ENCLOSURE

FINAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-400/91-12

CAROLINA POWER AND LIGHT

SHEARON HARRIS

DECEMBER 1, 1989 - JUNE 1, 1991

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance on the basis of this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocation of NRC resources and to provide meaningful feedback to the licensee's management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on July 11, 1991, to review the observations and data on performance, and to assess licensee performance in accordance with the NRC Manual Chapter NRC-0517, "Systematic Assessment of Licensee Performance." The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

This report is NRC's assessment of the licensee's safety performance at Shearon Harris, for the period December 1, 1989 through June 1, 1991.

The SALP Board for Shearon Harris was composed of:

L. A. Reyes, Director, Division of Reactor Projects (DRP), Region II (RII) (Chairperson)
C. A. Julian, Chief, Engineering Branch, Division of Reactor Safety (DRS), RII
B. S. Mallett, Deputy Director, Division of Radiation Safety and Safeguards, RII
D. M. Verrelli, Chief, Reactor Projects Branch 1, DRP, RII
J. E. Tedrow, Senior Resident Inspector, Harris, DRP, RII
E. G. Adensam, Director, Project Directorate II-1, Office of Nuclear Reactor Regulation (NRR)
B. L. Mozafari, Project Manager, Project Directorate II-1, NRR

Attendees At SALP Board Meeting:

H. O. Christensen, Chief, Reactor Projects Section 1A, DRP, RII
M. M. Glasman, Project Engineer, DRP, RII
G. R. Wiseman, Technical Support Staff, DRP, RII
M. C. Shannon, Resident Inspector, Harris, DRP, RII
D. J. Roberts, Project Engineer/Intern, DRP, RII
C. F. Holden, Reactor Engineer, Performance and Quality Evaluation Branch, NRR

II. SUMMARY OF RESULTS

During the assessment period, Shearon Harris continued to be operated in a safe and effective manner. Improvement was noted in the security area. Major strengths were identified in the areas of plant operations, radiological controls, emergency preparedness, engineering/technical support, and safety assessment/quality verification. There were no major weaknesses identified in any functional area.

Increased attention to secondary plant component maintenance contributed to an overall excellent material condition of plant equipment and reliability. Improvements in plant operations contributed to no reactor trips during the assessment period.

Implementation of the radiation protection program was good. Efforts to control radiation exposure were effective as well as was contaminated area control. However, measures to control the radiological consequences of receipt of spent fuel were reactive in nature.

Major strengths were exhibited in the maintenance management system, predictive and preventative maintenance, and the surveillance scheduling program. However, problems related to procedure adherence and performance of post-maintenance testing were also evident.

Security program improvements were noted in areas of access control and sensitivity to commitments. Hardware changes, training, and increased supervision of security force personnel all contributed to improvement in the security program.

Engineering and Technical Support continued to be good. Proactive management support was evident. Strong support was demonstrated through the boron corrosion program, refueling activities, system engineering, and engineering evaluations associated with plant modifications.

Good management involvement in the safety assessment/quality verification area was evident. Self-identification of problems was considered to be a major strength. The implementation of a new non-conformance reporting system also helped licensee performance in this area. The Nuclear Assessment Department has yet to demonstrated its effectiveness.

Overall, the licensee's performance was considered to be superior.

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

III. CRITERIA

The evaluation criteria which were used, as applicable, to assess each functional area are described in detail in NRC Manual Chapter 0516. This chapter is in the Public Document Room files. Therefore, these criteria are not repeated here, but will be presented in detail at the public meeting to be held with licensee management on August 1, 1991.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area addresses the performance of activities directly related to operating the unit.

The plant was operated in a safe and conservative manner during the assessment period. No reactor trips occurred during power operations, a substantial decrease from eight trips the previous assessment period. Licensee action to improve plant reliability included enhanced operating practices, procedure change enhancements and real time training, and improvements to secondary plant components. Deficiencies in secondary plant knowledge, discussed in the previous assessment, were corrected. Twice during this period plant management shut the plant down to perform reliability-related maintenance. In May 1990, a leaking steam generator level instrument isolation valve was repaired, and in November 1990, a small primary-to-secondary leak in one of the steam generators was repaired. These shutdowns were performed even though the magnitude of leakage in both cases was far below regulatory limits. These conservative decisions to shut the plant down for the above repairs enhanced plant safety as well as reliability.

Supervision of operations personnel was satisfactory. However, two examples of inadequate supervision were noted; a violation was issued for obtaining nuclear instrument calibration currents improperly. The data was obviously taken in error, yet the operator's supervisor failed to notice the mistake. Also, supervision of a heatup activity was lacking, which led to a condition in which a main steam safety valve inadvertently lifted.

Operations were conducted in a professional, dedicated, and conscientious manner. The operations staff was well qualified, and the shift turnover process contined to be good. Good response by control room operators was noted following an inadvertent trip of the turbine electro-hydraulic control system pumps, inadvertent tripping of a circulating water pump, and failure of a cold leg temperature instrument. These responses averted two turbine-reactor plant trips and unnecessary plant transients. During performance of a surveillance test on a pressurizer pressure transmitter, manual control of plant

pressure was necessary. Rehearsal of this operation on the plant simulator, and pre-evolution planning for potential transients during the test, enabled operators to expeditiously respond to a spurious opening of the spray valve.

Examples of poor performance were also noted. Two mistakes were made following the plant heatup and startup in December 1989, which involved 1) the failure to adequately drain main steam lines of condensate which then contributed to an inoperable turbine driven auxiliary feedwater pump, and 2) the failure to recognize the significance of a mismatch between power level indications. Other less significant errors occurred when operators failed to stop a draindown activity and resolve a level indication discrepancy during operations with the reactor coolant system (RCS) in a reduced inventory condition, and during an improper operation to bypass a clogged RCS filter which inadvertently lifted a relief valve. In May 1991, a reactor protection system actuation occurred while the plant was cooling down from hot standby. During the process of removing test equipment from an instrumentation cabinet, a spurious reactor trip signal was generated. Although warned of this potentiality, operators failed to perform actions to prevent the unnecessary reactor protection system actuation.

Emphasis on self-verification, communications and training was evident. Self-verification was emphasized in classroom training and was stressed by line management. Administrative controls concerning plant operations were considered to be good. Controls established to maintain correct procedure revision, plant drawings, and equipment tagouts, were reviewed and found to be detailed and implementation was verified periodically by internal audits. The computerized technical specification/ clearance generation program continued to be utilized with an enhancement to the data base which included post-maintenance test requirements. This effort helped improve a weakness noted in operator knowledge of priority/emergency work requirements.

Plant housekeeping continued to be excellent; material condition of plant equipment was good. The absence of valve leakage was noticeable during plant tours. The plant general manager and area managers have continued their weekly walkdowns to identify housekeeping deficiencies. This practice was effective in correcting a weakness noted in the previous assessment period in infrequently toured areas.

Operations interface with other site organizations continued to be excellent. Coordination with technical support system engineers, environmental and radiation control personnel, and maintenance was evident. The proximity of the area manager's offices contributed to the good communication between the separate groups and enhanced this coordination.

During this assessment period two violations were identified.

2. Performance Rating

Category: 1

3. Recommendations

None

B. Radiological Controls

1. Analysis

This functional area addresses those activities related to radiological controls, radioactive waste management, effluent and environmental monitoring, water chemistry, and transportation of radioactive materials.

Corporate and station management actively supported the radiation protection program. Management support has increased because of additional radiation protection responsibilities required by the Harris spent fuel handling program. Radiation protection management participated in the Spent Fuel Handling Management Oversight Committee and the Crud Task Force. Quality assurance audits and surveillances were comprehensive and management provided responsive commitments to effect corrective actions. The ALARA program was generally strong and the licensee developed an ALARA suggestion program to increase participation and involvement from the workers. The licensee's program for self-identification of weaknesses in the radiation protection program was revised to include criteria for initiating investigations of radiological incidents. During this assessment period, upgrades to the radiation program included hardware purchases, procedure enhancements, and improved training which included increased use of mock-ups.

Radiation protection program staffing, which included experienced CP&L and contractor personnel, continued to be adequate. Changes to the organization involved rotation of key personnel. The most significant change was the assignment during March 1991, of another experienced Radiation Protection Manager (Environmental and Radiation Control Manager). The licensee continued to maintain a comprehensive training program in radiation protection for CP&L and contractor employees. Generally, this training was effective.

The licensee's efforts to control dose were effective. The 1990 collective dose was 84.9 person-rem. During 1990, the licensee had 64 personnel contaminations; 43 of these were received

during non-recurring spent fuel pool (SFP) modifications. During the last assessment, a weakness was noted in the area of personnel contaminations. Improvement was noted this assessment period. The Radiation Work Permit (RWP) Program was effective and the RWPs were detailed, containing specific radiation protection requirements.

Contaminated areas were reduced to about half of those that existed during the previous assessment, or approximately 0.5 percent of the total plant area. Improvements in this area throughout the plant, especially in the fuel handling building, have allowed greater access to plant equipment.

During this assessment period the licensee continued to experience problems with the radiation monitoring system. As was discussed in the previous assessment report, a task force was formed to correct the problems with this system. Some of the recommendations from this task force were implemented. However, during this assessment period the task force recommendations were not totally effective in that some of the Technical Specification radiation monitors were still inoperable.

As mentioned in the previous assessment, the licensee continued to receive spent fuel from the other CP&L nuclear plants. The receipt of spent boiling water reactor (BWR) fuel elements created an unanticipated radiological hazard. A fine, highly activated oxide crud was deposited in the SFPs and refueling transfer canals when BWR fuel was moved into the Harris SFPs. This deposited crud resulted in the activity concentration in the SFPs significantly exceeding the design basis concentrations for various nuclides.

The dispersion of crud throughout the SFPs and transfer canals created large areas for cleanup, which required more time and exposure to clean up when work on the spent fuel holding racks was initiated. The licensee responded to this significant challenge reactively, rather than taking proactive measures. Audits and reviews were performed by corporate personnel and independent third parties to assist in the resolution of this problem. Recommendations from these audits/reviews were implemented and a cleanup of the pools/transfer canals began, utilizing an underwater filter/vacuum unit. By the end of this assessment period significant progress was achieved in controlling the radiological hazard and cleanup of the SFPs and transfer canals.

The liquid and gaseous effluents program was effectively managed. Liquid and gaseous effluents for calendar year 1990 were well within the limits specified in the Technical Specifications. The maximum whole body dose was less than 1 percent of the applicable limit. Further, the licensee was in agreement with all four of the radioisotopes shipped to them as part of the Confirmatory Measurements Program.

The licensee's program for monitoring and controlling primary and secondary chemistry parameters was adequate. Primary chemistry parameters were maintained within Technical Specification guidelines. Although secondary chemistry parameters were generally maintained within administrative limits, the licensee has experienced continuing problems with oxygen inleakage into the condenser which they were attempting to resolve. In addition, there were several instances where chemistry and counting room technicians did not adhere to procedural requirements. Licensee management took effective action.

During this period the licensee was not meeting NRC commitments for the training of chemistry technicians on the Post Accident Sampling System (PASS), and did not develop procedures for removal of an undiluted sample from a shielded container. While PASS operability has improved, problems associated with this system persisted. Corrective actions were in progress by the end of the assessment period.

During this assessment period, six violations and one deviation were identified.

2. Performance Rating

Category: 1

3. Recommendations

Although the radiation protection and contamination control programs were good, the Board noted the continuing problem over the last two assessment periods with inoperable radiation monitors. The licensee should resolve this deficiency.

The Board noted the progress made in the control of radiological hazards and cleanup of the spent fuel pools following the receipt of spent fuel from the other CP&L facilities. Continued attention is recommended to preclude the potential for significant personnel contamination.

C. MAINTENANCE/SURVEILLANCE

1. Analysis

This functional area addresses those activities related to equipment condition, maintenance, surveillance performance and equipment testing.

Performance of maintenance activities continued to be good. No reactor trips occurred as a result of maintenance activities. An example of excellent maintenance planning was noted. A modification scheduled to be installed in the switchyard during the 1991 refueling outage was pre-planned to reduce the risk of loss of offsite power with the reactor coolant system in the

reduced inventory condition. During post-maintenance testing of this work, switchyard relays were inadvertently actuated which would have resulted in a loss of offsite power if appropriate precautions had not been taken. Four violations, however, in the maintenance area were identified. Most of the violations involved failure to properly implement maintenance procedures.

The computerized automated maintenance management system continued to serve as a valuable asset to the maintenance program. This system was used to initiate and track work request status, plan and schedule work, review work history, and to identify repetitive failures. Additionally, this system was used to provide area managers with a daily printout of work tickets written for the previous day. This enabled managers to quickly focus on emergent problems.

To increase plant system knowledge, two maintenance supervisors completed training equivalent to that received by senior reactor operators. This training helped emphasize the importance of maintenance activities on plant operations.

The licensee has increased emphasis on secondary plant maintenance. A preventive maintenance inspection program was initiated for large pumps and motors. Inspections of three circulating water pumps detected significant end bell erosion which was repaired before degraded pump performance was evident. Additional components inspected included the heater drain pumps, condensate booster pumps, cooling tower makeup pumps, and normal service water pumps. The work performed during two short-duration outages contributed significantly to plant reliability. This work included repairs to the emergency diesel generator load sequencers, boric acid leak inspection and valve repairs, replacement of eroded piping in the blowdown system, main condenser repairs, and various repairs to secondary system valves.

To correct deficiencies identified by the licensee in the performance of post-maintenance testing, a corporate task force was formed. Recommendations from this group included improving the post-maintenance test matrix and test program procedure, and inclusion of these requirements in the technical specification/clearance generation computerized data base. However, near the end of this assessment period, post-maintenance testing for reactor trip breaker maintenance and replacement of a trip switch was found to be deficient, which indicated that the licensee's corrective action did not achieve the desired results. This resulted in a Level III violation issued after the assessment period.

Significant accomplishments were noted in the predictive maintenance program. Extensive use of thermography in safety-related and non-safety related systems was evident. This enabled the licensee to identify and replace degraded components prior to failure. Vibrational analysis was performed on major

components and identified potential problems on a condenser vacuum pump motor bearing, main feedwater pump, and a motor generator bearing. This work enabled the affected equipment to be scheduled for repair prior to failure. The licensee's efforts in the performance of lube oil analysis continued, as well. The accomplishments in the predictive maintenance area were noteworthy and became a significant contributor to the lack of reactor trips this cycle and high safety system availability.

The surveillance test scheduling program was considered to be a strength. The reports generated from this system allowed management to focus attention on overdue tests. These efforts contributed to the completion of surveillance tests in the required periodicity with no scheduled tests overdue or missed.

Surveillance activities were performed adequately. An excellent example of good pre-test planning was evident during the pressurizer pressure surveillance test which was discussed in the operations section of this report. However, a few problems occurred during performance of surveillance tests. Approximately half of the violations cited during this assessment period occurred in the surveillance area. The violations ranged from improper implementation of required tests and improper implementation of procedures, to poor documentation of a completed surveillance test. While implementation of surveillance procedures was generally adequate, procedure adherence problems were widespread, occurring in most organizational units. To correct the procedure implementation problems, the licensee has concentrated on self-verification, improving communications, and training, all of which has helped improve performance in this area.

The licensee's approved inservice testing program was found to be satisfactory; requirements and responsibilities were clearly defined. Weaknesses, however, were found in the implementation of the program. These included omission of certain check valves, inadequate check valve exercising, and failure to test the fail-safe function of some power-operated valves. To correct these problems the licensee performed a complete system review to identify similar problems. Also, an independent third party was requested to review the program.

During the assessment period, 14 violations were identified.

2. Performance Rating

Category: 2

3. Recommendations

None

D. EMERGENCY PREPAREDNESS

1. Analysis

This functional area addresses those activities related to the implementation of the Emergency Plan and procedures, as well as support and training of onsite and offsite emergency response organizations.

The licensee conducted an independent audit during the assessment period to review the overall implementation and maintenance of the emergency preparedness program. Prompt and appropriate corrective actions were completed to address findings identified during the independent audit, and during inspections, drills, and exercises. The licensee's critique of the 1990 emergency response exercise was effective, and the licensee pursued timely corrective actions for items identified.

The licensee provided additional staff training on the notification and activation process and conducted a series of unannounced augmentation drills during early 1990 in response to a delayed off-hour activation of emergency response facilities for an October 1989 Alert declaration. Although improvements in this area were achieved and verified by the drills, some key positions were still not staffed in a timely manner. Further corrective actions in this area were successful, however, as demonstrated by a timely off-hour activation of the Technical Support Center, Operational Support Center, and Emergency Operations Facility during the September 1990 exercise. The licensee's emergency response qualification and training program was complete and effective.

The licensee made two emergency declarations during the appraisal period, both at the Notification of Unusual Event level (February 15 and March 5, 1991). In each case, the event classification was prompt, correct, and offsite authorities were notified in accordance with requirements.

The licensee staffed the emergency response organization with qualified and well-trained personnel during the September 1990 exercise. The licensee's performance during the exercise effectively demonstrated the ability to provide for the radiological safety of onsite personnel as well as the public. Communications with State and local authorities during the exercise were timely and effective. A fire drill, included as a component of the exercise, demonstrated prompt and effective response capabilities. No weaknesses were identified during the 1990 exercise.

The licensee established and implemented a strong program for maintaining emergency response facilities, communications equipment, status monitoring equipment, and the public Alert and

Notification System. Coordination with offsite authorities was effective in providing appropriate training for fire, rescue, hospital, State/local emergency management, and State radiological health personnel.

No violations or exercise weaknesses were identified during the assessment period.

2. Performance Rating

Category: 1

3. Recommendations

None

E. SECURITY

1. Analysis

This functional area addresses those security activities related to protection of vital plant systems and equipment, and shipment of irradiated fuel.

During the previous assessment period, the licensee was not sensitive to security commitments. The licensee has took steps to improve performance in this area and has attained a high level of sensitivity in this area, and has continued work in an aggressive program to improve the previously installed protective measures. A Regulatory Effectiveness Review was concluded during the assessment period, and identified a number of strengths. NRC inspections conducted this assessment period verified routine elements of the security program were in compliance with the Security Plan commitments relative to barrier integrity, alarm response, alarm station operations, power supply, offsite response agencies, and protection of safeguards information.

During the previous assessment period, a weakness was noted in access control. The licensee has improved the access control program. The vehicle access control program was recently enhanced by the addition of a new gatehouse, which permits the officer to visually inspect the tops of large vehicles. Also, to ensure personnel access searches continue to be effective, the licensee has conducted numerous training drills in which they simulated contraband introduction into the protected area. In all drills the contraband was detected by the security force. Further, on eight separate occasions, the licensee's security force detected actual contraband during routine entry searches of individuals.

The licensee had entered into a cooperative research and development agreement with a national laboratory to ensure recent security hardware upgrades would successfully address previous NRC-identified closed circuit television (CCTV) concerns. The upgrade included replacement of a number of CCTV cameras and a "video capture" feature to improve alarm assessment. The licensee also ergonomically enhanced alarm station operation, by redesigning the equipment consoles. These upgrades demonstrated management's attention to security equipment, reduced long-term compensatory measures, and enhanced previously installed systems.

The security training program was found to be comprehensive; instructors were found to be very capable and motivated. The licensee had conducted 275 training drills/exercises which included "adversary" tactical response exercises, vital area response drills, plant emergency drills, and fire drills. There were also six 40-hour upgrade tactical training simulator exercises, which provided for more realism during exercises. It was noted in the previous assessment that the licensee needed to provide additional management attention to security force performance and effective first line supervision. The licensee aggressively pursued this concern and developed an extensive training program for first line supervisors. As an added enhancement, the licensee provided training sessions on security requirements for the plant staff. It was also noted that the turnover rate decreased from 32 percent in 1990 to 11 percent in 1991.

During the assessment period, two Security Plan changes were submitted. The changes were consistent with applicable regulations. Communications between the licensee and the NRC concerning the changes were effective.

The licensee's Fitness for Duty Program was inspected at the Corporate offices and on site. The licensee was found to be meeting the performance criteria of Part 26. The most notable strength was the professionalism of the Fitness for Duty staff, and the Employee Assistance Coordinator. A weakness identified by the licensee involved the infrequence of random drug testing on weekends. Corrective measures were initiated. The licensee's Fitness for Duty Program has received aggressive management attention and is supported by an informed workforce.

No violations were cited.

2. <u>Performance Rating</u>

Category: 1

3. <u>Recommendations</u>

None

F. ENGINEERING/TECHNICAL SUPPORT

1. Analysis

This functional area addresses those activities associated with the design of plant modifications, engineering and technical support for operations, maintenance, outages, testing and surveillances; and licensed operator training.

Overall, engineering and technical support was good during this assessment period. Proactive management support was evident. Strong engineering support was generally demonstrated through the boron corrosion program; refueling activities; the predictive maintenance and repetitive failure analysis programs; system engineering program, and engineering evaluations associated with plant modifications. However, assistance provided by the technical support group for the auxiliary feedwater pump motor replacement, and during maintenance of a vital inverter, was considered deficient in that some critical vendor recommendations were not followed.

Efforts to improve the boron corrosion program were evident. Visual inspections for boric acid leakage were scheduled early during the short outages so repairs could be made. Procedures were revised to add clearly defined requirements for identification and repair of boric acid leakage, and notification of system engineers.

An Electrical Distribution System Functional Inspection (EDSFI) was conducted this assessment period. Although several minor program weaknesses were noted, such as commercial dedication and the previously identified LK-16 breaker problems, the EDSFI team appraisal of licensee performance was very positive. For example, management involvement and control in assuring quality indicated consistent evidence of prior planning and assignment of priorities. Well written, controlled and explicit procedures for control of activities were noted and corporate management was frequently involved in site activities. With respect to resolving technical issues, the EDSFI team noted that the licensee demonstrated an understanding of issues from a safety standpoint and conservatism was routinely shown when a potential for safety significance existed.

As mentioned in the previous assessment, technical support personnel were actively involved in the spent fuel shipment program. During this assessment period approximately 17 shipments of spent fuel were received. However, as previously discussed in the radiological controls section of this report, significantly higher concentrations of radioisotopes were deposited in the SFP and associated systems as a result of placing spent BWR fuel in the SFP. This constituted a change to to the facility which was not evaluated for its effect on plant safety. In response to this problem the licensee began a complete licensing and design basis review of affected systems.

Following the 1991 refueling outage, NRC review noted that appropriate technical support procedures were properly implemented and that nuclear instruments were properly calibrated. Proactive licensee performance was demonstrated by a newly-created power ascension test program which detailed the various tests and calibrations necessary to achieve full power. The subsequent startup conducted after implementation of this program was completed without incident. During the outage, the licensee also modified the nuclear instrument channels from analog to digital indication in order to reduce indication errors.

The licensee's system engineering program was found to be very effective. Formally defined duties and responsibilities were specified, system engineers were actively involved in troubleshooting system problems, and system engineers served as lead contacts in coordinating corrective action. An example of this group's diligent performance was exhibited during October 1990, when a system engineer observed abnormal motion of a steam line near a main feedwater pump; the problem was repaired before significant damage occurred. In addition, good communications between the system engineering organization, operations and maintenance continued to promote good working relationships between these plant organizations.

Several motor-operated valve (MOV) program activities were completed during the period. Following the completion of engineering design assessment packages, 42 of the 120 designated valves were tested and adjusted to meet full flow and full differential pressure operational requirements. The licensee also installed permanent test connections and internal test devices on selected MOVs to enhance future testing, thereby minimizing valve inoperability time as well as reducing personnel radiation exposure while conducting MOV tests.

Various examples of extra licensee effort to provide plant safety and protect personnel were also noted during the assessment period. Following the steam generator tube leak, the licensee performed 100 percent eddy current testing of the steam generators. A video inspection of the secondary side of the affected steam generator was also performed to identify any loose parts. In response to recent industry events, an underwater camera was used during the reactor vessel head and upper internals lift to ensure proper removal with minimal damage potential. A steam generator mockup was procured and personnel were trained on nozzle dam installation, eddy current inspection, and steam generator shot peening evolutions.

Technical support personnel managed and implemented the predictive maintenance and inservice testing programs. Predictive maintenance programs were implemented in the areas of thermography, oil sampling, vibration monitoring, and the erosion/corrosion program. The erosion/corrosion program

identified several sections of steam and blowdown system piping with reduced wall thickness. The piping was repaired prior to possible failure. Also, technical support engineers had an active role in the repetitive failure analysis program, which was effective.

Procurement activities have improved and commercial grade dedication procedures were implemented which assured proper procurement, acceptance, and installation of commercial grade items. Close attention to detail was demonstrated during material inspections by technical support personnel when fraudulent replacement electrical relay components were identified. Technical support personnel also identified record falsification of product certifications by an intermediate supplier. These actions resulted in a letter of commendation to the licensee from the NRC Executive Director for Operations.

Licensee procedures and administrative controls for refueling operations were found to be satisfactory and acknowledged lessons learned from industry events. The licensee completed good pre-planning of the two short outages during this period. An effort to quickly identify emergency work was very successful during the 1991 refueling outage. This enabled work to be scheduled and completed with minimal impact on the schedule.

A special unannounced inspection in the area of simulator examination techniques, as used in the licensed operator training program, found the techniques generally met NRC requirements. The overall assessment showed improvement was still needed in assuring prompt feedback and dissemination of significant procedural issues, and increasing the number of available scenarios to ensure instructors are not evaluated on the same scenario they may have witnessed as evaluators.

Although the training program was effective in preparing operators, two programmatic weaknesses were identified during the assessment period. One weakness was in examination development. Another was in team communication skills training. Over the past year, the licensee implemented new communications standards that have greatly enhanced operators' communications skills. As a result of examination failures in the previous assessment period, two reactor operators and two senior reactor operators received an initial retake examination. All operators passed these examinations.

One violation was cited during the assessment period.

2. <u>Performance Rating</u>

Category: 1

3. <u>Recommendations</u>

None

G. SAFETY ASSESSMENT/QUALITY VERIFICATION

1. Analysis

This functional area addresses those activities related to licensee implementation of safety policies; license amendments, exemptions, and relief requests; responses to Generic Letters; Bulletins, and Information Notices; resolution of safety issues; reviews of plant modifications performed under 10 CFR 50.59; safety review committee activities; and the use of feedback from self-assessment programs and activities.

Management continued to place high priority on assessment of industry experience and plant events to improve plant safety and performance. An operating experience feedback program, in operation since initial fuel load, reviews industry experience identified in NRC Information Notices, vendor technical bulletins, industry events, Licensee Event Reports, INPO Nuclear Network items, and events at other CP&L sites. Operation Experience Feedback Reminders, detailing industry events and previous problems, were then sent to plant staff a few days prior to similar plant evolutions. New items were then discussed in weekly meetings and action items were tracked by the site's corrective action program.

Progress in development of important emergency operating program features was good. Recognition of the need for Plant Specific Technical Guidelines, Emergency Operating Procedures (EOP) and Abnormal Operating Procedure (AOP) revisions was adequate. An NRC EOP/AOP team inspection determined that the procedures necessary for safe shutdown of the plant adequately covered the broad range of accidents and equipment failures. Only minor weaknesses were identified in the areas of human factors, adequate step deviation document justifications, writer's guide, nomenclature inaccuracies, and verification and validation of locally performed actions.

The licensee demonstrated a conservative approach to safety issues in its responses to safety concerns. Oversight groups were effectively utilized by the licensee to identify and resolve various safety-significant areas of concern. Examples included special investigations of the miscalibration of nuclear instrumentation during a plant startup, and an investigation into circuit breaker problems. The licensee conducted a review of the emergency service water system and a project quality team was formed to recommend improvements in offsite power reliability. The special investigations and system reviews were found to be thorough and recommendations were appropriate. Recommended actions were tracked, discussed with plant management, and adequately resolved. Particularly noteworthy was the practice by the Onsite Nuclear Safety unit to perform weekend/backshift observations of plant activities. The project quality team reviewed approximately 100 industry events

involving losses of offsite power. Recommendations from this team included completion of a customer/supplier agreement, closeout inspections following maintenance of electrical equipment, expansion of thermography surveillance to include major electrical transmission components, and distribution of operating experience feedback information to the transmission department. The licensee is in the process of implementing these recommendations.

Selected plant nuclear safety committee meetings were observed. Good participation and advance preparation by committee members for those items discussed were noted. Minutes from the meetings contained accurate documentation of the committee's activities.

Plant management continued to perform weekly inspections of various plant areas. The inspection team consisted of approximately 10 managers, led by the plant general manager, and focused on the general cleanliness and material condition of equipment. This type of management involvement had a positive effect on plant housekeeping and general managers were frequently seen in the plant observing work in progress and performing plant tours.

Management decisions regarding plant safety were considered very conservative in most cases. Although not required by regulations, plant management made decisions to shut the unit down to repair a small secondary-side steam leak, and again, after detecting a steam generator tube leak. A non-conservative management decision was made, however, following the 1989 refueling outage which allowed plant heatup without the main condenser available as discussed in the Plant Operations section.

In January 1991, the licensee implemented a new non-conformance reporting system which replaced Significant Operational Occurrence Reports with Adverse Condition Reports. The new system established a lower threshold for reporting problems and included other reporting systems to improve problem trending, root cause, and human performance analysis. Good self-identification of problems was considered to be a major strength in the assessment area.

In January 1991, the licensee made organizational changes to provide three levels of self-assessment and created the Nuclear Assessment Department (NAD) from the Corporate Nuclear Safety and Onsite Nuclear Safety departments. The first level of assessment consisted of individual self checks, supervision and monitoring of work performance, and management review of performance indicators. The second level was a centralized review of plant performance in various functional areas by the Nuclear Service Department. The third level of assessment was an independent review performed by NAD. The licensee has maintained the number of available QC inspectors, and, in

addition has relied upon the craft to perform a significant amount of first level assessment. Problems were identified with plant personnel failing to perform adequate independent verifications at the Harris facility and at the licensee's other nuclear plants. This indicated that the licensee has not achieved the desired results from the first level assessment process. The Nuclear Service Department created critical success factors for functional areas to aid in the assessment period; revisions to the critical success factors were being discussed with site personnel to improve this assessment.

Performance of 10 CFR 50.59 reviews continued to be strong. A new program was implemented to further strengthen this area. The 10 CFR 50.59 evaluations reflected management involvement consistent with the safety significance of the issue. Those issues with considerable complexity and safety significance exhibited evaluations which indicated that decision making was consistently at a level that assured adequate management review. Evaluations in support of complex license amendments such as the reactor level heatup and cooldown curves, demonstrated an understanding of the technical issues involved and required little additional information from the licensee.

The licensee devoted considerable resources to planning and scheduling licensing activity. This planning exhibited a considerable degree of management involvement and review. Activities were planned to anticipate actions thereby avoiding the need for emergency amendments and waivers of compliance. The licensee demonstrated responsiveness in closing out TMI items, Generic Letters, and Bulletins.

One violation was cited.

2. Performance Rating

Category: 1

3. Recommendations

The Board noted the conservative approach to safety issues demonstrated by the licensee. However, the effectiveness of the three levels of self-assessment has not been demonstrated. Management review of the effectiveness of the organizational changes should be conducted.

V. SUPPORTING DATA

A. Licensee Activities

The plant began the assessment period in the defueled condition during refueling outage 2. Power operations resumed December 22, 1989. The unit was shutdown on May 19, 1990, to perform repairs on a leaking steam generator instrument isolation valve, the emergency

diesel generator load sequencer, and other components to enhance reliability. The unit restarted May 31, 1990. In October 1990, the licensee detected abnormally high radiation levels in the secondary plant and determined a small steam generator primary-to-secondary leak had developed. The leak was carefully monitored by the licensee, and on November 10, 1990, the plant was shutdown to perform repairs to the steam generator. Power operations resumed November 29, 1990. On December 1, 1990, a baffle plate failed in the main condenser, and a number of tubes were damaged. Following these repairs, the unit resumed power operations December 10, 1990, until March 15, 1991, when the unit was brought down for Refueling Outage 3. Normal power operations resumed May 25, 1991. During the assessment period, no automatic reactor trips from power were experienced, however, a reactor protection system actuation occurred on May 15, 1991, during plant heatup from the refueling outage.

B. Direct Inspection and Review Activities

During the assessment period, 37 routine and 3 special inspections were performed at Shearon Harris by the NRC staff. The special inspections were:

- RER; December 11, 1989 through December 15, 1989
- EDSFI; February 12, 1990 through March 16, 1990
- EOP; October 29, 1990 through November 9, 1990

C. Escalated Enforcement Actions

1. Orders

None

2. Civil Penalties

None

D. Management Conferences

During the assessment period there were 8 management conferences with the licensee. These were:

- December 1, 1989; Self-assessment Presentation, previous assessment period.
- December 20, 1989; Discussion of the electrical fault and fire which took place October 9, 1989.
- February 15, 1990; Enforcement Conference to discuss miscalibrated nuclear instrumentation.
- February 20, 1990; SALP Presentation at Site.

- August 6, 1990; Presentation of corporate emergency preparedness program.
- August 15, 1990; Presentation regarding licensed operator training.
- January 3, 1991; Presentation of Nuclear Assessment Program.
- February 11, 1991; Planned activities for March 1991 Outage

E. Confirmation of Action Letters

None

F. Reactor Trips

The unit experienced no automatic reactor trips at power during the assessment period; one reactor protection system actuation occurred 5/15/91 while in Mode 3.

G. Review of Licensee Event Reports (LERs)

During the assessment period a total of 45 LERs were analyzed. The distribution of these events by cause, as determined by the NRC staff, was follows:

Cause	
Component Failure	11
Design	9
Construction, Fabrication, or Installation	0
Personnel	
- Operating Activity	16
- Maintenance Activity	7
- Test Calibration Activity	0
- Other	1
Other	1
TOTAL	45

Note 1: With regard to the area of "Personnel Errors", the NRC considers lack of procedures, inadequate procedures, and erroneous procedures to be classified as personnel error.

Note 2: The "Other" category is comprised of LERs where there was a spurious signal or a totally unknown cause.

H. Licensing Activities

26 licensing activities were completed during this assessment period:

9 amendments were issued (including one emergency TS change)

2 relief requests granted

9 generic letters and bulletins were reviewed

6 safety evaluations (non-amendment issues) completed

I. Enforcement Activity

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	Dev.	V	IV	III	II	I
Plant Operations			2			
Radiological Controls	1		6			
Maintenance Surveillance			13	1*		
Emergency Preparedness						
Security						
Engineering/Technical Support			1			
Safety Assessment/Quality Verification			1			
TOTAL	1		23			

*Violation issued subsequent to the assessment period.