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DEC 0 9 2010

10CFR50.73

LR-N10-0432

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington DC 20555-001

LER 272/2010-005
Salem Nuclear Generating Station Unit 1
Facility Operating License Number DPR-70
NRC Docket Number 50-272

Subject: Automatic Reactor Trip Due to Actuation of The Generator Protection Relay

This Licensee Event Report, "Automatic Reactor Trip Due to Actuation of The Generator Protection Relay " is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(iv)(A).

The attached LER contains no commitments. Should you have any questions or comments regarding this submittal, please contact Mr. E. H. Villar at 856-339-5456.

Sincerely,

Carl J. Fricker
Site Vice President - Salem

Attachments (1)

IE22
NRR

DEC 0 9 2010

cc Mr. W. Dean, USNRC - Administrator - Region I
Mr. R. Ennis, USNRC - Licensing Project Manager - Salem
USNRC Senior Resident Inspector - Salem (X24)
Mr. P. Mulligan, NJBNE Manager IV
Mr. H. Berrick, Salem Commitment Tracking Coordinator
Mr. L. Marabella, Corporate Commitment Tracking Coordinator

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

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.

LICENSEE EVENT REPORT (LER)

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4. TITLE
Automatic Reactor Trip Due to Actuation of The Generator Protection Relay

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
10	15	2010	2010	0 0 5	0	12	09	2010		DOCKET NUMBER

9. OPERATING MODE: 1

10. POWER LEVEL: 100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 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)
☐ 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)
☐ 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

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Enrique Villar	(856) 339 -5456

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	GEN	RG	B093	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 October 15, 2010, at approximately 2312, Salem Unit 1 experienced an automatic reactor trip. The automatic reactor trip was the result of a turbine trip. The cause of the turbine trip was the actuation of the loss of field relay, which provides the regular (primary) protection for loss of excitation for the main generator. The exact cause for the loss of excitation has not yet been determined; a root cause evaluation is in progress. The most likely cause for the actuation of the loss of field relay is a defective Automatic Digital Regulator computer (WDR 2000).

Corrective actions included: Repairing the main generator potential transformer spring loaded detent drawer locking mechanism and replacing the fuses. Unit 1 was returned to service with the voltage regulator in manual control. The unit 1 voltage regulator will be replaced during the next scheduled refueling outage.

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)...."

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NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor (PWR/4)

Electric Voltage Regulator {-/RG}

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

IDENTIFICATION OF OCCURRENCE

Event Date: October 15, 2010

Discovery Date: October 15, 2010

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 1 was in Operational Mode 1.

No structures, systems or components were inoperable at the time of the discovery that contributed to the event.

DESCRIPTION OF OCCURRENCE

On October 15, 2010, at approximately 2312, with Unit 1 at 100% power and steady state conditions, the Electrical System Operator (Load Dispatcher) requested control room personnel to lower MVARS from 280 MVAR out to 230 MVAR out. When the Voltage Regulator {-/RG} Digital Control Auto Adjuster "Lower auto setpoint" console pushbutton was depressed VARS rapidly went negative to approximately -100 MVARS and immediately reversed to +270 MVARS and stabilized. A number of alarms were received, and in accordance with alarm response procedure, an operator was dispatched to the voltage regulator panel to investigate these alarms. At approximately 2321, the Unit 1 reactor tripped due to a turbine trip. The cause of the turbine trip was the actuation of the loss of field relay.

All safety related equipment responded as designed, including the Auxiliary Feedwater Pumps which started due to steam generator low level.

Unit 1 was returned to service (generator output breaker closed) on October 18, 2010, with the voltage regulator in manual control.

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NARRATIVE

DESCRIPTION OF OCCURRENCE (cont'd)

This report is being made in accordance with 10C FR50.73(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)...."

CAUSE OF OCCURRENCE

The cause of the reactor trip was the result of an automatic turbine trip. The cause of the turbine trip was the actuation of the loss of field relay, which provides the regular (primary) protection for loss of excitation for the main generator.

The exact cause for the loss of excitation has not been determined yet. A root cause evaluation is currently in progress. The most probable cause for the actuation of the loss of field relay is a defective primary Automatic Digital Regulator computer (WDR 2000).

Immediate investigation performed at the time of the event found a broken latch pin on the Phase C Main Generator Regulator Potential Transformer (PT) drawer. This finding originally led to the conclusion that the missing latch pin could have caused intermittent contact of the primary and/or secondary PT stabs causing erroneous input signals to the Main Generator Voltage Regulator (VR) automatic controls. These PT's provide voltage sensing and feedback for generator output (voltage) control when the VR is in automatic (digital) mode. Further review of alarms and relay actuations did not support the original conclusion. The broken latch pin on the PT drawer was repaired.

Troubleshooting performed during the restart of Unit 1, with the voltage regulator in manual control, found that the Maximum Excitation Limiter (MEL) WDR 2000 was actuating at no load field current levels. This early MEL actuation, with the voltage regulator in automatic control, would drive full load field excitation levels down to no load values, which could actuate the regular (primary) protection for loss of generator field. Further review of alarms and relay actuations supported the conclusion of the WDR 2000 failure.

PREVIOUS OCCURRENCES

A review of LERs at Salem Station dating back to 2007 did not identify any similar events.

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NARRATIVE

SAFETY CONSEQUENCES AND IMPLICATIONS

There was no actual safety consequence associated with this event. Operators appropriately responded to the automatic reactor trip. Plant response to the reactor trip was as expected and as designed. All safety systems operated as required.

The potential safety consequences associated with this event have been analyzed in Chapter 15 of the Salem UFSAR. A Loss of External Electrical Load and/or Turbine Trip is categorized as condition 2 event of moderate frequency. The results of the analyses show that the plant design is such that a total loss of external electrical load without a direct or immediate reactor trip presents no hazard to the integrity of the RCS or the Main Steam System. Pressure relieving devices incorporated in the two systems are adequate to limit the maximum pressures to within the design limits.

The integrity of the core is maintained by operation of the Reactor Protection System, i.e., the DNBR will be maintained above the limit value. Therefore, there will be no cladding damage and no release of fission products to the RCS.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines, did not occur. This event did not result in a condition that alone could have prevented the fulfillment of a safety function of a system needed to remove residual heat control the release of radioactive material, or mitigate the consequences of an accident.

CORRECTIVE ACTIONS

1. The phase C main generator potential transformer spring loaded detent drawer locking mechanism was repaired, and fuses were replaced.

2. Unit 1 was returned to service with the voltage regulator in manual control. During the period the voltage regulator is in manual control, daily briefings with the operating shifts are being conducted to heighten the attention to this condition.

3. The voltage regulator will be replaced during the next scheduled refueling outage via a design change.

4. A root cause has been initiated to determine the cause of the trip.

COMMITMENTS

No commitments are made in this LER.