ENCLOSURE

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

REPORT NOS. 50-272/89-99
50-311/89-99

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

SALEM GENERATING STATION

UNITS 1 AND 2

ASSESSMENT PERIOD: MAY 1, 1989 - JULY 31, 1990

BOARD MEETING DATE: SEPTEMBER 20, 1990

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated Nuclear Regulatory Commission (NRC) staff effort to collect observations and data to periodically evaluate licensee performance on the basis of this information. The SALP process is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. SALP is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management to improve the quality and safety of plant operations.

An NRC SALP Board, composed of the staff members listed below, met on September 20, 1990, to review the collection of performance observations and data and to assess the licensee's performance at the Salem Generating Station. This assessment was conducted in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance."

This report is the NRC's assessment of the licensee's safety performance at the Salem Generating Station, Units 1 and 2 for the period May 1, 1989 through July 31, 1990.

The SALP Board for the Salem Generating Station assessment consisted of the following individuals:

Chairman:

C. Hehl, Director, Division of Reactor Projects (DRP)

Members:

R. Blough, Chief Projects Branch 2, DRP
P. Swetland, Chief, Reactor Projects Section 2A, DRP
T. Johnson, Senior Resident Inspector, DRP
W. Butler, Director, Project Directorate I-2, Office of Nuclear Reactor Regulation (NRR)
J. Stone, Project Manager, NRR
M. Knapp, Director, Division of Radiation Safety and Safeguards (DRSS)
J. Durr, Chief, Engineering Branch, Division of Reactor Safety (DRS)

Others in Attendance:

S. Pindale, Resident Inspector, DRP
S. Barr, Resident Inspector, DRP
A. Lopez, Reactor Engineer, DRS
C. Anderson, Chief, Plant Systems Section, DRS
D. Bessette, Acting Chief, Operational Programs Section, DRS

Others in Attendance (Continued)

J. Jang, Senior Radiation Specialist, DRSS
R. Nimitz, Senior Radiation Specialist, DRSS
J. Joyner, Division Project Manager, DRSS
C. Conklin, Senior Emergency Preparedness Specialist, DRSS
C. Amato, Emergency Preparedness Specialist, DRSS
R. Keimig, Chief, Safeguards Section, DRSS
R. Albert, Physical Security Inspector, DRSS
P. Ray, Operations Engineer, Performance Evaluation Branch, NRR
J. Caldwell, Regional Coordinator, Office of the Executive Director for Operations
C. Woodard, Reactor Engineer, DRS
A. Almond, General Engineer, Director's Office, NRR

II. SUMMARY OF RESULTS

II.A Overview

PSE&G was successful in improving performance in the functional areas of plant operations and emergency preparedness during the assessment period. Good management involvement, supervisory oversight, and individual performance resulted in a reduced reactor trip and personnel error rate. The emergency preparedness functional area achieved a superior level of performance. An effective, performance based security program resulted in maintaining a superior level of performance in the security/safeguards functional area.

Very good performance by corporate engineering was noted, while mixed performance of the onsite system engineering group was observed. As a result, the engineering and technical support functional area did not achieve the high level of performance that was predicted in the last assessment.

Although a large number of maintenance and surveillance activities were successfully completed during this assessment period, there were significant performance weaknesses noted. These weaknesses included a large maintenance backlog, recurring missed surveillance tests, inservice testing program deficiencies and poor material condition of the plants. An overall rating of Category 2 was assigned, however, the SALP Board gave serious consideration to a lower rating. The licensee's prior recognition of the identified problems and the achievement of small but measurable progress toward resolution of these weaknesses were critical factors in the Board's determination. However, as a plant ages the challenges of maintaining equipment reliability and readiness increase. The declining trend in this area reflects the gravity of the Board's concern over performance in this area and the need for marked progress in correcting the identified weaknesses.

Some improvements in the safety assessment/quality verification functional area were noted such as better supervisory involvement and oversight, development of significant event response teams, and effective review by the independent safety review groups. Weaknesses were identified in the effectiveness of licensee corrective action programs. In particular, there was a lack of effective interim measures to address continuing procedural inadequacies and degrading material conditions notwithstanding the long term significant remedial initiatives which were in process.

Although the licensee has achieved discernible improvement in some aspects of each functional area, the overall performance in maintenance and surveillance, engineering/technical support, and safety assessment/quality verification has not improved. Continued management attention and aggressive prosecution of remedial initiatives is needed to attain a uniform, high level of performance.

II.B Facility Performance Analysis Summary

Functional Area	Rating, Trend Last Period	Rating, Trend This Period
Plant Operations	3	2
Radiological Controls	2	2
Maintenance/Surveillance	2	2, Declining
Emergency Preparedness	2	1
Security and Safeguards	1	1
Engineering/Technical Support	2, Improving	2
Safety Assessment/ Quality Verification	2	2

Previous Assessment Period: January 1, 1988 through April 30, 1989

Present Assessment Period: May 1, 1989 through July 31, 1990

III. PERFORMANCE ANALYSIS

III.A Operations

III.A.1 Analysis

The previous SALP rated Salem operations as Category 3. That assessment identified weaknesses in the area of supervisory oversight of routine day to day operations. The number of plant trips and frequency of personnel errors had increased. Operations management did not always provide adequate guidance to the operators for non-routine evolutions, however, operator response to plant transients was very good. Procedure establishment, use and compliance required continued station management attention. Some root cause analyses and corrective action determinations lacked aggressiveness and thoroughness, especially in cases related to possible operator errors. The licensee had instituted actions to improve performance in these areas with mixed results. The planning and work control processes were noted as strengths as was the fire protection program.

During this assessment period, both reactors were generally operated in a conservative and safety conscious manner. Examples of conservative licensee operations include extension of shutdowns for both units to fully evaluate emergency core cooling system (ECCS) concerns, and the shutdown of one unit when a potential main steam isolation valve (MSIV) fast closure concern was identified. Operator response to reactor trips and plant transients was good. In several instances prompt actions by operators prevented transients or reactor trips due to feedwater problems, loss of circulators, and steam dump system failures. Specific exceptions include an operations initiated loss of residual heat removal (RHR) event while shutdown due to operator error and an inadequate procedure, poor initial Station Operations Review Committee (SORC) response to an engineering identified single failure vulnerability associated with the low pressure safety injection system, and non conservative interpretation and use of Technical Specification 3.0.3.

The licensee has been successful in reducing the frequency of automatic reactor trips. During the current assessment there were a total of 6 trips (4 at power and 2 while shutdown) for both units. This compares to 16 trips last assessment. During the assessment period, Unit 1 did not experience a reactor trip for over 10 months and Unit 2 for over one year. One of the six reactor trips during this assessment period was attributed to a personnel error by a licensed operator. An effective licensee trip reduction program included "scram-a-gram" information notices, warning signs for reactor trip sensitive areas, a new troubleshooting procedure and independent verification of trip sensitive procedural steps.

PSE&G has committed resources to upgrade plant operation. A second operating engineer, a dedicated radwaste engineer, and an emergency operating procedure coordinator were added to the operations staff. In addition to the three senior reactor operators (SROs) required for each shift, a number of replacement candidates were hired to pursue a goal of five SROs for each shift crew. Two additional SRO-licensed individuals now supervise the work control group during regular maintenance hours. Operations · maintenance interface for equipment tagging is satisfactory. There are a total of 45 licensed operators, including 38 on-shift and seven in staff and training positions.

Plant operations were generally well supported by the Training Department. One exception was the response to the loss of RHR event, where both the station and the training department were not aggressive in obtaining training assistance following the potentially significant plant event. Simulator refresher training before each unit restart continues to be given to the reactor operators (ROs) and SROs immediately before taking their shift and is considered a strength. The station instituted improved procedures to control the training process, and also established a master training matrix to track individual qualifications and to facilitate the maintenance of training records.

Six of six SRO license candidates and six of seven RO candidates passed their initial license examinations. The RO/SRO requalification program was excellent with seven of seven ROs and six of six SROs tested passing an NRC administered requalification exam. Direct involvement of operations management personnel has had a positive effect on the requalification program success.

Licensed operators' plant awareness, safety perspective, and professional control room demeanor were consistently evident. Shift turnovers were formal and included thorough briefings of the relief crew. Control room access was controlled, and activities were limited to those directly related to plant operations. Good performance of non-licensed equipment operators was noted during NRC observations made on plant tours, and during licensee equipment testing and operation. However, operator overtime was at times not properly controlled in that proper management approval for exceeding administrative guidelines was not obtained. The licensee has increased the number of licensed operators to reduce the amount of overtime and has initiated corrective actions to ensure appropriate approval is obtained.

Overall, there has been a reduction in the personnel error rate. This is reflected in root causes for LERs and licensee incident reports. This can be attributed to increased accountability of personnel, effective management oversight of activities, and implementation of worker performance standards.

Procedural inadequacy continues to be a leading root cause for events, including the loss of RHR event during the Unit 1 refueling outage. A procedural upgrade project (PUP) continues to be an important initiative; however, program implementation has encountered problems as discussed in Section III.G.

Operators effectively used Emergency Operating Procedures (EOPs) as evidenced during simulator observations, and actual unit transients and trips; as well as during the NRC EOP team inspection. EOPs were well written, usable by operators and well maintained. However, a concern was identified regarding excessive responsibilities placed on the one RO who operates the controls while the other RO reads the EOPs. The licensee plans to resolve this issue by modifying RO/SRO command and control responsibilities. Weaknesses were also noted with respect to abnormal operating procedures (AOPs) and some alarm response procedures. The lack of a good procedure verification program resulted in AOPs containing many longstanding errors including labeling problems and missing information. Consequently, successful performance of these procedures relies heavily upon operator knowledge and experience.

Licensee Operations Department event and problem evaluation and response were usually prompt and comprehensive. Improvements in root cause analysis and self-assessment were noted. Management attention and the root cause training program have been effective. Also, implementation of the Significant Event Response Team initiative has been effective in providing timely, independent, detailed, and thorough root cause analyses. However, there were isolated instances where internal incident reports were not written when required by station procedures. Examples include boric acid transfer pump failures and a spurious steam dump system actuation, which nearly resulted in a reactor trip. Also, early in the period, there were several instances where the licensee failed to make timely 10 CFR 50.72 reports. Improvements were noted later in the period.

Strong plant management oversight and attention to operations were evident on a daily basis. There was an operational perspective of plant problems, and work prioritization was well understood and enhanced by daily meetings. The licensee has been effective in ensuring good interdepartmental communication and in resolving problems. The senior nuclear shift supervisor has direct access to plant management.

Plant housekeeping has shown some improvement during the period. Plant area decontamination activities have reduced the contaminated floor space, particularly in the ECCS rooms. Equipment operators can make their rounds with only minimal contamination protective clothing. Overall, however, material condition of the plant was weak (Section III.C). Licensee initiatives in progress to improve the degraded conditions were not sufficient to display significant improvements.

The overall fire protection program was satisfactory. Dedicated fire protection personnel performed well and were knowledgeable, which demonstrated an effective training program. The fire brigade was staffed by site protection personnel, which minimized the reliance on operators to respond to emergencies. Appropriate operator involvement in emergencies was provided. The preventive maintenance and surveillances of fire protection equipment were effective. Fire protection equipment upgrades included a new ambulance, incident command vehicle, and other items. However, the fire protection program experienced implementation problems at Salem. For example, a weakness was identified in the apparent tolerance for and the lack of timely resolution for a long term condition at Salem where some fire doors did not always close securely. This condition was due to imbalances in the plant's ventilation system. Some interim compensatory measures were taken by the plant to monitor these doors during the rounds of roving fire watches; however, doors that were not part of the route for the watches often went unmonitored. In response to NRC concerns, a task group was formed to investigate the root cause of this problem and to formulate corrective actions. A second weakness was related to improper control of combustible material in safety related areas. The licensee was aggressive in addressing and correcting this concern.

In summary, improvement in management involvement and supervisory oversight, in reduced reactor trip and personnel error rate, and in root cause analysis initiatives were noted. Emergency operating procedures are considered a strength; however, weaknesses were noted relative to abnormal operating procedures. Good operations management and training department involvement has resulted in a successful operator requalification program. The licensee has committed resources to improving plant operations.

II.A.2 Performance Rating

Category: 2

Trend: NA

III.A.3 Board Comments

None

III.B Radiological Controls

III.B.1 Analysis

The previous SALP rated the functional area of radiological controls as Category 2. The NRC's review during the last assessment period identified that performance for inplant radiation protection activities had declined early in the period and that the licensee's corrective actions and self-assessments were initially ineffective in improving overall performance. NRC observations toward the end of the last assessment period found that management attention had resulted in significant performance improvement. The radiological controls organization was reorganized and a new ALARA group was established during the last period. The licensee's performance in the areas of radwaste transportation, effluent monitoring and control were adequate, and radiological confirmatory measurements was good.

During the current assessment period, direct NRC observations of Unit 2 refueling activities indicated that outage activities were well planned and effectively controlled. The licensee established and implemented an effective outage radiological controls organization which minimized the use of contractor personnel acting in supervisory roles. All major radiological work activities performed during the outage (e.g., steam generator work activities) were directly supervised by a licensee radiological controls supervisor. In addition, the staffing levels to support outage and non-outage work activities, including the training of personnel, were good and the new ALARA organization continued to provide aggressive oversight of outage radiological work activities.

During the Unit 2 outage, the licensee experienced operational problems with emergency core cooling systems at Unit 1, necessitating a concurrent mini-outage at Unit 1. The licensee established a special organization to review and plan the Unit 1 work activities in order to prevent distraction of personnel supporting the Unit 2 outage. This indicated a good level of management involvement in outage activities. No degradation of radiological controls was identified.

The licensee also experienced an operational event at Unit 1 which resulted in generation of High Radiation Areas in various portions of the Auxiliary Building. The event, which caused a high crud burst during full-flow testing of emergency core cooling systems, was well responded to by the licensee. No unplanned exposures occurred and the crud was quickly cleaned up. Corrective actions were taken to prevent recurrence. However, the event did indicate test planning process weaknesses that failed to predict and prevent occurrence of the crud burst.

NRC observations during the current assessment period found that the licensee's oversight of radiological program activities has improved relative to the last assessment period. For example, an independent radiological assessor was reporting findings to management during the Unit 2 outage and QA was active in identifying concerns.

The licensee's enforcement history during the assessment period has generally been good. However, there were two NRC identified problems. One involved lack of performance of an audit of radwaste activities and one involved two examples of failure to adhere to radiation protection procedures. The problems were properly addressed by the licensee. In addition, the licensee identified a number of problems that included a worker leaving the site with a contaminated shoe, identification of contaminated tools in a storage area located outside the radiological controlled area (RCA), radioactive material stored in offsite warehouses, and one individual who exceeded administrative external exposure guidelines through personnel error in use of exposure control computers.

Review of the NRC and licensee identified problems indicated the problems were attributable to inattention to detail by the licensee and weaknesses in procedures. The radioactive and contaminated material control problems did not result in any unplanned or unmonitored exposures of personnel and the licensee's response to the events was timely, comprehensive, and effective. Good support and involvement in resolving the event by the corporate radiological controls group were evident. The licensee had not yet implemented all long term corrective actions at the end of the assessment period for the radioactive material control problems.

The problems with release, control and handling of radioactive material outside formally defined RCAs indicated the need to provide enhanced procedures. The licensee has been attempting to improve procedures, but this effort was progressing slowly. The licensee has initiated action to improve these efforts.

The licensee's radiological occurrence program exhibited a number of significant weaknesses which minimized the effectiveness of this program for identifying, tracking, and resolving self identified radiological problems. NRC review found that root cause analysis of the problems was weak, problems were not always categorized properly, and corrective actions for problems were not always identified. Examples of this weakness included the contamination control problems.

With the exception of the previously mentioned administrative limit problem, there were no unplanned external whole body or internal exposures resulting from work activities. Access controls to HRAs were effective and enhanced through the use of "talking signs" which automatically inform personnel of access control requirements to HRAs. The licensee has installed digital signs at the entrance to the RCA to inform workers of important information. NRC observations indicated improvement in industrial safety, but housekeeping continues to be in need of attention. Observations of numerous candy wrappings in the RCA continue to indicate lack of worker sensitivity to the potential of ingestion of radioactive material.

The licensee's controls for steam generator work, a significant radiological work activity, were commendable. Of particular note was the use of multiple, redundant monitoring methods to monitor and control the exposure of personnel working on steam generators.

Performance in the ALARA area was very good and improved over previous assessment periods. Exposure of station and contractor personnel was closely tracked, monitored and reported by use of the computerized radiation work permit and automated dosimetry access control system. Potential emergent work was anticipated and planned (e.g. possible extended work scope for steam generator inspection and maintenance). The licensee performed ALARA reviews for work that accounted for about 95% of the aggregate exposure sustained during the outage. ALARA goals were reasonable and effectively used to monitor ongoing work but person hour estimating could be improved. Overall performance in the ALARA area has been effective.

The licensee has an effective solid radwaste/transportation program. The training provided to radiological controls personnel involved in the radwaste program continues to make a positive contribution to the effectiveness of the program.

NRC reviews of the radiological effluent monitoring and control program indicated calibration of effluent and process monitors was performed acceptably during the assessment period. However, there were about 32 Emergency Safety Feature (ESF) actuations due to spurious Radiation Monitoring Systems (RMS) signals. The licensee had established short and long term projects to upgrade the RMS during the previous assessment period. The projects are on schedule with the installation of a central process unit in 1990 and replacement of ESF RMS in 1991.

NRC reviews performed during this assessment period indicated weaknesses in the licensee's maintenance of safety related ventilation systems particularly charcoal filter systems. For example, the NRC identified that the licensee did not take measurements to verify the relative humidity of the Auxiliary Building Ventilation System. Other systems, such as the Control Room ventilation systems, were found to have failed inplace surveillance testing with no explanation as to possible causes. Also, the licensee's response to an NRC identified issue related to testing of the air cleaning systems, including humidity measurements, identified early in the assessment period remained open, with the licensee not anticipating closeout of the issue before the end of 1990.

An effective Radiological Environmental Monitoring Program (REMP) was implemented. Sampling and analytical procedures were upgraded and an effective QC program was in place to assure the quality of sample analysis. One problem was identified in the area of an unmonitored liquid radwaste release, but there was no impact on the public health and safety or environment and the licensee took effective corrective actions for the occurrence. The meteorological monitoring system was properly calibrated and maintained. Audits of these areas performed by the Quality Assurance Division were thorough and audit identified deficiency items were adequately resolved in a timely manner by the licensee.

In summary, the licensee implemented a good radiological controls program with a good level of management involvement in the program. Efforts in organization, staffing, training and qualification have improved performance. The licensee's ALARA activities were very good. Weaknesses exist in the radiological occurrence report program and personnel attention to detail is in need of improvement. Also, problems with radioactive material control indicated a need to improve procedural controls. The radwaste handling, transportation, and environmental monitoring programs were effective. The licensee has performed adequately in the area of liquid and gaseous effluent controls.

III.B.2 Performance Rating

Category: 2

Trend: NA

III.B.3 Board Comments

None

III.C Maintenance and Surveillance

III.C.1 Analysis

The last SALP assessment rated the Maintenance and Surveillance functional area a Category 2. Identified strengths included the initiative to develop work standards; maintenance planning, pre-staging and oversight during refueling outages; and the assignment of additional resources to prevent missed surveillances. Weaknesses included inconsistent use of procedures, insufficient documentation of troubleshooting activities, failure to follow procedures and inattention to detail resulting in several plant events, and multiple missed surveillances.

Maintenance:

During this assessment period, the licensee implemented a satisfactory maintenance program. A large volume of maintenance activities was successfully implemented, however specific observations often indicated several areas for continued improvement and management attention. The goals and objectives of the maintenance program were well defined. There was a good level of maintenance management involvement and supervisory oversight in daily activities. Some procedure content and usage deficiencies continued to exist during this assessment period. The licensee has stressed procedure compliance and identification of procedure inadequacies. Work in progress has occasionally been stopped by workers and first line supervisors due to procedure problems, indicating that licensee management's efforts to identify procedure weaknesses have been communicated to the staff.

Early in the SALP period, work standards were issued to employees for the purpose of improving work, procedural compliance and industrial safety practices. Written planning standards were subsequently issued to enhance maintenance planning. Although the work standards improvement program is in its early stages, its development is considered to be a good licensee initiative.

The turnover rate experienced by the maintenance organization is low and is indicative of a stable staff. Maintenance workers are competent, trained and qualified. Qualification criteria are well-defined and documented for both licensee and contractor workers. The training center continues to provide extensive electrical and mechanical training facilities. When the existing modular training program was initiated in 1987, many craft personnel were "grandfathered" with the intent of eventually being formally trained. However, reviews of training records did not support fulfillment of this plan. Additionally, there was not an aggressive effort to satisfy yearly training requirements for mechanical maintenance, apparently due to increased work loads from unit outages. Overall, however, the maintenance staff was highly knowledgeable in their areas of responsibility.

Maintenance department staffing was adequate to properly support significant maintenance activities. Staffing additions during this SALP period included supervisors, planners and craft personnel. Also, each unit now has an outage manager. However, the maintenance backlog of overdue corrective and preventive maintenance was large. Initiatives taken to increase productivity, improve scheduling, upgrade work planning, and increase staffing were demonstrated to increase maintenance productivity. However, the monthly work order production rate has increased proportionally to the increased productivity. The work order production increase was partly due to recent management goals to improve plant materiel condition deficiencies and worker sensitivity in identifying deficiencies.

The aging of any plant causes the challenge of material condition maintenance to increase over time. The number of deficient plant material and area conditions such as steam and water leaks, equipment corrosion, and service water pipe integrity was indicative of years of insufficient attention to facility and equipment status. Particular concerns included inadequate maintenance of the watertight features of the service water valve galleries and the steam and water leaks in the containment penetration rooms in both units. Recent NRC findings, such as main steam isolation valve detent problems and material condition deficiencies that are not identified by the licensee staff indicate an apparent tolerance of equipment deficiencies. The licensee has shown some recent improvement (e.g., Unit 2 service water valve rooms) in this area and has assigned a special task force to address material condition and equipment improvements. Despite the existence of these problems, the plants have been maintained and operated in a safe manner.

Maintenance activities are at times impaired due to the control and availability of spare parts. The licensee had previously recognized these parts problems and recently dedicated additional resources with sole responsibility for material control to improve performance in this area. The spare parts problems represented a major contributor to a large maintenance backlog.

The licensee is developing a reliability centered maintenance (RCM) program. Based on a licensee assessment that the existing number of preventive maintenance (PM) activities is excessive, implementation of the RCM program is expected to adjust the PM program scope, schedule and workload accordingly. The licensee's self initiated RCM program has been in progress for about three years. Significant increases in RCM program resources have been provided by licensee management in mid-1989. The program is planned to be performed in two phases and is expected to cover about 30 systems. The RCM program is currently in its early stages of implementation.

Effective management involvement and oversight resulted in successful completion of two unit refueling outages and several forced outages during the assessment period. Core alterations, reactor vessel work, and other refueling activities were well supported by operations. Reactor coolant system midloop operations were well planned, procedur-alized and implemented. Periodic outage meetings were effective in communicating priority activities and problem areas to all members of the dedicated outage team.

Maintenance procedure deficiencies continued during this assessment. The station's expanded procedure upgrade project (PUP) was initiated in mid-1989 to fully address procedural deficiencies. Only two maintenance procedures had been completely processed and issued at the end of the assessment period. The NRC identified examples where complex maintenance activities were conducted without complete, sufficiently detailed and approved procedures, including emergency diesel generator and main steam isolation valve mechanical latching mechanism (detent) maintenance.

Two reactor trips were attributed to maintenance activities conducted prior to this assessment period; one due to ineffective actions for a previous event, and the other due to an inadequate maintenance procedure. Examples of plant events caused by maintenance activities during the current assessment period include the failure of an emergency lighting inverter due to inadequate maintenance and an inadvertent safety injection signal, which occurred when a maintenance technician used a drawing for the opposite safety train while performing maintenance work.

At times, the licensee did not effectively control and supervise contractor maintenance. Several findings were identified during this assessment period relative to procedural noncompliance by contractors and indicated the need for increased management attention. Examples include work on a feedwater regulating valve without proper work authorization and the failure to implement administrative procedure requirements for temporary installations. The licensee recently modified their contractor procedures including enhanced work standard requirements and procedural familiarization. Increased direct oversight by PSE&G personnel was provided. Toward the end of the assessment period, improvements were noted relative to contractor control. However, continuing problems were noted.

Surveillance:

During this assessment period, surveillance testing was usually conducted in a well controlled manner by knowledgeable personnel with usually appropriate supervision. A large number of surveillance testing activities were successfully completed. The surveillance program administrative procedure was modified to clarify personnel responsibilities, to assign individual surveillance coordinators, and to formally assign a Technical Specification (TS) Administrator to coordinate related station activities. Surveillance test procedures continued to contain human factors and technical deficiencies. Weaknesses were identified in the administration of the Inservice Testing Program.

There were seven missed surveillances this period, predominantly due to past inadequate administrative controls related to TS amendment issuance. This compares with 12 missed surveillances during the last assessment period. Missed surveillances have been a long-standing problem at Salem for which numerous TS surveillance reviews and audits have been performed, including a computer data base review and a limited review of recent TS amendments. Technical procedure reviews to identify additional missed TS requirements have not yet been completed. The continued missed TS surveillances due to past inadequate administrative controls indicate that the previous licensee actions taken to identify the problems have been too narrowly focused and ineffective. Licensee management recently directed a more comprehensive review of TS surveillance requirements against existing surveillance procedures to resolve this issue.

Several surveillance procedures contained deficiencies, some of which resulted in plant events. Human factors deficiencies contributed to the May 20, 1989 loss of residual heat removal (RHR) event and emergency core cooling systems flow calculation errors. The licensee is addressing these types of procedural inadequacies in their ongoing PUP efforts.

In an effort to reduce plant trips, early in the assessment period the licensee instituted an independent peer review of critical steps for reactor protection system and ESF testing. This action appeared to have been effective in preventing trips during surveillance testing; no reactor trips occurred during surveillance testing. However, three engineered safety feature (ESF) actuations occurred during surveillance testing. Two were due to inadequate procedures and one was due to personnel error.

There are indications that the Inservice Testing (IST) program was not effectively administered. Pump vibration testing was not repeatable due to a combination of unmarked vibration reading points and unclear component drawings in test procedures, and weaknesses were evident relative to evaluation of questionable and unsatisfactory test results (e.g. auxiliary feedwater and boric acid transfer pumps). Weaknesses were also identified concerning trending of surveillance test data.

In summary, the maintenance organization implemented a satisfactory program. Work standards, management involvement, and the RCM initiative were licensee strengths. Maintenance weaknesses include the large maintenance backlog, the quality of some procedures, control of contractor maintenance, and control and availability of spare parts. A poor overall material condition of the plant was a significant weakness sourced in a prolonged period of insufficient attention to maintaining the plant. Licensee efforts to improve this area have been slow; meanwhile, the challenge to the maintenance program increases with plant age. A large number of surveillance testing activities were conducted in a well controlled fashion by knowledgeable and experienced personnel. Some surveillance test procedures continue to contain deficiencies. Although no reactor trips were caused by personnel errors, such errors resulted in other plant events. Weaknesses were identified in the administration of the IST program. Missed surveillances continued to be identified due to ineffective previous actions.

III.C.2 Performance Rating

Category: 2

Trend: Declining

III.C.3 Board Comments

Although the overall assessment was that a Category 2 rating was appropriate, several weak areas continue to exist without significantly effective measures to improve performance. Increased management attention is warranted.

III.D Emergency Preparedness

III.D.1 Analysis

The Emergency Plan for Artificial Island covers both Hope Creek and Salem Nuclear Generating Stations, therefore the assessment of emergency preparedness is a combined evaluation of both facilities' emergency response capabilities.

During the previous SALP period, this area was rated Category 2. This rating was based on weaknesses identified during a Salem based full-participation exercise, some actual event classification problems, and delays in ensuring that the Salem Technical Support Center could meet NRC design requirements. Strengths noted included a high level of management involvement in emergency preparedness activities, responsiveness to NRC concerns, and an overall effective emergency preparedness training program.

Management involvement in emergency preparedness was effective and extensive. Executives and plant managers maintain emergency response organization position qualification, review and approve plan and procedure changes, participate in drills and exercises, resolve audit noncompliance issues, exercise oversight functions, and interface with Delaware and New Jersey State and County government personnel. Management oversight includes a review of call-in test results and emergency preparedness training rescheduling.

The licensee successfully completed a partial-participation emergency preparedness exercise conducted at the Salem facility during this assessment period. PSE&G's emergency response actions were succcessful in providing for the health and safety of the public. Overall, licensee performance was excellent and noted to be improved since the last period.

Resolution of technical issues continues to be very good and demonstrates a commitment to quality. For example, as a result of an NRC concern, the licensee completed a review of default iodine to noble gas ratios as a function of release pathway, and determined the values were consistent with accident data and emergency off-gas system design and specifications. A four hour, default release duration time has been developed and accepted by the States. User friendly personal computer software has been developed for the back-up dose assessment program. Relating to deficiencies in the previous assessment, the Technical Support Center ventilation system has been upgraded to meet NRC design requirements. Innovative program activities in-progress include development of site Emergency Action Levels (EALs) for natural phenomena and security events to replace individual station EALs, a single Event Classification Guide for all three units, and a simplified EAL des-cription for use in the initial contact message sent to the States. Another example of resolving identified concerns was apparent in review of the licensee's corrective actions following loss of the NRC Emergency Notification System (ENS) when it was accidentally disconnected from an uninterruptable power supply (UPS) in May 1990. The licensee's communications staff has aggressively pursued upgrading the Salem Telephone Switch Room (location of the ENS UPS connection).

The licensee successfully used the Hope Creek and Salem simulators to enhance training effectiveness during emergency drills. To enhance the training effectiveness of these facilities, emergency communication systems duplicating those in the control rooms were installed in each simulator. Staffing in the emergency preparedness area is stable with a well-qualified staff available to maintain an effective emergency preparedness program. Personnel with operations backgrounds are on staff who develop demanding operations based scenarios for drills and exercises.

Management's attention to quality was effective as demonstrated by the following items. Effective licensee audits and reviews for each unit were completed by independent audit groups. Among other things, drills were observed and the State/County/licensee interface was determined to be adequate. There were no significant findings and the licensee/off-site interface was proactive. Emergency Department personnel with licensee executives and managers attended almost 100 meetings with State and County personnel. The public alerting system is tested daily, and is well maintained with availability at 99.5%, a value which exceeds Federal Emergency Management Agency standards. Independent and redundant siren activating systems are installed and maintained in each State.

The licensee has an effective emergency preparedness training program. Responsibility for emergency preparedness training has been assigned to the Emergency Preparedness Department. Two qualified emergency preparedness trainers have been transferred from the Nuclear Training Center to the Emergency Preparedness Department to support this effort. Weekly, on-the-job, mini training drills for each site have resumed and nine day-long drills are also scheduled. Over 1,000 licensee personnel have been trained for Emergency Response Organization (ERO) positions. There are at least three personnel qualified for each key ERO decision-making and management position. A dedicated emergency preparedness training facility has been placed in service. Engineers assigned to the Technical Support Center and the Emergency Operations Facility are given an overview of Emergency Plan Implementing Procedures and Core Damage Assessment Procedures.

The effectiveness of the training program was also demonstrated by response to twelve actual conditions requiring classification, and the strong exercise performance. This resolves the previous SALP concern regarding event classification. Observations of training drills indicated active involvement from licensed senior reactor operators dedicated to drill scenario development. Operations Support Center and Technical Support Center personnel were observed to implement effective problem identification and resolution.

In summary, the licensee maintains a strong and effective emergency preparedness program. Management remains involved with a demonstrated commitment to quality. Technical issues are generally promptly resolved and appropriate response is given to NRC initiatives. The Emergency Preparedness Program staff is stable and well qualified to maintain an effective program. Training is well developed and is effective as demonstrated by exercise performance and response to actual conditions requiring classification. A good working relationship is maintained with the States and Counties with regular meetings, and frequent drills.

III.D.2 Performance Rating

Category: 1

Trend: NA

III.D.3 Board Comments

None

III.E Security and Safeguards

III.E.1 Analysis

The Security Plan for Artificial Island covers both Hope Creek and Salem Generating Stations, therefore the assessment of security and safeguards is a combined evaluation.

During the previous assessment period, the licensee's performance was rated as Category 1. Noted were an excellent enforcement history, the continued implementation of an effective and performance-based program, knowledgeable and experienced security supervisory personnel, and management's involvement in and support for the program.

During this assessment period, the licensee continued to implement a high quality and very effective program, and management's attention to and involvement in the program remained evident. The site security supervisor and his staff are well-trained and qualified professionals who have been vested with the necessary authority to ensure that the security program is carried out effectively and in compliance with NRC regulations. The site security manager and his staff continued to actively participate in the Region I Nuclear Security Association and other groups engaged in nuclear plant security matters. They also maintained excellent rapport and effective communication channels with the plant staff who exhibit respect and a good attitude toward the program.

Staffing of the contract security force was consistent with program needs. Early in this assessment period, the security force attrition rate was high (24 percent). Licensee and contractor efforts through personal incentives were successful in reducing this rate to 9 percent by the end of this period.

The licensee continued to demonstrate responsiveness to several potential weaknesses during the period. These weaknesses primarily involved system and equipment aging. As a result, the licensee promptly initiated a comprehensive evaluation of all systems and equipment and developed appropriate plans and a timely schedule for upgrading and/or replacing the affected equipment. In addition, the licensee implemented a well managed fitness-for-duty program in response to new NRC requirements during the period. The licensee's policy has been clearly stated and widely disseminated among both employees and contractors. It was found to be aggressively implemented by knowledgeable personnel, and processing facilities and procedures were excellent. These efforts represented a proactive management approach that continually seeks to improve the effectiveness of the entire security program.

The security force training and requalification program is well-developed and administered by an experienced staff of two full-time and five part-time instructors, and a supervisor. Facilities are provided on-site for training and requalifications and were well-equipped and well-maintained. During this period, the licensee established additional oversight of the contractor's training and requalification program by providing a full-time licensee representative to administer the program.

The licensee's event report procedures were found to be clear and consistent with the NRC's reporting requirements. Only one reportable safeguards event was submitted to the NRC during the assessment period. This report involved the loss of power to the security system and was properly compensated for by the security force. The licensee's report was clear and concise, and indicated an appropriate response to the event.

During the assessment period, the licensee submitted three revisions to the security program plans under the provisions of 10 CFR 50.54(p). These revisions were of high quality and technically sound, and reflected well-developed policies and procedures. The licensee also updated all Physical Security Plan implementing procedures.

In summary, the licensee continued to maintain a very effective and performance-based security program that exceeds regulatory requirements. The licensee's ongoing program to identify and correct potential weaknesses in systems and equipment during this period are commendable and demonstrated the licensee's commitment to maintain an effective and high quality program.

III.E.2 Performance Rating

Category: 1

Trend: NA

III.E.3 Board Comments

None

III.F Engineering/Technical Support

III.F.1 Analysis

The previous SALP rated Engineering and Technical Support as Category 2, improving. The previous assessment noted significant changes within the corporate engineering department established to improve engineering's interaction with the station staff. Improvements were noted in corporate/station engineering communications. System engineering was a strength. Weaknesses included implementation problems associated with station modifications and inadequate safety evaluations.

During this SALP period, evidence of good performance was noted in E&PB. The Project Matrix Organization and the new design change control process worked well. The other changes appeared to function properly. Communications between E&PB and the plants also improved through daily morning, regular weekly and monthly meetings. Several new concerns were identified regarding the consistency of the quality of work performed by the systems engineers and instances of inappropriate implementation of the temporary modification program.

The design change process is effective in plant modification implementation. Design change process procedures were observed to be clear and detailed. The procedures adequately addressed design interface, design process and corrective action process requirements with appropriate levels of review and verification specified. Satisfactory performance and documentation of cross discipline reviews were noted. Calculations contained in modification packages were technically correct and performed in accordance with applicable

procedures. A new workbook procedure has been developed to improve the existing design change package process and to improve configuration management control. The workbook was sufficiently detailed to control the design process and post-modification testing. The drawings affected by modifications were mostly accurate and appropriately reviewed and approved. In addition, a new prioritization program is under development to improve workload prioritization and resource allocation. The E&PB organization works well with onsite system engineering. This was evidenced during the followup of the Emergency Core Cooling System (ECCS) flow problems.

The onsite system engineering group supports operational, maintenance, testing and design change activities. Inconsistencies were observed in the quality of work performed by the systems engineers. For example, system engineer troubleshooting and corrective action plans for radiation monitoring system deficiencies, main power transformer problems, main steam line isolation valve (MSIV) modification errors, reactor coolant system check valve leakage, and feedwater system and regulating valve timing problems were thorough and comprehensive. However, system engineer followup of boric acid pump low flow problems, initial MSIV drifting indications, and initial analysis of the RHR overpressurization event were poor. System engineers are used as station qualified reviewers (SQRs). The SQR process, at times, was noted as a weakness. Examples include: procedure changes involving safety significant issues being processed by the SQR; not maintaining the required SQR independence; and, not implementing SQR training that was committed.

There have been several examples of inappropriate implementation of the temporary modification program. Some installed temporary changes should have been processed as permanent modifications, some temporary modifications were found to have been in place for excessive time periods, and a required periodic review of temporary modifications by the Station Operations Review Committee was missed. A new control procedure for temporary modifications (T-MOD) had been developed and approved for use at Salem. The training for the use of this new procedure was just completed at the end of the SALP period and the control of T-MODs at Salem is in a transition period for using the new procedure. The purpose of the new procedure is to provide clearer guidance than the old one.

Engineering problem evaluations are generally adequate. However, the licensee's response to discrepant system flow measurement devices was initially too narrowly focused. 10 CFR Part 21 reviews and notifications are appropriately executed.

Technical support for refueling and maintenance outage periods and for post outage recovery activities was noted as being effective. Both E&PB and onsite system engineering participated in and interfaced with the outage organization on a daily basis. Reactor engineering was noted as providing strong support during fuel movement activities, and during reactor startup and power ascension testing.

The licensee established project task forces led by E&PB managers to address specific technical issues and problem areas. These included ECCS pump and flow problems and MSIV circuitry design. These task forces effectively integrated offsite, onsite and contractor engineering groups. The licensee's site and corporate management were actively involved in the resolution of these technical issues.

The technical justification for amendment requests was mostly satisfactory and exhibited good responsiveness to NRC issues and concerns. However, the technical justification that accompanied requests for emergency changes to the Technical Specifications was not of the same quality. Examples included main steam isolation valve timing and charging pump excess flow submittals. These changes required the licensee to augment its application with significant amounts of additional information. The technical information included in licensee responses to NRC Bulletins, Generic Letters, and other licensee requests was generally timely and adequate with sufficient detail to allow a determination concerning the acceptability of the licensee's action. One exception was the response to Bulletin 88-04, Potential Safety Related Pump Loss. In that response the licensee did not recognize that the existing system alignment made the Salem Unit 1 RHR pumps potentially susceptible to the strong pump/weak pump interaction.

The licensee has maintained adequate control over the inservice inspection (ISI) Program, and has completed required inspections and examinations for the first interval without undue recourse to extension and deferral requests. The licensee has performed inspections in excess of the technical specification requirements in all steam generators to determine the operating condition of the generators, and to assure safety and reliability of the NSSS system. Also, recognizing the importance of the "ALARA" concept, the licensee provided adequate training, controls, and maximum effective automation for these inspections and examinations.

Forty-eight of 87 licensee event reports (LERs) were attributable to this functional area. The majority of these were due to radiation monitoring system initiated actuations caused by design flaws. PSE&G is adequately addressing this area. There were other LERs that were identified by the licensee during their Configuration Baseline Documentation (CBD) project. This design basis reconstitution is a

positive licensee initiative (Section III.G). Two of the six automatic reactor trips during the period were attributed to the engineering/technical support area. The causes of these trips were a personnel error leading to an unauthorized modification, and untimely corrective actions for a previously identified inadequate modification design.

In summary, the corporate engineering (E&PB) performance, design change control, communications between E&PB and the plants have been very good. Inconsistencies were observed in the quality of work performed by the systems engineers. There have been several examples of misuse of the temporary modification program. The requests for license amendments were adequately supported with the exception being those requests made under emergency circumstances. Other licensee submittals and responses to generic correspondence have been timely and provided the requested information. These exhibited adequate management support, attention to detail and interdepartmental communications.

III.F.2 Performance Rating

Category: 2

Trend: NA

III.F.3 Board Comments

None

III.G Safety Assessment/Quality Verification

III.G.1 Analysis

This area assesses the effectiveness of the licensee's programs provided to assure the safety and quality of plant operations and activities. During the previous period the licensee was evaluated as Category 2 in this functional area. The last assessment noted that licensee management generally displayed an adequate safety perspective, however, continued management attention to assure consistency in the quality and timeliness in licensee submittals was needed. To correct a licensee recognized need for improved quality performance and personnel accountability, enhanced management communication and corrective action programs had been developed. Implementation of these programs had begun, but completion of the programs and continued management oversight was necessary.

At the beginning of this assessment period, a number of new programs were instituted by the licensee to correct the noted concerns. Corporate and station management continue to be involved in the conduct of operations and in the resolution of unplanned occurrences. Station management is directly involved in the daily oversight of unit operations. Corporate management was observed onsite and in the plant during normal and off-normal working hours. Senior Nuclear Shift Supervisors were held accountable for unit operations and had direct access to station management. Daily meetings were held to provide an operational perspective to unit problems and for work prioritization. First and second line supervisors were directly involved in field activities. Worker performance during the period was adequate.

Other than for routine material condition problems, (see Section III.C.), the licensee had a generally effective program for problem identification. Plant deficiencies and events were documented using incident reports. These reports were discussed at shift turnover and at the daily morning status and management meetings. There were several instances of late or poor 10 CFR 50.72 and 50.73 reports. Examples include engineering safeguards feature actuations caused by radiation monitoring systems and a residual heat removal (RHR) overpressurization event. Root cause determination and corrective actions were generally adequate. The licensee has implemented a root cause training program. There were several instances where initial corrective actions were either incomplete or ineffective. Examples include emergency core cooling system (ECCS) pump surveillance deficiencies, overdue biennial procedure reviews, and late station qualified reviewer training.

At the beginning of the period, management promulgated worker standards and provided training which has improved worker performance and procedure compliance. PSE&G has been successful in reducing the number of personnel errors and reactor trips. An effective trip reduction program included "scram-a-gram" notices, reactor trip warning signs on sensitive equipment, and independent verification of trip sensitive surveillance procedures. Two reactor trips (both while shutdown) were caused by personnel errors. One was caused by an operations error during atmospheric steam dump operation and the other by an engineering and technical support error resulting from a 1987 plant modification.

Management has been aggressive in disseminating and instilling a safety conscious attitude among station personnel. There have been effective results as evidenced by the following conservative operations: a voluntary unit shutdown because of main steam isolation valve (MSIV) operability concerns; extending shutdowns for both units to resolve ECCS concerns; successful reactor coolant system midloop operation with detailed procedures and training; and voluntary unit

power reductions to avoid transients. However, at times management appeared to tolerate deficient conditions. Examples of this tolerance include MSIVs drifting off their open latch; open fire doors; and continuing degraded material condition of both units. Also, worker overtime was, at times, not properly controlled by station management.

Station Operations Review Committee (SORC) review of reactor trips, design changes, significant technical issues, and reportable events were usually thorough and timely. However, there were several occasions where SORC reviews were weak, such as (1) the failure to identify an RHR system single failure vulnerability, (2) an MSIV closure circuit failure to "seal in", with a subsequent modification providing an uncontrolled steam generator vent path to the environment, and (3) a non-conservative interpretation of Technical Specification 3.0.3.

At Salem, personnel designated as Station Qualified Reviewers (SQRs) are used to decide whether a safety evaluation and subsequent SORC review is necessary. Because of incomplete screening criteria and a misunderstanding on the part of SQRs and station management, some issues that should have been reviewed by SORC were not. Included were both procedure changes and facility changes. This was a programmatic control problem, but no safety issues were identified. Licensee safety evaluations, when completed, were found to be of high quality.

The Quality Assurance (QA) Department, the Onsite Safety Review Group (SRG) and the Offsite Safety Review Group provided effective, independent review of plant activities. The QA organization has developed and used performance based surveillance of station activities. QA involvement in radwaste processing is considered a strength. Post trip reviews and other investigations by the SRG were effective in determining root cause and providing good corrective action recommendations. In addition, PSE&G has instituted an event review process entitled "Significant Event Response Team" (SERT). A SERT is initiated by the station general manager and is a real time, independent review of any unplanned reactor trips or other major station event. The SERTs effectively developed the sequence of events, determined root cause(s) and recommended corrective actions. In one instance, shortcomings associated with a SERT evaluation were identified by PSE&G management and corrected. The Human Performance Evaluation System, a detailed analysis method for determining root cause of incidents involving personnel error is also utilized by the licensee.

Direct inspection of station activities through inspection hold points by Quality Control (QC) has been significantly reduced over the past several years. Additionally, the administrative processes to identify, document, and resolve adverse conditions were at times not aggressively applied. Examples include the reassembly of a main steam drain valve with an unacceptable seating surface, and the failure to install the required washer kit and properly tighten flange fasteners on service water system repairs. Management attention in this area is needed for assurance that those conditions are properly evaluated. PSE&G has revised their guidance for QC inspection and hold points, and increased QA surveillance of maintenance activities.

The overall design process was well controlled and contained appropriate checks and balances. There was an emphasis on nuclear safety as evidenced by discussions with personnel related to upgrading of procedures and implementation of new initiatives, such as the Configuration Baseline Documentation project, which is intended to reconstitute the design basis for many of the major plant systems.

Inadequate station procedures continue to be a contributing root cause for both reportable and non-reportable events. PSE&G initiated a procedure upgrade project (PUP) last assessment period and provided additional resources this period. The PUP was an important initiative; however, the program has encountered implementation problems. These included program scope changes, a variable resource allocation, and re-definitions of an end product. Also, the required biennial reviews of existing procedures were not completed in a timely manner. These items have resulted in significant setbacks in upgrading station procedures.

Licensee performance in routine licensing activities, in most instances, has been adequate. Requests for additional information were necessary in over half the cases. PSE&G is usually very responsive to the requests for information. Non-routine licensing activity (i.e., emergency requests, exigent requests) in most instances required significant followup by the staff with PSE&G to obtain the requisite additional information. PSE&G was responsive to these requests and provided the requested information in a timely manner.

PSE&G's response to generic NRC correspondence (Bulletins, Generic Letters) was generally timely and with sufficient information that a judgement concerning the suitability of the position taken by them could be made. In one instance PSE&G failed to recognize a possible strong pump/weak pump interaction in the RHR system. (See Section III.F.) PSE&G has shown inconsistent performance in resolving the open TMI Action Plan items. For example, PSE&G was responsive in adding the upgrade to the subcooling margin monitor to the Unit 2 refueling outage work list at a late date. However, the post accident sampling system was to be upgraded by the end of March 1990. While it was in a licensee tracking system it had not been properly flagged and the due date was missed.

In summary, corporate and station management involvement in station activities have improved. Management continued to be involved in problem resolution and the assurance of nuclear safety. Initiatives taken by management such as the SERT formation and their efforts in instilling a safety conscious attitude among station personnel are particularly noteworthy. The two safety review groups, Onsite and Offsite, have provided effective, independent review of plant activities. SORC reviews, in some cases, have failed to identify safety issues that required additional consideration. The use of SQRs, in some cases, have raised the threshold for SORC review beyond the expected threshold. QC involvement in station activities has not been sufficient to assure that adequate independent review is being maintained. The material condition of the plants is poor and needs management attention. Inadequate procedures are a frequent contributor to plant events and the implementation of the PUP was delayed. Effective and timely implementation of the PUP is important to the continued safe operation of the Salem units. Closer attention should be paid to the details provided in responses to generic correspondence and to other licensing submittals.

III.G.2 Performance Rating

Category: 2

Trend: NA

III.G.3 Board Comments

Licensee initiatives such as the PUP and materiel condition improvement program require increased and more aggressive management attention to ensure completion.

IV. SUPPORTING DATA AND SUMMARY

IV.A LICENSEE ACTIVITIES

BACKGROUND

The assessment period began May 1, 1989, with Unit 1 in its eight refueling outage and the Unit 2 reactor operating at full power.

Unit 1 was restarted and placed on-line on July 18, 1989. Automatic reactor trips occurred at Unit 1 on June 9, 1989, June 19, 1989, April 3, 1990 and April 9, 1990. These trips and other unit unplanned shutdowns occurring during the assessment period are further detailed in Section III.C. Extended forced outages occurred April 11 - June 7, 1990 (emergency core cooling system deficiencies) and July 22 - July 31, 1990 (main steam isolation valve concerns). The unit remained shutdown at the end of the assessment period.

A manual reactor trip was initiated at Unit 2 on June 10, 1989 and an automatic reactor trip occurred on June 28, 1990. These trips and other Unit 2 unplanned shutdowns are further detailed in Section III.C. On

March 31, 1990, the unit shutdown for its fifth refueling outage. The Unit restarted on June 24, 1990. Extended forced outages occurred on October 13 - November 5, 1989 (main power transformer replacement) and June 30 - July 31, 1990 (main steam isolation valve concerns). The Unit remained shutdown at the end of the assessment period.

IV.B NRC Inspection and Review Activities

Two resident inspectors were assigned to the site throughout the assessment period. Regional inspectors performed routine inspections throughout the period, with added inspection emphasis during the scheduled refueling outages. In addition to the routine inspections, the following NRC special and team inspections were conducted as follows:

-- May 22 through 26, 1989; Unit 1 Special Inspection to review the loss of the residual heat removal system event that occurred during surveillance testing.

-- May 27 through July 10, 1989; Special Inspection to review inadequate response time testing of main and bypass feedwater regulating control valves.

-- November 17 through 29, 1989; Special Inspection to review the identification of a single failure vulnerability in the emergency core cooling system.

-- November 29 through December 1, 1989; Unit 1 Special Inspection to review circumstances surrounding an entry into Technical Specification 3.0.3 during a turbine volumetric flow test.

-- January 10 through 25, 1990; Emergency Operating Procedures Team Inspection.

-- March 12 through 15, 1990; Team Inspection of the Artificial Island Fitness-for-Duty Program.

-- April 9 through 13 and April 23 through 27, 1990; Maintenance Team Inspection.

-- April 11 through 18, 1990; Special Inspection to review circumstances surrounding the miscalculation of safety injection pumps' flow rates in the associated flow balance verification surveillance procedure.

-- May 14 through 25, 1990; Integrated Performance Assessment Team Inspection.

IV.C Significant Licensee Meetings

-- An Enforcement Conference was held on July 26, 1989 in the NRC Region I office to discuss potential violations associated with the inoperability of the feedwater isolation system at both Salem units. A Severity Level IV violation was subsequently issued on August 9, 1989.

-- An Enforcement Conference was held on December 11, 1989 in the NRC Region I office to discuss potential violations associated with the identification of a single failure vulnerability in the emergency core cooling system and related licensee activities. Circumstances surrounding entries into Technical Specification 3.0.3 were also discussed at the meeting. Three Severity Level IV violations were subsequently issued on January 8, 1990.

-- A Management Meeting was held on February 26, 1990 in the NRC Region I office to conduct a mid-SALP cycle review and evaluation of licensee performance.

-- An Enforcement Conference was held on May 18, 1990 in the NRC Region I office to discuss the circumstances related to the identification of miscalculations of emergency core cooling system flowrates during surveillance testing. One Severity Level IV violation was subsequently issued on June 8, 1990.

IV.D Reactor Trips and Unplanned Shutdowns

Unit 1

Event Description

Date	Power	Root Cause	Functional Area

1. An automatic safety injection/reactor trip occurred while in Mode 3 (Hot Standby) due to a high steam line differential pressure condition created by internal steam line pressure oscillations. A 1987 modification was determined to have been implemented which installed an unidentified valve (closed) in the common steam line drain header, which prevented draining saturated water that had accumulated in the steam lines. Neither the computerized tagging system nor the associated system drawings reflected the valve addition.

6/9/89	Shutdown	Personnel error	Engineering/Technical Support

Unit 1 (Continued)

Event Description

Date	Power	Root Cause	Functional Area

2. An unplanned shutdown occurred due to an inoperable safeguards equipment control (SEC) train 1A. The SEC failed the surveillance test and was declared inoperable. Licensee troubleshooting replaced some components. Further testing proved operability.

6/18/89	20%	Component failure	Not Applicable

3. The reactor tripped automatically on low-low steam generator water level due to main steam isolation valve (MSIV) closure during a post-maintenance surveillance test of MSIV bypass valves. A design deficiency was identified in the MSIV continuity check circuitry, which allowed voltage to remain high for a sufficient time period and reset a latching relay, causing the MSIV inadvertent closure. A Unit 2 reactor trip occurred from full power due to the failure of the same relay approximately two months earlier (previous SALP period). Subsequent to the reactor trip, an 8-day unplanned shutdown commenced from Mode 3 on June 20, 1989 to repair a leaking safety injection system check valve (No. SJ55).

6/19/89	45%	Untimely corrective actions	Engineering/Technical Support

4. An unplanned shutdown was made due to the failure of the speed increaser bearing on a safety injection charging pump. The unit was cooled down further to Mode 5 following the identification of a leaking safety injection system check valve (No. SJ56).

12/1/89	100%	Component failure	Not Applicable

5. An unplanned shutdown was made due to an inoperable safeguards equipment control (SEC) train 1A. The SEC actuated following testing and licensee troubleshooting could not determine a specific cause. The licensee declared the SEC inoperable, replaced the electrical chassis, tested satisfactorily, and declared the SEC operable.

3/27/90	100%	Component failure	Not Applicable

6. The reactor tripped automatically while in Mode 3 on low-low steam generator water level due to personnel error. A licensed operator failed to establish optimum operating conditions prior to transferring main steam atmospheric dump control from one steam generator to another. This was aggravated due to auxiliary feedwater flow indication abnormalities.

4/3/90	Shutdown	Personnel error, poor supervisory oversight	Operations

Unit 1 (Continued)

Event Description

Date	Power	Root Cause	Functional Area
7. The reactor tripped automatically on low-low steam generator water level due to the loss of one main feedwater pump. The pump went to idle speed due to the failure of the governor valve control linkage. A pin bushing in the linkage assembly was missing and an associated lock nut was found installed backwards. Subsequent to the reactor trip, an extended shutdown commenced on April 11, 1990 due to emergency core cooling system flow discrepancies.			
4/9/90	90%	Inadequate procedure	Maintenance/Surveillance
8. An unplanned shutdown was made to evaluate potential deficiencies associated with the main steam isolation valves' ability to close under certain postulated conditions, and to resolve main steam line isolation circuitry deficiencies identified relative to the original circuit design.			
7/22/90	100%	Inadequate design	Engineering/Technical Support

Unit 2

Event Description

Date	Power Level	Root Cause	Functional Area
1. An unplanned shutdown was made to resolve feedwater regulating control valve (FRV) response time testing inadequacies. Inadequate surveillance procedures prevented identification of design/performance problems with the FRVs.			
5/27/89	50%	Inadequate procedure	Maintenance/Surveillance
2. The reactor was tripped manually after five of the six circulating pumps had become inoperable due to high differential pressure across the associated circulating water system screens. A large accumulation of grass and debris following a recent storm caused the high screen differential pressure. A periodic preventive maintenance activity to periodically clean the lower portion of the intake trash racks was not established following a similar event in 1983.			
6/10/89	100%	Ineffective corrective actions	Maintenance/Surveillance

Unit 2 (Continued)

Event Date	Power Level	Root Cause	Functional Area
3. An unplanned shutdown was made to replace a degraded phase B main power transformer. Periodic monitoring identified an elevated total combustible gas concentration, indicating the presence of an internal hot spot (700 degrees F).			
10/13/89	90%	Component failure	Not Applicable
4. An unplanned shutdown was made to repair a leak on a welded pipe cap on the discharge side of the boron injection tank. The cause of the leaking joint was attributed to a defect in the root of the weld that occurred during a modification.			
1/17/90	100%	Modification installation error	Maintenance/Surveillance
5. The reactor tripped automatically on low steam generator level coincident with steam/feed flow mismatch following a loss of feedwater caused by a 460 volt transformer failure. A similar catastrophic transformer failure occurred on Unit 1 about one week earlier, however, significant operational problems were not experienced. Subsequent to the reactor trip, an extended unplanned shutdown was made to evaluate and resolve main steam isolation valve fast closure circuitry deficiencies.			
6/28/90	75%	Component failure	Not Applicable

TABLE 1

Inspection Hours Summary

Salem Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Hours*	Annualized Hours	% of Time
A. Plant Operations	2912	2257	44
B. Radiological Controls	303	235	5
C. Maintenance/Surveillance	1340	1039	21
D. Emergency Preparedness	151	117	2
E. Security and Safeguards	243	188	4
F. Engineering/Technical Support	594	460	9
G. Safety Assessment/ Quality Verification	959	743	15
TOTALS	6502	5039	100

* Does not include NRC licensing staff hours.

TABLE 2

Enforcement Summary

Salem Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Number/Severity of Violations	
	Level IV	Deviation
A. Plant Operations	4*	
B. Radiological Controls	3*	
C. Maintenance/Surveillance	7**	
D. Emergency Preparedness		
E. Security		
F. Engineering/Technical Support		1
G. Safety Assessment/ Quality Verification	5**	
TOTALS	19	1

* Violation cited two examples, one in operations and one in radiological controls areas.

** Violation cited two examples, one in maintenance/surveillance and one in safety assessment/quality verification areas, and is therefore included in both areas.

TABLE 3

Licensee Event Reports

Salem Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Number by Cause A	B	C	D	E	X	Subtotal
A. Plant Operations	7	-	-	1	5	-	13
B. Radiological Controls	2	-	-	-	1	1	4
C. Maintenance/Surveillance	8	4	-	7	2	1	22
D. Emergency Preparedness	-	-	-	-	-	-	-
E. Security	-	-	-	-	-	-	-
F. Engineering/Technical Support	6	31	2	1	8	-	48
G. Safety Assessment/ Quality Verification	-	-	-	-	-	-	-
Totals	23	35	2	9	16	2	87

Includes Unit 1 LERs 89-18 through 89-37 and 90-01 through 90-20; and, Unit 2 LERs 89-10 through 89-27 and 90-01 through 90-30.

Cause Codes:
A. Personnel Error
B. Design, manufacturing or installation
C. Unknown or external cause
D. Procedure inadequacy
E. Component failure
X. Other

Root causes assessed by the SALP Board may differ from those listed in the LER.

ATTACHMENT 1

Salp Criteria

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations in that area. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

1. Assurance of quality, including management involvement and control;

2. Approach to resolution of technical issues from a safety standpoint;

3. Enforcement history;

4. Operational and construction events (including response to, analyses of, reporting of, and corrective actions for);

5. Staffing (including management); and

6. Effectiveness of training and qualification program.

On the basis of the SALP Board assessment, each functional area evaluated is rated according to three performance categories. The definitions of these performance categories are given below:

Category 1.

Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a superior level of performance. NRC will consider reduced levels of inspection effort.

Category 2.

Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a good level of performance. NRC will consider maintaining normal levels of inspection effort.

Category 3.

Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in an acceptable level of performance; however, because of the NRC's concern that a decrease in performance may approach or reach an unacceptable level, NRC will consider increased levels of inspection effort.

Category N.

Insufficient information exists to support an assessment of licensee performance. These cases would include instances in which a rating could not be developed because of insufficient licensee activity or insufficient NRC inspection.

The SALP Board may assess a functional area to compare the licensee's performance during a portion of the assessment period to that during an entire period in order to determine a performance trend. Generally, performance in the latter part of a SALP period is compared to the performance of the entire period. Trends in performance from period to the next may also be noted. The trend categories used by the SALP Board are as follows:

Improving: Licensee performance was determined to be improving

Declining: Licensee performance was determined to be declining and the licensee had not satisfactorily addressed this pattern.

A trend is assigned only when, in the opinion of the SALP Board, the trend is significant enough to be considered indicative of a likely change in the performance category in the near future. For example, a classification of "Category 2, Improving" indicates the clear potential for "Category 1" performance in the next SALP period.

It should be noted that Category 3 performance, the lowest category, represents acceptable, although minimally adequate, safety performance. If at any time the NRC concluded that a licensee was not achieving an adequate level of safety performance, it would then be incumbent upon NRC to take prompt appropriate action in the interest of public health and safety. Such matters would be dealt with independently from, and on a more urgent schedule than, the SALP process.