ENCLOSURE

INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-325/90-38 and 50-324/90-38

CAROLINA POWER AND LIGHT

BRUNSWICK UNITS 1 AND 2

SEPTEMBER 1, 1989 - SEPTEMBER 30, 1990

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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 November 1, 1990, to review the observations and data on performance, and to assess licensee performance in accordance with the NRC Manual Chapter NRC-0516, "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 the NRC's assessment of the licensee's safety performance at Brunswick Units 1 and 2, for the period September 1, 1989, through September 30, 1990.

The SALP Board for Brunswick was composed of:

E. W. Merschoff, Deputy Director, Division of Reactor Projects (DRP), Region II (RII) (Chairperson)
C. A. Julian, Chief, Engineering Branch, Division of Reactor Safety, RII
J. P. Stohr, Director, Division of Radiation Safety and Safeguards, RII
D. M. Verrelli, Chief, Reactor Projects Branch 1, DRP, RII
R. L. Prevatte, Senior Resident Inspector, Brunswick, DRP, RII
E. G. Adensam, Director, Project Directorate II-1, Office of Nuclear Reactor Regulations (NRR)
N. Le, Project Manager, Project Directorate II-1, NRR

Attendees at SALP Board Meeting:

R. E. Carroll, Acting Chief, Project Section 1A, DRP, RII
G. R. Wiseman, Technical Support Staff, DRP, RII
R. W. Borchardt, Regional Coordinator, EDO
C. F. Holden, Senior Operations Engineer, Division of Licensee Performance and Quality Evaluation Branch
D. J. Nelson, Resident Inspector, Brunswick, DRP, RII

II. SUMMARY OF RESULTS

Overall, Brunswick has been operated in a safe manner during the assessment period. Improvement was noted in the area of Maintenance/ Surveillance, and Security continued to be a strength. Performance in the area of Engineering/Technical Support declined from last assessment period.

Operational performance showed improvement with the exception of the last six weeks of the assessment period. Good operator performance was observed during plant startup and shutdown, with improvements being noted in controlling plant conditions during shutdown. There were no problems identified in the implementation of the fire protection program, and housekeeping continued to be a strength. Improvement with respect to clearance problems was also evident during the last half of the assessment period, but valve lineup problems persisted. Although the presence of an extra operator per shift continued to be effective in identifying equipment and instrumentation deficiencies in the control room and back panel area, there were nonconforming conditions in other areas of the plant which were not found by plant personnel during routine plant tours. Operator performance deficiencies were revealed during licensed operator requalification examinations and related operational evaluations. These significant deficiencies were brought about, in part, because of Operations' willingness to accept minimal training, rather than demanding improvements.

Performance in the area of Radiological Controls was good, reflecting an experienced health physics staff and increased management support/ involvement in radiation protection and ALARA programs. Efforts were successful in decreasing the amount of contaminated area and in reducing both volume and radioactivity of released liquid radwaste. The radiological environmental monitoring program and the liquid and gaseous effluent program were effective. Brunswick exhibited a successful spent fuel shipment program, but CP&L corporate had not resolved the associated crud problems at Harris. Although collective personnel radiation exposure was high, collective doses were not considered excessive. There were two events, however, which resulted in unnecessary personnel exposures; one for which escalated enforcement action was taken. In addition, corrective actions taken in regard to high radiation area access control problems was not fully effective.

Overall, performance in the area of Maintenance/Surveillance was good, with an improving trend noted throughout the assessment period. Twenty-four hour shift coverage provided by a knowledgeable/experienced staff and high quality maintenance surveillance test procedures were strengths in this area. Previously established computerized management systems continued to be excellent tools for managing maintenance and surveillance activities. Notable improvements were seen in emergency core cooling system/safety system availability, as well as in routine planning and scheduling activities. Efforts taken to improve component identification labeling, reduce the work request backlog, limit actuations from shorted test leads, and address previously identified weaknesses in the inservice inspection/testing program were effective. Additionally, predictive maintenance, motor operated valve, and modification testing programs also produced good results. There were, however, a number of work control related issues identified, and coordination with control room operators

was not always well disciplined. Also, several examples of inadvertent engineered safety feature actuations occurred during the performance of surveillance and periodic testing, one of which resulted in a reactor scram.

Effective Emergency Preparedness (EP) coordination and control, at both the site and corporate levels, was demonstrated during a difficult annual exercise scenario. The adequacy of EP facilities and equipment continues to be maintained, and adequate staffing levels and timely augmentation were demonstrated. From a performance aspect, the EP training program was effective, as was the licensee's post exercise self-critique process. Performance in actual emergency classifications was considered satisfactory, although in one instance an unusual event was not declared until after discussions with the NRC resident staff. Additionally, management support was not always sufficient, as evidenced by NRC findings during the 1990 exercise.

Security performance continued to be strong, exhibiting effectiveness in security program implementation, personnel performance, and compliance with regulatory requirements and physical security plan commitments. A number of security related enhancements were undertaken by the addition of two security management technical assistants, as well as through various system/equipment improvements and on-going upgrades. The Regulatory Effectiveness Review (RER) conducted this assessment period did not identify any violations and noted six safeguards strengths.

Performance in the area of Engineering/Technical Support declined as a result of initial design/implementation problems encountered during the Unit 2 recirculation pipe replacement and an unsatisfactory licensed operator requalification training program. The significant deficiencies revealed by the NRC in both of these important matters were indicative of inadequate management support and involvement. Performance by maintenance, component, and system engineers did show some improvement as a result of Integrated Action Plan initiatives and increased involvement in plant activities. Other improvements included design information consolidation activities, the engineering work request program, and the establishment of a nuclear prioritization process.

Management interest and involvement in the area of Safety Assessment/ Quality Verification showed improvement through an increased focus on Site Incident Investigation Team investigations and the development/ implementation of a standard corporate safety review methodology which provided a more formal 10 CFR 50.59 program. Performance based Quality Assurance audits were successfully implemented, showing improvement in quality. The established program for reporting defects/non-compliances was effective, and licensee event reports, as well as responses to Bulletins and Generic Letters were considered to be good. Previous deficiencies involving a decrease in staff level and lack of independent reviews by the Onsite Nuclear Safety group were corrected; however, Corporate Nuclear Safety appeared to be understaffed and suffering from an increasing backlog. Licensee submittal packages demonstrated a good technical understanding of related safety issues, though some submittals

were found to be incomplete. Although the approach taken to resolve safety issues was generally conservative, several issues required NRC involvement to assure comprehensive resolution. A significant weakness identified with existing assessment programs involved the inability to detect those deficiencies which were revealed by NRC in the licensed operator requalification training program.

Functional Area	Rating Last Period	Rating This Period
Plant Operations	2	2
Radiological Controls	2	2
Maintenance/Surveillance	2	2 (improving)
Emergency Preparedness	2	2
Security	1	1
Engineering/Technical Support	2	3
Safety Assessment/ Quality Verification	2	2

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 December 19, 1990.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area addresses the control and performance of activities directly related to operating the units, as well as fire protection, as reviewed during routine inspections and an Augmented Inspection Team (AIT) which were conducted during the assessment period.

With the exception of the five automatic scrams which occurred during the last six weeks of this assessment period, the units' performance showed improvement over the previous assessment period. Unit 1 was shutdown four times during the assessment period. One shutdown occurred as part of hurricane Hugo preparations, another to fix a drywell-to-torus vacuum breaker, a third because of deficient licensed operator requalification (LOR)/operational evaluation (OPEVAL) test results, and the last (which involved an automatic reactor scram due to an inadequate turbine valve tightness test procedure) was in support of the refueling outage. Like Unit 1, Unit 2 was also shutdown due to

deficient LOR/OPEVAL test results. In addition, Unit 2 had one manual scram and four automatic scrams. Four of the scrams were due to equipment failures and the other caused by personnel error.

The addition of an extra operator per shift in the control room noted last assessment period continued to be effective. Operations personnel were aggressive in identifying malfunctioning control room indicators and annunciators, and helped to focus maintenance resources through the use of the "Ten Most Wanted List". This management initiative resulted in fewer malfunctioning control room indicators and annunciators. These actions also continued to result in fewer NRC identified equipment and instrumentation deficiencies in the control room and back panel area. However, nonconforming conditions in other areas of the plant continued to be found by NRC inspectors. An open junction box cover, unlocked high radiation area doors, faulty residual heat removal service water pump mechanical seal, discolored oil in residual heat removal service water pump sight bulbs, and valves out of position are examples of deficiencies that were not found by plant personnel during routine plant tours.

Staffing levels of licensed personnel were strained following the LOR/OPEVAL failures. The licensee operated with four shifts for a six week period until a fifth shift was qualified. Overtime increased from 10 percent to 16 percent for licensed operators when compared with the previous assessment period. This increase occurred because of the reduction in the number of qualified personnel following the LOR failures and activities associated with starting up Unit 2 following its refueling outage. During this period the licensee identified 21 examples where overtime was not preapproved as required. Management oversight in this area has not been totally effective, as similar occurrences were identified in the three previous assessment periods. The licensee has been actively recruiting to fill vacancies in the Operations area. At the end of the assessment period, Operations was reorganized by establishing individual senior reactor operator licensed unit managers, but the Manager - Operations position was vacant.

Standard attire remained in effect for the Operations personnel. Control room demeanor was appropriate. The licensee closed their work window during reactor startups and restricted non-essential entries to the control room to ensure that operators remained focused on plant activities and parameters. Shift turnovers were detailed and accurately relayed plant status.

Four reportable events and four violations occurred as a result of clearance problems, but improvement was evident during the last half of the assessment period. Valve lineup problems persisted as indicated by two violations issued in this area along with other licensee identified mispositioned valves. Real Time Training on valve types and methods to determine their position and weekly system walkdowns are recent measures implemented to correct these discrepancies.

Controlling plant conditions during shutdown improved this assessment period due to increased attention to detail by licensed operators and the new computer display which provided indication and trends of plant parameters important during shutdown.

Several events related to inadequate procedures and failure to implement procedures were noted during this assessment period. The failure to shut a reactor water cleanup valve following the securing of reject flow to the main condenser, failure to follow a main steam leak detection test which resulted in the actuation of main steam isolation valves, and failure to properly place the startup level control valve in service are a few examples where procedures were not followed. The failure to have a procedure that detailed local feed pump operation resulted in improper performance of this evolution and entry into recirculation flow instability Region C. The reactor core isolation cooling system operating procedure was also deficient for not providing complete instructions for resetting the turbine following a turbine trip. The licensee's approach to improving the adequacy of the emergency operating procedures (EOP) revisions was determined to be adequate, and the subsequent validation and verification process was noted as being viable and generally sound.

The LOR and the subsequent OPEVALS found significant operator performance deficiencies. The performance deficiencies were in the areas of command, control, and communication skills; emergency core cooling system manipulative skills and logic/ interlock knowledge; and EOP flowchart usage. Subsequent training and testing showed that improvement has been made in these areas. Communication weaknesses between Operations and other groups still persist as evidenced by the events leading to the Unit 2 scram on August 19, 1990. The licensee has formed a project quality team to establish a communication standard for control room personnel to help correct these discrepancies.

Housekeeping continued to be a strength and improved from the last period. The licensee's manhole project, where manholes were cleaned out and penetrations resealed, helped to reduce the amount of ground water leakage into site buildings. The drywell closeout process remained a strength.

Performance by Operations during plant startup and shutdown was good. Nine startups and three controlled shutdowns were conducted without incident.

Operator actions during off normal conditions demonstrated both strengths and weaknesses. The Unit 2 scram on August 19, 1990, showed that operators were focused on important plant parameters, but were lacking in fine control of systems. Reporting of subsequent actuations during this event and its emergency classification were inadequate. Operator performance during the Unit 2 scram on September 27, 1990, was good. In addition to carrying out the actions required by EOPs, the operators demonstrated good manipulative skills in controlling important plant parameters. In addition, classification and reporting of the event to NRC was in accordance with procedures.

Fire protection inspections showed that program implementation procedures and surveillance procedures were adequate and that the licensee's program met NRC requirements.

Six violations were cited.

2. Performance Rating

Category: 2

3. Recommendations

It is recognized that operator performance deficiencies exhibited during LOR/OPEVAL examinations were brought about, in part, by Operations' willingness to accept minimal training, rather than demanding improvements. Appropriate management attention is needed to correct this problem, as well as assuring continued improvement in procedural compliance and configuration control. A high level of inspection effort is recommended.

B. RADIOLOGICAL CONTROLS

1. Analysis

This functional area addresses those activities directly related to radiological controls and primary/secondary chemistry control, as reviewed during routine inspections conducted during the assessment period and a special review of activities associated with an unplanned radiation exposure to personnel from an unshielded Traversing Incore Probe (TIP).

Management support for the radiation protection and ALARA programs increased significantly during the assessment period. Several dose reduction initiatives designed to improve the ability to identify, control, and reduce collective personnel dose were implemented. Additionally, management was more aware of their role in reducing collective personnel dose.

The collective personnel radiation exposure for 1989 remained high with 1,786 person-rem. However, considering the significant maintenance and modification activities that were performed, the collective doses were not excessive. The Unit 2 recirculation pipe replacement project was the main dose contributor in 1989, with 476 person-rem. The dose received for the pipe replacement job was low considering the amount of work performed. The licensee estimated that 664 person-rem w s saved by performing chemical decontamination of the recirculation system before the work began. Planning for the Unit 1 recirculation piping replacement has incorporated lessons learned from Unit 2. The licensee's collective personnel annual dose through September 30, 1990, was 400 person-rem.

During this assessment period the average area contaminated decreased from approximately 79,000 to 65,000 square feet. During non-outage periods the contaminated area was reduced to as low as 35,000 square feet (approximately 6 percent of the area included in the contamination control program). The total area within the program was lowered with the removal of space impractical to decontaminate due to personnel exposure considerations.

The number of personnel contaminations during non-outage periods decreased significantly in this assessment period from approximately 30 to 3 cases per month. However, the number of personnel contaminations during outage periods did not drop significantly and averaged about 90 per month. The majority of the contaminations occurred during the Unit 2 recirculation pipe replacement. There were 652 personnel contamination events in 1989 and approximately half of those events occurred during the Unit 2 recirculation pipe replacement outage.

There were two events during the assessment period that resulted in unnecessary personnel exposures. However, these exposures did not exceed regulatory limits for internal or external radiation. Each event was attributed to failure to follow procedures. In the first event, several persons were contaminated when a slightly pressurized spent fuel shipping cask released a small amount of contamination following an improper valve lineup for cask flushing. Some of the released contamination sprayed a worker when he attempted to disconnect a flush supply line to the cask. This was the only significant contamination in the otherwise successful spent fuel shipment

program. In a more significant event, which resulted in escalated enforcement and a civil penalty, a licensee technician accidentally withdrew a traversing incore probe (TIP) into his work area. Because of the high dose rates from the TIP, this event had a significant potential for personnel overexposure.

In addition to the above events, there were several instances during the assessment period where the licensee failed to control access to high radiation areas as required by Technical Specifications. Although no unintentional exposures resulted from these occurrences, the frequency of the events and the duration of the problem indicate that licenses corrective actions were not fully effective.

The radiation protection staffing level, including health physics (HP), radwaste, and transportation were considered adequate to support routine and outage operations. The licensee made limited use of contract HP technicians during outage operations to supplement the permanent staff. The overall quality and experience level of the HP staff was considered a program strength.

The liquid and gaseous effluent program was effective. Doses from liquid and gaseous effluents for calendar year 1989 were within the limits of 10 CFR Part 20, Appendix B. These doses showed no significant trends.

The performance of the count room staff and equipment was good. Samples counted in the licensee's count room were in agreement with the Region II mobile laboratory for all measured isotopes. Quarterly, the licensee participated in an extensive split gamma spectroscopic, tritium, gross alpha, and gross beta analyses program with an outside vendor. The results of this program for 1989 and the first quarter 1990 were in agreement for all isotopes.

The radiological environmental monitoring program continued to be effective. A review of 1989's annual Radiological Environmental Operating Report indicated that there were no significant radiological consequences attributable to the operation of Brunswick in 1989 due to airborne, waterborne, aquatic, ingestion, or direct exposure pathways.

During this assessment period, plant chemistry appeared to have been maintained within the guidelines recommended by the BWR Owner's Group and no fuel leakers were identified in either unit. The licensee had implemented hydrogen water chemistry (HWC) in both units to help reduce crack growth rates in reactor coolant system piping and welds caused by intergranular stress corrosion cracking.

The licensee significantly reduced the average volume of liquid radwaste released per month and reduced the average radioactivity in this radwaste over the last three years. The trends are indicative of dedicated work efforts towards achieving established goals for reducing the volume and total curie content released in liquid waste.

Brunswick continued shipments of spent fuel to the Harris site throughout the assessment period. Cask backflushing, which was to be performed prior to shipment to remove some or all of the crud from the fuel and the bottom of the cask, was stopped after one performance due to ALARA concerns. Specifically, Brunswick's radwaste system is not designed to handle the levels of activity in the crud. As the crud also imposes a problem at Harris, a corporate task force was formed to determine the best method for dealing with the issue. At the end of the assessment period this problem remained unresolved.

Two violations were cited.

2. Performance Rating

Category: 2

3. Recommendations

The current level of inspection effort should continue.

C. MAINTENANCE/SURVEILLANCE

1. Analysis

This functional area addresses those activities related to equipment condition, maintenance, surveillance performance, and equipment testing as reviewed during routine inspections conducted during the assessment period.

Overall, performance in the maintenance/surveillance area has been good, with improvement noted throughout the assessment period. The maintenance organization was well staffed. The turnover rate remained low and the relationship with other plant

organizations was good. Twenty-four hour staffing established during the previous assessment period continued, providing quick response for emergent work items. The knowledge level and experience of technicians and mechanics remained high. Personnel rotation within the Maintenance organization was initiated to broaden experience.

The component identification labeling problem discussed in the previous SALP report was effectively addressed through the newly established plant labeling group. In areas where retagging/relabeling had been completed, a recognizable improvement in component identification was noted.

The Automated Maintenance Management System, the Equipment Data Base System, and the Surveillance Tracking and Scheduling Systems continue to be excellent tools in managing maintenance and surveillance. Routine planning and scheduling activities continued the improvement initiated during the last assessment period.

There has been a downward trend in the number of backlog work requests. The backlog was reduced by 46 percent over the last two years and by 23 percent during the assessment period. Work request rework has been maintained below the licensee's goal of less than three percent.

The procedure upgrade program continues on schedule with approximately 56 percent of the original projected scope of 1250 procedures upgraded. The high quality of maintenance surveillance test procedures is a strength.

A significant improvement in emergency core cooling system/ safety system availability was evident over the past two years. Contributing to this were the motor operated valve program, which was successful in reducing valve failures, and improved surveillance procedures that minimized down time during required testing. For example, Unit 2 high pressure coolant injection (HPCI) system unavailability exceeded 10 percent six of eight years from 1981 through 1988. For three of those years, unavailability was in excess of 20 percent. The 1989 and projected 1990 unavailability is approximately 5 percent.

Numerous minor drywell deficiencies were caused by the recirculation piping replacement in Unit 2. Although the drywell closeout process was effective in identifying these deficiencies, processes to prevent the deficiencies were not sufficient. Inspectors have found deficiencies in the closeout of other spaces where the licensee's closeout process has not been as aggressive.

The licensee's predictive maintenance vibration monitoring program was effective in identifying potential failures of rotating machinery such that corrective maintenance could be performed in a planned fashion. Infrared thermography was also used effectively to identify potential equipment failures. Additionally, at the end of the assessment period the licensee was developing an oil sampling program for selected safety related rotating machinery which will also provide early identification of equipment problems.

Modification testing was found to be detailed and comprehensive. Additionally, the number of identified post-maintenance testing issues declined from the previous assessment period.

Corrective actions with regard to the work control interface with offsite transmission maintenance personnel as a result of the June 1989 loss of offsite power event were not effective. This was indicated by errors during maintenance on the Unit 2 station auxiliary transformer watt meter transducer which caused a loss of offsite power to emergency bus E3 in May 1990.

In addition to the event discussed above, other occurrences took place which also illustrate a weakness in work control. Examples cover a broad spectrum from unauthorized removal of a control room ventilation boundary door to unnecessary personnel exposure during a modification to replace traversing incore probes (TIP). Towards the end of the assessment period, the licensee suspended all non-vital work activities for one day, because of the personnel errors involved in such occurrences as the TIP event mentioned above; a removal from service of the wrong reactor protection system motor generator set; failures to control access to high radiation areas discussed in Section IV.B; and the August 19, 1990 reactor scram discussed below. During this work stoppage, work control briefings were conducted with all work groups to review these occurrences. Accordingly, the licensee imposed new requirements for pre-job briefings to be performed by first line supervisors which include, but were not limited to, the following major issues: identification of critical tasks associated with the job; potential consequences of improper job performance; required interfaces; and safety/ ALARA considerations.

Technical Specification required surveillances and periodic tests were generally performed without incident and in accordance with procedures. Five examples of inadvertent engineered safety feature actuations occurred during the performance of surveillances and periodic testing. One of these was of particular significance in that an Instrumentation and Control technician violated a surveillance test procedure causing an automatic closure of main steam isolation valves

which resulted in a Unit 2 reactor scram from 100 percent power on August 19, 1990. Afterwards, the technician falsified the test procedure documentation and persuaded a second technician to do the same. At the end of the assessment period this event was the subject of pending escalated enforcement. Prior to this, the plant had gone six years without personnel error during a maintenance surveillance test causing an automatic scram during operation.

The number of cases of shorted instrument leads causing actuations and isolations had declined from the previous assessment period. Contributing was the licensee's progress in installing test jacks to simplify instrument lead connections.

Frequent observation of surveillance test activities indicated that personnel were technically knowledgeable of the procedures, components, and systems involved. However, coordination with operators in the control room was not always well disciplined.

In response to inservice inspection (ISI) and inservice test IST program weaknesses addressed in the previous SALP report, the licensee implemented ISI Nuclear Generation Group guidelines. Observations during the latter portion of the assessment period indicated that this program enhancement had been effective in preparing IST program revisions in response to Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs.

Five violations were cited.

2. Performance Rating

Category: 2 (improving)

3. Recommendations

The current level of inspection effort should be maintained.

D. EMERGENCY PREPAREDNESS

1. Analysis

This functional area includes evaluation of activities related to the implementation of the Emergency Plan and procedures, as well as support and training of onsite and offsite emergency response organizations as reviewed during emergency exercises and routine inspections.

Management support to the emergency preparedness program was sufficient to achieve corrective action in response to NRC findings; however, management support was not always sufficient to assure a completely effective program. For example, the 1990 emergency exercise corrected the 1989 exercise weakness of an unchallenging scenario; however, the 1990 exercise resulted in additional NRC findings for unsatisfactory performance in providing timely offsite notifications and providing complete protected area personnel accountability. 1990 findings required an early remedial drill to demonstrate adequate corrective action. This early demonstration of corrective action also supported the State of North Carolina and the Emergency Planning Zone (EPZ) counties in their remedial exercise required by FEMA. The presence of management support in the remedial exercise was evident as both the licensee, State of North Carolina, and EPZ counties fully demonstrated effective corrective actions.

Adequate staffing levels for responding to an emergency were demonstrated during the emergency exercise. Shift augmentation was timely during the 1990 emergency exercise. The licensee demonstrated a full augmentation drill with travel to the site during this SALP period that was satisfactory, and the frequency of beeper augmentation drills has been increased from quarterly to monthly. Emergency preparedness coordination and support for coordination, at both site and corporate levels, was sufficient as indicated by the difficult exercise scenario and effective control observed during the annual exercise. The emergency preparedness training program was effective from a performance aspect as demonstrated during inspection walk-throughs. However, training needed improving as reflected by a violation identified for failing to maintain training current for several members of the emergency organization. This problem was corrected by a training tracking system implemented later during the assessment period.

The licensee's audit program was adequate and the licensee's self-critique of the annual emergency exercise was effective in identifying numerous areas requiring corrective action. The licensee has an Emergency Preparedness Tracking System in place to ensure proper followup action on weaknesses identified during exercises and drills.

The licensee's performance in actual emergency classifications was satisfactory with one exception. There were six events requiring emergency classifications during the rating period. No problems were noted in the areas of classification, notification, or activation for five of the events. The sixth event, however, resulted in a late classification of an Unusual Event. This event classification was not declared until after discussions with the NRC resident staff.

The licensee continues to maintain adequate facilities and equipment to respond to an emergency, including the Technical Support Center, the Emergency Operations Facility and communications equipment. During the assessment period, the licensee moved the media center to the Sutton plant as recommended by FEMA. The licensee has also reviewed their facilities for the most efficient integration of the NRC's Incident Response organization into their organization, space, and equipment capabilities.

The licensee submitted two revisions to the Brunswick Emergency Plan during this assessment period. The changes were administrative in nature and were consistent with existing guidance and regulatory requirements in all cases.

Two violations were cited with one related to an event that occurred in the previous assessment period.

2. Performance Rating

Category: 2

3. Recommendations

The present level of inspection effort should continue.

E. SECURITY AND SAFEGUARDS

1. Analysis

This functional area addresses those security activities related to protection of plant vital systems and equipment, as viewed during routine inspections of the security program, three inspections of the protection provided for rail shipments of irradiated fuel, and a Regulatory Effectiveness Review (RER).

Inspection of the security program during this assessment period confirmed continued effectiveness in the implementation of security program requirements and personnel performance. Site management and corporate support of the security program was evident by the effectiveness of daily security operational activities and the attitude and motivation displayed by members of the contract Security Force. The Security Force's commitment to training and job skills was further evidenced by their winning of first place in the annual weapons competition among the Licensee's three nuclear facilities. This event was enthusiastically supported by senior plant management.

Management of the Security Program was enhanced by the addition of a Senior Security Specialist and a Security Technical Aide which helped reduce the routine workload on security management.

The licensee has established a program that includes several innovative initiatives to upgrade and enhance the security program. Security computers have been equipped with additional backup power to augment the Uninterruptable Power Supply System to preclude power fluctuations and enhance computer reliability. The security radio communications systems have been upgraded with improved signal repeaters, antennas, and portable radios. The system now provides a valid two channel capability. Electric card readers have been installed at the Operations Support Center and Technical Support Center to improve accountability capability. Active projects are in place to change out aging card readers, alarm system multiplexers, and closed circuit television cameras. Upgrade of the E-Field intrusion detection equipment to improve operability and reliability and reduce nuisance alarms is on-going.

Monthly meetings between maintenance, engineering and security are conducted to improve communications and coordination of security related projects and programs. The submission of security plan revisions continues to be timely with few revisions requiring further discussion, verification, or change. The licensee appropriately logs and submits reports of safeguards events in accordance with regulatory requirements. The aggressive and effective audit program established by the licensee continues to be beneficial to the overall implementation of the security program. The day-to-day security operations, transportation of irradiated fuel and contractor screening programs are all subjected to recurring audit.

In the areas of compliance with regulatory requirements and physical security plan commitments, the level of effectiveness demonstrated during previous assessment periods has continued. The RER conducted in January 1990, noted six safeguards strengths and did not identify any violations of regulatory requirements or safeguards vulnerabilities. However, several minor areas of concern related primarily to security systems and equipment were identified. Prior to the end of the assessment period both short and long term corrective actions had been implemented or initiated for the RER findings.

No violations were cited.

2. Performance Rating

Category: 1

3. Recommendations

A reduced level of inspection should continue in this area.

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 surveillance, and licensed operator training as reviewed during routine and special inspections conducted during the assessment period.

Design change program deficiencies were identified during this assessment period. Although design change development controls were improved and post modification testing was good, the NRC identified deficiencies related to implementation and close-out of design changes. The Unit 2 recirculation system piping replacement enhanced plant safety by correction of intergranular stress corrosion cracking problems; however, implementation demonstrated performance deficiencies. These deficiencies included engineering procurement controls, technical oversight of vendor services, internal communications, and weld performance quality. Subsequent to NRC identification, corrective actions were taken for the deficiencies and the modification was successfully completed. Other examples of deficiencies in the design change process involved procedures, environmental qualification documents, and simulator updates which were not accomplished following modification installation.

Initial operator licensing examinations were administered in November 1989, to seven senior reactor operators (SROs) and five reactor operators (ROs) with seven SROs and three ROs passing. An identified weakness in these initial examinations was the simultaneous use of multiple emergency operating procedures (EOPs) by the operators.

The licensed operator requalification (LOR) training program was rated as unsatisfactory based on a 35 percent pass rate during the May 1990 LOR examinations. Twelve SROs and eight ROs were examined individually and as four crews of five operators on the simulator. Three SROs and four ROs passed. One of four crews passed. Identified weaknesses included SRO command and control, communications, awareness of plant status, emergency core cooling system operations, and EOP flow chart usage. Three follow-up operational evaluations (OPEVAL) were administered by the NRC subsequent to the LOR examinations. The immediate

follow-up OPEVAL in May 1990, which identified as unsatisfactory four of four crews and eight of 27 operators, resulted in only two crews being considered satisfactory for operation of the plant. Consequently, the licensee shutdown both units and a Confirmation of Action letter was issued requiring the Regional Administrator's approval for restart. While the second OPEVAL conducted in June 1990 demonstrated improvement, only two of three crews and 16 of 21 operators performed satisfactorily, enabling the units to restart with the minimum contingent of four satisfactory crews. The third OPEVAL conducted in July 1990, still resulted in only one of two crews and nine of 12 operators passing.

The training deficiencies revealed by the LOR and the immediate follow-up OPEVAL examinations were of such depth and scope as to warrant shutdown of both units for 21 days to accomplish remedial training, which was still only partially successful. It was apparent from these training deficiencies that management's support and involvement in the training program was inadequate--reflecting their failure to recognize and appropriately assess the requalification needs of the licensed operators.

Licensee's corrective action for requalification weaknesses included interim and long term initiatives. Interim corrective action involved intensive retraining of operators. Improved operator performance was demonstrated in the second and third OPEVALs. Licensee analysis of program deficiencies and proposed corrective actions submitted to the NRC addressed the identified weaknesses. Long term corrective actions were incorporated into the Brunwsick Integrated Action Plan (IAP) with completion dates in the next assessment period. Among the corrective action commitments were the following: increased required simulator time for operators, increased management involvement in operator licensed training activity, and development of a self-assessment capability for the operator training program. Licensee corrective actions for training program weaknesses were progressing on schedule at the conclusion of the assessment period.

As indicated above, Engineering and Technical Support issues were included in the licensee's comprehensive schedule to improve plant performance in safety related activities encompassed by the IAP. The licensee met IAP scheduled commitments related to Engineering and Technical Support. IAP commitments included organizational, program, and process changes. Although these actions represent potential improvement in capability, the elapsed time since implementation was inadequate to assess effectiveness on overall performance. An important element to improve engineering support was a comprehensive Nuclear Prioritization Process which was developed

and implemented to provide a more effective management tool for determining engineering work priorities. The previous backlog of Engineering Work Requests (EWRs) and vendor recommendations have been entered into the process.

Other improvement actions included design information consolidation and actions to address weaknesses from the previous assessment period. A System Design Criteria Documentation activity was on schedule. Towards the end of the assessment period, the Design Turnover Project was expanded into a Design Bases Reconstitution Program, due, in part, to design deficiencies in safety-related systems that were identified during this assessment period. Engineering and Technical Support procedures have been updated to accurately reflect existing organizations and responsibilities. Definition of interfaces has improved and this issue has been monitored by licensee audits. The EWR program has improved and the EWR backlog was significantly reduced. Program controls were upgraded and the timeliness of operability and reportability reviews was also improved.

Performance in the Technical Support area has shown some improvement as a result of IAP initiatives and increased involvement in plant activities. For example, maintenance and component engineers provided timely support to the maintenance organization. System engineers identified portions of the reactor water cleanup system which were not afforded leak detection/isolation capability, as well as detecting the reversal of local power range monitor cables. The Technical Support System Engineering (SE) program was strengthened by the establishment of well defined functions and responsibilities. Weaknesses related to training and experience level were not fully resolved although actions were initiated to address these issues. A training schedule and set of training requirements were developed, and management monitored individual SE training status; however, demonstrable results were limited (i.e., few SEs completed the certification process). Near the end of the assessment period a career path was established to provide incentive for retaining experienced staff; however, the turnover rate remained high during the assessment period. Active recruiting has increased staff levels and nearly eliminated contractor positions. Technical support activity by SE, maintenance, and component engineering was well documented and demonstrated an active interface with plant and design organizations.

During the assessment period the licensee continued its program to upgrade the simulator facility. Completed upgrades resulted in a simulator more representative of actual plant conditions. However, followup investigation of the August 19, 1990 Unit 2 scram revealed that plant hardware changes performed under

direct replacement prior to March 1989, were not incorporated into the simulator. The licensee was taking actions to correct this problem at the end of the assessment period.

Six violations were cited with two related to events that occurred in the previous assessment period.

2. Performance Rating

Category: 3

3. Recommendations

Although IAP related initiatives and improvements were recognized in Engineering/Technical Support, the performance rating in this area was heavily influenced by the unsatisfactory LOR training program and initial design/implementation problems encountered during the Unit 2 recirculation piping replacement. Increased management attention and involvement is necessary to bring about the desired improvements in these specific areas without jeopardizing other improvement efforts observed within this functional area. Inspection effort in this area should remain high.

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 (10 CFR 50.59 reviews); safety review committee activities and use of feedback from self assessment programs and activities. In addition to routine inspections, several followup inspections were conducted to determine the licensee's progress on their Integrated Action Plan.

Management interest and involvement in safety reviews have shown improvement since the last assessment period. A standard corporate methodology for the performance of safety reviews that provided a more formal 10 CFR 50.59 program based on Nuclear Safety Analysis Center (NSAC)-125 was developed and implemented. Approximately 250 plant personnel have been provided training in this area. Plant management visibility in the power block continued to demonstrate their dedication to identification and correction of potential plant problems. When unit trips or plant problems occurred, management was supportive of Operations and their technical staff by providing vendor/consulting assistance when needed and ensuring that adequate

time was allotted to permit a comprehensive review of issues or concerns prior to plant restart.

Licensee management has generally been conservative in their approach to the resolution of safety issues. This was particularly noted with the resolution of the instantaneous over current trip relay problem identified on a nuclear service water pump. In addition to resolving the individual problem, 117 additional relays of this type were inspected to verify that a generic problem did not exist. However, the operability of a diesel generator following two failures of the engine driven jacket water cooling pump and design problems associated with the containment atmospheric dilution system were not vigorously pursued without NRC involvement.

As previously discussed in Section IV.F, one of the most significant deficiencies identified during this period was the unsatisfactory licensed operator requalification (LOR) training program. This deficiency was of such magnitude, that when revealed by NRC administered examinations, the licensee decided to shutdown both units for a period of 21 days to affect retraining of the licensed operators. The failure to detect such a deficiency revealed a significant weakness in existing licensee assessment programs.

The licensee, in response to a previously identified SALP problem of not getting the right people involved in safety reviews, has provided increased focus on Site Incident Investigation Team (SIIT) investigations of reactor events. These teams, comprised of personnel the licensee believes to have the best knowledge and ability to investigate the event, have demonstrated a more comprehensive performance than past investigation efforts. It was noted that the Chairman of the SIIT and four of the other nine members had not received root cause training. Root cause training has been conducted for 78 personnel with additional training scheduled in 1990. Although the added management attention in this area appears to be achieving improved results, some weaknesses still exist in the depth and scope of the licensee's investigation of events. This was the case with the less than effective followup seen on the blown feedwater control system fuse which caused the August 16, 1990 Unit 2 reactor scram.

LER quality was considered good and covered all major aspects of each event. Report details were extensive and supplemental reports were provided if needed. The licensee program for reporting defects and non-compliances, as required by 10 CFR 21,

was effective. The addition of staff personnel with SRO experience to the Regulatory Compliance area provided additional depth and experience to the above functions.

The previous deficiencies involving the decrease in staff level and lack of independent reviews by the Onsite Nuclear Safety (ONS) group have been corrected. The group is fully staffed and a principal engineer with an SRO license was added to improve the group's capability. This group was aggressive in providing: 24 hour coverage of Unit 2 restart after the refueling outage, a detailed assessment of the Unit 2 loss of offsite power event, and assistance in standardizing plant performance indicators. Their followup on industry issues and advisories led to the identification of shelf life problems and needed replacement of large safety-related fuses. They routinely conduct pre-outage and pre-startup workshops to update plant personnel on industry and plant problems. Corporate Nuclear Safety did not exhibit the same strength. They appeared to be understaffed, did not have a good priority system established, and suffered from an increasing backlog.

Onsite Quality Control inspections were satisfactory and focused on safety systems. Quality Assurance has successfully implemented performance based audits. The improvement in quality of audits was especially noted in the as-low-as-reasonably-achievable (ALARA) and the electrical distribution system (EDS) audits. Inspection personnel were aggressive and willing to make broad based conclusions regarding the findings of the above audits. A delay in the assignment of responsibility for followup of identified problems associated with the EDS audit led to a delay in initiating resolution of these issues.

The licensee's Integrated Action Plan (IAP) to address the results of their self-assessment and the findings of the NRC Diagnostic Evaluation Team (DET) report appeared to be progressing with some positive results. At the March 1990 IAP status meeting, the licensee provided considerable data on development of programs to meet the due dates for the IAP action items, but there was no description of their actions to reach the final objectives of those programs (i.e., improved safe performance). It was only in reaction to concerns raised by the NRC at that meeting that the licensee implemented a multi-level independent review process to determine if the IAP programs are being effective in achieving their stated objectives. However, long-term effectiveness of the IAP has yet to be seen, in part, due to the large scale of some actions which require more than a short implementation period.

The licensee has met the majority of IAP milestones and established schedules. The extensive efforts to improve

communications, achieve feedback, and instill a sense of ownership appeared to be gaining acceptance. Completed site specific corrective action program improvements included: promoting identification of plant problems by plant staff, lowering the threshold for identification of plant problems and significant non-conformances, and improving trending. The development of an improved trending program and increased management attention on the repair of main control board and safety system discrepancies, has resulted in a significant increase in safety system availability and allowed the plant to achieve the first main control board annunciator "black board" at one point during the assessment period. The formal identification of Operation's "Ten Most Wanted" Job Order/Work Requests and the plant's "Ten Most Needed" modifications have permitted each area a better input into the plant priority system.

In response to a concern raised in the last SALP regarding untimely requests submitted to NRR, the licensee adopted an 18 month agenda for required licensing actions to ensure that the plant, corporate, and NRR have the same priority and are working toward common goals. This has resulted in improved internal and NRC communications on these items.

The licensee's response to the Bulletins and Generic Letters has been timely and has met staff requirements. No emergency Technical Specification changes were requested. The licensee has been prompt in submitting requests for temporary waivers for their Technical Specifications interpretations and requests for changes to the Technical Specifications in response to the DET findings. The "no significant hazards considerations" evaluations were generally adequate. Good communication with the NRR staff during meetings, telephones calls, and other discussions for resolution of licensing activities was maintained.

Licensee submittals and responses to the staff's requests for additional information were adequate, however, in some cases, submittals were incomplete. For example, the licensee's proposed amendment to increase the allowable primary containment leak rates specified in Technical Specifications did not consider the contribution from main steam isolation valve leakage. In the licensee's submittal of the inservice testing second ten-year interval program, the staff identified that the licensee had misinterpreted certain Code requirements.

The licensee demonstrated a good technical understanding of the safety issues in most of their submittal packages and during the staff's onsite review. For example, during staff review of the licensee's requested exemption from Appendix R requirements, the staff's evaluation of the suggested changes confirmed the validity of each change prepared by the licensee. The technical

supporting material in each case was clear and appropriate. The combination of management involvement and licensee understanding of the issue during the preparation of their suggested changes was evident, as no additional information or clarification was required.

No violations were cited.

2. Performance Rating

Category: 2

3. Recommendations

The inability of existing assessment programs to detect deficiencies such as those revealed in the LOR training program is disturbing. Appropriate management attention is required to assure scheduled IAP related improvements in your Nuclear Assessment Program address/correct this problem. A high level of inspection effort should be maintained.

V. SUPPORTING DATA

A. Licensee Activities

The licensee operated Unit 1 with an availability factor of 91.63 percent. The assessment period started with Unit 1 at full power. The Unit entered a refueling outage on September 27, 1990, just prior to the end of the assessment period. During the shutdown for the outage, the unit scrammed from approximately 22 percent power while testing turbine stop/control valves. This was the only Unit 1 scram during both the assessment period and the fuel cycle. Unit 1 had three forced outages: September 21 through September 25, 1989, for Hurricane Hugo; November 16, 1989, to repair a stuck open drywell-to-torus vacuum breaker; and May 20 to June 11, 1990, due to unsatisfactory NRC administered licensed operator examinations. The refueling outage is scheduled to be completed by February 20, 1991, with recirculation system pipe replacement being the major work item.

Unit 2 started the assessment period at 83 percent power, in an end-of-cycle coastdown towards its refueling outage which began on September 8, 1989. Major work during the outage was recirculation system pipe replacement. The Unit restarted on March 10, 1990, but was manually scrammed on March 13, 1990, at low power when a safety/relief valve failed to reclose during startup testing. Following repairs, the unit restarted on March 15, 1990, but shutdown again from April 6 to April 9, 1990, to correct leakage problems on safety/relief valves A and C. Normal power operations were conducted until the May 20, 1990 shutdown prompted by unsatisfactory NRC administered examination results. Restart occurred on June 11, 1990, and the unit

conducted normal power operations except for experiencing three reactor scrams in August 1990, and one on September 27, 1990. The unit restarted from the September 27, 1990 scram on the last day of the assessment period, and operated with an availability factor of 44.39 percent.

As a result of licensee self assessments and NRC Diagnostic Evaluation during the previous assessment, the licensee implemented the Integrated Action Plan to consolidate corrective actions.

Management changes were made at the corporate and site level, all in the last two months of the assessment period: the Senior Vice President-Nuclear Operations acquired an eighteen month loaned executive from INPO as an assistant; an additional Vice President position of Special Nuclear Projects was established and staffed by the former Vice President-Nuclear Services, which was refilled from outside the utility. The previously vacated site Training Manager position was temporarily filled by a two year loanee from INPO. Operations was reorganized by establishing individual SRO licensed unit managers. Non-licensed shift managers were being provided for each shift to improve interactions with other facility organizations. The former Manager-Operations moved to Manager-Radioactive Waste/Fire Protection. The Manager-Operations position was vacant at the end of the assessment period.

B. Direct Inspection and Review Activities

During the assessment period, 52 routine, one special, and two reactive inspections were performed at Brunswick by the NRC staff. In addition, extensive efforts were expended during licensed operator requalification (LOR) examinations and subsequent operational evaluations (OPEVAL). The special and reactive inspections, as well as the LOR and OPEVAL examinations, are as follows:

- January 22-26, 1990; Regulatory Effectiveness Review
- July 9-13, 1990: Reactive Inspection of July 5, 1990 traversing incore probe (TIP) withdrawal event
- August 21-25, 1990; Augmented Inspection Team investigation of August 19, 1990 Unit 2 reactor scram
- May-July, 1990; LOR and OPEVAL examinations

C. Escalated Enforcement Actions

1. Orders

None

2. Civil Penalties

Severity Level III violation for failure to promptly identify and correct service water system deficiencies. ($75,000 CP) - (This problem was addressed in the previous SALP report).

Severity Level III problem for activities associated with the inadvertent TIP withdrawal event of July 5, 1990. ($62,500 CP)

D. Management Conferences

During the assessment period there were eleven management conferences with the licensee. These included: Integrated Action Plan status meetings; meetings concerning corrective action with respect to licensed operator requalification training; and Enforcement Conferences involving the matters discussed in Section V.C.2 above.

E. Confirmation of Action Letters (CAL)

May 16, 1990 - Addressed actions to be taken with regard to deficiencies identified during operator requalification examinations.

May 21, 1990 - Susperseded May 16, 1990 CAL. Addressed actions to restart both units, which were voluntarily shutdown on May 20, 1990, due to poor results on operational evaluations that were conducted in accordance with the May 16, 1990 CAL. Long term corrective actions to improve licensed operator requalification program were also addressed.

F. Reactor Scrams

Unit 1

One automatic scram occurred:

September 27, 1990 - The unit scrammed from 22 percent power during shutdown to its refueling outage while conducting a turbine stop/control valve tightness test with the generator separated from the grid.

Unit 2

Three automatic scrams with reactor power greater than 15 percent occurred:

August 16, 1990 - The unit scrammed from full power due to high water level when a blown fuse in the feedwater level control system caused feed flow to unnecessarily increase to maximum.

August 19, 1990 - The unit scrammed from full power due to automatic main steam isolation valve closure. This was caused by an inadequately controlled/performed surveillance test of the low condenser vacuum auto closure function.

September 27, 1990 - The unit scrammed from full power due to loss of excitation on the generator causing a full load reject and resultant turbine trip/reactor scram. The loss of excitation was due to a faulty voltage regulator.

One manual and one automatic scram from low power occurred:

March 13, 1990 - The unit was manually scrammed from low power when safety/relief valve G failed to reclose during startup testing.

August 30, 1990 - The unit scrammed from nine percent power during startup due to a water level transient caused by a broken air supply line to the startup level control valve.

G. Review of Licensee Event Reports

During the assessment period a total of 41 LERs were analyzed. Not included are events later in the period for which LERs had not yet been issued. The distribution of these events by cause, as determined by the NRC staff, was as follows:

Cause	Unit 1 or common	Unit 2	Total
Component Failure	3	9	12
Design	3		3
Construction, Fabrication, or Installation	1	1	2
Personnel			
- Operating Activity	3	3	6
- Maintenance Activity		1	1
- Test/Calibration Activity	1	4	5
- Other	3	1	4
Other	5	3	8
Total	19	22	41

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

During the assessment period the staff completed 61 licensing activities. This included the issuance of 15 Technical Specification amendments; the granting of one relief request; completion of 24 (non-amendment) safety evaluations; and review of eight generic letters, four bulletins, and two MPAs.

I. Enforcement Activity

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	Dev.	V	IV	III	II	I
Plant Operations			6			
Radiological Controls			1	1		
Maintenance Surveillance		1	4			
Emergency Preparedness			2			
Security						
Engineering/Technical Support		1	4	1		
Safety Assessment/Quality Verification						
TOTAL		2	17	2		