ENCLOSURE

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

REPORT NO. 50-354/89-99

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

HOPE CREEK GENERATING STATION

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

BOARD MEETING DATE: SEPTEMBER 19, 1990

TABLE OF CONTENTS

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated 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 19, 1990 to review the collection of performance observations and data and to assess the licensee's performance at the Hope Creek 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 Public Service Electric and Gas (PSE&G) Co.'s safety performance at the Hope Creek Generating Station for the period May 1, 1989 through July 31, 1990.

The SALP Board for the Hope Creek 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)
C. Shiraki, 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:

J. Stone, Project Manager, NRR
S. Dembek, Project Manager, NRR
S. Barr, Resident Inspector, DRP
S. Pindale, Resident Inspector, DRP
K. Lathrop, Resident Inspector, DRP
C. Anderson, Chief, Plant Systems Section, DRS
J. Jang, Senior Radiation Specialist, DRSS

Others in Attendance (Continued)

R. Nimitz, Senior Radiation Specialist, DRSS
J. Joyner, Division Project Manager, DRSS
W. Pasciak, Chief, Facilities Radiation Protection Section, DRSS
J. Noggle, Radiation Specialist, 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
A. Almond, General Engineer, Director's Office, NRR

II SUMMARY OF RESULTS

II.A Overview

PSE&G successfully operated the Hope Creek reactor in a safety conscious manner, effectively completed their second refueling and maintenance outage, and exhibited excellent performance by support groups. Strong licensee management involvement and oversight were evident in all functional areas, as was excellent performance at the worker and supervisory levels. Strong and effective self-assessment by supervision, management and independent assessment groups was noted. Critical, technically sound problem identification, root cause analysis and corrective action programs were also evident in all functional areas. As a result, the plant operations, radiological controls, and security/safeguards functional areas maintained a superior level of performance. In addition, the emergency preparedness, engineering/technical support and safety assessment/quality verification functional areas achieved this high level of performance during this period. However, some isolated personnel errors persisted in most functional areas.

The maintenance/surveillance functional area received the same SALP performance rating noted during the last assessment period. Improvements are needed in worker attention to detail and procedural compliance, in the spare parts procurement and material control programs, and in reactor trip rate reduction. Significant licensee corrective measures in this area were evidenced and an improving trend in this area at the end of the period was noted.

In summary, the licensee achieved an overall superior level of performance. It is important that the licensee recognize the challenge to maintain this performance level by continuing the aggressive, safety conscious attitude and approach to nuclear, radiological and personnel safety, from the worker level through corporate management.

II.B Facility Performance Analysis Summary

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

Previous Assessment Period: January 16, 1988 through April 30, 1989

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

III PERFORMANCE ANALYSIS

III.A Plant Operations

III.A.1 Analysis

The previous SALP rated Hope Creek operations as Category 1. That assessment concluded that the operating staff continued to display a conservative and safety conscious approach to plant operation. There was an excellent operating record with no operationally caused reactor scrams. The operators were skillful and knowledgeable, and properly responded to transients. PSE&G improved the support of operations with increased staffing in both onshift and support roles. The need for reduction in personnel errors represented the primary area for improvement.

During this assessment period, the reactor was operated in a conservative and safety conscious manner. Operators skillfully performed their duties during unit startups, shutdowns and transients. There were four reactor scrams during the period and none were caused by operators. However, two of these scrams occurred during main turbine testing from the control room, and a reactor operator error contributed to one of these scrams. Operator response to reactor scrams and plant transients was exemplary. In several instances, prompt actions by operators prevented plant transients and possible reactor scrams due to a feedwater heater isolation, a loss of instrument air event and reactor feedwater pump trips.

PSE&G has committed resources to upgrade plant operations. Each operating shift continues to have three Senior Reactor Operator (SRO) licensed individuals (one above Technical Specification requirements). The operations staffing includes a pipeline into licensed operator status to recover losses from attrition. A separate SRO licensed individual supervises the work control group during regular maintenance hours. There are a total of 36 licensed operators, including 25 onshift and 11 in staff and training positions.

Plant operations were adequately supported by the Training Department. Simulator refresher training on reactor startups continues to be given to the ROs and SROs immediately before taking their shift. Three of five SRO license candidates and four of four Reactor Operator (RO) candidates passed their initial license examinations. The RO/SRO requalification program was determined to be satisfactory with four of four ROs and eight of ten SROs passing an NRC administered exam. The failure rate for these initial and requalification SRO exams indicates weaknesses in licensee and candidate preparation.

Deficiencies also existed in methods for simulator evaluations, in exam grading and in poor quality of licensee submitted exam material.

Licensed operators' plant awareness, safety perspective, and professional control room demeanor were consistently evident. However, minor weaknesses were noted in the routine performance of periodic control board walkdowns and with the procedures that establish the requirements such as the allowed control room mobility for the RO/SRO. For example, the SRO was allowed to enter the computer room where he would be out of sight of control room alarms/indications. The licensee was responsive to these NRC concerns and adequately addressed these minor weaknesses. Plant operations were well supported by detailed procedures, and procedural adherence was good. 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. A high number of lit annunciator alarms was noted upon the completion of and prior to startup from the second refueling outage. Aggressive management attention resulted in significant reductions in these lit annunciators. The use of overtime was properly controlled. Good performance of non-licensed equipment operators was noted during observations made on plant tours, and during equipment testing and operation.

The licensee has implemented revision 4 to the emergency procedure guidelines in their emergency operating procedures (EOPs). The operators effectively used the EOPs as evidenced by observations of actual plant transients and scrams, and during simulator training. Overall, the EOPs continued to be fully capable of performing their intended purpose.

Strong plant management oversight and attention to operations was evident on a daily basis. An operational perspective of plant problems and work prioritization was well understood and was 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.

Instances of personnel errors in Operations continued. The errors were of minor safety significance, occurred during operational, maintenance and testing activities and were committed by different people. The errors were most prevalent during the outage period early in the SALP period. Acceptable, appropriate corrective actions were taken for each error. Management meetings with each shift during the refueling outage were held to ensure operators understood

expectations. All operations related outage activities were stopped during these meetings. Safety, procedure compliance, proper briefings and communications, and reversing the short term negative trend in personnel errors were demonstrated to be more important to management than meeting the outage schedule. There were fewer errors in the latter portion of this assessment period, and the frequency of significant personnel errors has decreased compared to previous assessment periods. PSE&G's aggressive approach has continued to reevaluate previous corrective actions and the potential for additional corrective actions.

Plant housekeeping has improved during the period. Plant area painting is nearing completion. This activity has reduced the contaminated floor space, particularly in the high pressure coolant injection and reactor core isolation cooling rooms. Equipment operators can make their rounds with only minimal contamination protective clothing. The assignment of housekeeping area responsibilities has been effective in providing "ownership" of specific plant areas.

The overall fire protection program was effective. Dedicated fire protection personnel performed well and were knowledgeable, which demonstrated an effective training program. The fire brigade was staffed by the Site Protection group personnel, which minimized the reliance on operators to respond to fire and first aid related 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. Overall, plant and site management aggressively supported the fire protection area.

In summary, the Hope Creek reactor was operated skillfully and in a conservative and safety conscious manner. Reactor operator error contributed to one of four reactor scrams that occurred during the period. Strong management and supervisory oversight and involvement occurred at all levels from the senior reactor operator through the station general manager. An aggressive approach by management has been effective in reducing the number of personnel errors. Senior reactor operator failure rate during licensing and requalification exams was higher than normal.

III.A.2 Performance Rating

Category: 1

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 1 and concluded that PSE&G maintained and implemented an effective radiological controls program. No significant weaknesses were identified during the last assessment period.

During the current assessment period, the radiological controls program continued to be effective and well managed. NRC observations throughout the period, which included the second refueling outage, continued to indicate a good level of management involvement and control of the radiological controls program. PSE&G supervisors and managers actively observed ongoing work activities and plant conditions through formal review processes. The licensee's internal review processes such as quality assurance audits and surveillances and internal self-assessments provided effective oversight of program activities. The review processes were generally performance based and used technical experts where appropriate.

The licensee's approach to the resolution of technical issues was good as evidenced by the licensee's response to and resolution of technical problems associated with two operational events. For example, the licensee's response to a higher than expected crud burst during refueling was appropriate and well managed. In addition, late in the assessment period the liquid radwaste processing system backed up, causing overflows of several tanks into in-plant dikes. The licensee's technical review of the overflow event was extensive and continuing at the end of the assessment period. The overflows did not result in any onsite or offsite radiological concerns. This was an isolated event, and the licensee's response to this event was determined to be appropriate.

The licensee's enforcement history during the period was good. No NRC violations were cited. The licensee effectively detected an isolated problem with a High Radiation Area door being left open and implemented appropriate corrective actions. PSE&G's ability to self-identify and implement appropriate corrective actions remains a strength.

Staffing throughout the period continued to be good, both for routine operations and outage periods. Well qualified personnel continued to fill key positions within the organization. Reliance on contractor support was minimized by use of temporary support from the Salem station and the corporate radiological controls group. The staff, including contractors, received appropriate training and qualification testing to perform assigned tasks.

There were no unplanned external whole body radiation exposures during the assessment period. Engineering controls were effectively used to control airborne radioactivity, and no significant intakes of airborne radioactivity occurred during the assessment period. Overall external and internal exposure controls were effective.

The licensee instituted several engineering changes to reduce ISI personnel radiation exposure. These changes are: (1) the replacement of control blade pins and rollers with others made of non-stellite materials prior to startup; (2) the use of zinc injection to reduce cobalt plate-out; and (3) the reduction of feedwater iron from approximately 11.8 parts per billion (ppb) during the first fuel cycle to 3-5 ppb during the second cycle.

The station ALARA (As Low As Reasonably Achievable) organization effectively planned for outage radiological work activities. Exposure goals were reasonable. ALARA initiatives, such as use of robotics and video cameras were evident throughout the outage. The use of the computerized radiation work permit system in conjunction with the automated dosimetry access control system was effective in tracking and controlling exposure. The licensee aggressively pursued power reductions to minimize occupational exposure during steam plant maintenance activities. Also, an in-depth post-outage ALARA report was developed to document strengths and weaknesses encountered during the outage. Areas for improvement were tracked to ensure resolution prior to the next outage. The licensee performed ALARA reviews for outage work that accounted for about 90% of the aggregate exposure sustained during the outage. Overall, the licensee's efforts to maintain occupational radiation exposure ALARA have been very effective.

The radiological liquid and gaseous effluent monitoring and control programs were effective. Liquid and gaseous effluent sampling, analysis, and reporting were good. Air cleaning and effluent/process radiation monitoring systems were well maintained, tested, and calibrated. The licensee's effluent control training program for technicians was very good.

An effective Radiological Environmental Monitoring Program was implemented. Sampling and analytical procedures were upgraded, and an effective QC program was in place to assure the quality of sample analysis. The meteorological monitoring system was properly calibrated and maintained. Audits performed by the Quality Assurance Division were thorough, and audit-identified deficiency items were adequately resolved in a timely manner by the licensee.

The solid radwaste/transportation program continues to be very good. The unique radwaste processing system (asphalt solidification and dewatering system) has been effectively operated, with no incidents, violations or problems at the disposal sites. The quality assurance (QA) program for radwaste was determined to be excellent with notable strength in the area of QA surveillances. The licensee's training program, especially for the Radwaste Operators, was excellent.

The licensee's performance with respect to NRC standard chemical measurements was good. In addition, the results of the radiological sample measurements comparisons indicated that all the measurements were in agreement under the NRC criteria used for comparing results. Disagreements initially encountered in the measurement of an air particulate filter and a charcoal cartridge were resolved. The licensee's QA program for chemical and radiological measurements is a noted strength.

In summary, PSE&G continued to maintain and implement an effective radiological controls program. Management support and oversight of the program were good. Overall radiological controls, including staffing, to support routine and outage work activities were good. The licensee's initiatives in the ALARA area continue to indicate a proactive approach to reducing aggregate exposure over the life of the plant. Programs such as radwaste processing and shipping, effluent monitoring and control and environmental monitoring continue to be well managed.

III.B.2 Performance Rating

Category: 1

Trend: NA

III.B.3 Board Comments

None

III.C Maintenance/Surveillance

III.C.1 Analysis

The last SALP rated the Hope Creek maintenance/surveillance functional area as a Category 2, Improving. That assessment concluded that the maintenance organization effectively managed preventive and corrective maintenance and was staffed with technically knowledgeable and experienced personnel. Strengths noted included an improvement

in the control of maintenance work as evidenced by the decrease in the number of maintenance-related reactor trips, and the adequacy and detail of the plant's surveillance test procedures. The SALP noted the reduction of the number of personnel errors and missed surveillances as the areas requiring improvement.

Maintenance:

The Hope Creek maintenance program is well organized, and the licensee has demonstrated good performance in this area including overall adherence to procedures in maintenance work, and appropriate oversight of maintenance activities. Both unit and individual systems availability have been maintained at a high level. Senior management was noted to be directly and intimately involved in plant maintenance activities. Management oversight has been effective through the direct use of maintenance performance indicators and a maintenance tracking system. Daily planning meetings demonstrated the ability of plant management to adjust maintenance priorities and to review and correct adverse trends. Additionally in this area, the licensee has been acquiring risk assessment data to be used for prioritizing maintenance activities. This activity has only recently been initiated at Hope Creek and is a positive indication of management's safety-conscious control of maintenance work at the plant.

The most significant strength of the maintenance organization is its stable and well-trained staff. The maintenance work force operates under the direction of good supervision, and utilizes proven maintenance procedures. The maintenance training program was effective and demonstrated very well-defined qualification criteria for personnel. However, not all maintenance personnel had completed this formal training program. The training center continued to provide extensive electrical and mechanical training facilities. Overall, the maintenance staff was highly knowledgeable in their respective areas of responsibility. For times when the Hope Creek maintenance staff needs to be supplemented, the licensee has established an effective control for contracted maintenance personnel by using the Contractor Control Sheet to track contractor personnel and their training, indoctrination and qualification.

Maintenance facilities were generally well controlled, equipped and maintained. The layout and utilization of these facilities were well planned, organized and controlled throughout the plant to accommodate the maintenance activities and the movement of materials and equipment. The administrative controls over procurement, receipt, inspection, storage and issuance of materials were generally adequate for ensuring that maintenance materials were available when needed and

are issued properly for their intended use. A weakness in maintenance support activities was noted, however, concerning the availability of replacement parts. A slow requisition process resulted in a large number of routine maintenance requests being delayed because they were awaiting parts. At the end of the assessment period, the licensee had recently dedicated additional resources with sole responsibility for material control to improve performance in this area.

The licensee's routine management oversight and feedback system has worked well to assure safe and reliable plant operations. A strength of the system is the Managed Maintenance Information System (MMIS). MMIS not only provides a wide range of information, such as equipment history, recurring task scheduling, real time job status and parts inventory, but is widely used by plant personnel, is easily accessible, and usable.

During the assessment period, Hope Creek completed one refueling and several forced outages. The maintenance planning and outage organizations functioned well in scheduling all required tasks and coordinating the team work required of the different work groups to accomplish those tasks. The unit underwent its second refueling outage during September through November 1989, with all major efforts successfully completed and without the occurrence of any maintenance related safety system actuations or other significant incidents. The maintenance organization functioned effectively during a two week forced outage following the March 19, 1990 reactor scram. With little notice or preparation time, the maintenance department performed successful repairs on a feedwater drain cooler that had been isolated and had been preventing the unit from operating at full power.

Several events occurred during the period related to improper system restoration following maintenance on the system. One event occurred in September 1989 and resulted in a core spray pump being operated for 45 minutes with both the minimum flow and full flow test lines isolated. A second event occurred in June 1990 when a Reactor Water Cleanup (RWCU) isolation was caused by an RWCU pump being started with two discharge drain valves open, which resulted in a high differential flow signal. Additional examples of improper system restoration included the failure to reconnect the air supply to the air operated drain valves, which contributed to the January 6, 1990 turbine and reactor trip, and a faulty circulating water system alignment which resulted in a large amount of salt water being released to and contaminating the liquid effluent radwaste system. The licensee received one maintenance-related violation during the assessment period, resulting from several instances of maintenance work procedures not being properly followed.

Notwithstanding the weaknesses identified in this area, the licensee has managed and performed a high number of maintenance activities in a commendable manner.

Surveillance:

The Hope Creek surveillance program was conservatively and effectively managed and implemented throughout the assessment period. Surveillance tests were scheduled and tracked effectively through the MMIS, which provided good coordination of the Operations, Maintenance, Radiation Protection, Chemistry and Site Protection Departments for the performance of the surveillance program. This inter-department coordination and cooperation were strengths of the Hope Creek program.

Another asset of the surveillance program was the surveillance test procedures themselves, which continued to be well written, accurate and complete. The procedure revision backlog noted in the previous SALP report was eliminated during this SALP period, and the licensee is now ahead of schedule in the required review of surveillance procedures. An additional positive aspect of the surveillance program is the implementation by the licensee of a policy whereby all surveillance procedures which affect safety system redundancy or initiation are performed on the night shift. The policy results in the surveillances being performed in a more controlled atmosphere, with fewer distractions for the test performers and the onshift plant operators. However, the policy is implemented only between May and September, primarily to reduce the risk of a plant scram during the day when the electrical distribution grid is more strained.

Although the number of surveillance related incidents decreased from the prior SALP cycle, the predominant cause of the incidents continued to be personnel error, including inadequate administrative controls. Three surveillance tests were missed during this SALP period, one due to a computer malfunction and two due to personnel error. Personnel error was also the attributable cause of the three calibration errors which occurred over the course of the assessment period. One calibration error resulted in an engineered safety feature actuation, while another resulted in a licensee identified Technical Specification violation. The licensee took effective and timely corrective action for all six of these incidents, but attention to detail remained the primary area for improvement in the routine surveillance program.

Two reactor scrams occurred at Hope Creek during the SALP cycle during surveillance testing. In December 1989 and again in January 1990, the reactor scrammed due to a main turbine trip. The first scram was due to a main turbine thrust bearing wear detector failure, and the second was caused by a high water level trip of a moisture

separator. The root cause of the first event was management's failure to implement a modification recommended as a result of a previous similar event. The root cause of the second event included poor calibration of the normal and emergency separator drain path controls combined with an operator procedural noncompliance while the surveillance test was being performed. The licensee ultimately implemented adequate corrective actions, yet this is another example of the need for better attention to detail in the surveillance area.

The inservice inspection (ISI) program at Hope Creek was well administered and effectively implemented. Staffing levels, including the use of ISI contractors were good. The licensee exhibited good control over ISI vendors, part of which was the performance of multiple quality assurance surveillances of vendor activities. A notable strength existed in the licensee's ISI personnel and contractors who were well qualified to perform ultrasonic testing of intragranular stress cracking corrosion (IGSCC) susceptible piping. Hope Creek has been effectively operating plant equipment in a manner which achieves optimum primary water chemistry which in turn is part of an overall effort to reduce the susceptibility of austenitic stainless steel piping systems to IGSCC. Licensee management has also demonstrated an active concern and sensitivity to efforts regarding personnel exposure during ISI and surveillance activities. ISI results have been well documented, complete, easily retrievable, and able to be trended by comparison with previous data.

In summary, the Hope Creek station has carried out successful maintenance and surveillance programs. The programs have been adequately scheduled, planned and implemented. The strengths of the program lie in management, a well-trained and experienced staff and good procedures. Weaknesses in the area continued to be found in the procurement process, post-maintenance system restoration, and in the personnel errors which have contributed to the noted plant events and scrams. Hope Creek's maintenance and surveillance program is a good one, but improvements need to continue to resolve these weaknesses.

III.C.2 Performance Rating

Category : 2

Trend: Improving

III.C.3 Board Comments

None

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 successful 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 description 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).

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.

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.

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 conformance 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 was responsive to identified concerns. This was evident by the approach to several potential weaknesses during the period which 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 identified during the assessment period. This event 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 indicated significant changes within the corporate engineering department (Engineering and Plant Betterment, E&PB). These changes were intended to improve engineering interaction with the plant staff. These changes included: establishment of Project Matrix Organization, revision of the Design Change Process, implementation of an Engineering Work Request System, use of a Project Management System, and improved responsiveness of E&PB to site needs. Inconsistencies in the quality of engineering work from E&PB were noted to remain and a concern was identified early in the assessment period regarding reduced experience levels within the systems engineering group.

During this SALP period, evidence of improved performance was noted in the E&PB. The Project Matrix Organization and the new design change control process worked well. The other changes appeared to function properly. Communication between E&PB and the plants also improved through daily morning meetings, and regular weekly and monthly meetings. An improvement in the consistency of the quality of work from E&PB and improvements in the performance of the systems engineering group were observed.

The E&PB was mainly involved in the design process and less involved in daily plant activities. The overall design process within E&PB was well controlled and contained appropriate checks and balances. There was an emphasis on nuclear safety as evidenced by discussions with E&PB 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. The 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 the 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 accurate and appropriately reviewed and approved. A new prioritization program is under development to improve workload prioritization and resource allocation.

The E&PB organization support of plant problems is noteworthy. For example, engineering support following a reactor scram and electrical transient was thorough and aggressive. This included immediate response, root cause analysis and investigations, and corrective actions. Also, metallurgical evaluations for plant defects were noted as being satisfactory, as was Hope Creek's implementation of the guidelines of Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code 1, 2, and 3 Piping," in affecting repairs to the service water system. The E&PB organization works well with Onsite System Engineering. However, one example of a poor design change package was associated with the core spray system flow instrumentation not meeting the ASME Section XI instrument range requirements. The licensee is properly addressing this concern.

The onsite system engineering group is staffed with experienced and knowledgeable personnel. Evidence of good system engineering support for station activities includes: (1) location of a packing leak in the drywell and its prompt isolation; (2) maintenance trending, disposition for degraded equipment, and procedure generation; (3) active participation in a scram reduction program by review of Hope Creek and other plant events and near misses; and (4) thorough root cause determination and incident report followup. The licensee has been aggressive in identifying and following up on engineering related deficiencies. 10 CFR Part 21 evaluations and associated notifications such as HPCI/RCIC drain pot level switch qualification were appropriately executed. System engineering aggressively pursued corrective actions associated with Rosemount transmitters. The licensee's operating experience feedback (OEF) program has been effectively implemented. For example, vendor information regarding design problems with Terry Turbine overspeed trip devices was reviewed and addressed by the station in a timely and adequate manner. Also, the station is conducting weekly meetings to discuss current industry OEF information.

Early in the period, a high turnover rate was noted for system engineers. This had the potential for reducing the overall experience level. The licensee continued to implement their pipeline program to train new system engineers. Improvements in system engineering site experience and the addition of new system engineers were noted to reduce the turnover rate later in the assessment period. These individuals provided good day-to-day support of plant operations.

Engineering analyses in support of proposed licensing amendments were technically viable and sound from a safety standpoint and on only a few occasions, required additional information. The licensee's responses to Generic Letters and Bulletins usually addressed all required aspects of the issues with little or no prompting. The engineering staff's performance indicated good interdepartmental communications.

The licensee aggressively pursued solutions to a high failure rate for the Bailey Solid State Logic Modules. The licensee has been able to reduce the failure rate of these modules. The statistical analyses of failure rates for the modules were conservative.

The inservice inspection (ISI) program is generally well administered and showed a high degree of licensee control over its ISI vendors. An example is the diversified QA surveillances performed on a number of vendor activities.

In summary, corporate engineering (E&PB), design change control, communications between E&PB and the plant have all improved. The engineering support was excellent for license amendments and replies to generic correspondence. The engineering staff possesses good technical knowledge and competence and closely monitors areas that have been problems in the past. They are responsive to the daily needs of the station and prompt to respond with sufficient support.

III.F.2 Performance Rating

Category: 1

Trend: NA

III.F.3 Board Comments

None

III.G Safety Assessment/Quality Verification

III.G.1 Analysis

The previous SALP rated Safety Assessment/Quality Verification as Category 2, Improving. The safety conscious approach instilled by plant management and exercised by Hope Creek personnel was commendable. Problem identification was excellent, and problems were promptly addressed and corrected. PSE&G licensing activities were generally complete and timely. Numerous personnel errors had occurred in all functional areas, and continued management attention was deemed necessary.

Overall during this SALP period, individual performance was excellent. First and second line supervisors were directly involved in the field. However, early in the period, isolated personnel errors continued in all functional areas which resulted in further management attention. The errors were of low safety significance, and were promptly reported and corrected. During the refueling outage, the operations department concluded that the rapid pace of outage activity was contributing to the personnel errors and stopped outage activities to counsel the department to take the time required to do the job right. In addition to being willing to halt work to emphasize the importance of quality work, it is to management's credit that undue schedular pressures are not exerted on the workers. Another tool being utilized to emphasize the importance that management places on quality output is a training session on attention to detail, which includes an effective video tape presentation. Fewer personnel errors occurred during the second half of the assessment period.

Station management, including department managers and the general manager, was directly involved in providing effective station oversight on a daily basis. The Senior Nuclear Shift Supervisors were held accountable for plant operations, and they had direct access to station management. Effective daily meetings gave an operational perspective to plant problem/work prioritization, and to tracking and trending of information. When a high number of lit control room annunciator alarms were present, station management aggressively dedicated resources and successfully reduced the number.

Corporate management was also involved in station activities. Their presence was observed onsite and in the plant during normal and off-normal working hours. Nuclear services, engineering and quality assurance (QA) management were also involved in their departments' activities. Corporate, plant, QA, and nuclear services management personnel responded to the site when several unplanned scrams occurred during evening hours.

The licensee has an effective program for problem identification. Incident Reports continued to be used to identify and resolve these plant problems and off-normal events and for tracking corrective actions to completion. PSE&G continued to analyze and trend the Incident Reports and LERs; their analyses demonstrated a steadily decreasing frequency.

The Station Operations Review Committee (SORC) provided consistent, effective review of significant plant issues, including design changes, post-scram reviews, and reportable events. After the off-site marsh fire on March 19, 1990 and the resultant electrical transient and scram, the SORC met several times to review the root causes, corrective actions and course of action before implementation, a good indication of the SORC's proactive role.

PSE&G has instituted an event review process entitled "Significant Event Response Team (SERT)". A SERT is initiated by the general manager and is a real time, independent review of any unplanned reactor scram or other major plant event. SERTs effectively developed the sequence of events, determined root cause(s) and recommended corrective actions for the four reactor scrams that occurred during the reporting period. The Human Performance Evaluation System, a detailed analysis method for determining root causes in incidents involving personnel errors is also utilized by the licensee.

The Quality Assurance Department, the Onsite Safety Review Group (SRG), and the Offsite Safety Review Group provided effective, independent review of plant activities. These groups also participated in SERT activities and root cause training. The station QA organization provided effective day-to-day review of station activities, including resolution of problems, and was well integrated into the station's organization. The QA organization has developed and used performance based surveillances for several station activities. QA involvement in the area of radwaste processing was considered a strength. The SRG has been aggressive in reviewing and assessing plant performance. This included a twenty-four hour coverage of control room activities for a two week period.

Two of four scrams during the period were attributed to this functional area. A December 30, 1989 main turbine trip and reactor scram were caused by failure of the thrust bearing wear detector trip bypass linkage during testing. The root cause analysis determined that plant management failed to aggressively implement modifications that were recommended after a similar failure and scram in 1986. Also the March 19, 1990 scram which resulted from an offsite marsh fire, had previously been identified by the licensee as a potential problem, yet appropriate actions or contingency plans were not developed to cope with them.

Twenty-seven licensing actions were processed. The quality of the technical evaluations was good, indicating that PSE&G has a good understanding of the technical issues, is aware of and participates in industry groups, and uses acceptable approaches to problem solutions. The licensee's response to Generic Letter 88-01 regarding stainless steel piping was timely and adequately addressed the issues in the letter. PSE&G has developed and effectively implemented Hydrogen Water Chemistry in the plant as a result of their review and followup to the generic letter.

During the assessment period, a small leak was detected in the Hope Creek service water piping, and plant management proposed to perform a non-code repair in accordance with the newly released Generic Letter 90-05. This was the first application of the provisions of Generic Letter 90-05, and numerous discussions were required to arrive at a satisfactory resolution. Although the licensee and the NRC staff had differing views as to the best technical approach for effecting the temporary non-code repair, PSE&G's decision to adopt the provisions of the Generic Letter was a positive action that allowed the issue to be satisfactorily resolved.

In summary, Hope Creek, continues to be a well run, safety conscious organization. Management is heavily involved on a daily basis, and makes its safety conscious attitude known throughout the plant. The review teams are candid and effectively determine root cause of events. The licensee effectively identifies problem areas and ensures prompt and effective corrective actions. However, isolated personnel errors continue to be an area meriting additional management attention.

III.G.2 Performance Rating

Category: 1

Trend: NA

III.G.3 Board Comments

None

IV SUPPORTING DATA AND SUMMARY

IV.A LICENSEE ACTIVITIES

BACKGROUND

The assessment period began May 1, 1989, with the Hope Creek reactor at full power. Automatic reactor scrams occurred on August 30, 1989, on December 30, 1989, on January 6, 1990 and on March 19, 1990. These scrams are further described in Section III.C. Other than these four scrams, there were no unplanned shutdowns during the assessment period. On September 16, 1989, the Unit shutdown for its second refueling outage. The Unit restarted on November 16, 1989. At the end of the period, the Unit had operated continuously for 124 days.

IV.B NRC Inspection and Review Activities

Two NRC 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 schedule outage. In addition, a special inspection of the Maintenance Program was performed in October 1989, and a Fitness For Duty inspection was performed in March 1990. Also, a team inspection was conducted to review performance during the annual emergency preparedness exercise on October 14, 1989. NRC performed a total of 3165 hours of inspection during the period, which equates to 2453 hours on an annualized basis.

IV.C Significant Licensee Meetings

A meeting was held on February 28, 1990, at Hope Creek Generating Station to conduct a mid-SALP review and evaluation of licensee performance.

IV.D Reactor Scrams and Unplanned Shutdowns

Event Description

Date	Power	Root Cause	Functional Area
1. The reactor was manually scrammed when half of the control rods inserted due to a failed solder joint in the scram air header connection to one control rod drive. The solder joint had been inadequately installed during plant construction.			
8/30/89	81%	Component failure, inadequate installation	NA
2. The reactor automatically scrammed due to a turbine trip caused by the failure of the main turbine thrust bearing wear detector trip bypass linkage during surveillance testing. Management had not aggressively implemented modifications that were recommended after a similar failure and scram in 1986.			
12/30/89	100%	Component failure, inadequate corrective actions	Safety Assessment/ Quality Verification
3. The reactor automatically scrammed due to a main turbine trip caused by a high level in the A moisture separator during surveillance testing. Although calibrated per the vendor's recommendation, the normal and emergency drain systems were poorly tuned. This, when combined with an operating error, caused the moisture separator level to rise uncontrollably.			
1/6/90	96%	Inadequate level control system maintenance, operating error	Maintenance/ Surveillance
4. The reactor automatically scrammed on low reactor level due to loss of the condensate and feedwater pumps when an offsite marsh fire caused an electrical bus transient. Although an electrical transient was predictable from previous marsh fire events, the licensee did not implement effective measures to prevent recurrence.			
3/19/90	100%	Marsh Fire, electrical system transient; inadequate corrective actions	Safety Assessment/ Quality Verification

TABLE 1

Inspection Hours Summary

Hope Creek Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Hours*	Annualized Hours	% of Time
A. Plant Operations	1375	1066	43
B. Radiological Controls	283	219	9
C. Maintenance/Surveillance	964	747	30
D. Emergency Preparedness	80	62	3
E. Security and Safeguards	144	112	5
F. Engineering/Technical Support	191	148	6
G. Safety Assessment/ Quality Verification	128	99	4
TOTALS	3165	2453	100

* Does not include operator licensing hours.

TABLE 2

Enforcement Summary

Hope Creek Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Number/Severity of Violations Level IV
A. Plant Operations	
B. Radiological Controls	
C. Maintenance/Surveillance	1
D. Emergency Preparedness	
E. Security	1
F. Engineering/Technical Support	
G. Safety Assessment/ Quality Verification	
TOTALS	2

TABLE 3

Licensee Event Report

Hope Creek Generating Station

May 1, 1989 - July 31, 1990

Functional Area	Number by Cause						
	A	B	C	D	E	X	Subtotal
A. Operations	2	-	1	1	1	-	5
B. Radiological Controls	1	-	-	1	-	-	2
C. Maintenance/Surveillance	4	2	-	2	3	-	11
D. Emergency Preparedness	-	-	-	-	-	-	-
E. Security and Safeguards	-	-	-	-	-	-	-
F. Engineering/Technical Support	2	-	-	-	3	1	6
G. Safety Assessment/ Quality Verification	1	-	-	-	-	-	1
TOTALS	10	2	1	4	7	1	25

This analysis includes LERs 89-12 through 89-26, and 90-01 through 90-11.

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.

Clearly, the above causal analysis shows that personnel errors remained the major contributor to reportable events. PSE&G's analysis also showed personnel errors to be the major contributor, but to a lesser extent than last period. These errors involved six violations of Technical Specifications (all PSE&G identified). PSE&G analyses, including the Human Performance Evaluation System (HPES), have not identified any common root causes for the personnel errors. Personnel at various working levels were involved, from technicians to procedure writers to engineers to supervisory licensed operators.

The next significant causal factor was component failure. Review of these failures did not determine any shortcomings in the preventive maintenance program.

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 one 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.

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

TABLE OF CONTENTS

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	Description / 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.