ENCLOSURE 1

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

REPORT NOS. 50-272/90-99
50-311/90-99

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

SALEM GENERATING STATION

UNITS 1 AND 2

ASSESSMENT PERIOD: AUGUST 1, 1990 - DECEMBER 28, 1991

BOARD MEETING DATE: FEBRUARY 26, 1992

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 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 February 26, 1992, 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." A summary of the guidance and evaluation criteria is provided in Section IV.C of this report.

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 August 1, 1990 to December 28, 1991.

The SALP Board was composed of:

Chairman:

C. W. Hehl, Director, Division of Reactor Projects (DRP), Region I (RI)

Members:

T. P. Johnson, Senior Resident Inspector, Salem/Hope Creek, RI
J. C. Stone, Project Manager (Salem), Office of Nuclear Reactor Regulation (NRR)
C. L. Miller, Director, Project Directorate I-2, NRR
A. R. Blough, Chief, Projects Branch No. 2, DRP, RI
W. D. Lanning, Deputy Director, Division of Reactor Safety (DRS), RI
R. W. Cooper, Deputy Director, Division of Radiation Safety and Safeguards (DRSS), RI

Others in Attendance:

J. R. White, Chief, Reactor Projects Section 2A, DRP, RI
S. M. Pindale, Resident Inspector, Salem/Hope Creek, RI
S. T. Barr, Resident Inspector, Salem/Hope Creek, RI
H. K. Lathrop, Resident Inspector, Salem/Hope Creek, RI
J. G. Partlow, Associate Director for Projects, NRR
B. C. Westreich, Reactor Engineer, DRP, RI
I. B. Moghissi, Reactor Engineer Intern (Salem), NRR
M. J. Davis, Performance Evaluator, Performance & Quality Evaluation Branch, NRR
D. L. Caphton, Senior Technical Reviewer, DRS, RI

Others in Attendance (continued)

W. J. Pasciak, Chief, Facilities Radiation Protection Section, (FRPS), DRSS, RI
R. L. Nimitz, Senior Radiation Specialist, FRPS, DRSS, RI
J. C. Jang, Senior Radiation Specialist, Effluents Radiation Protection Section, DRSS, RI
L. S. Cheung, Senior Reactor Engineer, Electrical Section, DRS, RI
C. Z. Gordon, Senior Emergency Preparedness (EP) Specialist, EP Section, DRSS, RI
D. F. Limroth, Senior Reactor Engineer, Safeguards Section, DRSS, RI
S. Dembek, Project Manager (Hope Creek), NRR

II. SUMMARY OF RESULTS

II.A Overview

PSE&G operated both reactors of the Salem facility in a generally safe and conservative manner. A strong level of management involvement in facility activities promoted a safety conscious approach. Improvements were noted relative to unit operations, though instances of personnel errors affecting plant performance occurred occasionally. An improving performance trend was noted in the area of radiological controls. Facility material condition, the quality of procedures, and system engineer performance also improved. The security and emergency preparedness areas maintained a superior level of performance. Independent review groups and station review committees provided safety conscious assessments of related activities.

The Unit 2 turbine generator failure was a significant event that occurred during the period. Several contributing causes were identified which indicated deficiencies in several functional areas. The most prominent causes involved personnel error, insufficient preventive maintenance, and inadequate surveillance. The licensee conducted a thorough review of the event, adequately determined root causes and related causal factors, and implemented or planned effective corrective actions. Aggressive resolution of several performance related issues were in process at the end of this SALP period.

Several initiatives indicated continued management support and consequent improvement in the radiological controls program. However, occasional instances of insufficient corrective actions, lapses in control and oversight of some activities, and deficiencies in the maintenance of quality relative to the on-site dosimetry processing laboratory detracted from an otherwise strong and effective program.

The licensee's programs and efforts relative to maintenance and surveillance activities have been effective in assuring plant system reliability and sufficiency. Problems with material condition of certain plant systems, while improving, still persist and challenge plant performance, and continue to require intensive maintenance and surveillance efforts. Instances of personnel errors, insufficient adherence to procedures, and inattention to detail still persisted earlier in the period. The licensee's efforts to correct these types of deficiencies resulted in a reduced frequency of discrepant performance later in the period.

The licensee's corrective action programs functioned well at times as evidenced by the improvements previously mentioned. Occasional weakness was noted relative to the effectiveness of some specific corrective actions, and some personnel errors due to a lack of attention to detail indicated inconsistent performance. Notwithstanding these performance deficiencies, there was an overall slight improvement noted during the SALP period.

II.B Facility Performance Analysis Summary

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

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

Present Assessment Period: August 1, 1990 through December 28, 1991

II.C Unplanned Shutdowns, Unit Trips and Forced Outages

UNIT 1

	Date	Power Level	Root Cause	Functional Area
1.	8/17/90	25%	Inadequate Preventive Maintenance	Maintenance/ Surveillance

An automatic reactor trip occurred due to low-low water level in the No. 14 steam generator (SG). A loss of power to one non-vital bus occurred during supply breaker switching, resulting in a loss of power to the No. 14 reactor coolant pump (RCP) motor. The breaker failure was due to lack of cubicle preventive maintenance. The resultant decreased loop flow caused a level shrink in the No. 14 SG. The unit subsequently proceeded to Mode 5 to replace the No. 14 RCP motor when a phase-to-ground fault occurred during restart preparations.

2.	9/10/90	78%	Personnel Error	Operations

The reactor tripped automatically due to low-low water level in the No. 13 steam generator (SG). While preparing to isolate a high pressure turbine drain line steam leak, operators inadvertently caused all turbine governor valves to close. This unexpected closure caused SG level shrink to the trip setpoint. Licensee post-trip review determined that operations personnel failed to initiate an adequate plan and procedure for the troubleshooting and repair activities.

3.	6/16/91	100%	External Cause	N/A

An automatic reactor trip occurred due to a lightning strike on the phase "B" main power transformer. The main generator output breakers opened to protect the main generator, resulting in an automatic main turbine and reactor trip.

4.	9/16/91	100%	Inadequate Installation/ Deficient Design	Maintenance/ Surveillance & Engineering/ Technical Support

An unplanned shutdown was made to repair an unisolable leak on the turbine electro-hydraulic control system (EHC). The EHC leak was due to poor EHC piping installation (insufficient thread engagement), and a deficient design that used dissimilar metals at the EHC block connection. The condition was worsened by a missing EHC pipe hanger, which resulted in increased vibration of the susceptible components.

UNIT 2

	Date	Power Level	Root Cause	Functional Area
1.	9/4/90	60%	Multiple Component Failures	N/A

An automatic main turbine and reactor trip occurred on high-high water level in the No. 24 steam generator (SG). While at 100% power, the No. 21 steam generator feed pump (SGFP) tripped on low suction pressure. Unit operators immediately initiated a rapid load reduction to 60% power; however, the No. 24 SG water level reached the high-high setpoint before the operator could effectively control an associated feedwater flow transient caused by a failed Feedwater regulator valve. Two additional equipment problems resulted in the No. 21 SGFP trip: a failed suction pressure switch; and a heater drain pump discharge control valve which failed closed, causing a reduction in suction pressure.

2.	11/9/91	100%	Multiple Component Failures/Personnel Error	Maintenance/ Surveillance and Operations

An automatic main turbine and reactor trip occurred during main turbine trip testing. The main turbine and generator sustained severe damage when the turbine failed to trip and proceeded to overspeed. Causal factors included lack of preventive maintenance and surveillance testing on the turbine trip solenoid valves and operator procedure non-compliances regarding failure to resolve a test deficiency during unit turbine generator startup.

III. PERFORMANCE ANALYSIS

III.A Plant Operations

III.A.1 Analysis

The previous SALP rated the Salem Operations functional area as Category 2. The quality of the emergency operating procedures was noted as being an operations strength. The operator requalification program was successful in that all licensed operators tested, passed the NRC administered exam. Improvements were noted in management involvement, supervisory oversight, and root cause analysis initiatives. A reduced reactor trip and personnel error rate was observed. A weakness was noted relative to the quality of the abnormal operating procedures.

During this assessment period, both reactor units were generally operated in a safe and conservative manner. Examples include effective and conservative midloop operations, a well planned 10-day maintenance and testing outage at Unit 2 and a prompt Unit 1 shutdown due to increased electrohydraulic control system leakage. However, examples of deficient performance were also observed. For example, a Unit 1 safety injection charging pump was operated with its suction valve closed due to multiple personnel errors, communication deficiencies, and breaches of several programmatic barriers in the safety tagging program. Late in the period, a boric acid transfer pump was similarly operated with its suction valve closed due to miscommunication and procedural non-compliance. Similarly, several licensed personnel, including supervision, permitted a Unit 2 startup to proceed without resolving a test discrepancy that indicated that the turbine overspeed protection system was not functioning properly. That deficiency contributed to the Unit 2 turbine-generator failure event.

Licensee efforts continued to be effective in reducing the frequency of reactor trips caused by operations personnel. During the current period, there were a total of five reactor trips for both units. This compares to six reactor trips in the last assessment period. During the period, Unit 1 did not experience a reactor trip for over nine months and Unit 2 for over 14 months, during which Unit 2 operated continuously for 245 days. One of the five reactor trips during this assessment period was attributed to personnel error by a licensed operator while troubleshooting a sheared turbine drain instrument line. Operator error contributed to the Unit 2 turbine-generator failure event. Operator response to reactor trips and plant transients was excellent. In several instances, prompt operator actions averted the necessity for reactor trips. One example included a Unit 2 steam generator feedwater pump trip, where operator response was sufficiently effective and timely to prevent a unit trip.

The five operating shifts are effectively staffed, as each has three senior reactor operator (SRO) and four reactor operator (RO) licensed individuals. Additionally, one separate SRO licensed individual supervises the work control group for each shift. There are a total of 47

licensed operators, including 40 on-shift, and 7 in staff and training positions. Aggressive management attention has been effective in resolving previously identified licensed operator staffing weaknesses by training and qualifying several additional SROs and ROs.

The licensed reactor operator training programs continued to be effectively implemented. Licensed operator initial and requalification examination performance demonstrated that the candidates were generally well prepared for examinations. However, because of operator performance and written test issues, one licensed operator initial examination administered during this period did not demonstrate good performance. Additionally, the licensee was ineffective in correcting self-identified training deficiencies identified during a facility audit examination. This demonstrated a weakness in the corrective action process.

Licensed operators' safety perspective and awareness of plant conditions were consistently evident. The procedure upgrade project has made a positive contribution toward improved operations. Procedural adherence was generally good. Shift turnovers were formal and included thorough briefings of the oncoming crew. Control room access was effectively controlled, and activities were limited to those directly related to plant operations. Aggressive management attention has resulted in reductions in the number of lit annunciators. The use of overtime was properly controlled. Good performance of non-licensed equipment operators was observed during unit tours and equipment testing and operation.

The licensee's emergency operating procedure (EOP) program and implementation have generally functioned well. EOP quality and implementation were good. The licensee was responsive in correcting specific EOP deficiencies; however, the licensee did not broadly review other EOPs for similar deficiencies. Consequently, similar deficiencies existing in other EOPs were not addressed. This indicated a narrowly focused review of identified deficiencies. Abnormal operating procedures were being revised during the assessment period to correct weaknesses identified in the previous SALP period.

Operations supervision and management oversight and attention to operations on a daily basis were evident during this assessment period. An operational perspective of plant problems and work prioritization was well communicated and understood in daily meetings. The daily meetings provided the operations shift personnel a direct and effective interface with operations and station management.

Plant housekeeping has continued to improve during this period. General area and component painting and cleaning, enhanced housekeeping area responsibility controls, and continued management emphasis have been effective in improving overall plant housekeeping.

The licensee generally made timely and appropriate 10CFR50.72 NRC notification reports. However, initial corrective actions for reporting and event classification deficiencies that were identified in the last SALP period were ineffective and resulted in examples of untimely and inconsistent reporting. One example included a late NRC notification of an auxiliary

feedwater system actuation, due to licensee reportability guidance that was inconsistent with reportability requirements. Effective programmatic improvements were made later in the period. The overall quality of written licensee event reports submitted during this period was very good.

The overall fire protection program was effective. Dedicated fire protection personnel performed well and were knowledgeable, which demonstrated an effective training program. Of particular noteworthiness was the fire brigade's excellent response to the Unit 2 main generator explosion and fire. Appropriate operator involvement and interface in fire emergencies were evident. Plant and site management strongly supported the fire protection program.

Summary

The Salem reactor units were operated safely and conservatively. Operator response to plant transients and reactor trips was good; however, multiple errors and/or programmatic barrier breakdowns contributed to several operational events. EOP quality and implementation were good. Corrective actions for identified weaknesses were at times incomplete. Increased management involvement was effective in resolving licensed operators staffing weaknesses; however, the licensed reactor training programs demonstrated some weaknesses. Daily supervision and management oversight of plant operations was good.

III.A.2 Performance Rating: Category 2

III.B Radiological Controls

III.B.1 Analysis

The previous SALP rated radiological controls at Units 1 and 2 as Category 2. The program was characterized as good with a sufficient level of management involvement. Overall ALARA efforts were very good, but there were weaknesses in the corrective action process for self-identified radiological concerns and the radioactive material and contamination control programs. The radwaste handling, transportation, and environmental monitoring programs were effective, and performance in the area of liquid and gaseous effluent controls was adequate.

During the current period, NRC identified that the licensee took a number of actions to improve overall radiological controls and address previously identified weaknesses. The actions included sending personnel to visit similar stations, establishing incentive programs for good personnel performance, and developing a Unit 1 Outage Handbook that included organizational descriptions and responsibilities of key personnel. Very good efforts were made to respond to a strike by contractor radiological controls personnel. For example, during the Unit 1 outage, work packages were prioritized to ensure that proper radiological

controls were implemented for on-going work. NRC observations at Unit 2 noted no negative impact on the effectiveness of radiation protection coverage of non-outage activities. There was a good level of expertise available within the staff, and no excessive use of overtime was noted.

There were no external or internal personnel exposures in excess of NRC or administrative limits during the period. The NRC's performance-based review of significant Unit 1 outage radiological work activities (e.g., steam generator sludge lancing) identified performance deficiencies including improper monitoring of personnel exposure relative to large radiation dose rate gradients, insufficient monitoring of airborne radioactivity, instances of personnel unnecessarily working in elevated radiation fields, and poor contamination control practices. These lapses in the quality of radiological controls were attributed to weaknesses in procedures and the oversight of work activities by radiation protection personnel.

These deficiencies were promptly corrected by procedure revisions and appropriate training of applicable personnel. Subsequent NRC review during the Unit 2 outage later in the period identified significantly improved oversight of work activities. There was a high degree of management and supervisor oversight of on-going radiological work activities, effective shift-to-shift planning of work, and excellent oversight of work activities from an ALARA perspective. In light of the significant improvement identified late in the period, the overall external and internal exposure control programs were considered good.

Relative to ALARA efforts, the licensee exhibited effective planning and preparation for steam generator work activities which resulted in the possible reduction of personnel radiation exposure. For example, the licensee increased the number of steam generator tubes to be tested in each generator, resulting in all tubes being tested within four outages (versus the previously scheduled five outages), at a significant exposure saving. The station's aggregate personnel exposure continues to be well below industry averages and among the lowest in the industry for comparable facilities. Exposure goals were challenging and were met.

The training and qualification program for radiological controls technicians contributed to a good understanding of program requirements. Although there was no specific training and qualification program for radiation protection supervisors, this did not result in any observed operational performance problems. A specific training program was established late in the period. In addition, as a result of the weaknesses in radiation protection oversight of Unit 1 outage activities identified by the NRC, PSE&G management discussed their expectations regarding the level of oversight of work activities with radiation protection personnel. Radiation workers were provided appropriate training.

Late in the period, an evaluation of the on-site dosimetry processing laboratory by personnel from the National Voluntary Laboratory Accreditation Program (NVLAP) identified a number of significant weaknesses in the management of the PSE&G processing laboratory. The licensee immediately suspended processing of dosimeters and implemented extensive

corrective actions to improve processing. NRC reviews at the end of the period indicated corrective actions were on-going and dosimetry system performance met applicable performance standards. The NRC's review of this matter found that the weaknesses stemmed from the loss of key supervisory and management personnel and a lack of understanding, by replacement personnel, of regulatory aspects associated with maintaining an accredited personnel dosimetry program. Although no decrease in the quality of dosimetry processing information was identified, this matter indicated weak understanding of program and personnel qualification requirements by management.

The radioactive material and contamination control programs were effective. Weaknesses identified during the previous period were addressed by a task action plan which included revision of procedures, training of personnel, and purchase of new equipment. The licensee has been aggressively decontaminating, cleaning and painting the radiologically controlled areas (RCAs) of the station. As a result, total station contaminated area compared very favorably to similar facilities. Isolated lapses in contamination control within the RCA were noted, but quickly corrected. The efforts to minimize personnel contamination were commendable, with very few personnel contaminations occurring during the Unit 2 outage.

The radiological occurrence report program, while continuing to be weak into the early part of this SALP period, improved over time. NRC review late in the period found that the program was enhanced, self-identified concerns were resolved in a timely manner, appropriate corrective actions were taken, and root causes were clearly identified. Findings were discussed at appropriate levels of management, including weekly station management meetings. Monthly radiological controls performance summaries were provided to management. A radiological controls assessor was assigned to support the Unit 2 outage. The licensee's efforts to improve the program were commendable and indicated better management oversight of self-identified problems.

The licensee has been proactive in improving chemistry programs and hardware. For example, installation of an in-line secondary monitoring system, including an ion-chromatograph, was completed during the period. A successful secondary chemistry program has resulted in excellent steam generator performance. Likewise, excellent primary chemistry and active management oversight has resulted in excellent fuel performance and reliability. This has resulted in reduced exposure associated with fuel leaks and unplanned steam generator work activities.

A strong radioactive waste management and transportation program was implemented. Personnel demonstrated good understanding of program requirements as the result of an effective training program. Prompt corrective actions were evident when problems were identified. Overall performance was very good. The volume of waste shipped for burial was well below the industry average. The organization and staffing exhibited stability and strength. The radwaste processing methods continue to operate well, and the on-site

storage of radwaste was generally minimal. There was sufficient oversight of radioactive waste activities. The involved personnel demonstrated adequate technical depth and scope in the management and control of radioactive waste processing and shipping operations.

The licensee continued to conduct an effective Radiological Environmental Monitoring Program (REMP). The meteorological monitoring program was sufficient in ensuring that meteorological instruments were operable, maintained, and calibrated, meteorological data were obtainable from various locations on and off site and an effective QC program was in place to assure the quality of REMP sample analyses. Audits by the Quality Assurance Department personnel were thorough and of appropriate technical depth to assess the REMP.

NRC reviews of the radiological effluent monitoring and control program indicated acceptable calibration of effluent/process radiation monitoring systems (RMS), but there were a number of Engineered Safety Feature actuations during this assessment period due to spurious RMS signals and equipment failures. NRC review of the progress of the short and long term RMS upgrading projects, established during the previous SALP period, indicated the licensee was on schedule in pursuing these projects. An effective effluent control program was conducted by the Chemistry Department.

Overall QA oversight of program areas was good. However, the observations of isolated problems indicated a potential need for expansion of quality oversight into areas not previously evaluated (e.g., NVLAP adherence).

Summary

Weaknesses in the radiation protection program were noted during the Unit 1 outage early in the assessment period. The licensee took effective corrective actions to resolve the weaknesses, including those associated with dosimetry processing, and implemented a good radiological controls program. Overall staffing and training were good. ALARA efforts and performance were commendable. Overall radwaste processing, storage and transportation activities were very good. The licensee continued to implement effective confirmatory measurements, effluent controls and a REMP.

III.B.2 Performance Rating: Category 2

Trend: Improving

III.C Maintenance/Surveillance

III.C.1 Analysis

The Salem Maintenance and Surveillance functional area was rated as a Category 2, with a declining trend, in the previous SALP assessment. Maintenance program strengths were noted in management involvement, work standards, and reliability centered maintenance initiatives. Weaknesses were identified relative to the large maintenance backlog, procedure quality, contractor maintenance control, and spare parts availability and control. The poor overall material condition of the plant was also noted as a significant weakness. Surveillance testing activities were characterized as being conducted in a well controlled fashion by knowledgeable and experienced personnel, although weaknesses were noted in procedure quality and in the ineffective actions which led to missed surveillances.

Maintenance:

The Salem maintenance program was effective and was satisfactorily implemented during this assessment period. The maintenance organization performed a large volume of successful maintenance activities and effectively supported plant operations. Management involvement was evident, as many of the deficiencies noted in the previous assessment were addressed and progress was achieved toward their resolution during this period. Improvements were accomplished in the maintenance backlog, procedure quality and parts availability, but deficiencies continued to exist in personnel error. The maintenance organization successfully responded to plant equipment problems over the course of the assessment period and functioned well with other Salem departments, as management initiatives began to reverse the trends identified in the last assessment.

The Salem maintenance staff remained stable and experienced, and Maintenance Department personnel were well trained and qualified. The three senior managers in the Maintenance Department were relatively new to the Salem Station during this period, yet succeeded in implementing a new work standards program and improving overall personnel performance and teamwork. Despite the staff's experience level and management's direction, instances of personnel error due to inattention to detail continued to exist. Examples included reactor protection system actuations and plant system inoperabilities which resulted from improper procedure adherence. Factors contributing to the number of personnel error events that occurred during the SALP period were incomplete training and weak supervision of non-Maintenance Department personnel, such as contractors and site services, performing work at Salem. The majority of these instances occurred in the beginning of the period, and as a sense of ownership developed over this period, the frequency of these events decreased. Personnel training continued to receive strong management attention and was well supported by the excellent training center facilities.

The Salem maintenance facilities are well equipped and adequately support all maintenance activities at the site. Management has taken steps to improve the previously identified problems with spare parts control and availability. The PSE&G inventory management improvement initiative included a newly formed organization under a general manager, a new warehouse for centralizing and storing the parts inventory onsite, and the state-of-the-art computerized warehouse automated material management system (WAMMS). The effort taken by PSE&G to gain control of the spare parts inventory showed indications of being effective, as the new warehouse went into service and parts availability began to improve at the end of the SALP period.

Good management involvement and oversight resulted in the successful completion of a refueling outage at each unit during the assessment period. Good outage performance at Salem was partly attributable to the institution of dedicated unit outage managers during the last period. In addition, a mid-cycle outage was performed at Unit 2 for the accomplishment of maintenance activities, and six forced outages occurred at the two units. The last forced outage at Unit 2 was caused by a turbine overspeed event at the end of the period and became the unit's sixth refueling outage. Core alterations, plant modifications, and other refueling activities were well supported by maintenance operations. The Maintenance Department responded especially well to the Unit 2 turbine overspeed event, as event clean-up, plant repairs and early outage implementation were well executed on extremely short notice.

Effective planning, the improvement in spare parts availability, and the introduction of a reliability centered maintenance program have helped increase maintenance productivity and reduce the maintenance backlog. The number of overdue preventive maintenance activities, while still high, had reached its lowest point in three years by the end of this assessment period. Despite the improvement in planning and work control, two events occurred which showed the need for continued attention in this area. A follow-up to the NRC Maintenance Team Inspection (MTI) revealed that corrective actions taken for several MTI findings were not thorough, predominately due to inadequate planning.

The Unit 2 turbine overspeed event in November 1991 revealed additional maintenance planning weaknesses which directly contributed to the occurrence. Over a year prior to the event, PSE&G committed to replace the Unit 2 solenoid valves that were directly responsible for the overspeed event, at the first outage of sufficient duration. Due to a failure in the planning process, the solenoids were not replaced in the May 1991 Unit 2 mid-cycle outage. Further, though information and experience was available that indicated that the solenoid valves could fail to function, the licensee did not establish any preventive maintenance program for these devices.

One reactor trip was attributed to maintenance activities during this period. The trip occurred during 4kV non-vital auxiliary power transformer feeder breaker switching. The failure of the feeder breaker to properly close caused the loss of a reactor coolant pump, and

the reactor tripped on low-low water level in the respective steam generator. The root cause of the reactor trip was mechanical failure of the breaker due to a lack of preventive maintenance of the breaker cubicle.

An area noted in the previous assessment as a weakness was the plant material condition of both Salem units. Recognizing a need to improve in this area, PSE&G created a special task force with a dedicated supervisor to address material condition and equipment improvements. While a large amount of work remains to be done, this licensee initiative has resulted in significant improvements in the appearance and functionality of a number of Salem plant areas. For example, the number of internal plant system leaks was reduced by over 50 percent during this assessment period.

Surveillance:

The Salem surveillance program was safely implemented during the assessment period and positively contributed to the safe operation of the Salem station. The personnel performing the surveillance testing were well trained and fully successful in carrying out the Technical Specification (TS) required surveillance program. The number of plant events related to surveillance test performance decreased from the last period and showed a positive trend over this period. The licensee completed an audit in the middle of this assessment period to ensure the adequacy of the surveillance program in meeting all TS requirements. As a result of the audit, PSE&G adequately resolved the existing administrative problems in the program, and the number of missed surveillance tests dropped over the remainder of the SALP period.

There were, however, five missed surveillance tests this period. Similar to last period, the root cause of the missed tests was inadequate administrative controls. This number is down from seven during the last SALP period, and the problem was successfully addressed by the licensee's TS audit. There were no missed surveillances after May 1991. The number of plant events related to surveillance testing also dropped this period, despite the increased challenge posed by the problems encountered with the Salem 4kV vital bus undervoltage relays and the Salem radiation monitoring system (RMS). Fourteen Licensee Event Reports were submitted by PSE&G this SALP cycle documenting surveillance personnel errors and related engineered safety feature actuations. While nine of these events were related to the 4KV bus relays and the RMS, many events remained due to personnel error and inattention to detail. Plant events such as a chemical and volume control system valve misalignment, a steam generator pressure channel inoperability, and circuit breaker TS non-compliance were all attributed to personnel error and show the need for continued management attention in this area.

No plant trips during this assessment period were directly caused by improperly performed surveillance activities. Surveillance related improvements noted during the period included the institution of a self-verification process designed to reduce personnel errors, and the initiation of a system to transmit trending data from the Maintenance Department to the plant

Technical Department to better evaluate system and component performance. The lack of this trending data was cited as a weakness in the previous period.

The Unit 2 turbine overspeed event exposed a weakness in the Salem surveillance test program relative to balance of plant systems. Surveillance tests were performed to comply with the Technical Specifications relative to turbine overspeed protection system, but the surveillance method was not sufficient to verify the independent operability of systems and components that actually effected turbine overspeed control. The licensee's failure to provide sufficient suveillance testing was one of the contributing factors to the turbine overspeed event.

The Salem Inservice Testing (IST) and Inspection (ISI) programs were effectively implemented over the assessment period. In order to correct a deficiency noted in the last period, all affected Salem equipment was marked with the proper locations for vibration probes for repeatability during testing. Other activities reviewed with positive results during the period included the Unit 1 containment integrated leakage rate test, the Unit 1 steam generator inspection program, the Unit 1 outage radiography weld examination program, and the installation of a service water full flow test line for the ease and repeatability of pump testing.

Summary

The Salem maintenance and surveillance programs were successfully implemented during this assessment period and contributed to the assurance of nuclear safety during the operation of the Salem power plants. The majority of the problems noted over the course of this SALP cycle, in both the maintenance and surveillance areas, were the result of personnel error and inattention to detail. Although continued management attention is warranted in this area, the programs and initiatives undertaken by Salem management following the previous SALP have been effective in arresting the negative trend documented in that report.

III.C.2 Performance Rating: Category 2

III.C.3 SALP Board Comment

Although the SALP Board recognized the reversal of the previous negative trend in the Maintenance/Surveillance functional area, continued PSE&G management attention is warranted in previously identified weak areas, such as personnel errors, plant material condition and maintenance planning, in order for the Salem maintenance program to continue to improve.

III.D Emergency Preparedness (EP)

III.D.1 Analysis

During the previous SALP, EP was rated Category 1. That rating was based on strong management involvement, a highly qualified EP staff, prompt resolution of technical issues, and excellent training. PSE&G was very effective in exercise performance and in response to actual events requiring emergency classification.

During this SALP period, the operational status of PSE&G's Emergency Preparedness Program was found superior by NRC review. Management was directly involved in the daily operation of the EP program. Three levels of management provided oversight. Managers at each level were qualified as members of the emergency response organization (ERO), reviewed all changes to the Emergency Plan and Procedures, reviewed drill scenarios, and regularly participated in drills. A thorough audit of the EP program by two independent groups from the Quality Assurance Department identified no deficient program areas. Management also fostered an excellent relationship with state, county, and local governments through numerous meetings and training sessions, and in support of resolving FEMA-identified concerns.

PSE&G was aggressive in handling technical issues. The EP Department effectively maintained emergency response facilities and implemented a number of significant facility improvements. These included the installation of a new callback system for ERO members, completion of the control room simulator and Safety Parameter Display System data links to the Technical Support Center and Emergency Operations Facility. Emergency Response Data System installation is in progress. The new emergency news/community center, which is under construction, also represents a significant PSE&G off-site commitment. The Public Alerting System throughout the Emergency Planning Zone was maintained at 98.8% siren availability, exceeding Federal Emergency Management Agency (FEMA) standards.

Operators at Salem and Hope Creek responded to several actual Unusual Events and one Alert during this assessment period. Operators consistently displayed good knowledge and familiarity with emergency action levels contained in the Event Classification Guide (ECG). Events were correctly classified, and timely notification was made to the States and the NRC. All response actions were consistent with Emergency Plan requirements. During the Alert at Salem Unit 2, PSE&G activated the Salem Operations Support Center which was instrumental in providing good in-plant support and assistance in response to the turbine-generator failure.

Staffing of the EP program remained strong. The program was maintained by a full time, fully qualified staff of fourteen individuals. The well-balanced mix of disciplines included five senior reactor operators, experienced health physicists, and additional staff with experience in radiological controls and equipment operations. The ERO was also fully staffed, with all key managerial positions filled.

EP training was comprehensive, innovative, and thoroughly implemented. Operations and EP personnel training continued to be significantly enhanced through drills on the control room simulator. Training drills for shift operators were conducted weekly at both facilities. The nine additional extensive training exercises conducted during the period tested major portions of the Emergency Plan. Changes and innovations to EP training methodology were constructive in qualifying ERO staff. ERO qualification was kept at a high level, as demonstrated in walkthrough training sessions with ERO members. Off-site training was also a strength, with well developed training and quality information provided to the states and counties.

Training effectiveness was demonstrated by the excellent performance of the ERO during two NRC-observed annual exercises. Both scenarios were very challenging, particularly the 1990 exercise, which included full state participation, and involved both plume (10-mile) and ingestion (50-mile) exposure pathways. Only minor areas for improvement were noted during this exercise. Also, there were no FEMA deficiencies. During the 1991 exercise, ERO performance was also effective. A poorly worded emergency classification guide did, however, cause an exercise weakness involving tardy declaration of a Site Area Emergency. This weakness had not been identified in any previous drills or exercises.

Summary

PSE&G has maintained a sound and effective EP program with clear management commitment to maintaining a highly professional and qualified staff. The EP site staff was proficient in ensuring readiness for implementation of emergency response activities. The training program was thoroughly defined and effectively implemented with different innovative performance-based techniques. The ERO was well qualified as evidenced by exercise performance. Facilities and equipment were well maintained, and upgraded in cases where improvements were needed. Licensee support for local governmental and support organizations was strong.

III.D.2 Performance Rating: Category 1

III.E Security

III.E.1 Analysis

The previous SALP rated this area Category 1. That rating was based on the licensee maintaining a performance orientated security program which reflected significant enhancements and which exceeded regulatory requirements.

During this SALP period, station security management, which consisted of knowledgeable and experienced security professionals, continued to provide effective oversight of the security program, even under adverse conditions. When a security

officer sustained a serious self-inflicted injury while on duty at the station, management conducted an intensive investigation of the incident, and contracted a team of psychological and security consultants to counsel members of the security force and to conduct a study of security operations. This was indicative of management's sensitivity to the impact of the incident on the security organization and whether the organization contributed to the incident.

Management's attention to and involvement in the security program remained evident throughout this period, especially during construction of a new warehouse which required the reconfiguration of the protected area barrier. The construction project progressed without any negative program impact. The licensee continued to aggressively address NRC findings and concerns. Operability of security monitoring equipment was high as evidenced by the minimum number of compensatory posts and a decreasing number of security events that required logging.

The licensee also continued to conduct very aggressive, in-depth and comprehensive audit and self-assessment programs. These programs were very effective in identifying potential weaknesses and correcting them before they became security problems.

Staffing of the security organization was very good, with limited use of overtime and a minimum backlog of work on security equipment. Overtime use during scheduled refueling outages was necessary and adequately controlled. Late in the period, the licensee increased its security force by 30% in order to minimize the impact of overtime on the force which was identified as a potential weakness during the security study. Security related contingency plans that were implemented during a union job action were excellent. The use of the auxiliary guard house was effective in separating work groups. Security force members were thoroughly briefed on contingency actions, and good communications among station groups were maintained.

Corporate management continued to provide appropriate financial and technical support for the security program and organization. This was evident early in the period when consultants were contracted to conduct a comprehensive study of the security program and organization, and throughout the period as a systematic upgrade of the aging assessment aids continued. Support was also apparent by the increase in security force staffing.

As evidenced by responses to two Fitness-for-Duty (FFD) events during the period, the licensee continued to implement a clear and strong FFD policy. The policy was effectively promulgated to employees and contractors, and measures established to implement the policy were properly maintained. In addition, supervisors continued to demonstrate their knowledge of the program and its implementation.

In addition to a team of licensee security supervisors who provided effective day-to-day oversight of the contractor security force, the licensee continued to maintain a well-developed and administered security force training program. The effectiveness and quality of the supervision and training were apparent by security officers' display of (1) knowledge in security matters, (2) attentiveness to security responsibilities, (3) responsiveness to security problems and (4) aggressiveness in following up on identified security deficiencies. There were also a minimal number of events that were attributed to security-personnel error.

The licensee's event reporting procedures were found to be clear and consistent with NRC reporting requirements. Two event reports were submitted to the NRC during this period. One report involved a security officer being inattentive to duty and the other involved delayed arrival of a shipment of fuel. The licensee's reports were clear, concise and indicated appropriate responses in each case.

During this period, the licensee submitted one revision to the training and qualification plan. The revision was of high quality, technically sound and reflected well-developed policies and procedures.

Summary

The licensee continued to maintain an effective, performance-based security program which, in many areas, exceeded regulatory requirements. The licensee demonstrated sensitivity in effectively managing events that challenged the performance of the security organization. The audits and self-assessments of the security organization, program upgrades and enhancements were indicative of excellent support from both corporate and station management for the security program.

III.E.2 Performance Rating: Category 1

III.F Engineering/Technical Support

III.F.1 Analysis

The previous SALP rated Engineering and Technical Support as Category 2. The previous assessment identified weaknesses in the implementation of the temporary plant modification program. The previous SALP also identified deficiencies involving inconsistencies in the quality of work performed by system engineers and a problem with the implementation of the Station Qualified Reviewers (SQR).

During this SALP period, noted improvements in the implementation of temporary modifications were observed. Increased management control and oversight, including periodic Station Operations Review Committee review, and increased engineering effort

have been successful in reducing the duration and backlog of temporary modifications. Improvements have also been noted in the area of Station Qualified Reviewers (SQR). The required SQR training was completed. Safety review group audits of this area also have noted program improvements.

Engineering and Technical Support for the Salem plants was organized with a corporate engineering group, known as Engineering and Plant Betterment (E&PB), and the onsite system engineering group. E&PB handled those major engineering efforts such as plant modifications, and design bases reconstitution. The onsite system engineering group also supported operational, maintenance, testing and minor design change activities. E&PB was appropriately staffed with experienced personnel in various engineering disciplines.

E&PB engineering problem evaluations were generally good. A good root cause analysis was effective in identifying causes of reactor coolant system resistance temperature detector drifting problems. Design change packages were of good quality. They were complete and in accordance with applicable procedures. Two deficiencies were observed in the plant modification control area. There was a lack of an independent, in depth review of the emergency diesel generator load studies, and an inadequate control in the use of fuses. The lack of adequate review resulted in the emergency diesel generator load studies containing substantial technical errors. The inadequate control of fuses resulted in the use of six undersized main fuses in safety-related 125 volt DC system. Although no operability issues resulted, this condition was known to the licensee for a considerable period of time. Prompt management attention was not implemented to assure system reliability.

A problem involving lack of required evaluations of control room habitability for all chemicals stored on-site was identified. The NRC was reviewing this matter at the end of the period. During the previous SALP period, concerns were identified involving air balance and humidity testing for air cleaning systems and high oxygen concentrations in the Unit 1 waste gas decay tank. The licensee's progress in resolving air balance and humidity issues has been slow.

The E&PB organization worked well with the onsite system engineering group, and communications were noted as being improved. This was evidenced during the followup of the main steam isolation valve design change. The onsite system engineering group was well staffed with engineers. The establishment of a Small Design Change Project team has been effective in reducing the system engineering workload. As a result, improvements were noted relative to system engineer involvement in periodic field inspections of their systems. System trending, knowledge of system outage work, and increased management awareness have been effective in improving safety system availability.

System engineers' questioning attitude, and overall sense of safety perspective were good, with noted improvements during this period. For example, system engineer troubleshooting activities and corrective action plans for the radiation monitoring system deficiencies, vital bus undervoltage relay setpoint drift problems, steam driven auxiliary feedwater pump problems, Unit 2 turbine generator failure and higher than normal river water temperatures were effective and thorough. Additionally, system engineer presence in the field was apparent, as evidenced by their identification of several hardware issues, such as degraded small bore service water piping and main steam isolation valve air control valve problems. Of the five automatic reactor trips during the period, none were attributed to the engineering activities.

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

The licensee has established effective project management task forces led by E&PB managers to address specific technical issues, modifications and problem areas. These included the configuration baseline documentation (i.e., design basis reconstitution), service water and radiation monitoring system (RMS) modifications, and the Salem material condition revitalization project. These task forces successfully integrated offsite, onsite and contractor engineering activities. A large number of licensee event reports were due to actuations caused by the poorly designed radiation monitoring systems. The licensee has a plan in-place to correct these RMS design problems.

The Procedure Upgrade Project (PUP) showed good progress during the period. The PUP was managed through the station Technical Department during the last SALP period. During this SALP period, management of PUP was moved out of the line organization to a dedicated Salem revitalization group. This management shift appeared to be effective as the project completed about 50% of the procedure upgrade. The revised PUP procedures have been effective in decreasing errors and events previously caused by inadequate or poor procedures.

Improvement was noted in the engineering procurement activities. Until 1990, the licensee had no formal procedure for controlling the commercial grade item dedication program. The licensee's personnel had worked closely with Electric Power Research Institute (EPRI) personnel in the development of the EPRI commercial grade dedication program guidelines.

Engineering's Self-Assessment Program emphasizes the key performance elements to the engineering and management personnel. By setting goals and tracking them and by having upper management support, significant improvements have been achieved. The

contribution from this effort was a positive factor in improving engineering performance, as evidenced by a reduction in overdue engineering items, improved safety evaluation quality and improved performance concerning design change project timeliness.

There was generally strong evidence of management support for improving the engineering effort. Funding was provided by management, not only for routine engineering activities, but also for engineering enhancement projects, such as the Salem Revitalization Project (SRP), the Configuration Baseline Document (CBD) project, for planned additional engineering facilities, and for additional computerized material to increase efficiencies in engineering activities. The CBD project involves the design basis reconstitution of 87 systems and structures for Salem. During this SALP period, 24 systems were completed. The licensee also implemented the computerized Document Information Management System to complement the hard copy CBD for the completed systems. However, one example where a lack of aggressive management attention existed regarding the pressurizer power operated relief valves (PORVs). Insufficient vendor and engineering guidance for material specifications and torquing requirements has resulted in numerous PORV failures.

The technical content of license amendment requests and other licensee initiated submittals was generally good and continues to improve. However, the technical content of responses to certain NRC generic communications has required significant additional information submittals by the licensee. Examples include submittals relative to station blackout specifications, thermal stresses in piping systems connected to the reactor coolant system (NRC Bulletin 88-08) and information concerning the vendor information interface program (NRC Generic Letter 90-03). In some cases, the initial responses provided only a schedule for submission of the requested information. However, when the additional technical information was submitted, it was of high quality and responsive to the staff's request.

Summary

The control and limitations of temporary modifications improved, and improvements were made in the quality of work performed by the systems engineers and in the SQR program. Corporate engineering performed well with only a few deficiencies in the design change control area being observed. The onsite system engineering performed well in supporting plant operations. Corporate and onsite engineering management involvement was generally effective, although some plant issues resulted from a lack of management attention. Progress was observed in two of the engineering enhancement projects, the Salem Revitalization Project and the Configuration Baseline Document Project. At the end of the period, improvements in the engineering procurement program were also observed. The engineering for license amendments was of good quality; however, weaknesses were observed in the responses to NRC generic communications.

III.F.2 Performance Rating: Category 2

III.F.3 SALP Board Comment

There was a distinct difference in the level of quality between the licensee's responses to generic issues and its other submittals. The licensee should pay particular attention to improving the overall quality of its responses to generic issues.

III.G Safety Assessment/Quality Verification

III.G.1 Analysis

The previous SALP rated this area as Category 2. That assessment noted that management was involved in problem resolution and the assurance of nuclear safety. Onsite, offsite and event followup review groups had provided effective, independent evaluation of plant activities. A weakness was noted concerning the use of the station qualified reviewer, which prevented some issues from being reviewed by the onsite review committee. Quality Control (QC) involvement was not sufficient to maintain an independent review of station activities. The material condition of the plant was poor. The implementation of the procedure upgrade project was delayed, and inadequate procedures continued to contribute to plant events.

During this assessment period, corporate and station management continued to be involved in the conduct of daily station operations and in effectively responding to unplanned occurrences. Daily station manager accountability meetings were effective in ensuring an appropriate level of oversight of station activities. In addition, the daily morning meeting provided a useful operational summary for station management with emphasis on current unit problems and identification of high priority work. That meeting also provided the senior nuclear shift supervisor with direct access to station management. On a semi-annual basis, the Salem General Manager conducted State-of-the-Station meetings, which effectively communicated management's assessment of performance. Management and supervision were observed to be present in the field, including weekends.

Strong management attention and support were provided during this assessment period to develop programs to improve the material condition of the Salem facility and to improve the procedures. As a result, the procedure upgrade project (PUP) has made noticeable progress during this assessment period. Station procedure overall quality has likewise improved, with clear improvement noted in the procedures which have been processed through the PUP. Plant material condition has shown some improvement.

Conversely, a lack of management assessment and untimely correction of known deficiencies contributed to the existence of long-standing concerns associated with the pressurizer power-operated relief valves.

The licensee's Station Operations Review Committee (SORC) effectiveness improved during this assessment period. SORC reviews of reactor trips, proposed design changes, significant technical issues, and reportable events were generally very good and displayed an excellent safety perspective.

The independent onsite safety review groups continued to provide effective reviews of station activities and identification of safety concerns, including the Station Quality Assurance (SQA) Department and Safety Review Group (SRG). Two specific examples are the SQA identification that Technical Specifications were inappropriately exited during surveillance testing because of ineffective communications, and the identification that testing of the Unit 1 containment penetration conductor overcurrent protection devices was not properly implemented. SQA performance-based inspections continued during this period, and Quality Control (QC) increased direct inspection activities by providing increased department notification and hold points. SRG investigations were comprehensive, focused on safety issues and provided meaningful recommendations to plant management. The independent Offsite Safety Review (OSR) group was also used effectively and provided a safety conscious review of licensee activities.

The Significant Event Review Team (SERT) process provided a multi-disciplined, independent review of reactor trips or other safety significant events. SERTs conducted during this assessment period were generally of excellent quality, including proper root cause determinations and effective corrective actions. In one instance, however, the NRC identified a minor weakness associated with a SERT evaluation in which the licensee's prior recognition of existing deficiencies which contributed to the event was not identified by the SERT. The SERT process was used effectively by station management and was appropriately complemented by those evaluations performed by the SRG.

The licensee had previously placed increased emphasis on attention to detail in an attempt to reduce the number of personnel errors and procedural problems at Salem. While PSE&G's efforts had initially been successful, station performance has been inconsistent during this SALP period. Specifically, at about the middle of the period, a high number of events, across all functional areas and in a relative short time period, were attributed to personnel errors and procedural compliance/adequacy problems. PSE&G management took action and the error rate had decreased. However, near the end of the assessment period, several licensed operators permitted a Unit 2 startup to proceed without resolving a test discrepancy, and this was identified as one of several causal factors that led to the Unit 2 turbine generator failure.

Communications and interfaces among the various station groups were generally good. However, several ineffective intradepartmental and interdepartmental communications were contributing causes for plant events and equipment concerns. Prompt management action was taken and was effective in improving performance.

Outage preparations for the Salem Unit 1 refueling outage were excellent and proactive. Aggressive outage goals were established, and thorough SQA/QC inspections and surveillance plans were developed. Likewise, the Salem Unit 2 10-day maintenance and testing outage was well planned. PSE&G management displayed an excellent safety perspective in electing to conservatively shut down the unit to perform the planned activities.

The licensee's corrective action program generally functioned well. Improvements were noted relative to the material condition of both units, the quality of procedures, and in system engineer performance. However, weaknesses were noted in the LER commitment tracking system (one causal factor of the Unit 2 turbine failure), in correcting licensed operator training and EOP deficiencies, in addressing undersized 125 volt DC fuses, and in their investigative efforts relative to security program concerns. Also, deficiencies were noted in personnel performance and attention to detail, which resulted in personnel errors. At times, this resulted in degraded performance trends during the period.

The quality of requests for routine licensing actions has shown some improvement in that the number requests for additional information has declined. There was one notable exception, however, which was the request to change the diesel generator surveillance requirements. Significant additional information was required from the licensee. (See Section III.F.) There was only one non-routine licensing action, a Waiver of Compliance for a containment fan cooler unit, which was issued by the NRC Regional office. The quality of the licensee's submittal was good.

The quality of the responses to NRC generic communications has not significantly improved. On occasion, requests for additional information have been necessary for completion of staff review (See III.F.)

Summary

PSE&G management continued to be effectively involved in station activities and in problem resolution. The SERT process has been effective, and the independent review groups (onsite and offsite) provided safety conscious reviews of licensee activities. An increase in QC involvement in direct inspection activities was noted. An improvement in SORC effectiveness was also noted. The PUP made noticeable progress during this period that resulted in an overall improvement in station procedures. Personnel errors

and procedure compliance continued to be a source of periodic performance problems. Improvements were noted in routine license submittals, but additional management attention will be necessary to improve the responses to generic communications to the same level.

III.G.2 Performance Rating: Category 2

III.G.3 SALP Board Comment

The SALP Board noted cyclic performance relative to attention to detail resulting in personnel errors. The licensee should evaluate the effectiveness of their corrective action programs to ensure that a higher level of consistent performance is achieved.

IV. SITE ACTIVITIES AND EVALUATION CRITERIA

IV.A Licensee Activities

Both Salem Units began the SALP period in Hot Standby and preparing for unit startup following resolution of main steam isolation valve (MSIV) concerns. During Unit 1 startup activities, the reactor automatically tripped on August 17, 1990, after the No. 14 reactor coolant pump (RCP) lost electrical power. The unit was subsequently shutdown to Cold Shutdown to replace the No. 14 RCP motor. The unit was returned to service on September 7, 1990, and operated until September 10, 1990, when an automatic reactor trip occurred while preparing to isolate a high pressure turbine sensing line leak. Power operation resumed on September 12, 1990.

Unit 2 was placed in service on August 20, 1990, and power operation continued until September 4, 1990, when the unit tripped automatically due to a secondary system transient caused by equipment failures. Power operation resumed on September 8, 1990.

Unit 1 shutdown on February 9, 1991, for its ninth refueling outage. Core offload was completed on March 2, 1991, and core reload was completed on March 16, 1991. The reactor was made critical on April 23, 1991, and full power operation was achieved on April 29, 1991.

On May 10, 1991, following a 245 day record run for the unit, Unit 2 was shut down for a scheduled maintenance outage. The unit was restarted and achieved criticality on May 21, 1991, and power ascension followed.

Unit 1 tripped on June 16, 1991, due to a lightning strike on the main transformer. The unit restarted on June 24, 1991.

On September 16, 1991, the licensee initiated a shutdown of Unit 1 due to an unisolable electro-hydraulic control (EHC) system fluid leak. The unit initially proceeded to Hot Standby. However, a body to bonnet leak was observed on one of the two pressurizer spray valves, requiring entry into Cold Shutdown for valve repair. The unit was restarted on September 25, 1991, and was synchronized to the grid on September 27, 1991.

On October 18, 1991, the licensee began a Unit 2 power reduction from 100% in order to remove chloride ions from the steam generators. The turbine generator was taken off line, and a chemical hideout recovery evolution was performed. The licensee initiated this hideout recovery evolution because of a vendor calculation that concluded the chloride crevice concentration due to a September 22, 1991, condenser tube failure was such that the steam generator tubes were subject to accelerated denting over time. During this power reduction, the unit remained in Mode 2 at 0% power. Final chloride

concentration on all steam generators was within the chemistry goal. The unit was synchronized with the grid on October 20, 1991, and was subsequently returned to full power.

On November 9, 1991, Salem Unit 2 experienced an automatic main turbine and reactor trip during performance of turbine mechanical trip testing. The turbine trip subsequently reset, resulting in overspeeding the turbine and causing significant damage to the turbine/generator set. The unit proceeded to Cold Shutdown and commenced its sixth refueling outage, which had previously been scheduled to begin in January 1992.

The licensee continued to experience problems with service water leaks, spurious radiation monitor alarms and actuations, and Safeguards Equipment Cabinet failures and actuations. The licensee continues to pursue both short and long-term solutions to these issues.

IV.B NRC Inspection and Review Activities

Four NRC resident inspectors were assigned to Artificial Island during the assessment period. NRC team inspections were conducted in the following areas:

-- Emergency Preparedness inspections conducted on October 29 through November 2, 1990, and on December 3 through 6, 1991 to observe the Artificial Island annual exercises.

-- Safety System Functional inspection conducted at Salem Units 1 and 2 on April 15 through April 26, 1991, to assess the design basis and operational readiness of the Residual Heat Removal system.

-- Augmented inspection Team inspection conducted at Salem Unit 2 on November 10 through December 2, 1991, to review and evaluate the circumstances and significance of the November 9, 1991 turbine/generator failure event.

IV.C SALP Evaluation 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 the identification and resolution of technical issues from a safety standpoint;

3. Enforcement history;

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

5. Staffing (including management);

6. Training and qualification effectiveness;

Based upon the SALP Board assessment, each functional area evaluated is classified into one of three performance categories. The definitions of these performance categories are:

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.

The SALP report may include an appraisal of the performance trend in a functional area for use as a predictive indicator. Licensee performance during the assessment period is examined to determine whether a trend exists. Normally, this performance trend would be used only if both a definite trend is discernable and continuation of the trend would result in a change in performance rating.

The trend, is used, is defined as:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period and the licensee had not taken meaningful steps to address this pattern.