip as indicated from the digital feedwater control system. No other spikes in SGFP speed were observed in the digital feedwater control system, the Plant Computer or on the associated Control Console during this event.

The DFCS design change package (DCP) was implemented during the Fall 2015 refueling outage. The rate trip is a new trip added during the DFCS DCP. The SGFP acceleration rate trip is incorporated as standard protection as part of the DFCS speed detection module. The setting is currently at maximum value allowed by the module. This trip is anticipatory to an overspeed condition.

This report is being made in accordance with 10CFR50.73 (a)(2)(iv)(A), “Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B),” for this event actuation of the Auxiliary Feedwater System. Notification of this event was provided via ENS report 51738.

CAUSE OF EVENT

The 22 SGFP trip was a rate trip (~400 RPM increase in 300milliseconds) caused when the main steam poppet valve opened. A root cause evaluation was conducted for this event.

The evaluation determined that one root cause was that the specification agreed upon by PSEG and the DFCS vendor did not identify the acceleration rate trip that was incorporated into the digital feed modification. An independent Critical Digital Review (CDR) was performed by an experienced independent vendor. The CDR did not identify the installation of the trip. The vendor was involved in the process throughout the entire lifecycle, from requirements definition to factory acceptance testing. The design requirements/specifications as defined by PSEG for the implementation of the modification did not identify the acceleration rate trip. The DFCS vendor was contacted and requested to validate that the acceleration rate trip was not discussed in the Functional requirements document. The response to the inquiry was "The Trip on acceleration is NOT required; therefore it is not contained in the Functional Requirements Document.” The trip function was installed without knowledge by engineering and the vendor had documentation identifying function/trip did exist, but did not specifically communicate the existence or functionality of the specific trip function. The acceleration rate trip will be removed from the system in accordance with the design change process.

A second root cause identified was that the instructions for swapping from low pressure steam to high pressure steam provided in the procedure utilized did not include a conservative description/method for implementing a change in steam supply source to minimize speed perturbation. A review of data collected from the event was performed. The speed and demand signals specific to this event indicated a delta from previous start ups and a speed perturbation was experienced. The feed pump operation was performed within the requirements of the procedure and the review performed by this evaluation indicates that this was not the conservative method to operate/perform the transition from heating steam (HS) to main steam (MS). Additional guidance is required to prevent further speed perturbations.

SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences as a result of this event.

The operating crew responded correctly to the event. The applicable abnormal operating procedure was properly entered and documentation met expectations.

The DFCS and the AFW systems operated as designed. There were no nuclear safety implications associated with this event.

SAFETY SYSTEM FUNCTIONAL FAILURE

This condition did not result a safety system functional failure as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines.

PREVIOUS EVENTS

A review of the previous three years identified no similar events:

CORRECTIVE ACTIONS

- Revise the Material, Equipment and Service Specification governing procedure to require any exceptions or additional features from PSEG detailed specifications be identified by supplier in writing and evaluated by PSEG to determine suitability for use.

- Revise procedure for swapping the SGFPs from low pressure steam to high pressure steam to include guidance for conservative operation during swap from Heating Steam to Main Steam of the SGFP.

COMMITMENTS

There are no regulatory commitments contained in this LER.