UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-325/34 and 50-324/34

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Docket Nos.: 50-325 and 50-324 License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: October 3 - October 31, 1992

Lead Inspector: _____ 11/18/92
R. L. Prevatte, Senior Resident Inspector Date Signed

Other Inspectors: D. J. Nelson, Resident Inspector
P. M. Byron, Resident Inspector

Approved By: _____ 11/18/92
H. Christensen, Chief Date Signed
Reactor Projects Section 1A
Division of Reactor Projects

SUMMARY

Scope:

This routine safety inspection by the resident inspectors involved the areas of maintenance observation, surveillance observation, operational safety verification, licensee self-assessment, outage activities, organizational changes and quality control inspections.

Results:

In the areas inspected, one violation was identified involving a reactor operator with an inactive license standing watches (paragraph 4). Additionally, further examples of Violation 325,324/92-28-02 were identified for failure to maintain positive control of visitors (paragraph 4).

Within the area of outage work activities some progress was noted in completing work requests/job orders (WR/JOs). However, identification of new work negated progress in backlog reduction of WR/JOs. A reduction in operator work-arounds was noted (paragraph 5).

Units 1 and 2 were in cold shutdown for the entire reporting period. The outage that started on April 21, 1992, continued with no announced startup date.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

K. Ahern, Manager - Operations Unit 2
M. Bradley, Manager - Brunswick Project Assessment
M. Brown, Plant Manager - Unit 2
*S. Callis On-Site Licensing Engineer
J. Cowan, Manager - Technical and Regulatory Support
J. Dobbs Assistant to Site Vice President
*S. Floyd, Manager - Regulatory Compliance
*R. Godley, Supervisor - Regulatory Compliance
R. Helme, Manager - Technical Support
J. Holder, Manager - Outage Management & Modifications (OM&M)
*M. Jackson, Manager - Maintenance Unit 2
M. Jones, Manager - Training
*P. Leslie, Manager - Security
D. Moore, Manager - Maintenance Unit 1
R. Morgan, Plant Manager - Unit 1
R. Richey, Vice-President - Brunswick Nuclear Project
C. Robertson, Manager - Environmental & Radiological Control
*J. Simon, Manager - Operations Unit 1
*R. Tart, Manager - Operations Unit 2
*J. Titrington, Manager - Operations Unit 1
C. Warriner, Manager - Contract and Administration
E. Willett, Manager - Planning and Scheduling

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, office personnel and security force members.

*Attended the exit interview.

Acronyms and initialisms used in the report are listed in the last paragraph.

2. Maintenance Observation (62703)

The inspectors observed maintenance activities, interviewed personnel and reviewed records to verify that work was conducted in accordance with approved procedures, Technical Specifications and applicable industry codes and standards. The inspectors also verified that: redundant components were operable; administrative controls were followed; tagouts were adequate; personnel were qualified; correct replacement parts were used; radiological controls were proper; fire protection was adequate; quality control hold points were adequate and observed; adequate post-maintenance testing was performed; and independent verification requirements were implemented. The inspectors independently verified that selected equipment was properly returned to service.

Outstanding work requests were reviewed to ensure that the licensee gave priority to safety-related maintenance. The inspectors observed/reviewed portions of the following maintenance activities:

WR/JO 92 ABBR 1 thru 8	Bearing replacement and other outage work activities on DG No. 1

Diesel Generator No. 1

DG No. 1 inspections and maintenance activities discussed in the previous report continued. The licensee identified additional problems with this DG. The damaged first idler gear and the broken teeth (Inspection Report 325,324/92-28) were sent to CP&L's Harris Environmental & Energy (E&E) Center and the consultant for failure analysis. This analysis has not been completed.

The four connecting rod bearings adjacent to bearings 6 and 9 were disassembled and inspected. Even though no damage was observed, they were reassembled with new bearings. Vendor services were obtained to repair the minor scoring previously identified on the Number 9 bearing journal. During the journal repair, the contractor identified that the crankshaft was bowed approximately 0.002 inches.

As part of the bowed crankshaft investigation, the generator stator dowel pins were removed. The dowels were found to be slightly bent. The inspector observed that the stator had shifted outward approximately 1/64 - 1/32 inches. However, it was also found that the stator base paint was not disturbed, indicating that the stator movement was not recent. The licensee is still investigating the cause of this movement. The dowel pins were sent to the Harris E&E Center to determine the force required to bend them. This analysis had not been completed at the end of the reporting period.

On October 8, 1992, cold crankshaft web deflection readings were taken. These readings exceeded the allowable band of .002 inches. After consultations with former Nordberg engineers, the licensee decided to realign the crankshaft. This was accomplished by adding a 0.020 inch shim under the generator pedestal bearing to raise the crankshaft. This returned the deflection readings to within specifications. Reassembly of the engine was completed on October 13 and break in runs commenced. The engine was run for 5, 15 and 30 minutes with no load and inspections were performed after each run. On October 14, the unit was run for one hour with a 900kw load. Post run inspections found thrust collar temperatures above normal. Investigation revealed that the thrust collars had experienced severe thermal stress. Metal displacement was found on the bearing surfaces and radial cracking was identified at several points on the outer edge of the generator side thrust collar. The inspector observed that the radial cracking was more significant at the top of the collar. He also noted some pitting of the lower shell of the No. 9 bearing and that there were slight deposits of aluminum bearing material on the thrust collars. The licensee subsequently found brass from the thrust collar embedded in the crankshaft thrust surface.

On October 16, the licensee removed the oil seal assembly from the generator end of the engine and found signs of excessive heating on the upper assembly. The heat stress zone extended from about 280 degrees to 100 degrees of the radial area and was approximately 1/2 inch wide on the inner radius. The inspector noted that the first of four labyrinth rings showed signs of heat stress. The housing and first two labyrinth rings had rolled edges. The crankshaft at a corresponding axial position was gouged approximately seven to eight inches long, 1/2 inch wide and several mils deep. Because of the above damage, the No. 9 bearing journal and the No. 8 R and No. 8 L connecting rod bearing journals were dye-penetrant tested. No damage was found.

The licensee requested on site assistance from NAK Engineering Company. This company is composed of the former chief service engineer and other former Nordberg engineers. They also held the engine design drawings. The NAK representative has previously assisted the licensee in trouble shooting and identifying the causes of previous engine problems.

The licensee took additional crankshaft measurements on October 17 and 18 and concluded that the crankshaft was bowed approximately 0.003 inches. A marine engineering consultant was contracted to provide a second opinion and assist in straightening the crankshaft. This consultant, after inspecting the crankshaft, determined that it had a kink instead of a bow. The kink resulted in the No. 10 journal being offset 4 mils from the No. 9 journal. The marine engineering consultant believed that the damage was caused by high heat stress which had resulted from overheating of the thrust collars. He believed that the crankshaft could be straightened by using a peening process to relieve the induced stresses. He also concluded that the damage in the area of the oil seal was caused by the crankshaft jumping. The licensee disagreed with his conclusion and believed the damage was caused by a wobbling crankshaft. Neither party has been able to explain the cause of the phenomenon which they believed to have caused the damage. Two representatives from the NRR staff were onsite October 21 and 22, and reviewed the problems associated with this engine.

On October 31, the inspector observed the crankshaft peening process. A hand held pneumatic hammer was used to peen a point predetermined by rotational clearance measurements on the engine side radius of No. 9 journal. The crankshaft straightened approximately .0005 inches. The Nos. 6 and 9 journals were then polished by the consultant to remove any damage that resulted from the previously described failed bearings. A second peening operation took place November 2. The licensee then had difficulty obtaining repetitive measurements while measuring to determine the amount that the crankshaft had straightened. While troubleshooting the cause of these inconsistent readings, the licensee discovered damage to the flexible drive gear located at the opposite end (front) of the engine from the generator. The drive gear is attached to the crankshaft and drives the engine driven lube oil pump. The inspector observed that damage occurred on the face of the gear teeth for approximately 300 degrees. The damage was about 1/4 to 3/4 inches in length and varied in height on the tooth face. It was noted that as

the damage approached the root it occurred on both faces and appeared to have been caused by impact. The licensee observed that approximately one-half of the lube oil pump gear showed signs of thermal stress. These gears had been previously inspected during the current outage. It was therefore apparent that this damage had occurred during the post maintenance runs.

The licensee's diesel consultant, NAK, believed that the gear damage may have been caused by movement of the diesel and suggested that the collision blocks be inspected. Collision blocks are steel blocks attached to the engine skid by 1-inch steel dowel pins and 3/4-inch bolts. There are two collision blocks on each side and ends of the engine. They are used primarily in mobile and marine installations to restrict engine movement in the event of a vehicle or ship collision. The blocks can be used to determine if there has been any movement of the engine block relative to the skid. An inspection revealed that both collision blocks at the rear of the engine (generator end) were missing. The collision blocks were found under the generator mounting rails. Investigation revealed that both the dowels and bolts were sheared at the foundation surface and the bolts were missing. The inspector observed that the dowels remaining in the blocks were deformed. The licensee calculated that the engine had moved approximately 1/4 inch toward the rear, or generator end. At the end of this reporting period the licensee was attempting to determine the cause(s) of all damage sustained to DG No. 1. The inspector will follow the licensee's investigations, inspections and repairs, and provide additional information in the next monthly report.

On October 6, 1992, while observing maintenance on DG No. 1, the inspector observed that material was improperly stored in an adjacent "Q" Temporary Storage Area. The storage area contained material with unprotected threads and valves which did not have the openings covered and were not tagged. The inspector informed maintenance and QC of this concern. The maintenance foreman stated that the untagged material was to be scrapped. The scrap material was immediately removed and placed in a trash container.

Violations and deviations were not identified.

3. Surveillance Observation (61726)

The inspectors observed surveillance testing required by Technical Specifications. Through observation, interviews, and records review, the inspectors verified that: tests conformed to Technical Specification requirements; administrative controls were followed; personnel were qualified; instrumentation was calibrated; and data was accurate and complete. The inspectors independently verified selected test results and proper return to service of equipment.

The inspectors witnessed/reviewed portions of the following test activities:

OMST DG-501R3	54 month inspection on DG No. 3
PT 12.2 B	DG No. 2 Monthly Load Test
PT 12.2 D	DG No. 4 Monthly Load Test

These above tests and inspections were well planned and managed with adequate supervisory and technical oversite.

Violations and deviations were not identified.

4. Operational Safety Verification (71707)

The inspectors verified that Unit 1 and Unit 2 were operated in compliance with Technical Specifications and other regulatory requirements by direct observations of activities, facility tours, discussions with personnel, reviewing records and independent verification of safety system status.

The inspectors verified that control room manning requirements of 10 CFR 50.54 and the Technical Specifications were met. Control operator, shift supervisor, clearance, STA, daily and standing instructions and jumper/bypass logs were reviewed to obtain information concerning operating trends and out of service safety systems to ensure that there were no conflicts with Technical Specification Limiting Conditions for Operations. Direct observations of control room panels, instrumentation and recorder traces important to safety were conducted to verify operability and that operating parameters were within Technical Specification limits. The inspectors observed shift turnovers to verify that system status continuity was maintained. The inspectors also verified the status of selected control room annunciators.

The inspectors verified the system alignment and operability of equipment used for the normal and backup means for shutdown cooling on each unit. They additionally verified that there was no leakage of major components; that proper lubrication and cooling water was available; and conditions did not exist which could prevent fulfillment of each system's functional requirements. Instrumentation essential to system actuation or performance was verified operable by observing on-scale indication and proper instrument valve lineup, if accessible.

The inspectors verified that the licensee's HP policies and procedures were followed. This included observation of HP practices and a review of area surveys, radiation work permits, posting and instrument calibration.

The inspectors verified by general observations that: the security organization was properly manned and security personnel were capable of performing their assigned functions; persons and packages were checked

prior to entry into the PA; vehicles were properly authorized, searched and escorted within the PA; persons within the PA displayed photo identification badges; personnel in vital areas were authorized; effective compensatory measures were employed when required; and security's response to threats or alarms was adequate.

Three occurrences of failure to maintain positive control of visitors were identified by the licensee during the assessment period. On October 2, 1992, an escort attempted to leave the protected area while his visitor remained in the protected area eating lunch. This is documented in ACR 92-793. On October 21, an escort was relieved at the end of his shift, but failed to notify security of the transfer to a new escort. This was detected by security when the escort attempted to leave the protected area without his assigned visitor. This is documented in ACR 92-847. The next day a security officer observed two visitors without an escort. It was determined that the escort was in an adjacent area and did not have positive control of his visitors. This is documented in ACR 92-846. These findings indicate that security office alertness has increased; however, it appears that other plant personnel are not adequately trained in escort duties or that additional emphasis and oversite by supervisory personnel is needed. The licensee received a violation (Inspection Report 325,324/92-28) for failure to maintain positive control of visitors on September 15, 1992. The licensee's investigation of that event has not been completed and all corrective actions have not been identified. Therefore, the above deficiencies will be identified as additional examples of Violation 325,324/92-28-02. In response to Violation 325,324/92-28-02, the licensee agreed to provide any additional corrective action that is being taken to address the above events.

The inspectors also observed plant housekeeping controls, verified position of certain containment isolation valves, checked clearances and verified the operability of onsite and offsite emergency power sources.

In early July 1992, a licensed reactor operator was removed from licensed duties and placed in a rehabilitation program after his admission of using a controlled substance contrary to the requirements of 10 CFR 26 and subsequent positive testing. The individual completed a rehabilitation program and his facility unescorted access was restored on September 8. After a period of observation in unlicensed activities he was returned to licensed duties on October 3, 1992. He was assigned and assumed the licensed duties of Reactor Operator, Balance of Plant (BOP), at approximately 7:00 a.m., on October 3, 1992. At approximately 9:00 a.m., while updating the accumulated watchstanding hours log for licensed operators, the Operations Shift Supervisor discovered that the subject operator had not completed the required 60 hours (five-12 hour shifts) of watchstanding in the previous quarter (i.e., July, August and September). Upon discovery, the Shift Supervisor relieved this individual of his assigned duties and placed him on watch in a training status to begin license reactivation.

10 CFR 55.53.e requires that in order to maintain an active license, the licensee shall actively perform the function of an operator or senior operator for a minimum of seven 8-hour or five 12-hour shifts per calendar quarter. This requirement is implemented in the licensing training instruction, NRC Licensee Operator/Quarterly Reporting Requirements, TI-208, Volume 1, Rev. 6. A review of the licensee's accumulated watchstanding hour log by the resident inspector showed that the individual did not stand any licensed watches during the July, August and September quarter.

Technical Specification 6.2.2.a and Table 6.2.2.1 list the minimum shift composition for Unit conditions. The requirements specify that for both units in Condition 4, a minimum of two Reactor Operators shall be in the control room. The licensee appears to have met this requirement. However, the inactive operator was the only reactor operator at the controls for Unit 2. The licensee states that the condition existed for a very short period. A review of the SCO and CO logs could neither substantiate nor disprove that fact. However, the inspector noted that he entered the control room on October 3 at approximately 9:00 a.m., reviewed the operating logs for both units and held a conversation with the operator concerning his return to duty. At that time he and the Senior Control Operator were the only licensed reactor operators on Unit 2 and he was the only individual monitoring the Unit 2 Reactor Control Board.

On Thursday, October 1, the Unit 2 Manager of Operations informed the Senior Resident Inspector that the subject operator was being returned to duty. At the time, he indicated that everything had been checked and that a letter was being sent to inform the Regional Office that the individual was being returned to a full duty status. However, a review after this event reveals that when the individual was returned to an active status and reassigned to a shift on September 25, he met the requirements of 10 CFR 55.53e since he had stood more than five-12 hour watches in the preceding quarter of April, May and June 1992. Based on interviews with affected personnel, it appears that they did not realize that the quarter would change prior to the individual being returned to duty and did not perform an actual record review for the second or third quarter of 1992. The review was accomplished by asking the operator if he was current in his watch-standing. At the time he was questioned, he was satisfactory.

The licensee, upon identification of this event, appears to have taken the correct action of relieving the individual and reassigning his duties to an active licensed person. The licensee initiated ACR 92-797 to document this event and determine the cause and required corrective actions. The ACR stated that the immediate corrective action was to summon a second RO to the Unit 2 control room to assume the BOP operator duties and place the above individual in a training status for license restoration. A review of the SCO and CO logs does not confirm this action. Neither log shows that a new reactor operator assumed the watch after this event. The log does show that the involved BOP operator lined through his duty as BOP operator and changed it to Reactor

Operator Trainee (ROT) with a date of October 3, 1992. Discussion with the involved individuals indicated that the Plant Monitor Reactor Operator was summoned back to the control room to assume the Reactor Operator watch. However, this was not documented in either the Reactor Operator or Senior Reactor Operator log. This weakness and inconsistency in the amount of information placed in Control Room logs has been previously identified. Although improvement has been made, logkeeping is still inconsistent between shifts and generally does not contain adequate detail to document all significant shift occurrences or allow recreation of events at a later date.

The inspectors became aware of the above event during a routine review of ACRs the week of October 19, 1992. Inspection revealed the event and the actions taken to restore the operator to an active status were incomplete. 10 CFR 55.53(f) states that if the requirements of 10 CFR 55.53(e) are not met, then the licensee operator must complete a minimum of 40 hours of on-shift functions under the direction of an operator or senior operator as appropriate and in the position to which the individual will be assigned. The 40 hours must have included a complete tour of the plant and all required turnover procedures.

The inspectors interviewed the operator involved in the event and reviewed the reactor operator logs for documentation of the required training. This review revealed that the operator had used the hours of watch he stood on October 3 as an unqualified BOP operator as a credit toward his required 40 hours for retraining after disqualification on October 3.

The inspector then questioned the operator about when he completed the requirements to return to active status and was told that he had finished these on October 6. At this time he offered as evidence a completed Form TI-208-5 used to certify completion of action required to return to active status. The inspector noted that this form showed 40.5 hours which included the time in question on October 3, 1992. At that time the inspector requested that security provide a security access printout for this operator for the period of September 15 to October 27. A review of this record determined that the operator did not complete a tour of the plant between his removal from watch on October 3 and his return to an active status on October 6. The Shift Supervisor signed him off as completing the tour on October 4, but the inspector determined that he toured only a few areas of the plant between October 3 and 4.

Questioning of this operator and the Shift Supervisor by Operations Management revealed that the Shift Supervisor and operator thought that they could take credit for a period of Auxiliary Operator watches the individual had stood between October 15 and October 27 as adequate for the plant tour and that he could take credit for the hours on watch as an unqualified Reactor Operator on October 3 to meet the requirements. A further review of the security access logs by the inspector and Operations Management determined that the individual had not toured all plant areas during the Auxiliary Operator watch standing time. It also

revealed that the individual had not stood a complete four hour watch that he took credit for on October 6. He had credited 4 hours on October 6, but had left the control room and the protected area of the plant prior to completing those 4 hours. In both instances, October 3 and October 9, 1992, the operator was returned to an active status without completing the requirements of 10 CFR 55.53. This is a violation: Watchstanding With An Inactive License (325,324/92-34-01).

The licensee, upon becoming aware of the first event, removed the individual from an active licensed status and placed him in a training status. After the second event the watchstander was removed from licensed duties until an investigation could be completed. The licensee's corrective actions to date include: retraining and recertification of the affected operator, personnel actions for the Reactor Operator and Shift Supervisor and improvements in the computerized scheduling system to track watchstanding hours and posting of all inactive licensed operators in the Shift Supervisor's office. This action will be completed by November 24.

The licensee had prior notification that it might be susceptible to an event of this nature. In 1989, an event occurred at a nuclear plant where a senior reactor operator with an inactive license assumed the watch as operator at the controls. As a result of that event, an inspection was conducted at Brunswick and other plants in Region II to determine the administrative controls in place to prevent an occurrence of this nature. Inspection Report 325,324/ 89-34 determined that "no program or administrative safety net existed to prevent unintentional or willful assumption of licensed duties by an unqualified licensed operator." That report also stated the on-shift operations management had no means in the control room to independently verify that on-watch personnel are duly licensed. The report noted that no violations had been identified concerning unqualified personnel performing licensed duties since 1984.

As a result of the above inspection, the licensee initiated a procedure change to Licensee Watch Standing Log Operating Instruction OI-49, Volume VII, Rev. 3, Step 6.2.3. to require that the Day Shift Production Assistant on the first Saturday of March, June, September and December, forward a list to the Operations Manager of all personnel whose license will become inactive at the end of the calendar quarter. This step provided approximately one month early notification to allow remedial action before a license became inactive. This step was deleted when the above OI-49 procedure was revised on August 1, 1991, to clarify the duties of the production assistant.

Service Water Piping

Through wall piping leaks have occurred frequently in the service water system. Through wall leaks are significant because, if not corrected, they could progress to failures rendering safety systems inoperable. On October 19, 1992, a through wall leak occurred in an 18-inch service water line running through the Diesel Generator No. 4, four day fuel oil

tank room. This line is a branch from the Unit 2 Nuclear Service Water Supply Header and provides the Unit 2 source for cooling all four DGs. Diesels No. 3 and No. 4 rely on this source as their primary heat sink with the Unit 1 source as an automatic backup. The opposite configuration exists for DGs No. 1 and No. 2. The one to two gallon per minute leak was temporarily repaired. Code repair will be affected before restart. No adverse effects occurred.

The leak occurred in a non-welded, straight run section of the pipe just downstream from a flanged connection. The carbon steel pipe is cement lined. The cement lining is intended to prevent corrosive brackish water from contacting the carbon steel. This material combination was prevalent in the service water system as originally constructed, but most is being gradually replaced with corrosion resistant copper-nickel or stainless steel. The leaking section was replaced in 1985 in conjunction with changing the upstream piping to copper-nickel due to underground leaks. The flanged connection became the boundary between the new copper-nickel and existing carbon steel. This necessitated replacing a short section of carbon steel with new carbon steel to accommodate the new flange connection.

Almost all leaks in service water piping occur at weld joints, including some in copper-nickel. Since April 1989, 24 service water leaks due to internal erosion/corrosion have been identified. Only three of these, including the one described above, have occurred in non-weld areas; but these represent three of the total seven leaks in cement lined carbon steel. In all cases, leaks in cement lined carbon steel are the result of water penetrating the cement lining through cracks or seams.

The remaining cement lined carbon steel pipe in safety significant applications is either scheduled to be replaced or visually inspected. Inspected portions are large diameter pipe sizes that permit entry by personnel or remote controlled cameras. No other non-destructive examination methods are routinely included, but in-progress corrosion areas are easily identified by the characteristic "rust plume" on the cement lined internal surface.

No routine internal inspections or non-destructive examinations occur on carbon-steel piping that is scheduled for replacement. The current schedule, which extends into late 1995, includes all piping downstream of the leak described above that supplies the DGs and all Unit 1 DG supply piping from its branch connection with the Unit 1 nuclear service water header. This includes hundreds of feet of piping and many weld joints. Of the seven safety significant portions of cement lined carbon steel pipe that developed leaks, four have occurred in these areas of DG service water piping.

Two of these DG service water leaks occurred at 6 X 8 inch reducers near the connections to the DG jacket water coolers. These may be more susceptible to erosion/corrosion due to the flow turbulence induced by the small-to-large diameter change. However, the inspector concluded that many other susceptible leak locations exist in the DG service water

supply lines. Most of this piping is too small for internal inspection; therefore no surveillance is performed to assess the condition of the piping and hence the failure potential. The majority of this is 6-inch, non-insulated piping accessible within the DG building and therefore, could be easily tested by ultrasonic methods.

The service water system engineers are aware of the vulnerability to leaks in these areas and routinely walkdown accessible portions of this piping specifically to locate leaks. The inspector concluded that while this is prudent, more evaluation may be warranted in consideration of the large portion of the system not inspected and the high safety significance of failures in this ar .. URI 92-34-02; Service Water Leaks.

Violations and deviations were not identified.

5. Outage Work Activities (62703)(37828)

DGB & CB Walls

Designs are issued on 59 of 61 walls that require repair or modification. The two remaining designs involve DGB wall modifications for tornado venting. The repair activities are approximately 75 percent complete. It is anticipated that the remaining designs will be completed in early November and work will be completed in December. Engineering design and design changes have caused the majority of delays in completing this project.

RHR/SW Booster Pumps

The 2A and 2C pump motors have been inspected and refurbished. New pump motor baseplates have been installed. The pumps have been modified with new pullout pump assemblies and supports have been added to the discharge piping. Check valve slam tests were performed to verify that check valve operation will not affect alignment. Extensive vibration and thermal growth testing/analysis was performed to determine their effect on alignment. Correct torque values and torquing sequences of bolts have been determined and incorporated into procedures. The above activities resulted in reduced vibration levels, lower bearing temperatures and significant improvements in performance of the pump motors. Additional work is currently being planned for Unit 1.

Double-Disc Gate Valves

Due to concerns noted by the BNP Motor-Operated Valve Task Group in 1988 involving the potential for thermal binding and/or bonnet overpressurization in certain flex-wedge gate valve applications, the licensee embarked on a program to replace the valves with a valve type which would prove to be less susceptible to these phenomena. Plant modifications were developed to replace 22 flex-wedge gate valves in both units, 20 of which were in LLRT applications. The applicable plant systems include HPCI, RCIC, RWCU and Main Steam.

Over the past several refueling outages, the valves were replaced with Anchor Darling double-disc gate valves. Since the valves have been installed, the plant has experienced an unusually high LLRT failure rate of these valves. Eight failures have been identified in this outage. Several of the failures have ultimately been discovered to be the result of poor quality and workmanship during the valve manufacturing process. ACR B92-782 was generated to investigate the root cause of the failures and to look into commonalities in the failures. The inspector will follow licensee activities on this item.

Reactor Recirculation System Ring Header Supports

This work activity is essentially complete except for shielding removal, insulation and grating replacement, turnover, and operability testing.

Maintenance WR/JO Status

The current status of the backlog is as follows:

	Pre 4/21/92	Post 4/21	Completed Since 4/21	Remaining In Backlog
Unit 1				
Outage	783	962	858	887
Non-outage	993	3002	2291	1704
Unit 2				
Outage	673	1451	1202	922
Non-Outage	1582	4319	3772	2129

The corrective maintenance backlog was reduced by approximately 200 items during October. This progress has been very slow. Approximately 5900 corrective maintenance items remained open at the end of October. The pre-April 21 backlog has been reduced from 4465 to 1673 during the outage. The initial screening of the overall backlog on a system priority basis was essentially completed for 79 systems as of October 27. Management review of the planned work on items to be excepted is still ongoing. Revision 0 of the startup schedule was completed, but is under further review and refinement. The united schedule contained several unresolved issues and assumptions that must be resolved or clarified to improve the schedule accuracy. The licensee has committed to providing a copy of the Integrated Startup Schedule for Unit 2 to NRC by November 30, 1992.

Structural Steel

A summary and status of this item is contained in Inspection Report 325,324/92-27.

Instrument Racks

Work on rack replacement on Unit 2 is approximately 85 percent complete. Three of three replacement racks are installed. All designs on Unit 2 are completed. This project is behind schedule with an anticipated completion in late January. Work on Unit 1 is approximately 45 percent complete. The estimated completion date of January may be extended as work activities and focus are redirected to completing work and restarting Unit 2.

Operator Work-Arounds

Added emphasis and focus by the licensee has improved progress on this item. There were 86 open operator work-arounds on Unit 1 and 117 on Unit 2 at the end of the reporting period. The licensee now tracks these items on a daily basis and provides a report on additions, completions and items not completed on schedule in the daily plan of the day meeting. Accountability is assigned for each item. This added emphasis appeared to be improving the completion rate of open items in this area.

Plant Material Condition

Work continues in this area with emphasis in the condenser pits and intake structure areas. Severely corroded components are being replaced and painting/preservation work occurred on the SW/CW intake areas and crane, the CB crane, condenser pits, reactor feedpumps, turbine building "breezeways" and other plant areas. The licensee has developed a plan and schedule for these activities. A significant amount of work remains around the SW/CW intake screens.

Turbine 2A Low Pressure Rotor

The ten year Unit 2 low pressure A turbine ultrasonic inspection recommended by General Electric was completed. Several indications were located during the process. Many of the crack indications found in the 1982 inspection have grown in size. Several new crack indications were discovered in the dovetails, keyways and hubs.

The recommended fix is to first remove the buckets around the notch on the fourth stage, turbine end. Depending on the severity of the cracks found, options are available. One option is to remove the buckets at the notch and replace the notch buckets with titanium blocks, keyed in place. Blades at 180 degrees would be removed to counterbalance. If the cracks are deep and extensive enough on the wheel, the buckets or the entire wheel will be removed and replaced with pressure plate. The turbine could then be run, but at reduced efficiency. As the cracks are being ground out, they will be magnetic particle inspected to check for crack removal. The keyway cracks will not prevent the unit from starting up but several recommendations on inspection intervals have been provided by GE. The licensee is currently studying the available

options which may include rotor replacement. The inspector will follow actions taken on this item.

6. Licensee Self-Assessment (40500)

The inspectors attended selected Plant Nuclear Safety Committee meetings conducted during the period. A significant number of these meetings involved system review of planned and exempted systems work backlogs. The inspectors verified that the meetings were conducted in accordance with Technical Specification requirements regarding quorum membership, review process, frequency and personnel qualifications. Meeting minutes were reviewed to confirm that decisions and recommendations were reflected in the minutes and followup of corrective actions was completed. There were no concerns identified relative to the PNSC meetings attended. The resolution of safety issues presented during these meetings was considered to be acceptable.

In October, the Site Project Assessment Group of NAD loaned the manager of the Management Assessment Section to Maintenance for a 90 day period to assist in the training of new maintenance planners and implementation of maintenance planning upgrades. To supplement the loss, an engineer from the corporate assessment section was sent to assume his duties during this period. On October 23, the inspector was informed by the Manager of the Site Project Assessment that he was also loaning two of the three Engineering/Technical Support Assessors to the Site Technical Support Section to assist the Technical Support Managers from Nuclear and BOP areas in managing selected projects. This loan was to be for a period of three weeks starting on October 26. The reason given for these reassignments was that the managers of the Technical Support area were very involved in the review and prioritization of backlogs and in the development of the site restart and three year business plans, and needed supervisory assistance. When informed of this decision, the inspector expressed a concern that this could result in a loss of independence from line functions by the assessors. The inspector asked what measures had been established to prevent the assessors from later evaluating activities they were involved in. No measures had been established, but after being questioned, the licensee took steps to address this concern. After lengthy discussions with the licensee, the inspector was convinced that these personnel were needed to assist the Technical Support and Maintenance areas for a short duration project. During these conversations the inspector received assurances from the Manager of NAD that his organization would not be used in the future as a source of personnel for line organizations.

7. Organizational Changes

On October 6, 1992, Mr. J. W. Spencer resigned as Plant General Manager. The licensee implemented a unitized organizational structure with Mr. R. E. Morgan and Mr. J. M. Brown named as temporary Unit 1 and Unit 2 Managers, respectively. Mr. J. G. Titrington and Mr. K. J. Ahern were named as Manager of Operations and Mr. D. E. Moore and Mr. M. E. Jackson were named as Manager of Maintenance for Units 1 and 2, respectively.

The E&RC organization will now report to Mr. G. Warriner, Manager - Contract and Administration Section. On October 12, Mr. J. P. Cowan was named Manager of Technical and Regulatory Support reporting to Mr. R. B. Richey, Site Vice President. Mr. Cowan is on loan from INPO to assist in plant recovery operations. Mr. E. E. Willett from the Harris plant was named Manager - Planning and Scheduling, reporting to Mr. Richey. This organization combines OM&M, Planning and Scheduling, Maintenance Planning and SWFCG. OM&M will continue to manage outages and implement modifications. The licensee stated that some of the above positions are being filled on a temporary basis and additional changes may occur.

8. Quality Control (QC)

Quality Control identified numerous welding deficiencies during the outage. These deficiencies included welders working to verbal instructions, inadequate welding controls, improper techniques and inadequate control of welding rod material. These findings were documented in several QC assessment reports and indicated significant weaknesses with the site welding program.

The inspector discussed his concerns in this area with the Corporate Manager of Quality Control. The QC manager decided to obtain the services of an outside consultant to assess the site welding program. The assessment identified weaknesses in the areas of welder testing and training, procedures and control of weld rod material. Many of the findings were similar to those previously identified by QC. The assessment concluded that the large number of deficiencies indicated a weak welding program. An ACR was written to determine the root cause and corrective actions needed. The NRC inspector noted that this assessment focused on the overall program, but did not contain extensive field observations.

The inspector reviewed the licensee's corrective actions for the findings to date. The corrective actions were found to address individual findings, but did not appear to address overall welding program weaknesses.

QC has in the past been successful in effecting corrective actions on individual problems as they are identified; however, it appears that QC does not have the authority to require programmatic changes. In addition, CP&L Quality Verification Procedure, QVS-202, Support of Self-Assessment and Field Surveillance Programs, Revision 0, limits the activities of the QC organization. It allows QC to stop work on individual jobs if a hold point exists. The above procedure requires that QC pass their observations and findings to the line organization who will take corrective action as they deem necessary. QC does not have an input in determining if corrective action is appropriate or adequate to correct the QC identified deficiency. The authority to assess programs is the responsibility of NAD. NAD has the expertise to assess this area, but has not performed any assessments of the welding program. When questioned on this matter by the NRC inspector, the Manager of NAD and the Project Assessment Manager stated that they did

not look into this item as yet. The inspector will continue to follow actions taken by the licensee to address the welding program problems. URI 92-34-03, Welding Program.

9. Exit Interview (30703)

The inspection scope and findings were summarized on November 6, 1992, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings listed below and in the summary. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

Item Number	Description/Reference Paragraph
325,324/92-34-01	Violation - Watchstanding With An Inactive License (paragraph 4).
325,324/92-34-02	URI - Service Water Leaks
325,324/92-34-03	URI - Welding Program

10. Acronyms and Initialisms

ACR	Adverse Condition Report
BNP	Brunswick Nuclear Project
BOP	Balance of Plant
BSEP	Brunswick Steam Electric Plant
CB	Control Building
CO	Control Operator
CP&L	Carolina Power & Light Company
DG	Diesel Generator
DGB	Diesel Generator Building
E&RC	Environmental & Radiation Control
GE	General Electric
HP	Health Physics
HPCI	High Pressure Coolant Injection
LLRT	Local Leak Rate Test
MOP	Motor Operated Potentiometer
MST	Maintenance Surveillance Test
NAD	Nuclear Assessment Department
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
OM&M	Outage Management & Modification
PA	Protected Area
PNSC	Plant Nuclear Safety Committee
QC	Quality Control
RC	Run Control
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
ROT	Reactor Operator Trainee
RWCU	Reactor Water Cleanup

SCO	Senior Control Operator
SSTR	Stop/start Timing Relay
SW/CW	Service Water/Cooling Water
SWFCG	Site Work Force Control Group
WR/JO	Work Request/Job Order