

ENCLOSURE
INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

Inspection Report Number

50-325/92-30 AND 50-324/92-30

Carolina Power & Light Company

BRUNSWICK UNITS 1 AND 2

NOVEMBER 3, 1991 - OCTOBER 31, 1992

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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 licensee management regarding the NRC's assessment of their performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on December 9, 1992, to review the observations and data on performance and to assess licensee performance in accordance with 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 November 3, 1991, through October 31, 1992.

The SALP Board for Brunswick was composed of:

- J. R. Johnson, Deputy Director, Division of Reactor Projects (DRP),
Region II (RII) - (Chairperson)
- J. P. Stohr, Director, Division of Radiation Safety and Safeguards, RII
- A. F. Gibson, Director, Division of Reactor Safety, RII
- E. G. Adensam, Director, Project Directorate II-1 (PD II-1), Office of
Nuclear Reactor Regulation (NRR)
- D. M. Verrelli, Chief, Reactor Projects Branch 1, DRP, RII
- R. L. Prevatte, Senior Resident Inspector - Brunswick, DRP, RII
- R. H. Lo, Senior Project Manager, Project Directorate II-1, NRR

Attendees at SALP Board meeting:

- F. J. Congel, Director, Division of Radiation Protection and Emergency
Preparedness, NRR
- H. O. Christensen, Chief, Reactor Projects Section 1A, DRP, RII
- R. E. Carroll, Project Engineer, DRP, RII
- M. T. Markley, Operations Engineer, Performance and Quality Evaluation
Branch, NRR
- V. L. Ordaz, Reactor Engineer Intern, NRR

II. SUMMARY OF RESULTS

Overall performance in the area of Plant Operations was good. Licensed operators performed well when challenged by plant events, transients, and equipment failures. A slight decline in command, control and communication was apparent; however, operators were generally considered professional and knowledgeable of plant systems and procedures. Problems involving configuration control continued, and ineffective supervisory oversight contributed to a decline in plant housekeeping and material condition. Performance in this functional area during the second half of the assessment period decreased due to the lack of a recovery plan, weak supervisory oversight and operator lapses in attention to detail. There was a significant reduction in the number of operator work-arounds; and an adequate fire protection program was maintained.

The improving trend exhibited in Radiological Controls last assessment period also continued during this period. The licensee's radiological control programs were effective in controlling personnel exposure and limiting effluent releases. Exposure reduction efforts (which also included initiatives to reduce future exposure) were successfully performed. Efforts to reduce the volume of shipped radioactive waste and to clean up the spent fuel pools were considered aggressive. However, an inadequate inventory and evaluation led to a startup source being breached during fuel pool cleanup activities--resulting in an uptake of americium by one worker and the spread of alpha contamination throughout the Unit 2 refueling floor. In addition, examples were identified where inoperable radiation monitors remained out-of-service for significant periods of time.

Performance in the Maintenance/Surveillance area was acceptable, but was significantly challenged by a continuation of work control problems. There was a significant improvement noted in emergency diesel generator maintenance and the Surveillance Test Scheduling System continued to be an effective tool to assure timely conduct of testing. However, poor overall maintenance practices, equipment failures and deferred maintenance adversely affected performance in the Operations, Security and Engineering/Technical Support areas. During the second half of the assessment period, efforts were initiated to reduce the maintenance backlog and correct work control program deficiencies.

Emergency Preparedness (EP) was maintained in a state of operational readiness. Good response capability was demonstrated during the annual EP exercise. Classification of actual events was proper with offsite notifications being appropriately made. Licensee response to a toxic chlorine gas leak disclosed program response weaknesses with regard to non-radiological hazards. Additionally, training of EP response personnel continued to be an area of concern, as failures to conduct required first aid training were identified.

Over the assessment period, performance in the Security area was considered to be good. The site's contract security force typically

performed well, reflecting management's support for an effective training program. However, initial response effectiveness on two separate events was reduced as members of the security force were not respirator trained and qualified. Also identified by the NRC were several examples of failure to control vehicle access and inadequate escorting of visitors. Additionally, maintenance of security barriers and alarms was not timely or effective, resulting in considerable utilization of security officers for compensatory measures. During the latter part of the assessment period an increase in management support was seen through the completion of the protected area perimeter upgrade project and other equipment improvements.

Initially limited by equipment failures and a large, poorly managed backlog of plant deficiencies, performance within the Engineering/Technical Support area became more effective later in the assessment period as additional engineering resources were allocated and the backlog of engineering work was prioritized. System engineers were well qualified and knowledgeable of their assigned systems. Operator training improved since last assessment period as evidenced by the excellent results on requalification examinations. Due to previous inadequate engineering evaluations, long-standing structural deficiencies went uncorrected until actions were prompted by NRC. The quality of design related work was inconsistent, with identified discrepancies resulting from inadequate contractor oversight and use of draft and/or inadequate procedures.

Performance within the area of Safety Assessment/Quality Verification continued to be inconsistent. Significant management changes were made at the site and corporate level, and a Staff Assistance Team was implemented to assist site management in identification of procedural and process improvements. The previously established Site Incident Investigation Team process was effectively utilized, and the licensee's response to generic issues was well performed. However, despite improvements in problem identification, minimal corrective action followup and management support limited the overall effectiveness of self-assessments and Quality Control. Midway through the period, structural verification programs were implemented (after prompting by NRC) to identify/correct long-standing deficiencies involving safety-related wall anchorages and miscellaneous structural steel. Following implementation, NRC identified a number of quality assurance related problems adversely impacting the miscellaneous structural steel verification program.

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

III. CRITERIA

The evaluation criteria which were used to assess each functional area are described in detail in NRC Manual Chapter 0516, which can be found in the Public Document Room. Therefore, these criteria are not repeated here, but will be presented in detail at the public meeting held with the licensee management on January 14, 1993.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area addresses the control and performance of activities directly related to operating the facility, as well as fire protection.

Power Operations (Pre-April 21, 1992)

The plant was generally operated in a safe and conservative manner, with power operations being conducted until an extended dual unit outage began on April 21, 1992. During this first half of the assessment period, two automatic reactor trips occurred on each unit -- three attributable to plant equipment failures and the other a faulty test meter. Unlike Unit 1 (which essentially conducted normal power operations), Unit 2 started the assessment period in a refueling outage. Excluding the reactor trips, Unit 2 was subsequently forced to shutdown and/or reduce power nine times to rework items that had been repaired or modified during that refueling outage.

The performance of licensed operators was considered good during the four reactor trips, as well as during the startups, shutdowns and power maneuvers that occurred in the first half of the assessment period. Equipment problems continued to provide significant challenges to plant operators, but were handled very well.

For the most part, control room shift turnovers and pre-job briefings continued to be detailed and thorough. Plant operators as a whole were professional; knowledgeable of plant systems, as well as general and emergency operating procedures; and were responsive to plant annunciators. Additionally, the operators continued to achieve excellent overall results on licensed operator requalification examinations.

Problems involving configuration control continued during this period. Several adverse condition reports (ACRs) were written between November 1991 and March 1992 covering mispositioned valves. The licensee's corrective actions were unable to prevent recurrence, as each case was treated as an isolated event with no common thread to indicate performance breakdown. Also, performance in command, control, and communications (which was identified to have improved in the previous assessment period) declined somewhat. This decline was noted during simulator exams, and was apparent in the control room during routine operations and outages. In addition, log keeping was weak, having significant room for improvement.

Staffing was adequate to support five shifts of routine watchstanding and required training. However, the licensee's long-range planning did not provide a sufficient number of personnel in licensed operator training to permit an orderly transfer of operations-experienced personnel to other sections. This was evident by the use of contractors as Shift Technical Advisors and training instructors, as well as by unsuccessful attempts to meet management expectations. This problem was temporarily addressed through the short-term overstaffing of some positions.

Ineffective supervisory oversight contributed to a decline in plant housekeeping and material condition. Late in the assessment period, the assignment of a unit specific management staff was made to provide added focus on supervisory oversight.

Although operators identified a considerable number of adverse conditions, a significant number of inoperable and/or disabled annunciators, temporary and permanent caution tags, jumpers and lifted leads, and other operator work-arounds continued to be tolerated. Many of these conditions had existed for several years and were common knowledge to operators and plant management. After these conditions were brought to the attention of licensee management by several NRC inspections conducted in early 1992, the licensee initiated actions in an attempt to address this problem.

Shutdown Operations (Post-April 21, 1992)

On April 21, 1992, the licensee shut down both units due to concerns with the seismic qualification of diesel generator building interior walls. The units remained shutdown for the remainder of the assessment period.

After the dual unit shutdown, the licensee's staff struggled with known equipment problems, as well as confusing and deficient schedules and priorities. During the first few months, no clear priorities were established and only items that could be rapidly returned to service were removed from service and worked. No meaningful schedule existed. The lack of a plan and schedule with established goals and standards, weak supervisory oversight, and operator lapses in attention to detail resulted in a decreased performance during the second half of the assessment period. One such example was the inadequately controlled Unit 1 reactor water level draining evolution which resulted in the inadvertent low level isolation of shutdown cooling on October 2, 1992.

Licensee corrective action efforts during this period did lead to a reduction of operator work-arounds and temporary conditions by approximately 50 percent. However, other items such as long-standing Technical Specification Interpretations did not receive the same degree of attention.

Fire Protection Program

The licensee continued to maintain an adequate fire protection program. Positive features of the program were good adherence to fire prevention procedures and the conduct of comprehensive critical self-assessments and audits. Corrective actions related to previously identified fire brigade communications difficulties during fire drills and an actual fire were on schedule for completion in 1993.

During the assessment period five violations were cited.

2. Performance Rating

Category: 2

3. Recommendations

None.

B. Radiological Controls

1. Analysis

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

The radiological control (RC) programs continued to be effective during the assessment period in controlling the exposure of plant personnel to radioactive materials and limiting effluent releases to the environment. Typically, internal and external exposures were a relatively small percentage of regulatory limits with no exposures in excess of applicable limits.

The licensee continued to maintain a stable and well qualified RC organization supported by an adequate continuing training program. To further strengthen the organization, several staff reassignments were implemented during the assessment period. Sufficient numbers of qualified technicians were available to support both outage and non-outage radiation protection activities. Staffing in this area was further enhanced by achieving a high return rate for contractor technician support for the outage.

Collective dose for the previous assessment period was about 1660 person-rem as compared to 606 person-rem for the current assessment period. In general, the licensee was effective in controlling collective dose during the assessment period for the work required to be done. Supervisory control was generally adequate, with the notable exception of several instances where workers were in areas requiring radiological work permit (RWP) authorization who were not active on an RWP or were active on an incorrect RWP for that particular area.

During this assessment period, the licensee successfully performed exposure reduction efforts which included: chemical decontamination of the recirculation system piping, increased use of temporary shielding, nozzle flushes, and increased use of video cameras. Through these efforts, the licensee estimated a net savings of 555 person-rem. Other initiatives by the licensee this period to reduce future exposure included: clean up of the Unit 1 and Unit 2 Spent Fuel Pools, aggressive use of video cameras, addition of a surrogate tour system, and hydro-lasing floor drains in the turbine building to reduce the out-of-core source term.

The licensee continued to effectively control contaminated surface area until the americium/beryllium event (discussed

below) in September 1992. Overall, the average contaminated surface area remained relatively high, but continued to trend downward with respect to previous assessment periods. Personnel contamination events for the previous assessment period were 327 as compared to 173 for the current assessment period.

The licensee failed to maintain an adequate inventory and failed to perform an adequate evaluation, which resulted in a 5.4 curie americium/beryllium startup source being breached during the Unit 2 fuel pool cleanup evolution. As a result, one worker received an uptake of americium, although it was below 10 CFR 20 limits. During this event, alpha contamination was spread throughout the Unit 2 refueling floor. Although initial licensee actions to control the spread of the contamination could have been more aggressive, the licensee performed appropriate followup actions. Licensee offsite surveys and evaluations confirmed that environmental limits were not exceeded. At the end of the assessment period an extensive decontamination effort of the refueling floor was underway to reclaim the area and to eliminate the risk of alpha contamination to outside areas.

Liquid and gaseous effluent control programs were effective. The sum of all releases represented less than two percent of Technical Specification limits. The licensee's effluent monitoring program was enhanced by modifying the main stack isokinetic probe, as well as by the effort to maintain the turbine building at negative pressure; thereby reducing the probability of unmonitored releases. In the chemistry area, the licensee successfully analyzed NRC-supplied non-radioactive chemistry samples.

Control room logs contained numerous entries for inoperable monitors, including a drywell radiation monitor, offgas discharge radiation monitor, and turbine building high range noble gas monitor. Such equipment was normally repaired and returned to service within a reasonable period of time. Exceptions included a liquid radwaste flow totalizer that had been inoperable since 1984, and the Unit 2 reactor building roof ventilation monitor which had been inoperable for over a year.

The Radiological Environmental Monitoring Program continued to be effective. There were no significant radiological consequences attributable to the operation of Brunswick due to airborne, waterborne, aquatic, ingestion, or direct exposure pathways. The results of the licensee's environmental analyses supporting this were in good agreement with the monitoring results of the State of North Carolina.

Licensee assessments/audits were well-planned and documented, with a clearly-defined scope. Showing considerable improvement over the previous period. These assessments/audits identified programmatic weaknesses and made recommendations for corrective action.

During the assessment period, the shipping of a feedwater heater was observed and operations went well, reflecting the competence, training, and experience of the staff. Shipping documentation was thorough and well maintained. The licensee's effort to reduce the volume of radioactive waste shipped to the disposal site, as well as cleanup the spent fuel pools, was aggressive.

During the assessment period one violation was cited.

2. Performance Rating

Category: 2 (improving)

3. Recommendations

None.

C. Maintenance/Surveillance

1. Analysis

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

Performance in the maintenance/surveillance area was significantly challenged by a continuation of work control problems from the previous assessment period. For example, early in the period a diesel generator failed to start on demand due to inadequate work control (i.e., Maintenance-Operations interface) associated with engine cleaning.

Site management was not fully effective in implementing corrective actions for recognized problems in the work control process. Programmatic maintenance planning and post maintenance testing deficiencies were not corrected despite the existence of previous regulatory attention and adverse condition reports.

The predominant contributing cause of recurring work control events was related to inadequate procedures or improper use of procedures. Maintenance work procedures contained deficiencies which contributed to weak procedural adherence. Exacerbating this was the one year backlog of needed procedure revisions.

High emergent work volume and lack of an effective scheduling mechanism disrupted work flow and inhibited the maintenance staff in performance of corrective maintenance. Maintenance supervisors were responsible for scheduling work. This, and excessive administrative tasks, resulted in a limited amount of time available for field supervisory oversight.

Reflective of external industry inputs and assistance, initial licensee actions to correct work control program deficiencies were considered thorough. Program improvements taken or still in progress at the end of the period included: the addition of a minor maintenance program, streamlining of the corrective maintenance process, formulation of a centralized post maintenance testing program, initiation of new supervisory and craft training programs, and upgrading procedures.

The Unit 2 refueling outage in progress at the beginning of the period was deemed unsuccessful in that equipment failures, deferred maintenance, and faulty maintenance prevented a return to normal operation upon outage completion. During the two months following outage completion, the unit experienced one reactor trip, four forced shutdowns and five cases of reduced power operations due to plant equipment problems. Examples of deficient maintenance included a main turbine bearing failure due to missed alignment checks and the failure of the high pressure coolant injection system steam admission valve due to an improperly reassembled limit-switch.

Maintenance backlog reduction was emphasized during the dual unit forced outage which began midway through the assessment period. The backlog consisted of both preventive and corrective maintenance that had accumulated over a long period. Added to this was an accumulation of previously undocumented equipment deficiencies due largely to corrosion and other previously tolerated material deficiencies. The volume and nature of the needed maintenance illustrated the poor material condition of the plant. The licensee's initial screening process for identified maintenance items was considered to be appropriate.

A significant improvement was noted in the performance of emergency diesel generator (EDG) maintenance. Following the poor EDG 3 outage near the end of the previous period, a much improved EDG 4 outage was conducted at the beginning of this assessment period. EDG maintenance during the dual unit forced outage demonstrated increased sensitivity to potential engine problems. Utilizing vendor and other external assistance, the licensee identified and corrected

numerous long-standing problems that had previously gone unrecognized.

With respect to periodic Technical Specification surveillances, the licensee's Surveillance Test Scheduling System continued to be an effective tool. Two examples of missed surveillances occurred, both related to fire protection systems. However, when performed, neither identified inoperable equipment. Coordination of surveillance activities with control room personnel maintained the improvement noted in the last assessment period. Although three of the four reactor trips occurred during surveillance testing, none were attributable to personnel error.

During the assessment period three violations and one deviation were cited.

2. Performance Rating

Category: 3

3. Recommendations

Poor maintenance practices and deferred maintenance adversely affected performance in several functional areas. Notwithstanding current efforts to improve work control, significant management attention to the Maintenance area is warranted.

D. Emergency Preparedness

1. Analysis

This functional area addresses activities related to the implementation of the Emergency Plan and its procedures, the training of onsite and offsite emergency response organizations, licensee performance during emergency exercises and actual events, and the maintenance of facilities and staffing for emergency response.

Overall, the Emergency Preparedness (EP) program received sufficient management support to maintain the basic EP elements needed to implement the Emergency Plan and respective procedures in response to emergency events. The program was maintained in a state of operational readiness. The licensee maintained an excellent working relationship with State and local offsite agencies.

In general, the licensee continued to maintain adequate emergency response facilities and equipment, with appropriate equipment surveillance and functional testing. The licensee acknowledged the need for increased EP staffing

by adding an EP specialist to the program at the end of the assessment period.

Training of EP response personnel continued to be an area of concern, as failures to conduct required first aid training were identified. The licensee's corrective action to assure EP related training is conducted included assigning the full time responsibility to an individual in the Brunswick Training Unit. In addition, consultant support was made available for assistance in developing a program that will also provide for performance-based instruction versus the self-study program.

The licensee's audit program was found to be effective in identifying routine and exercise conditions requiring corrective action, as well as making recommendations for improvement. Conditions requiring corrective action were tracked via adverse condition reports until corrected.

During this assessment period, the licensee implemented its Emergency Plan in response to two events. Both events were properly classified as a Notification of Unusual Event (NOUE), and timely offsite notifications were made with the exception of one to Brunswick County when the county's 911 system was inoperable. The licensee's response to the NOUE involving a release of toxic chlorine gas disclosed weaknesses in the licensee's emergency response program for non-radioactive toxic materials. Areas of concern that were noted included training for the chlorine emergency response team and a lack of command and control in responding to a non-radiological hazard.

Brunswick demonstrated good response capability during their annual exercise in June 1992. During the exercise, the licensee demonstrated it could implement the Emergency Plan, as well as take suitable actions to mitigate the consequences of the accident scenario. Emergency classifications were timely as the scenario progressed. Exercise strengths included timely activation of emergency response facilities, control room command and control, and Health Physics support and response to the medical emergency. An exercise weakness was identified for failure to prioritize and dispatch repair teams to mitigate the plant accident conditions in the most effective manner.

During the assessment period one exercise weakness was identified and one violation was cited.

2. Performance Rating

Category: 2

3. Recommendations

None.

E. Security

1. Analysis

This functional area addresses those safeguard activities associated with the plant's safety-related vital equipment, the accountability of special nuclear material, and the effectiveness of the licensee's Fitness-For-Duty Program.

The site's contract security force was well staffed and typically performed security functions well. The licensee's security force was well managed, well supervised, had good procedures, and was subject to a self-assessment program. Overall, the security force was appropriately equipped to comply with NRC requirements and the licensee's commitments. The professionalism of the contract security force personnel was noteworthy. Towards the end of this assessment period, the NRC did identify several examples of performance weaknesses associated with failing to control access of vehicles and inadequate escorting of visitors.

Security training was coordinated, well planned, and met the requirements of the Security Training and Qualification Plan. Overall performance by security personnel reflected an effective training program. Management displayed support to the training program by the improvements at the range facility (i.e., improved target stands, new fifty yard firing lanes, and electrical power provided to the range). Tactical response and weapons training continued to improve with the addition of a highly qualified trainer to the training staff during the last assessment period. There were two separate events in which members of the security force who were responsible for access control, accountability and evacuation of personnel were not respirator trained and qualified. This reduced the effectiveness of the initial response to both the chlorine release and the americium/beryllium contamination events.

The licensee filled vacant positions promptly and with qualified personnel. An Administrative Senior Specialist position was filled to oversee the security regulatory compliance functions in order to improve assessment performance of the security operation. Isolated examples (identified by the NRC) of failure to control safeguards information and key control were corrected accordingly.

During the early portion of this period, there were examples where management support for the security program was weak.

For example, maintenance of security equipment (i.e., barriers, alarms, and alarm stations) was not timely or effective. A need to enhance the licensee's preventive maintenance program for security equipment and improve the communications between plant support and security also was identified by the licensee during the annual corporate audit of the security program in June 1992. Problems with equipment out of service caused the licensee to exceed their 200 hour target for utilization of security officers for compensatory measures by 386 hours. Plant management support for the security program increased in the latter part of this assessment period. Equipment improvements consisted of increased protected area lighting, additional security radios, and new rifles for the tactical response force. The licensee completed the protected area perimeter upgrade project which was initiated at the end of the last assessment period. This has decreased the safeguard events logged, false alarm rates, and protected area perimeter deficiencies.

Other ongoing security improvements during this period were directed, in part, at addressing problems with the video assessment capability that had been identified in the previous assessment period. Improvements included the addition of a video capture system to the closed circuit television (CCTV) assessment equipment and providing alarm stations and security shift supervisors with new television monitors. As a result, improved CCTV picture quality was evident.

The licensee's Fitness-For-Duty Program was found effective at achieving a drug-free workplace while balancing the rights and privacy of the workforce.

During this assessment period three violations were cited.

2. Performance Rating

Category: 2

3. Recommendations

None.

F. Engineering/Technical Support

1. Analysis

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

Early in the assessment period, most engineering and technical support resources were consumed in reacting to equipment failures. Little time was available for program development or long range planning. The corporate Nuclear Engineering Department was spending about one half its resources in support of Brunswick. The ability of the engineering staff to be more effective was limited by a large, poorly managed backlog of plant deficiencies. Performance in this area improved later in the period when the licensee allocated additional engineering resources and prioritized the backlog of engineering work.

The quality of design related work was inconsistent. Several modifications, such as addition of local switches for the Unit 2 station blackout 4kv bus crosstie and instrument rack replacements, were well designed. Other design related work was deficient. For example, errors were found in a contractor's design calculations for structural steel. Contractor oversight was increased to resolve this problem. Still, other deficiencies occurred when engineers used draft and/or inadequate procedures to perform design activities. Unrealistic schedules contributed to these deficiencies.

Several discrepancies were identified between conditions in the plant and those described in the FSAR and plant drawings. Examples included pipe supports and anchor bolts that did not meet the Final Safety Analysis Report (FSAR) commitments, and structural steel that did not meet FSAR commitments and was not described in as-built drawings. Further, the licensee did not have design calculations verifying that as-built steel supporting safety-related equipment met allowable stress values. The licensee initiated corrective actions for these examples and continued to implement a design basis documentation program to address this issue generically.

Previous inadequate engineering evaluations contributed to a failure to correct long-standing deficiencies until actions were prompted by NRC. For example, bolting in masonry walls was identified as deficient by the licensee as early as 1987 but was not corrected until 1992 because lack of a thorough engineering evaluation had resulted in an underestimation of the extent of the problem. Similarly, the licensee had been aware of structural steel deficiencies for several years; but the full extent of the problem was not recognized until a more thorough engineering evaluation of these deficiencies was performed late in the assessment period. The licensee maintained a short-term structural integrity (STSI) program for evaluating the operability of equipment which did not meet the structural design criteria in the FSAR. Such equipment was considered short-term qualified if the

evaluation found it to be operable. Though subsequent NRC review found the licensee's STSI evaluation criteria to be acceptable, a significant backlog of equipment was short-term qualified for several years.

System engineers were well qualified and had a good understanding of their assigned systems. They maintained current knowledge of the material condition and participated in the prioritization of maintenance for their assigned systems. The licensee maintained a rigorous program for qualifying system engineers.

The licensed operator requalification training program remains satisfactory and operator training improved since the last assessment period. This was evident by the results of the requalification examination administered by the NRC in April 1992, with 16 of 16 operators (100 percent) and 5 of 6 crews (84 percent) passing these examinations. One area that did not improve since requalification examinations administered in 1991 was the quality of the proposed static simulator examinations. Also, crew communications and command and control effectiveness declined since the 1991 requalification examinations, contributing to the crew failure during the April 1992 examination. Strengths were noted in the simulator modeling capability, especially for secondary containment and radiation release parameters. Also, the training staff's ability to evaluate crew and individual operator performance was very good. Six of six (100 percent) operators passed the October 1992, Generic Fundamentals Examination Section.

During the assessment period seven violations and one deviation were cited.

2. Performance Rating

Category: 2

3. Recommendations

None.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area addresses those activities related to licensee implementation of safety policies related to 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 committee activities; and the use of feedback from self-assessment programs and activities.

As revealed during NRC's Special Appraisal of Brunswick Operations (conducted from February 17 through May 1, 1992), the licensee's performance had not been fully effective and many of the problem areas observed in the 1989 Diagnostic Evaluation were still present. The Special Appraisal identified the fundamental root causes for the continued poor performance to be: (1) management's failure to set high standards for the material condition of the plant; (2) a failure of management to provide the leadership and support needed for improvement; and (3) a lack of critical self-assessment, which resulted in the failure to recognize problems and implement effective corrective action.

Established under the Integrated Action Plan, a number of improvement programs were already being implemented at Brunswick. One such program, which is indicative of a number of others, is the corrective action program (CAP). Both the NRC Special Appraisal and the licensee's own self-assessment found the CAP to be ineffective. Although the CAP lowered the threshold for problem identification, management support was inadequate, resulting in an increasing number of identified but uncorrected deficiencies.

Since the dual unit shutdown in April 1992, the licensee recognized the need to strengthen the safety policies at Brunswick. Licensee management also realized that the standards and expectations of Brunswick personnel at every level had to be raised. In addition, the licensee made significant management changes, both at the Brunswick site and at the corporate level.

Other initiatives include the implementation of a Staff Assistance Team (SAT) to assist the site management in the identification of procedural and process improvements. The SAT, whose 71 recommendations for improvements were at various stages of implementation at the end of the assessment period, appeared to have relieved site managers of some administrative burdens. The previously established Site Incident Investigation Team (SIIT) process was utilized for eight events during the assessment period. SIIT investigations were generally thorough and root cause determinations were acceptable.

Following NRC prompting, the licensee developed structural verification programs to identify/correct long-standing deficiencies involving safety-related walls, wall anchorages, and miscellaneous structural steel. Several

improvements were necessary to these structural verification programs before they were found to be acceptable. The NRC's Safety Evaluation concluded that the scope, criteria and methodology of those programs when fully implemented would provide the licensee with adequate assurance that the safety-related walls, wall anchorages, and miscellaneous structural steel are restored to their design basis. An interim implementation inspection by NRC of the licensee's miscellaneous structural steel verification program found a number of quality assurance related problems (i.e., a lack of adequate procedures and errors in calculations). These problems were subsequently corrected; and implementation of the miscellaneous structural steel verification program, as well as the licensee's other structural verification programs, was still in progress at the end of the assessment period.

The quality of the licensee's self-assessments improved during the assessment period. As indicated in Section IV.A, the licensee's self-assessment of repetitive valve mispositions in the first half of the assessment period was ineffective. Similarly, after expression of NRC concerns, self-assessments on the material condition of the plant changed from indicating conditions as acceptable to unacceptable. Self-assessments identified that there was inadequate management support for either the CAP or the preventive maintenance program to be effective. This condition remained uncorrected despite licensee senior management directives in 1991 to address these problems. As there was insufficient management sensitivity towards correcting issues raised by the self-assessments, the overall effectiveness of the process was limited.

Likewise, the licensee's quality control (QC) program suffered from the same problem. QC was effective in inspecting outage management and modification work activities, identifying many weaknesses involving procedures, procedural compliance, and material storage. However, in general, management did not followup on identified deficiencies and assure appropriate corrective actions.

The licensee performed well in response to generic issues. For example, the licensee provided a timely and conservative initial response to the Thermo-Lag issue (NRC Bulletin 92-01), including areas that were subsequently requested in Supplement 1 to the Bulletin. Similarly, the licensee completed implementation of modifications and tests required for the Station Blackout rule a few months ahead of the committed schedule. The licensee also provided a timely response to Generic Letter 88-20, Individual Plant Examination. Concerning licensing activities, the licensee

generally performed well and was responsive and knowledgeable.

During the assessment period, four violations were cited.

2. Performance Rating

Category: 3

3. Recommendations

Despite improvements in problem identification, minimal corrective action followup and management support has limited the overall effectiveness of self-assessments. Increased management attention is needed to improve the corrective action program.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Unit 1 began the assessment period at full power. A scram from full power as a result of losing an uninterruptable power supply occurred on January 17, 1992. The unit was restarted on January 19 and operated at essentially full power except for a power reduction to 30 percent on February 4 to permit bypassing a feed water heater. Unit 1 scrambled on February 29, 1992 from 80 percent power during main turbine stop valve testing and restarted on March 5. Power was reduced to 50 percent on March 18 for three days due to Reactor Feed Pump problems. Unit 1 was subsequently operated at 100 percent power until it was shutdown due to seismic concerns associated with the diesel generator building walls on April 21, 1992. The unit remained in cold shutdown for the remainder of the assessment period.

Unit 2 began the assessment period in a refueling outage that began on September 11, 1991, and was restarted on December 13, 1991. The unit tripped from approximately 5 percent on December 17, 1991, while performing surveillance testing on the residual heat removal system. The unit was restarted on December 18, but was shutdown on December 22, due to failure of the No. 3 main turbine bearing. Unit 2 was again started on January 3, 1992. During startup testing, problems with the electro-hydraulic control (EHC) system and a main generator-to-exciter coupling required the unit to shutdown for repairs on January 10, 1992. After restart on January 11, 1992, and attainment of full power, additional problems were encountered with EHC/turbine control valve oscillations. This required a power reduction to less than 85 percent on January 16, 1992. Full power operation was conducted between January 24 and 30, 1992, to obtain data on the control valve oscillations; power was subsequently reduced to less than 85 percent.

On February 2, 1992, a Unit 2 scram from 80 percent power occurred during main steam control valve testing. During the scram one feed pump seized. Startup commenced on February 6, 1992, utilizing only one feed pump, but was aborted the next day following additional equipment problems. Restart began again on February 11, but the unit was shutdown from 6 percent power the next day due to seismic concerns in instrumentation cabinets. The unit was restarted on February 13, 1992, but was limited to 82 percent power due to continued control valve problems. A power reduction to 80 percent was required on February 17, 1992, due to excessive main turbine vibration. Further reduction to 77 percent power was required on February 21, due to resonant harmonic frequencies in a feed pump. Unit 2 operated at 77 percent power until March 18, 1992, when a Technical Specification required shutdown was commenced due to inoperable primary containment hydrogen/oxygen monitors. Power was reduced to 23 percent before one of the monitors was restored. The subsequent power increase was limited to 60 percent due to feed pump speed control problems. Following repairs, power was returned to 77 percent on March 23, 1992. Unit 2 remained near this power level until it was shutdown on April 21, for the same reason as Unit 1. The unit remained in cold shutdown for the remainder of the assessment period.

Significant management changes were made at the site and corporate office. In December 1991 the Brunswick Maintenance Manager was replaced by the former Manager of Projects, Outage Management and Modifications. In January 1992 the temporary Manager - Operations moved to the corporate Nuclear Assessment Department and was permanently replaced by the former Manager - Regulatory Compliance. The corporate Nuclear Licensing Manager became the Manager - Regulatory Compliance. The Site Vice President - Brunswick Project became the Vice President - Nuclear Services on April 1, 1992, and was replaced by the former Site Vice President - Harris Project. On September 1, 1992, the new position of President and Chief Operating Officer (COO) of CP&L was filled with a senior executive from another utility. Reporting directly to CP&L's Chairman and Chief Executive Officer, the COO directs CP&L's Nuclear Operations, including Nuclear Assessment. The Brunswick Plant General Manager departed on October 7, 1992. Subsequently, each Brunswick unit was assigned a separate Plant Manager, Operations Manager, and Maintenance Manager. These changes were made in order to provide more focused management attention on operations and maintenance improvements necessary to return the units to service and to sustain reliable performance. On October 12, 1992, the former Manager - INPO Events Analysis Department was appointed to the new position of Manager - Technical and Regulatory Support, reporting to the Site Vice President. Reporting directly under this new position are the managers of Technical Support and Regulatory Compliance. Similar restructuring resulted in the Environmental and Radiation Control Manager indirectly reporting to the Site Vice President via the Control and Administration Manager.

B. Direct Inspection and Review Activities

During the assessment period, 25 routine and 12 special inspections were performed at the Brunswick facility by the NRC staff. The special inspections were:

- February 17 - March 27, 1992; Assessment of Work Control Programs
- March 9-13, 1992; Assessment of Radiological Protection and Emergency Preparedness
- March 23-27, 1992; Assessment of Physical Security Program
- March 16-27, 1992; Assessment of Operations Unit
- March 30 - April 20, 1992; Assessment of Engineering/Technical Support
- February 17 - May 1, 1992; Appraisal of Brunswick Operations
- May 26-28, 1992; Inspection of Chlorine Gas Release
- September 14-18 and 24-25, 1992; Structural Issues Inspection
- September 14-18, 1992; Evaluation of Pre/Post-Startup Work Screening Methodology
- September 24 - October 30, 1992; Inspection of Americium/Beryllium Contamination Event
- October 5-9 and 19-23, 1992; Structural Issues Inspection
- October 2-30, 1992; Inspection of Inadvertent Draining of Unit 1 Reactor Coolant System.

C. Escalated Enforcement Action

1. Orders

None.

2. Civil Penalties (CP)

Severity Level III violation (EA 91-158) concerning inadequate corrective actions for continuing problems related to work control and independent verification. (\$125,000 CP - Issued on January 3, 1992, this problem was addressed in the previous SALP report.)

Severity Level III violation (EA 92-024) for a work control

issue involving cleaning activities which resulted in the January 6, 1992 failure of EDG 2 to start on demand. (\$100,000 CP - Issued on March 24, 1992.)

D. Management Conferences

During the assessment period there were 13 significant management conferences with the licensee. These were:

- December 3, 1991; Enforcement conference to discuss recurrent problems in the areas of work control and independent verification.
- January 23, 1992; Management meeting to discuss SALP Cycle 10 assessment.
- January 23, 1992; Management meeting to discuss corrective actions taken for enforcement issues.
- March 3, 1992; Enforcement conference to discuss the failure of the No. 2 diesel generator to start on demand.
- May 12, 1992; Enforcement conference to discuss inadequate corrective action for seismic and structural issues at Brunswick.
- May 12, 1992; Management meeting to discuss corrective actions for masonry wall seismic qualification deficiencies.
- May 15, 1992; Management meeting for CP&L to present corporate initiatives to achieve sustained levels of good performance from CP&L's nuclear plants.
- June 8, 1992; Management meeting to discuss structural deficiencies identified at Brunswick.
- June 25, 1992; Management meeting to discuss CP&L's plans to resolve structural steel issues at Brunswick.
- July 16, 1992; Management meeting to discuss restart issues at Brunswick.
- August 10, 1992; Management meeting to discuss restart issues at Brunswick.
- September 25, 1992; Management meeting to discuss restart issues at Brunswick.
- October 23, 1992; Management meeting to discuss restart issues at Brunswick.

E. Confirmation of Action Letters

None.

F. Reactor TripsUnit 1

Two automatic reactor trips occurred:

- January 17, 1992; Low level reactor trip (from 100 percent power) when the uninterruptable power supply failed.
- February 29, 1992; Reactor Trip (from 80 percent power) due to a failure in the turbine stop valve master/slave logic during stop valve testing.

Unit 2

Two automatic reactor trips occurred:

- December 17, 1991; High flux/low power reactor trip (from 5 percent power) during surveillance testing when a defective test meter caused a high pressure coolant injection system initiation/cold water injection.
- February 2, 1992; Reactor trip (from 79 percent power) during main turbine control valve testing due to an electro-hydraulic control system failure.

G. Review of Licensee Event Reports (LERs)

During the assessment period, 41 LERs were analyzed. Special reports were submitted during the period by the licensee, but are not included in the table. The distribution of these events by cause, as determined by the NRC staff, was as follows:

<u>Cause</u>	<u>Unit 1 or Common</u>	<u>Unit 2</u>	<u>Total</u>
Component Failure	10	4	14
Design	3		3
Construction/Fabrication Installation	2	2	4
Personnel Errors			
-Operating Activity	7	2	9
-Maintenance Activity	1		1
-Testing/Calibration Activity	2	2	4
-Other	1		1
Other	4	1	5
Totals	30	11	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 this assessment period, 12 licensing issues were resolved. This includes one license amendment, one exemption, six generic actions and four other licensing actions. The most significant completion of multiplant activities was the implementation of actions related to station blackout and meeting the requirements of 10 CFR 50.63.

I. Enforcement Activity

FUNCTIONAL AREA	NO. OF VIOLATIONS IN SEVERITY LEVEL					DEV
	I	II	III	IV	V	
Plant Operations				6*		
Radiological Controls				1		
Maintenance/Surveillance			1	2		1
Emergency Preparedness				1		
Security				3		
Engineering/Technical Support				7		1
Safety Assessment/ Quality Verification			1*	3		
TOTAL			2	23		2

*Includes a violation which was related to an event that occurred in the previous assessment period.