



**MAY 21 2012**

LR-N12-0135

10CFR 50.73

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

LER 311/2012-001  
Salem Nuclear Generating Station Unit 2  
Facility Operating License No. DPR-75  
NRC Docket No. 50-311

SUBJECT: Automatic Reactor Trip Due to Turbine Trip

The Licensee Event Report, "Automatic Reactor Trip Due to Turbine Trip," is being submitted pursuant to the requirements of the Code of Federal Regulations, 10CFR 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)..."

The attached LER contains no commitments. Should you have any questions or comments regarding the submittal, please contact David Lafleur of Salem Regulatory Assurance at 856-339-1754.

Sincerely,

A handwritten signature in black ink, appearing to read "C. Fricker", written over the word "Sincerely,".

Carl J. Fricker  
Site Vice President – Salem

Attachments (1)

LE22  
MRR

**MAY 21 2012**

cc            Mr. W. Dean, Administrator – Region 1, NRC  
                 Mr. John Hughey, Licensing Project Manager – Salem, NRC  
                 Mr. D. Schroeder, USNRC Senior Resident Inspector, Salem (X24)  
                 Mr. P. Mulligan, Manager IV, NJBNE  
                 Mr. T. Joyce, President and Chief Nuclear Officer – Nuclear  
                 Mr. T. Cachaza, Salem Commitment Tracking Coordinator  
                 Mr. L. Marabella, Corporate Commitment Tracking Coordinator  
                 Mr. D. Lafleur, Salem Regulatory Assurance

# LICENSEE EVENT REPORT (LER)

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 Section (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.

<b>1. FACILITY NAME</b> Salem Generating Station - Unit 2	<b>2. DOCKET NUMBER</b> 05000311	<b>3. PAGE</b> 1 of 4
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**4. TITLE**  
Automatic Reactor Trip Due to Turbine Trip

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	23	2012	2012	0 0 1	0	05	21	2012		DOCKET NUMBER

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)									
<b>10. POWER LEVEL</b>  100%	<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)						
	<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 checked="" 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 type="checkbox"/> 50.73(a)(2)(i)(B)	<input 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 David Lafleur, Senior Compliance Engineer, Salem Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (856) 339-1754
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
U	TG	HCU	Siemens	Yes					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 23, 2012, at approximately 1428 hrs. Salem Unit 2 experienced an automatic reactor trip due to a turbine trip. The cause of the turbine trip was the spurious, simultaneous spiking of all three 103% overspeed inputs to the turbine Digital Electro Hydraulic Controller.

At the time of the trip, the 22 Station Power Transformer was tagged out of service for maintenance. Upon unit trip and non-vital bus transfer from the Auxiliary to the Station Power Transformers, power to the F and G group buses was lost due to unavailability of the 22 Station Power Transformer. The 23 and 24 Reactor Coolant Pumps tripped as a result of the F and G busses being de-energized.

This report is being made in accordance with 10CFR 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)..."

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

Westinghouse – Pressurized Water Reactor (PWR/4)

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

**IDENTIFICATION OF OCCURRENCE**

Event Date: March 23, 2012

Discovery Date: March 23, 2012

**CONDITIONS PRIOR TO OCCURRENCE**

Salem Unit 2 was in Operational Mode 1 at 100% power with the 22 Station Power Transformer (SPT) tagged out of service for scheduled maintenance. No other structures, systems or components were inoperable at the time of the discovery that contributed to the event.

**DESCRIPTION OF OCCURRENCE**

On March 23<sup>rd</sup>, 2012 Salem Unit 2 was in Mode 1, operating at 100% power and steady state conditions with the 22 SPT tagged out of service for scheduled maintenance. At approximately 1428 hrs. an automatic reactor trip occurred due to a Turbine Trip signal above P-9 (49% Reactor Thermal Power).

On a unit trip, station power is automatically transferred from the #2 Auxiliary Power Transformer (APT) to the 21 and 22 SPTs. Since the 22 SPT was unavailable, power was lost to the F and G group 4 KV non-vital busses. Undervoltage on the F and G busses caused a trip of the 23 and 24 Reactor Coolant Pumps (RCP).

The 21 and 22 motor driven, and the 23 turbine driven Auxiliary Feedwater (AFW) Pumps automatically started as expected on the unit trip due to low-low (14% Narrow Range) Steam Generator (SG) levels. At 1429 hrs. a second AFW actuation signal occurred due to low-low levels in the 21 and 22 SGs following the trip of the 23 and 24 RCPs. At 1457 hrs., SG low level setpoints were cleared and the 23 turbine driven AFW Pump was secured in accordance with operating procedures.

At 1523 hrs. a third AFW actuation signal occurred due to a low-low level in the 22 SG. The 21 and 22 motor driven AFW pumps remained in operation throughout unit stabilization.

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**NARRATIVE**

The cause of the Turbine Trip signal was due to a spurious actuation of the Digital Electro-Hydraulic Controller (DEHC) {TG/HCU}. Investigation revealed that all three input channels of the DEHC were found to have simultaneously spiked above the overspeed trip setpoint of 103% of 1854 rpm to approximately 104% indicated. No actual change of turbine speed was observed.

Visual inspections were made of the DEHC and speed probes wiring, mounting and contacts to detect damage or looseness as well as evidence of foreign material intrusion. The turbine speed pickup tooth wheel was inspected for damage and alignment issues. Attempts were made locally at the DEHC and surrounding areas to reproduce false signals due to radio frequency interference. No issues were identified. A causal evaluation is in progress.

**PREVIOUS OCCURRENCES**

A review of LERs at Salem Station revealed a similar unit trip occurred in 2006 on Salem Unit 1 (272/2006-001) due to a spurious spiking of inputs to the DEHC causing a 103% overspeed turbine trip actuation.

**SAFETY CONSEQUENCES AND IMPLICATIONS**

Loss of forced reactor coolant flow is a Condition II Event analyzed in Section 15.2.5 of the UFSAR. The UFSAR analysis states that the Departure from Nucleate Boiling (DNBR) will not decrease below the limiting value at any time during the transient and therefore no core safety limit is violated. The UFSAR analysis assumes a reactor trip on low RCS loop flow with two loops coasting down. Since reactor trip was actuated before the 23 and 24 loop low flow conditions occurred, the margin to Departure from Nucleate Boiling (DNB) was greater than that as analyzed in the UFSAR. Therefore there were no safety consequences as a result of the loop low flow conditions due to the loss of the 23 and 24 RCPs.

Emergency operating procedures require operators to maintain SG levels above 9% Narrow Range level in at least one SG to ensure adequate inventory for secondary heat sink requirements. The third AFW actuation occurred with adequate inventory in the SGs, thus secondary heat sink requirements were never challenged during post-trip stabilization.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, did not occur.

**CORRECTIVE ACTIONS**

1. Salem is evaluating changes to the DEHC system to enhance its ability to withstand false spurious input signals.

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2. The station has implemented a design change raising the existing Unit 2 DEHC system overspeed trip setpoint from 103% to 108% to reduce the likelihood of similar spurious actuations. A similar change is scheduled for implementation on Unit 1.

3. A causal evaluation is in progress to address additional corrective actions for the spurious turbine overspeed trip actuation.

**COMMITMENTS**

No commitments are made in this LER.