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Nuclear Business Unit

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Document Control Desk
Washington, DC 20555

**LER 272/98-015-01
SALEM GENERATING STATION - UNIT 1
FACILITY OPERATING LICENSE NO. DPR-70
DOCKET NO. 50-272**

Gentlemen:

This Supplemental Licensee Event Report entitled "Improper Installation of Test Equipment to the Reactor Protection System" is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(ii)(B).

Sincerely,

A. C. Bakken III
General Manager -
Salem Operations

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Attachment

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The power is in your hands.

LICENSEE EVENT REPORT (LER)
 (See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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.

FACILITY NAME (1) **Salem Unit 1** DOCKET NUMBER (2) **05000272** PAGE (3) **1 OF 6**

TITLE (4)
Improper Installation of Test Equipment to the Reactor Protection System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MON	DAY	YEAR	YEAR	SEQUENTIAL	REVISION	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	24	98	98	015	01	12	17	98	Salem Unit 2	05000311
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE	POWER LEVEL	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)				OTHER
Mode 1	100	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(ii)	X	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(iii)		50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)	
		20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)
 NAME: **Brian J. Thomas, Licensing Engineer** TELEPHONE NUMBER (Include Area Code): **609-339-2022**

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)
 YES (If yes, complete EXPECTED SUBMISSION DATE): NO: EXPECTED MONTH: DAY: YEAR:

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

A review of the procedure for the connection of test equipment for collection of State Point data identified that test leads from the four channels of Reactor Control and Protection system were connected to switch boxes that had not been qualified to the same requirements as the Reactor Control and Protection system. Specifically, these switchboxes had not been evaluated to determine their capability to resist multiple channel failures, the most credible being a seismic event. The connections to the Reactor Control and Protection system were from the non-isolated portion of the system and were not provided with isolation devices as described in the Salem Updated Final Safety Analysis Report (UFSAR). Based on this, the channels connected to the switchboxes should have been declared inoperable with the test equipment installed since a proper evaluation was not performed prior to installing the test equipment.

The cause is attributed to inadequate 10CFR50.59 applicability reviews during past revisions and the original issuance of the State Point Data procedure due to inadequate program guidance regarding the applicability of 10CFR50.59 to maintenance and test equipment. A contributing factor to this event is ineffective corrective actions from similar events. This event is reportable under 10CFR50.73(a)(2)(i)(B), any condition prohibited by the plant's Technical Specifications and 10CFR50.73(a)(2)(ii)(B), any condition that was outside the design basis of the plant.

(6-1998)

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

PLANT AND SYSTEM IDENTIFICATION

Westinghouse - Pressurized Water Reactor

Reactor Control and Protection System {JC/-}*

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

CONDITIONS PRIOR TO OCCURRENCE

At the time of discovery, Salem Unit 1 and Unit 2 were in Mode 1.

DESCRIPTION OF OCCURRENCE

A review of the procedure for the connection of test equipment for collection of State Point data identified that test leads from the four channels of Reactor Control and Protection system were connected to switch boxes that had not been qualified to the same requirements as the Reactor Control and Protection system. Specifically, these switchboxes had not been evaluated to determine their capability to resist multiple channel failures, the most credible being a seismic event. The connections to the Reactor Control and Protection system were from the non-isolated portion of the system and were not provided with isolation devices as described in the Salem Updated Final Safety Analysis Report (UFSAR). Specifically the UFSAR states that, "the design criterion used to assure electrical isolation is that no analog signal which is required for initiation of reactor protection or engineered safety feature actuation is allowed to leave a set of protection channels. Where protection signal intelligence is required for other than protection functions an isolation amplifier is used to transmit the intelligence." Based on this, the channels connected to the switchboxes should have been declared inoperable with the test equipment installed since a proper evaluation was not performed prior to installing the test equipment.

Based on the above, this event is reportable under 10CFR50.73(a)(2)(i)(B), any condition prohibited by the plant's Technical Specifications and 10CFR50.73(a)(2)(ii)(B), any condition that was outside the design basis of the plant.

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CAUSE OF OCCURRENCE

The cause is attributed to inadequate 10CFR50.59 applicability reviews during past revisions and the original issuance of the State Point Data procedure due to inadequate program guidance regarding the applicability of 10CFR50.59 to maintenance and test equipment. A contributing factor to this event is ineffective corrective actions from similar events as outlined in the following section.

PRIOR SIMILAR OCCURRENCES

A review of LERs for the past two years identified the following similar occurrences concerning the installation of Maintenance and Test Equipment (M&TE) to operable plant systems:

LER 272/97-013-00: "Failure to Meet Technical Specification 3.8.1.1 Action B." This event consisted of returning the 2A Emergency Diesel Generator (EDG) to operable status with the test equipment hooked up. Restoring the EDG to operable status with the test equipment installed had not been previously evaluated and was contrary to the operations procedure. This event was attributed to personnel error for intentionally leaving the test equipment in place when declaring the EDG operable contrary to the procedure requirement that directed the removal of the test equipment. A corrective action from the LER was to provide appropriate direction for the installation of temporary test instrumentation into operable plant equipment. This corrective action assessed the procedure for control of temporary modifications and the maintenance department troubleshooting procedure and determined that adequate guidance was provided in these procedures to ensure that installation of M&TE on operable systems would be evaluated under the 10CFR50.59 process. This assessment also identified enhancements to centralize the guidance for evaluating the installation of M&TE into a single document, which has not been completed.

LER 311/97-014-00: "Manual Reactor Trip From 100% Power Following Loss of Both Operating Steam Generator Feed Pumps." A circuit card in the Westrac Data Acquisition System (DAS) failed causing feedwater header pressure to indicate approximately 150 psig below actual. The advanced digital feedwater control system (ADFCS) responded by increasing feedwater pump speed causing feedwater flow to increase to more than 120% of full flow value. This caused feedwater pump suction pressure to drop leading to the automatic trip of both feedwater pumps. The cause of the event was attributed to the failure of the Westrac DAS circuit card. Although the 10CFR50.59 evaluation that had been performed discussed the modification to install the ADFCS including design, installation and testing, the potential failure modes of the M&TE were not discussed. The corrective actions associated with this LER consisted of addressing the specific impact of the Westrac DAS on the ADFCS and the installation of M&TE during modification testing.

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PRIOR SIMILAR OCCURRENCES (cont'd)

LER 311/98-001-00: "Failure to Meet Technical Specification 3.3.7 Table 3.3-11 Item 19 – RVLIS." The Reactor Vessel Level Instrumentation System (RVLIS) was considered operable with data system acquisition system (DAS) equipment connected to the system. The DAS instrumentation provided inadequate isolation between the non-safety related DAS and the RVLIS channels. Therefore, the RVLIS could not be considered operable with the test equipment installed. The cause was attributed to the failure to identify that the initial 50.59 evaluation for the RVLIS procedure installation assumed that during performance of the procedure, RVLIS would be considered inoperable. The corrective actions associated with this LER provided additional guidance in procedure SC.SE-AP.ZZ-0002(Q), "Conduct of Testing," to assess the impact of M&TE during infrequently performed tests.

LER 272/98-011-00: "Improper Isolation of the Single Cell Battery Charger from the 125 VDC Battery." The charging of cell 47 of the 1A 125 VDC battery using the single cell battery charger was identified as having been accomplished without proper evaluation for the isolation of the battery charger from the Class-1E 125 VDC battery. Although the single cell battery charger was installed in accordance with an existing maintenance procedure, proper analysis was not performed in accordance with the requirements of 10CFR50.59 to evaluate the electrical isolation between the single cell charger and the safety related battery. The corrective actions associated with this LER were to revise the program guidance document for 10CFR50.59 to include examples concerning the connection of temporary equipment to operable systems, to include this issue in 10CFR50.59 refresher training beginning in July 1998, and to review maintenance procedures to determine if other procedures allowed temporary equipment to be installed on operable systems and then perform a review to determine if the connection of the temporary equipment had been adequately evaluated for system operation. The revision to the 10CFR50.59 program guidance document was completed in August 1998. The discussion of this LER was included in the 10CFR50.59 refresher training cycle that began in July 1998. The review of maintenance procedures to determine other instances of connecting temporary equipment was completed in August 1998 and identified several procedures that connected temporary equipment to operable systems. However, the review to determine if the effect of the temporary equipment had been adequately evaluated has not been completed. As a result of the review of maintenance procedures, the procedure for the installation of test equipment for the collection of State Point Data had been identified as a procedure requiring further evaluation for system impact.

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PRIOR SIMILAR OCCURRENCES (cont'd)

Upon review of the LERs above and the associated corrective actions, the root cause investigation identified a lack of commitment to program implementation. Although events at Salem and in the industry indicated a need for the review of the usage of M&TE when connecting equipment to operable systems, a programmatic approach that would provide a consistent approach to personnel for assessing M&TE usage had not been developed.

Although corrective actions were identified in previous event investigations that may have prevented this event, the deferral of corrective actions in the corrective action program by closing activities to new tasks led to untimely implementation of corrective actions. The Corrective Action Program guidance regarding the closure of corrective actions did not prohibit the closure of an existing task to a new task, which provided a method of deferring implementation of an action without receiving the appropriate management approval. On October 15, 1998, revision 16 of procedure NC.NA-AP.ZZ-0006(Q), "Corrective Action Program," was issued which provided further guidance for the closure of one corrective action task (CRCA) to another CRCA.

SAFETY CONSEQUENCES AND IMPLICATIONS

The affect of the actual test equipment configuration used during statepoint data collection was reviewed to assess the impact to Reactor Control and Protection system. The only plausible failure that was determined to have an affect on the Reactor Control and Protection channels was if instrument loops shorted together during a seismic event. Testing identified that if the positive signal of one loop shorted to the negative of the other loop, large spikes in voltage occurred. This caused the voltage in one instrument loop to drop while the voltage in the other loop increased. Therefore, the occurrence of a seismic event while the test equipment was installed may have had the ability to affect multiple channels of the Reactor Control and Protection system with the test equipment installed. Since no design basis seismic event has occurred at Salem Station, there were no safety consequences associated with this event.

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CORRECTIVE ACTIONS

1. The procedures for the installation of test equipment for the collection of State Point Data for Salem Units 1 and 2 were placed on administrative hold to prevent use of the procedure until resolution of the connection of the test equipment to the Reactor Control and Protection system is resolved.
2. As committed in LER 272/98-011-00, review of maintenance procedures has been performed to determine if other procedures allow temporary equipment to be installed on operable systems. As a result of this review, ten (10) procedures (in addition to the State Point Data procedures) were placed on hold to prevent their use until the assessment of the M&TE connection is completed. Nine (9) of the procedures placed on hold have been reviewed for the M&TE applications (the Statepoint Data Procedures and one other procedure remain on hold). The assessment of the current method for connecting the M&TE as directed in these nine procedures revealed no problems.
3. On October 15, 1998, revision 16 of procedure NC.NA-AP.ZZ-0006(Q), "Corrective Action Program," was issued which provided further guidance for the closure of one corrective action task (CRCA) to another CRCA.
4. As committed in LER 272/98-011-00, the "10CFR50.59 Program Guidance" procedure was revised in August 1998 to include examples concerning the connection of temporary equipment to operable systems when performing 10CFR50.59 reviews.
5. As committed in LER 272/98-011-00, the subject of connection of M&TE to operable systems was included in the 10CFR50.59 refresher training cycle starting in July 1998.