

LICENSEE: PUBLIC SERVICE ELECTRIC &amp; GAS CO.

SITE: SALEM 1 2

EN NUMBER: 25609

DOCKET: 05000272 05000311

EVENT DATE: 06-04-93

RX TYPE: PWR PWR

EVENT TIME: 17:00

VENDORS: W-4-LP W-4-LP

NOTIFY DATE: 06-04-93

EMERGENCY CLASS: N/A REGION: 1 STATE: NJ

TIME: 17:45

OPS OFFICER: STEVE SANDIN

10 CFR SECTION: ADEG 50.72(b)(1)(ii)

DEGRAD COND DURING OP

UNIT SCRAM RX INIT INITIAL MODE

CURR CURRENT MODE

CODE CRIT PWR

PWR

1 N Y 100 POWER OPERATION

100 POWER OPERATION

2 N N 0 STARTUP

0 HOT STANDBY

UNIT 2 DISCOVERED A CONDITION WHERE A SINGLE FAILURE IN THE ROD CONTROL SYSTEM COULD RESULT IN EXCEEDING FUEL DESIGN LIMITS DURING A ROD WITHDRAWAL ACCIDENT.

"RECENT TROUBLESHOOTING OF THE UNIT 2 ROD CONTROL SYSTEM SUGGESTS THERE MAYBE A FAILURE MECHANISM WHEREBY A SINGLE FAILURE COULD CAUSE AN INADVERTENT WITHDRAWAL OF A SINGLE ROD CONTROL CLUSTER ASSEMBLY (RCCA) FROM AN INSERTED BANK. THIS IS IN CONFLICT WITH THE UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) SECTION 15.3.5.1 WHICH STATES THAT NO SINGLE FAILURE COULD CAUSE A SINGLE RCCA WITHDRAWAL. 10CFR50 APPENDIX A GENERAL DESIGN CRITERIA 25 REQUIRES THE FUEL DESIGN LIMITS ARE NOT EXCEEDED BY ANY SINGLE MALFUNCTION OF A REACTIVITY CONTROL SYSTEM. UFSAR 15.3.5.1 STATES THAT DEPARTURE FROM NUCLEATE BOILING RATIO (DNBR) LIMITS ARE EXCEEDED ON AN ACCIDENTAL ROD WITHDRAWAL."

THE LICENSEE IS ASSESSING CONTINUED UNIT 1 OPERATION BASED UPON THE RESULTS OF THE TROUBLESHOOTING ON UNIT 2 ROD CONTROL SYSTEM. THE LICENSEE INFORMED THE NRC RESIDENT INSPECTOR.

\* \* \* UPDATE 2135EDT 6/4/93 FROM OLSEN BY S.SANDIN \* \* \*  
THE LICENSEE IS INCLUDING UNIT 1 IN THIS EVENT NOTIFICATION.

\* \* \* UPDATE 12:00 EDT 6/8/93 BY SEBROSKY \* \* \*  
COMMISSIONERS ASSISTANTS BRIEFING NOTIFICATIONS (\*INDICATES OFFICE DID NOT PARTICIPATE): IRB(GIITTER), COMM SELIN(LEACH), CURTISS(CONNAUGHTON), REMICK(DOOLITTLE), ROGERS(\*), de PLANQUE(MCKENNA), EDO(WHEELER), REGION 1(WENZINGER), REGION 2(MERSCHOFF), REGION 3(GARDNER, BARTLETT), REGION 4(STETKA), REGION 5 (MILLER), EO(CHAFFEE), PAO(NEWLIN), CAO(CALLAHAN), SECY(HART), STATE(\*), IP(\*), NRR(GOODWIN, ROE, MILLER), BRIEFER(RULAND);  
SUMMARY OF THE COMMISSIONERS ASSISTANTS BRIEFING;  
IN 1989 A NUREG WAS ISSUED CONCERNING AGE RELATED PROBLEMS IN ROD CONTROL SYSTEMS FOR WESTINGHOUSE PLANTS. WESTINGHOUSE

RECOMMENDED THAT A COMPLETE MAINTENANCE PACKAGE BE PERFORMED ON THE ROD CONTROL SYSTEM TO PREVENT AGE RELATED DEGRADATION ON THE SYSTEM. THE WESTINGHOUSE MAINTENANCE PACKAGE CONSISTED OF A PORTABLE TESTER TO TEST CARDS IN THE SYSTEM IN ADDITION TO A VISUAL INSPECTION.

SALEM 2 CONTRACTED WITH WESTINGHOUSE TO PERFORM THIS MAINTENANCE FOR THE REFUELING OUTAGE THAT STARTED AT THE END OF MARCH 1993. THE MAINTENANCE PACKAGE CONSISTED OF TESTING ALL CARDS IN THE ROD CONTROL CABINETS (APPROX 175 CARDS). WESTINGHOUSE COMPLETED THIS MAINTENANCE AND PERFORMED A NUMBER OF REPAIRS TO THE CARDS. SALEM UNIT 2 WAS ONE OF THE LAST PLANTS TO HAVE THIS MAINTENANCE PERFORMED.

THE LICENSEE HAD TO ABORT STARTUPS ON 5/26/93, 5/27/93, 5/28/93 AND 6/3/93 DUE TO ROD CONTROL SYSTEM PROBLEMS. THE STARTUP ON 5/27 INVOLVED A FAILURE WHICH CONSISTED OF ONE ROD BEING INADVERTENTLY WITHDRAWN WHEN AN INSERT DEMAND SIGNAL WAS PRESENT.

ON 6/4/93 THE UNIT WAS RESTARTED. A SINGLE FAILURE WAS IDENTIFIED ON THIS DATE THAT COULD CAUSE AN INADVERTENT ROD WITHDRAWAL. THE LICENSEE SHUTDOWN THE PLANT ON THIS DATE AND THE PLANT HAS REMAINED SHUTDOWN SINCE THIS DATE TO INVESTIGATE THE ROD CONTROL SYSTEM PROBLEMS.

THE SINGLE FAILURE THAT WAS POSTULATED IS THAT THE MOVEABLE GRIPPER AND THE LIFT COIL COULD BE ENERGIZED AT THE SAME TIME ON AN IN MOTION DEMAND OR OUT MOTION DEMAND DUE TO A LOGIC CARD FAILURE. ON AN OUT CYCLE IT WOULD THEN BECOME A "RACE" AS TO WHICH COIL WOULD MOVE FASTER. IF THE LIFT COIL MOVES FASTER, THE LIFT COIL WOULD MOVE UP AND THEN THE MOVEABLE GRIPPER WOULD GRIP THE ROD RESULTING IN NO ROD MOTION. IF FOR SOME REASON THE MOVEABLE GRIPPER WAS FASTER THAN THE LIFT COIL, THE RESULT WOULD BE OUTWARD ROD MOTION.

AS THE LIFT COIL OPERATION IS CONTINUED THE LIFT COIL WOULD HEAT UP INCREASING THE RESISTANCE OF THE COIL, AND THUS REDUCING THE FIELD APPLIED TO THE LIFT COIL. EVENTUALLY THIS WOULD CAUSE THE LIFT COIL TO "SLOW" DOWN. THE MOVEABLE GRIPPER WOULD THEN "BEAT" THE LIFT COIL AND OUTWARD ROD MOTION WOULD RESULT.

WITH THIS PARTICULAR LOGIC CARD FAILURE THE LIFT COIL AND MOVEABLE COIL "SEE" THE SAME SEQUENCE ON AN IN MOTION DEMAND AS AN OUT MOTION DEMAND. IT CAN THEREFORE BE POSTULATED THAT THIS SINGLE FAILURE COULD CAUSE A ROD WITHDRAWAL WHEN AN INWARD ROD MOTION DEMAND IS PRESENT.

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THE PROBLEM APPEARS TO BE GENERIC. THE LICENSEE HAS PLACED THE ROD CONTROL SYSTEM IN MANUAL FOR UNIT 1 AND PLANS ON LEAVING THE ROD CONTROL SYSTEM IN MANUAL FOR THIS UNIT. BY TAKING THIS ACTION TWO FAILURES WOULD BE REQUIRED TO RECEIVE AN INADVERTENT ROD WITHDRAWAL.

THE LICENSEE CONTINUES TO INVESTIGATE THE PROBLEMS WITH THE ROD CONTROL SYSTEM FOR UNIT 2. THE NRC DISPATCHED AN AUGMENTED INSPECTION TEAM TO THE SITE ON 6/4/93 TO INVESTIGATE THE FAILURES.