PSE&G

Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Salem Generating Station

June 25, 1993

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION
LICENSE NO. DPR-75
DOCKET NO. 50-311
UNIT NO. 2

LICENSEE EVENT REPORT 93-007-00

This Licensee Event Report is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR 50.73(a)(2)(iv). This report is required to be issued within thirty (30) days of event discovery.

Sincerely yours,

C. A Vondra
General Manager -
Salem Operations

MJPJ:pc

Distribution

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Salem Generating Station - Unit 2	0 5 0 0 0 3 1 1	1 OF 0 4

TITLE (4) Manual Reactor Protection System Actuation Following Dropped Rods of Control Rod Bank C Group 1.

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)
										0 5 0 0 0
0 5	2 8	9 3	9 3	0 0 7	0 0	0 6	2 5	9 3		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
3		20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
0 0 0		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	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	TELEPHONE NUMBER
	AREA CODE
M. J. Pastva, Jr. - LER Coordinator	6 0 9 3 3 9 - 2 2 1 5

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	
X	A A	E C B D	W 1 2 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On 5/28/93, at approximately 1812 hours, during startup activities following completion of the unit's seventh refueling/maintenance outage, all four rods of Control Rod Bank C Group 1 unexpectedly dropped fully into the reactor core. At approximately 1814 hours, the reactor was manually tripped and the emergency operating procedure entered. The unit remained in MODE 3 (HOT STANDBY) during the entire event. This event did not affect the health and safety of the public. The rods dropped due to a degraded signal from the regulation board which caused discontinuation of firing orders to the C1 control rod group. This resulted from intermittent component failure of the Rod Control System (RCS) stationary "B" control group firing circuitry regulation card in the RCS 21AC Power Cabinet. The card was replaced restoring RCS operability for Control Rod Bank C Group 1 rods. In addition, all cards in the power cabinets have been removed, visually inspected, satisfactorily tested, and reinstalled. Following NRC concurrence, Unit 2 post refueling/maintenance outage startup testing will continue. An event involving a potential RCS single failure concern (common to Units 1 and 2), identified on June 4, 1993, is being reported in a separate LER.

PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes and component function identifiers are identified in the text as {xx/xx}

IDENTIFICATION OF OCCURRENCE:

Manual Reactor Protection System Actuation Following Dropped Rods Of Control Rod Bank C Group 1

Event Date: 5/28/93

Report Date: 6/25/93

This report was initiated by Incident Report No. 93-261.

CONDITIONS PRIOR TO OCCURRENCE:

Mode 3 Reactor Power 0% - Unit Load -0- MWe

Reactor startup activities were in progress following completion of the unit's seventh refueling outage. Shutdown Banks A, B, C, and D and Control Banks A, B, and C were fully withdrawn and Control Bank D was withdrawn to 160 steps.

DESCRIPTION OF OCCURRENCE:

On May 28, 1993, at approximately 1812 hours, all four rods in Control Rod Bank C Group 1 {AA/ROD} unexpectedly dropped fully into the reactor core. At approximately 1814 hours the Reactor was manually tripped and the emergency operating procedure entered. The Unit remained in MODE 3 (HOT STANDBY) during the entire event. The NRC was notified of the manual actuation of the Reactor Protection System {JC}, at 1835 hours, in accordance with the requirements of 10CFR50.72(b)(2)(ii).

ANALYSIS OF OCCURRENCE:

The Rod Control System (RCS) is used to withdraw control rods for Reactor startup and to control Reactor power during power operation. It consists of one Logic Cabinet, five Power Cabinets, and one Direct Current (DC) Hold Cabinet:

The Logic Cabinet translates manually-initiated or automatic commands into signals required by the Power Cabinets to step the banks of Shutdown and Control rod assemblies. This cabinet contains power supply assemblies and processes logic commands required for rod movements.

The Power Cabinets provide DC power pulses to drive the Control

ANALYSIS OF OCCURRENCE: (cont'd)

Rod Drive Mechanisms (CRDMs) by converting three-phase alternating current (AC) power to DC power and applying it to the CRDM magnetic coils.

On May 28, 1993 at 1512 hours, Reactor start-up commenced following satisfactory completion of procedure S2.OP-ST.RCS-0001, "Reactivity Control Systems - Rod Control Assemblies". Shortly before 1800 hours on May 28, 1993, Control Rod Bank D was withdrawn to 160 steps during preparation for reactor startup. At approximately 1810 hours, dilution to criticality began from a Reactor Coolant boron concentration of approximately 2060 ppm. At approximately 1812 hours, all four (4) rods in Control Rod Bank C Group 1 dropped fully into the core. Boron dilution was stopped and in accordance with procedure S2.OP-AB.ROD-0002(Q), "DROPPED ROD," the Reactor was manually tripped. Emergency Operating Procedure, 2-EOP-TRIP-1, "REACTOR TRIP OR SAFETY INJECTION", was entered. All rods were confirmed fully inserted following the trip and the unit remained in MODE 3 (HOT STANDBY) during the entire event. This event is reportable in accordance with 10CFR50.73(a)(2)(iv).

Troubleshooting revealed the control rods dropped as the result of defective firing orders on an RCS firing circuitry card due to an intermittent component failure.

Subsequent to this occurrence, an event involving a potential single failure concern (common to Units 1 and 2), identified on June 4, 1993, is being reported in a separate LER.

APPARENT CAUSE OF OCCURRENCE:

The root cause of this event is equipment failure. The Control Rod Bank C Group 1 rods unexpectedly dropped into the core due to intermittent component failure of the stationary "B" control group firing circuitry regulation card in the RCS 21AC Power Cabinet. A degraded signal from the card resulted in the discontinuation of firing orders to the C1 control rod group, which caused the rods to drop. The card failure is attributed to degradation of a solder trace on the printed circuit board.

PRIOR OCCURRENCES:

Prior Control Rod Drop events have been reported in LERs 311/85-009-00 and 311/88-009-00. Review of these occurrences did not reveal similarities in root or contributing cause(s), which are relevant to the May 28, 1993 event.

The 1985 event was a Unit 2 Reactor trip from 100% power due to high negative flux rate trip signals resulting from dropped rod 2C4. A high resistance connection in the rod gripper coil circuitry caused by the rod control rod drive mechanism cable connector pins making poor

PRIOR OCCURRENCES: (cont'd)

contact, had prevented the stationary grippers from energizing and resulted in the dropped rod. The 1988 event was a Unit 2 Reactor trip from 97% power due to a power range negative flux trip resulting from dropped rod 1D3. Testing to determine why rod 1D3 dropped was inconclusive.

SAFETY SIGNIFICANCE:

This event did not affect the health and safety of the public. It occurred with the reactor subcritical and is bounded by the at-power analyses, described in Chapter 15 of the Updated Final Safety Analysis Report. For all cases of dropped rod groups, the reactor is tripped by the power range negative neutron flux rate trip and consequently, dropped rod banks do not cause core damage.

CORRECTIVE ACTION:

The RCS 21AC Power Cabinet stationary "B" control group firing circuitry regulation card, Westinghouse Part No. 6050D12G01, was replaced. As a precautionary measure, the remaining cards in the firing circuitry were replaced: Regulation Circuitry Gripper (Westinghouse Part No. 6050D16G01), Phase Control Card (Westinghouse Part No. 6050D11G01), and the Input/Output AC Amplifier (Westinghouse Part No. 3359C65G01). The firing circuit was then satisfactorily retested.

Following NRC concurrence, Unit 2 post-refueling/maintenance outage startup testing will continue.

General Manager -
Salem Operations

MJPJ:pc

SORC Mtg. 93-058