U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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License Nos:	DPR-23
Report No:	50-261/96-08
Licensee:	Carolina Power & Light (CP&L)
Facility:	H. B. Robinson Unit 2
Location:	2112 Old Camden Rd. Hartsville, SC 29550
Dates:	May 26 - July 6, 1996
Inspectors:	J. Zeiler, Acting Senior Resident Inspector P. Byron, Resident Inspector (Sections 08.3, M8.1, M8.2, M8.3, M8.4, and M8.5) P. Balmain, Resident Inspector (Sections 08.1 and 08.2) R. Fruedenberger, Resident Inspector (Sections M8.6, M8.7, and M8.8)
Approved by:	M. Shymlock, Chief, Projects Branch 4 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

H. B. Robinson Power Plant, Unit 2
NRC Inspection Report 50-261/96-08

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of resident inspection; in addition, it includes the results of inspections by two visiting resident inspectors.

Operations

- In general, the conduct of operations was professional and safety-conscious. Good plant equipment material conditions and housekeeping were noted throughout the report period (Section O1.1).

- The inspectors determined that a unit downpower evolution to perform maintenance on a condensate pump was well planned and coordinated. Shift operations carefully controlled the evolution, management involvement was evident, and reactor engineering support was good (Section O1.2).

Maintenance

- Installation activities associated with the replacement of the C Instrument Air Compressor were well controlled and coordinated, however, the use of working copies that did not contain up-to-date signoffs was not considered a good practice. Management demonstrated good consideration for plant safety with the decision to install a temporary air compressor while the work was in progress (Section M1.1).

- Maintenance activities associated with the Condensate Pump B impeller adjustment, lubrication inspection of the Limitorque motor operator for valve SI-844B, and 480 Volt circuit breaker preventive maintenance, were properly performed (Sections M1.2, M1.3, and M1.4).

- Routine surveillance test activities were well coordinated and adequately performed (Section M1.5).

Engineering

- An Unresolved Item was identified concerning licensee resolution of potential design problems associated with air operated solenoid valves. These problems involved the misapplication of solenoid valves which were found to be under-rated for the pressure required to operate their respective valves (Section E1.1).

- Engineering adequately supported the investigation into the root cause of feedwater header low pressure alarms. A temporary modification lowering the feedwater header low pressure alarm to allow operations the ability to continue effectively monitoring feedwater header pressure was considered appropriate (Section E1.2).

- The licensee's actions to address cracked lock washers identified in the frame and pole piece bolts on 480 volt safety-related circuit breakers were adequate (Section E1.3).

- An Inspector Followup Item was identified concerning licensee resolution of previously identified examples of Updated Final Safety Analysis Report inconsistencies associated with the description of the spent fuel pool cooling system and design (Section E8.1).

Plant Support

- The licensee's actions to resolve concerns identified previously in the radiological survey program were considered adequate (Section R8.1)

Report Details

Summary of Plant Status

Unit 2 remained at power the entire inspection period completing 365 days of continuous operation. On June 15, a downpower to 50 percent was conducted to adjust the impeller clearances on Condensate Pump B as a result of slight pump performance degradation that was identified.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent control room tours to verify proper staffing, operator attentiveness and communications, and adherence to approved procedures. The inspectors attended daily operations turnover, management review, and plan-of-the-day meetings to maintain awareness of overall plant operations. Operator logs were reviewed to verify operational safety and compliance with Technical Specifications (TSs). Instrumentation and safety system lineups were periodically reviewed from Control Room and computer indications to assess operability. Frequent plant tours were conducted to observe equipment status and housekeeping. Condition Reports (CRs) were routinely reviewed to assure that potential safety concerns and equipment problems were reported and resolved.

In general, the conduct of operations was professional and safety-conscious. Good plant equipment material conditions and housekeeping was noted throughout the report period. Specific events and noteworthy observations are detailed in the sections below.

O1.2 Downpower to Perform Condensate Pump Maintenance

a. Inspection Scope (71707)

On June 15, 1996, the licensee conducted a downpower to 50 percent in order to adjust the impeller clearance on Condensate Pump B and to conduct routine turbine control valve testing.

b. Observations and Findings

The inspectors reviewed the licensee's activities associated with preparations and planning for the downpower evolution. Activities were scheduled during a weekend in order to limit the potential interaction from other ongoing activities. Prior to the downpower, operations management issued a Night Order which described the scope of the activities and provided operator guidance on maneuvering reactor power. In addition, reactor engineering provided information to aid the

operators in determining the effects of the xenon transient on core reactivity. During the evolution, representatives from both operations management and reactor engineering were present in the Control Room to monitor activities. A pre-job briefing was held with operations, engineering, and maintenance personnel to discuss details of the evolution, precautions, and contingencies should problems arise. The downpower commenced at 9:55 p.m. on June 15. Following condensate pump work and successful turbine control valve testing, the unit was returned to full power at 8:30 a.m. the following morning without incident. Further details regarding the condensate pump work is discussed in Section M1.2.

c. Conclusions

The inspectors determined that the downpower evolution was well planned and coordinated. Shift operations personnel carefully controlled the evolution, operations and site management monitored aspects of the evolution, and reactor engineering provided good support. No discrepancies were identified.

08 Miscellaneous Operations Issues (92901)

08.1 (Closed) Violation (VIO) 50-261/94-27-01, Operator Procedure Non-Compliance Results in Control Room Ventilation Inoperability: This violation involved a failure of a control room operator to restore a main control board switch to the proper position following an emergency ventilation system surveillance test. The inspectors reviewed the licensee's response to the violation (dated January 30, 1995) and reviewed implementation of the licensee's corrective actions.

The inspectors verified that Operations Surveillance Test procedure OST-750-1 and OST-750-2, Control Room Emergency Ventilation System - Train A, and Train B, were revised to require a verification of both the proper switch positions and indicating light status when restoring the system following testing. The inspectors also verified that the licensee developed a checklist to verify main control board switch positions each shift in addition to routine logkeeping activities. No additional mispositioning events were identified while this switch verification checklist was in effect and the licensee discontinued its use. This item is closed.

08.2 (Closed) Unresolved Item (URI) 50-261/95-07-02, Initial Evaluation for Removal of Safety Pump Room Coolers from Service was Inadequate. Review the Reanalysis: This item concerned the impact of the temperature increase in safety-related pump rooms caused by the loss of area room coolers. The inspectors reviewed CR 95-00431 which was initiated to evaluate room cooling requirements. The inspectors verified that Engineering Service Requests (ESRs) 95-00328, 95-00928, and 95-00929 were completed which evaluated the room cooling requirements in the Auxiliary Feedwater, Safety Injection, and Residual Heat Removal (RHR) pump rooms, respectively. These engineering evaluations determined that safety-related equipment in the three pump room areas would have

remained operable under accident conditions. However, the evaluation recommended operation of the room coolers to minimize fan motor lubrication degradation. The inspectors also verified that Engineering Evaluation 89-018 was voided to prevent inadvertent use. This item is closed.

08.3 (Closed) URI 50-261/95-14-05, Operations Surveillance Test 621 Deficiency: On April 30, 1995, a five pound CO_2 cylinder exploded while stored in a compressed gas storage shed. The explosion destroyed the cylinder storage cage. The cylinder ricocheted off one of six hydrogen cylinders used for emergency make-up for the Unit 2 hydrogen supply and came to rest approximately 20 feet from the storage shed. The hydrogen cylinder was torn from its mounts and moved approximately 10 feet. The hydrogen gas ignited and the Fire Brigade extinguished the fire within 10 minutes. The licensee immediately initiated an investigation. The investigation revealed that two five pound CO_2 cylinders (C-1 and C-4) had been sent to a vendor on April 24, 1995, to be recharged and were returned on April 26. The returned cylinders were weighed in accordance with OST-621, Diesel Generator CO_2 System Weight Test (Semi-Annual), Revision 7, Section 7.1.24. The C-1 cylinder weighed in at 131% of "stamped full weight" and the ruptured cylinder (C-4) weighed in at 180% of "stamped full weight." OST-621, Section 6.0, Acceptance Criteria, only addressed minimum cylinder weight.

The licensee sent the ruptured cylinder to the Metallurgy Group at the CP&L Energy and Environmental Center for analysis. Metallurgical results indicated that the rupture was caused by tensile strength overload and there was no apparent flaw in the cylinder. Additional testing determined that the tensile strength of the metal in the C-4 cylinder was 100,469 pounds and it required 6,583 psig to rupture the cylinder. The licensee contacted and received technical assistance from several vendors who supplied compressed gas. The vendors stated that gas cylinders are normally charged to plus or minus 10% of "stamped full weight." They informed the licensee that over-filling the cylinder was the cause of the rupture. The vendor who recharged the C-1 and C-4 cylinders stated that there had been recent problems with their scales. On May 4, 1995, the licensee was informed that the scales had been repaired and the over-filling was "purely accidental." The cylinder valve assembly contains a safety disc which is supposed to release at 2300-3000 psig. The licensee's investigation revealed that the safety disc assembly contained three safety discs; the original disc and two additional discs of unknown origin. The C-4 cylinder was manufactured in 1981 and purchased by the licensee in 1984. The licensee was unable to determine when and who installed the unauthorized and unevaluated discs. The licensee changed vendors and revised OST-621 to add acceptance criteria which limits maximum weight to 10% of the cylinder net weight listed in an attachment.

The licensee contacted the U.S. Department of Transportation following the event. The transportation of compressed gas cylinders is under the jurisdiction of the Department of Transportation and their regulations

specify the maximum filling density of compressed gas cylinders. The maximum filling density for CO_2 is 68 percent. The vendor who recharged the CO_2 cylinders was cited by the Department of Transportation following their investigation.

The inspectors were concerned that OST-621, Revision 7, did not contain requirements to check for the over-filling of cylinders. Section 9.5.1.3.2.5 of the Updated Final Safety Analysis Report (UFSAR), Revision 13, states that Fire Protection List components, are those components which must perform their intended function and usually demand special ordering, material handling, installation, and/or testing requirements. The Fire Protection List outlines boundaries to fire protection systems within which all Fire Protection List components are contained and is maintained as part of the plant Operating Manual. Fire Protection List items require inspection. Section 2.1 of Operations Management Manual OMM-020, Fire Protection List, Revision 0, dated November 11, 1984, lists new cylinders for CO_2 Suppression Systems. The inspectors noted that prior to 1983, all cylinders were included as Fire Protection List items by the licensee. The inspectors also reviewed the National Fire Protection Association Standard on CO_2 Extinguishing Systems, 1993 edition, and noted that it addressed the use of safety discs as over-pressure protection. Their requirement to weigh cylinders semiannually was to check for leakage. The inspectors concluded, after reviewing the documentation, that the licensee had no requirement to weigh the compressed gas cylinders for over-pressurization. It was a requirement placed on the vendor. The licensee's corrective actions were adequate and this item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Instrument Air Compressor Replacement Activities

a. Inspection Scope (62703)

The inspectors reviewed activities to replace the C Instrument Air Compressor (IAC) in accordance with design modifications ESR 95-00065 and 96-00322. The inspectors reviewed the modification package and observed aspects of the old compressor removal, and installation of the new D IAC. At the conclusion of the inspection period, installation of the modification was still ongoing.

b. Observations and Findings

Design modification ESR 95-00065 was developed to replace the C IAC with a more efficient rotary screw type compressor. The old compressor had become unreliable and needed continuing maintenance. The new compressor was equipped with a desiccant air drying system resulting in improved air quality. Replacement of the IAC was one of management's "Top 10" items and had been planned since early 1995.

The inspectors determined that the modification package had been well planned and adequately reviewed for 10 CFR 50.59 applicability, and did not affect TSs nor result in an Unreviewed Safety Question. The new compressor was designed to be capable of meeting the existing plant air supply demands of the old C IAC. The modification package included sufficient instructions to properly install and test the new compressor. Necessary welding diagrams, electrical schematics, and piping drawings were included to aid in the installation.

The inspectors periodically observed aspects of the old compressor removal and new compressor installation. Activities were adequately controlled and the installation instructions were at the work location and being used. The inspectors noted, however, that the "control copy" of the modification instructions (which contained the official signoffs) was not used at the job site. Personnel in both the electrical and mechanical groups used a separate "working copy" of the modification instructions to perform their work. At the end of each working day, personnel were required to update the control copy (located in document control) with signoffs for those steps completed. While this process was allowed by the modification program, the inspectors considered it to be a control vulnerability which could lead to errors in the coordination and completion of steps in the proper sequence, especiallv when multiple groups are working at the same time. This was discussed with licensee engineering management who indicated that this concern would be reviewed.

During the removal of the C IAC, a diesel powered air compressor and dryer was scheduled to be installed as a temporary backup. This temporary compressor had been requested by plant management even though the design of the instrument air system was capable of supplying the system load requirements without its use. The inspectors considered this indicative of good, conservative plant safety focus on the part of management.

The backup compressor was installed under temporary modification ESR 96-00322 and was connected via high pressure flexible hoses to the Primary Air Compressor Receiver Tank. The inspectors noted that good pre-planning had been performed for the use of this backup compressor. A detailed 10 CFR 50.59 evaluation was performed which thoroughly considered the potential impact on the instrument air system. The inspectors verified that both, applicable operations procedures were revised to reflect operation and maintenance of the temporary compressor, and the operators received appropriate training for operating the equipment.

At the end of the inspection period, the licensee had completed installation of the new D IAC and was in the process of testing the equipment. The inspectors planned to continue observation of these activities.

c. Conclusions

The inspectors determined that the IAC replacement modification package was of good quality and met the licensee's design modification requirements. Installation activities were well controlled and coordinated, however, the use of working copies that did not contain up-to-date signoffs was not considered a good practice. Management demonstrated good consideration for plant safety with the decision to install a temporary air compressor while work was in progress.

M1.2 Condensate Pump B Impeller Adjustment

a. Inspection Scope (62703)

The inspectors reviewed aspects of the June 16 maintenance to check and adjust the impeller clearance on Condensate Pump B. This work was determined necessary after identifying that pump operating performance had degraded. This degradation was believed to be attributed to excessive impeller clearances. The work was performed under Work Request/Job Order (WR/JO) 96-ACJM1 using the instructions in the work request, as well as Corrective Maintenance procedure CM-038, Condensate Pump Maintenance, Revision 5.

b. Observations, Findings, and Conclusions

Maintenance activities involved unbolting the motor coupling to impeller assembly allowing the pump to be backseated. The clearance between the adjustment plate and the motor coupling was found to be 0.039 inch. Adjustment was performed to obtain the proper clearance of 0.029 inch. The inspectors determined that the work was adequately planned and coordinated. Instructions provided in WR/JO 96-ACJM1 and CM-038 were adequate and the work was performed by qualified technicians. Upon return to service, post-maintenance testing was performed to verify proper pump operation. No discrepancies were identified.

M1.3 Preventive Maintenance on Valve SI-844B

a. Inspection Scope (62703)

On July 1, the inspectors witnessed mechanical maintenance personnel perform lubrication and lubricant inspections of the Limitorque motor operator for valve SI-844B, Containment Spray Pump B Inlet.

b. Observations, Findings, and Conclusions

This 3-year preventive maintenance activity was performed under WR/JO 95-AVS001. Preventive Maintenance procedure PM-112, Limitorque Inspection No. 1, was used to perform the lubricant inspections. The inspectors witnessed the technicians obtain a motor pinion grease sample and inspect the sample for foreign material intrusion, hardness, emulsification, and separation. The condition of the grease was found

to be adequate. In addition, the technicians inspected the condition of the external relief tubing and valve stem. Again, no adverse conditions were identified during these inspections. The inspectors concluded that the maintenance activities were properly performed by qualified personnel.

M1.4 Preventive Maintenance on 480 Volt Safety-Related Circuit Breakers

a. Inspection Scope (62703)

On July 1, the inspectors witnessed aspects of preventive maintenance on the 480 volt circuit breaker associated with Containment Spray Pump B. Work was performed under WR/JO AHMG-002. This maintenance is performed once every 18 months and involves inspecting and testing 480 volt safety-related circuit breakers to ensure that they operate properly.

b. Observations and Findings

The inspectors verified that operations appropriately entered the 24-hour TS Limiting Condition for Operation (LCO) for the inoperable spray pump prior to allowing work to commence. The inspectors noted that a "No" had been entered in the section of the WR/JO annotating whether a TS LCO was impacted by the work. This typo-graphical error was discussed with maintenance planning personnel who initiated actions to correct this and other circuit breaker WR/JOs. The inspectors determined that this error was caused by inattention to detail. Previously, the 18-month circuit breaker inspections were performed during refueling outages when the unit was in an operating condition that did not require the containment spray pumps to be operable. When a decision was made to schedule the work on-line, the WR/Jos had not been adequately revised to reflect the change.

The inspectors observed aspects of the maintenance activities and discussed them with the technicians performing the work. The WR/JO required that procedure PM-163, Inspection and Testing of Circuit Breakers for 480 Volt Bus E2, Revision 2, be used to perform the preventive maintenance on the circuit breaker. This procedure included the necessary steps for cleaning, inspecting, lubricating, and testing Westinghouse Type DB-50 circuit breakers. The inspectors also reviewed the vendor manual (CP&L No. 737-668-91) for this type circuit breaker and compared the maintenance schedules and inspection guidance against PM-163. The inspectors determined that the procedure provided clear, detailed instructions for performing the breaker inspections. Maintenance requirements prescribed in the vendor manual were incorporated in the procedure where applicable. Especially noteworthy were the detailed notes and precautions which aided performance of more complicated steps.

During observation of the work, the inspectors noted that several lock washers associated with fasteners on the breaker frame appeared to be cracked. The location of these broken washers were identified to the technicians. Broken lock washers in the DB-50 circuit breakers had

previously been identified on June 11, 1996, during similar circuit breaker inspections associated with Component Cooling Water Pump C. Details of this problem are discussed in more detail in Section E1.3.

c. Conclusions

The inspectors concluded that the maintenance and testing was performed in accordance with instructions in the WR/JO and applicable maintenance procedures. The technicians were deliberate in their activities and demonstrated knowledge of the equipment and procedures. The activities were completed without incident.

M1.5 Maintenance Surveillance Observations

a. Inspection Scope (61726)

During the inspection period, the inspectors observed all or portions of various maintenance surveillance activities performed by the licensee. These surveillances were performed to meet the surveillance requirements of various sections in TSs. The inspectors verified that approved procedures were available and in use, test equipment in use was calibrated, test prerequisites were met, shift pre-job briefings were performed, TS LCOs were entered and adhered to, and testing was accomplished by qualified personnel. Upon test completion, the inspectors verified that test data was complete and met acceptance criteria, and equipment restoration was properly completed. The inspectors observed all or portions of the following surveillances:

- OST-051 Reactor Coolant System Leakage Evaluation
- OST-401 Emergency Diesels Slow Speed Start
- OST-151-3 Safety Injection System Components Test - Pump C

b. Observations, Findings, and Conclusions

The inspectors determined that the surveillances were performed in accordance with the prescribed procedures. The inspectors reviewed the results of the surveillance tests and verified that test acceptance criteria were satisfied. Pre-job briefings were conducted by operations prior to testing which resulted in good test coordination. The procedures provided detailed precautions and instructions. The inspectors concluded that the tests were properly performed.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) VIO 50-261/93-19-04, Inadequate Calibration Procedures: The inspectors identified that temperature controllers TC-6559A and B which had been installed under Plant Modification M-994, Field Revision 45, had not been included in the plant's calibration program. It was also identified that Differential Pressure Indicator DPI-6520 was included in the plant calibration program when not required. DPI-6520 is a manometer which is not required to be calibrated.

The licensee issued Revision 39, Maintenance Management Manual MMM-006, Appendix B, Calibration Data Sheets, which added TIC-6514 and TIC-6515 to the calibration program and deleted DPI-6520. The inspector reviewed Document change Form, DCF 93-P-1926 which was written to add TC-6559A and B to MMM-006, Appendix B Revision 38 and noted that the licensee identified that the instrument identification numbers were duplicates and assigned the new identifiers listed above. The inspectors reviewed MMM-006, Appendix B, Revision 39, and noted that the instruments with the new identifiers were listed. This item is closed.

M8.2 (Closed) VIO 50-261/93-33-04, Failure To Take Adequate Corrective Action For Pressurizer Pressure Transmitters Found Out Of Tolerance: On October 13, 1993, during the refueling outage, the licensee calibrated pressurizer pressure transmitters PT-455 and PT-457 after finding them out of calibration. Two days later the licensee identified that these pressure transmitters had drifted out of calibration and they recalibrated them. On November 30, 1993, the licensee identified that pressurizer pressure transmitters PT-455 and PT-457 had again drifted out of tolerance and they replaced them. The inspectors observed the replacement of PT-457 on December 14, 1993, and also reviewed the calibration evaluations and work packages. These actions were documented in NRC Inspection Report 50-261/93-33. This item is closed.

M8.3 (Closed) VIO 50-261/93-35-01, Both Emergency Diesel Generators (EDGs) Inoperable With Unit At Power: On November 22, 1993, while performing a routine surveillance on EDG A, the licensee discovered that the generator output voltage was 440 volts rather than the required 480 volts. The licensee adjusted the automatic voltage control knob to 480 volts and successfully re-performed the surveillance. Following the EDG A surveillance, the licensee attempted to perform the same surveillance on EDG B, but the engine would not roll when starting air was applied.

The licensee found the EDG A automatic voltage control knob in the minimum or lower position and observed a spot of paint on the knob. On November 25, the licensee identified that the automatic voltage control knob was set at 450 volts rather than the required 480 volts. They determined that the surveillance had been successfully performed on November 8, 1993, and the EDG control panels were painted three days later. They concluded that the mispositioning occurred during the painting of the panels. The licensee added scales to the knobs and installed clear covers over the knobs. They also eliminated the use of generic work requests for painting in the power block.

EDG B had failed to start because two of the six pilot air valves in the air start distributor had seized which prevented starting air from being injected into two cylinders. The licensee observed that the number 2 and 6 pilot valves failed to descend to the air start cam and the number 5 air start check valve was leaking. A cleanliness inspection was performed on the air start distributor including blowing air through the piping but no attempt was made to capture the debris. The air start distributors were replaced on both EDGs.

On December 27, 1993, an independent evaluation team was formed. An inspection of the EDG B air start distributor revealed that the air start distributor was damaged, as well as the springs and spring sleeves. The air pilot valves and sleeves were worn. An evaluation revealed that the wear and damage were caused by the valves being rotated in their bores at a rate which was beyond the springs' ability to force them to track the cam's surface. It was postulated that the excessive wear on the pistons and bores resulted in a gap which was sufficient to allow the accumulation of debris, which could have caused the pistons to stick. The licensee assumed that the debris was either corrosion products in the pilot valve caps or pieces of the broken springs.

The evaluation team discovered that when OST-404, Diesel Generators Emergency Field Flashing And Manual Closure of Generators Main Breaker, was conducted on October 19 and 20, 1993, starting air was applied to EDG B for 50 to 60 minutes while at rated speed. The team determined that EDG A was operated in the same condition but only for 5 to 10 minutes. The team determined that OST-404, Revision 6, dated January 29, 1993, added the testing that resulted in the application of air to the starting distributor with the EDG running. The licensee determined the root cause of EDG B to not start was an inadequate test procedure. OST-404 was revised in Revision 8, dated April 20, 1994, to provide assurances that the air start solenoids do not remain energized with the diesel running. This was accomplished by canceling OST-404 and incorporating the testing of the air start solenoids in OST-401, Emergency Diesels (Slow Speed Start) and OST-409, Emergency Diesels (Fast Speed Start). The air start distributor pilot valves and air start check valves were also added to the preventive maintenance program. The inspectors reviewed OST-404, Revision 8 and the justification for cancellation. The inspectors also reviewed OST-401 and OST-409 and noted that they contained provisions to ensure that the air start solenoids are energized with the diesel running. The licensee's corrective actions were adequate and this item is closed.

M8.4 (Closed) VIO 50-261/93-35-02, Inadequate Corrective Action for EDG B Failure to Start on October 25, 1993: On October 25, 1993, EDG B failed to start during the conduct of safeguards system testing. Troubleshooting failed to identify the cause of the failure. The engine was started twice without incident on the following day. Subsequent troubleshooting revealed that the springs for three pilot air valves in the air start distributor were broken. The broken springs were replaced and EDG B was successfully started four times between October 27 and November 12. Additional details of the initial problems were described in Paragraph 4.b of NRC Inspection report 50-261/93-28. On November 22, EDG B failed to start as described in VIO 50-261/93-35-01, above. The licensee's failure to remove all the debris from the broken pilot air valve springs was the apparent cause of the EDG B failure to start. The licensee's corrective actions were to periodically inspect and clean the air start distributor pilot valves and air start check valves. The licensee has not experienced subsequent problems since implementing this

preventive maintenance. The corrective actions are adequate and this item is closed.

M8.5 (Closed) Licensee Event Report (LER) 93-19-00 and LER 93-19-01, Degraded Condition Due to EDG Inoperability: This event was also reported in VIO 50-261/93-35-01. The closure of VIO 50-261/93-35-01 also closes these items.

M8.6 (Closed) VIO 50-261/94-16-05, Inadequate Corrective Action Concerning MSIV Accumulator Volume: On January 28, 1994, with the plant in hot shutdown condition, Main Steam Isolation Valve (MSIV) A required 5 seconds to close with instrument air supplied to the valve actuator during post maintenance testing. Similar testing of MSIV B and C on January 31, 1994, revealed closing times in excess of the 5 second time limit per TS 3.7.1. Inspection to assess these failures surfaced issues related to the inadequacy of previous MSIV testing.

The inspectors reviewed the following previously docketed information regarding this violation:

- NRC Inspection Report 50-261/94-04,
- NRC Inspection Report 50-261/94-16,
- Licensee Event Report 50-261/94-02, Revision 1,
- NRC Letter dated August 5, 1994, Enforcement Conference Summary,
- CP&L Letter dated August 10, 1994, INSPECTION REPORT 50-261/94-16 ENFORCEMENT CONFERENCE RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
- NRC Letter dated August 30, 1994, NOTICE OF VIOLATION AND PROPOSED IMPOSITION OF CIVIL PENALTY - $75,000, and
- CP&L Letter dated September 29, 1994, NRC INSPECTION REPORT 50-261/94-16 REPLY TO A NOTICE OF VIOLATION.

In February 1994, a modification to increase the accumulator air volume capacity to provide additional margin for MSIV closure time was installed. NRC review of the installation of the modification and post modification testing was documented in NRC Inspection Report 50-261/94-04.

During this inspection period, the inspectors verified that procedures OST-501, Main Steam Isolation Valves, Revision 12; OST-702, ISI Secondary Side Valve Test, Revision 23; and the UFSAR included revisions as described in the September 29, 1994, CP&L Letter, Reply to a Notice of Violation, mentioned above.

In addition, the inspectors assessed the licensee's actions to address the periodic testing to verify the MSIV air actuation system leak tightness and post accident controls to ensure the MSIVs remain closed.

- The inspectors reviewed procedure EST-134, Main Steam Isolation Valves Air Leakage Test, Revision 2. This procedure was a refueling interval test which determined leak tightness of the MSIV air actuation system using a thirty minute pressure decay method.

- The results of an evaluation of post accident controls to ensure the MSIVs remained closed was not clearly addressed by the licensee's action closeout documentation associated with CR 95-00082. Acceptance criteria for EST-134 was developed based on the response to ESR 94-01136. The response to the ESR addressed post accident controls to ensure the MSIVs remained closed during the accident scenarios for which operation of the MSIVs was assumed. Existing actions in the Loss of Instrument Air procedure aligned a backup source of nitrogen to the steam generator Power Operated Relief Valves (PORVs) and MSIVs. Actions in Abnormal Operating Procedure AOP-017, Loss of Instrument Air, Revision 17, Attachment 2, were walked down by the inspectors. Emergency Operating Procedure EPP-1, Loss of All AC Power, Attachment 1 includes similar actions to supply nitrogen backup to the steam generator PORVs and MSIVs during a loss of all AC scenario. The inspectors concluded that the actions could be performed in the time frame assumed in the engineering evaluation.

The inspectors concluded that licensee corrective actions to address the violation were appropriately implemented. This violation is closed.

M8.7 (Closed) LER 50-261/94-02-00, Plant Condition Outside Design Basis due to MSIV Inoperability: The corrective actions included in this LER are the same as those included in the response to violation 50-261/94-16-05: Inadequate Corrective Action Concerning MSIV Accumulator Volume, discussed separately in this report. This LER is closed based on the review of the violation and the associated corrective actions.

M8.8 (Closed) URI 50-261/94-27-06, Resolution of Feedwater Nozzle Performance and Impact on Calorimetric: NRC Inspection Report 50-261/94-27 identified several concerns regarding the licensee's calorimetric program used to determine reactor thermal power. Violation 50-261/94-27-07: Failure to Adequately Control Calorimetric, addressed the use of uncalibrated instrumentation, failure to control the plant condition prerequisites under which the calorimetric program results were valid, failure to specify a method or timing for acquiring manual input data, and inconsistent controls on the instruments used in the calorimetric. As a result of the violation, as well as the subject URI regarding feedwater flow element performance, the licensee has implemented enhancements to the calorimetric program.

During this inspection period, the inspectors reviewed CR 95-00208 and the portions of NRC Inspection Report 50-261/94-27 that pertained to the URI.

In October of 1995 the licensee performed a feedwater tracer test that determined the feedwater flow instrumentation indicated flow 0.6 to 4.1% greater than actual flow. (Higher than actual flow indication has the affect of overestimating reactor thermal power.) The results of the tracer test were also used to establish flow constants for the steam flow elements and a steam flow calorimetric was implemented for power levels greater than 90%. The steam flow calorimetric provides an additional means of calculating reactor thermal power that is less susceptible to changes in the flow constant due to fouling.

Other actions not specific to the feedwater flow elements which improved the calorimetric program have been implemented by the licensee and will be assessed by the NRC as part of the closeout of violation 50-261/94-27-07.

Based on this review, the inspectors determined that a separate violation regarding performance assessments of the feedwater flow elements for long term degradation did not occur. This item is closed.

III. Engineering

E1 Conduct of Engineering

E1.1 Solenoid Valve Misapplication Discrepancies

a. Inspection Scope (37551)

During the report period, the inspectors reviewed the licensee's evaluations and corrective actions to address design problems identified with solenoid valves.

b. Observations and Findings

On May 20, after replacing the air regulator upstream of solenoid valve EV-1934A, an air leak through the vent port of the solenoid valve was identified. EV-1934A is an ASCO 3-way solenoid valve which controls the operation of air operated valve FCV-1934A, one of the two containment isolation valves in the Steam Generator A Blowdown sample line. After replacing the solenoid, leakage through the vent port continued. Subsequent investigations revealed that the air supply pressure (85 psig) exceeded the design rating of the solenoid valve (60 psid). This design rating is called maximum operating pressure differential (MOPD) and corresponds to the rating of the internal spring. Applying higher supply air pressure than the solenoid valve is designed can result in air leaking past the valve's seat and affecting the operation of the air operated valve that the solenoid valve controls.

Further investigation by the licensee determined that this MOPD application problem was much broader in scope. Not only were the solenoid valves for the six containment isolation valves in the Steam Generator Blowdown sample lines affected, but, other valves in safety-related and non-safety-related applications were affected as well. In an effort to thoroughly investigate and resolve this problem, engineering initiated an evaluation of the MOPD for all solenoid valves in the plant with priorities placed on safety-related applications. This included evaluation of approximately 850 solenoid valves. The inspectors verified that as the evaluation progressed, Operability Determinations (ODs) were initiated, where applicable, to address operability concerns. These ODs reviewed included the following: OD-10, OD-11, OD-12, and OD-13. Based on review of the above ODs, the inspectors determined that the licensee had adequately addressed the immediate operability concerns related to each.

c. Conclusions

At the end of the inspection period, the licensee was still investigating the scope of this problem in order to develop and implement corrective actions. Pending further review of the results of the licensee's investigation and corrective actions, this issue was identified as Unresolved Item (URI) 50-261/96-08-01: Review Licensee Investigation and Resolution of Solenoid Valve Discrepancies.

E1.2 Temporary Setpoint Change in Feedwater Header Low Pressure Alarm

a. Inspection Scope (37551)

The inspectors reviewed the licensee's investigation of Control Room alarms received for feedwater header low pressure. On June 19, a temporary modification was implemented via ESR 96-00320 in order to lower the setpoint of the Control Room alarm for feedwater header low pressure. The inspectors reviewed the modification package and its implementation.

b. Observations and Findings

In April 1996, the Control Room began to receive periodic feedwater header low pressure alarms (setpoint = 975 psig). Eventually, the alarm stayed in continuously with pressure ranging between 965 and 975 psig. Since November 1995, it was noted that feedwater header pressure had gradually reduced 25 psig. Based on review of secondary pump operating data, the licensee determined that the pressure decrease, in part, was attributed to degradation in operating performance of Condensate Pump B. The main concern with this condition was that the downward trend in feedwater pressure would eventually result in the feedwater regulating valves reaching the full open position and not being able to pass enough flow for 100 percent power operation. On June 15, the impeller clearance on Condensate Pump B was adjusted, however, upon return to full power, feedwater header pressure did not improve. The licensee intended to continue monitoring the pump performance and feedwater

header pressure until the refueling outage in September 1996. Based on the slight rate of feedwater pressure decrease, unit operation was not expected to be impacted. The licensee plans to overhaul both condensate pumps during the next refueling outage.

In order to aid operations in monitoring feedwater header pressure, a temporary modification was developed and implemented to lower the alarm setpoint from 975 psig to 960 psig. Based on review of the modification package, the inspectors determined that it was of good quality and had been reviewed and approved in accordance with the licensee's design control procedures. The 10 CFR 50.59 safety evaluation adequately addressed the potential impact of the setpoint change on the plant. The modification package provided adequate installation instructions for implementing the modification. The modification contained provisions for ensuring that the feedwater setpoint was returned to its normal value following repair of the condensate pump.

Following implementation, the inspectors reviewed the completed modification package verifying that the as-left voltage of the alarm module was set to the proper value and that procedures affected by the modification were revised as required. No discrepancies were identified.

c. Conclusions

The licensee adequately investigated the root cause of the feedwater header low pressure alarms. The temporary modification to lower the feedwater header low pressure alarm to allow operations the ability to continue effectively monitoring feedwater header pressure was considered appropriate. The modification package was of good quality and was implemented without incident.

E1.3 Review of Cracked Lock Washers Found in Safety-Related Circuit Breakers

a. Inspection Scope (37551)

On June 11, during preventive maintenance inspections of the 480 volt circuit breaker associated with Component Cooling Water (CCW) Pump C, the licensee identified several cracked lock washers under breaker frame and pole piece retaining bolts. The inspectors examined the broken washers and circuit breaker, discussed the incident with the technicians involved, and reviewed the licensee's corrective actions to address this problem.

b. Observations and Findings

A total of five quarter inch and half inch size lock washers were found to be cracked on the CCW pump circuit breaker frame and pole piece retaining bolts. Two of these washers were found in two separate pieces. The licensee checked the torque on the bolts that had broken lock washers, as well as other bolts on the breaker that did not have broken washers. The torque values were found to meet the vendor's

torque value criteria for the respective bolt size. The licensee performed laboratory testing on the broken lock washers and lock washers from the same breaker that were not damaged. The results of this analysis indicated that broken lock washers were made of plain carbon steel and had failed due to embrittlement. The exact cause of the embrittlement could not be identified but was believed to be related to metal impurities. The licensee found no evidence of service-related degradation or damage and believed that the lock washers failed shortly after their original installation.

The licensee determined that the performance of the circuit breakers was not affected by the cracked lock washers. The head of the bolts retaining the washers have a flared underside which covers the majority of the surface area of the washer. The greatest concern would be if a bolt that contained a washer that was cracked into separate pieces were not torqued properly or somehow backed off allowing a portion of the washer to fall in the breaker internals or cubicle. However, vendor and licensee controls provide assurance that the bolts are properly torqued. Therefore, the licensee believed that the potential for pieces of washer material to be loose inside the remaining breaker cubicles which had not yet been inspected was remote. The licensee decided that no immediate action to inspect the remaining circuit breakers was necessary. Broken washer inspections were to be conducted as part of the normally scheduled breaker preventive maintenance schedule. The inspectors verified that technicians qualified for this work were aware of the problem. The inspectors also verified that WR/JO instructions were revised to specifically inspect for cracked lock washers during circuit breaker preventive maintenance.

c. Conclusions

The inspectors determined that the licensee's actions to address the cracked lock washer problem associated with the 480 volt circuit breakers were adequate. However, if any bolt torquing discrepancies or loose washer parts are identified during subsequent breaker maintenance, the licensee needed to reevaluate the possibility of conducting more immediate inspections.

E7 Quality Assurance in Engineering Activities

E7.1 Special UFSAR Review

A recent discovery of a licensee operating their facility in a manner contrary to the to the UFSAR description highlighted the need for a special focused review that compares plant practices, procedures and/or parameters to the UFSAR descriptions. While performing the inspection discussed in this report, the inspectors reviewed selected portions of the UFSAR that related to the areas inspected. The inspectors verified that for the select portions of the UFSAR reviewed, the UFSAR wording was consistent with the observed plant practices, procedures and/or parameters.

E8 Miscellaneous Engineering Issues (92903)

E8.1 Review of Spent Fuel Pool UFSAR Inconsistencies

During a previous review of the spent fuel pool (SFP) heat load design assumptions (see NRC Inspection Report 50-261/95-29), the inspectors noted that the UFSAR contained several inconsistencies in Sections 9.1.2 and 9.1.3 where the true design basis for the SPF cooling system had not been captured in past revisions of the UFSAR. The licensee had initiated CR 95-02501 to address these inconsistencies. Since the earlier inspection, additional SFP UFSAR inconsistencies have been identified by both the NRC and licensee. All of the UFSAR inconsistencies that have been identified to date involving the SFP include the following:

- UFSAR 9.1.3.1.2 still states that the design basis of the SFP cooling capacity was to provide cooling for a full core off-load when only one-third core already exits in the SFP. Contrary to this, the licensee routinely conducts full core off-loads with greater than one-third core already in the SFP. However, the licensee calculation indicated that adequate cooling design capability existed for a full core off-load.

- UFSAR 9.1.3.3.1 discusses alternate means of providing circulation in the SFP cooling system loop by connecting a temporary pump. The temporary pump was no longer needed after permanently installing a second SFP cooling pump.

- UFSAR 9.1.3.3.1 and Table 9.1.3-1 shows that the time for the SFP water to rise from 132 degrees F to boiling with one-third core off-load was 14.5 hours and the time for the SFP water to rise from 150 degrees F to boiling with full core off-load was 6.8 hours. More current time to boiling calculations show that these times are approximately 12 hours and 3.75 hours respectively.

- UFSAR 9.1.3.1.3 is not consistent with 9.1.2.3.4 with respect to partial off-load temperatures.

- UFSAR Table 9.1.3-1 specifies the SFP cooling capacity for a one-third core off-load to be 6.54 X 10^6 Btu/hr when the December 1, 1980, SFP rerack amendment defined the value to be 12.0 X 10^6 Btu/hr.

The inspectors reviewed CR 95-002501 and noted the licensee planned to resolve these issues by performing a review of the SFP cooling design capability and design requirements. Following this, an UFSAR revision would be submitted to correct the inconsistencies identified. As discussed in NRC Inspection Report 50-261/95-29, the inspectors determined that the design basis of the spent fuel pool cooling system

was not exceeded as a result of the errors. Pending completion of the licensee's actions, and review by the inspectors, this issue will be identified as Inspection Followup Item (IFI) 50-261/96-08-02: Review Licensee Actions to Resolve UFSAR Inconsistencies.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750)

R1.1 Tours of the Radiological Control Area (RCA)

The inspectors periodically toured the RCA during the inspection period. Radiological control practices were observed and discussed with radiological control personnel including RCA entry and exit, survey postings, locked high radiation areas, and radiological area material conditions. No discrepancies were noted; the inspectors concluded that radiation control practices were proper.

R.8 Miscellaneous Radiation Protection Issues (71750)

R8.1 (Closed) URI 261/96-05-03, Followup on Radiological Survey and Posting Issues: This issue involved several items that the inspectors raised regarding the licensee's radiological survey program. These items were as follows: 1) several areas in the RCA were not periodically surveyed at a set frequency, 2) excessive flexibility was allowed for conducting periodic surveys, and 3) lack of controls for updating local radiological survey maps when radiological changes are identified. During this inspection period, the inspectors continued followup on these items. The results of this effort are as follows:

Item #1: Areas in RCA not Periodically Surveyed

Areas of the RCA which were not periodically surveyed at a set frequency included the following: auxiliary building ventilation inlet and exhaust fan rooms, purge inlet room, emergency diesel generator inlet fan room, auxiliary building stairways, oil house, Radwaste Building, and RCA yard. During this inspection period, the licensee developed specific criteria for evaluating areas that may require periodic radiological surveys to be performed and reviewed each of the above areas against the criteria. The inspectors reviewed the results of this evaluation. The licensee concluded that each of the areas not currently being surveyed represented a low risk for radiological change. This was based primarily on either the lack of radiological hazard in the area, adjacent area surveys that are periodically conducted, or surveys that would be conducted in the area before maintenance is performed. The inspectors also noted from review of contamination events since 1995 that there had been no events attributed to an individual being in or passing through these areas. As a conservative measure, the licensee indicated that all but the auxiliary building ventilation inlet and exhaust fan rooms, stairway, and the Radwaste Building would be placed on a periodic survey frequency. These remaining areas would continue to

be surveyed on an as-needed basis. The inspectors concluded that the licensee's actions to address this item were adequate. This item is closed.

Item #2: Excessive Flexibility In Periodic Survey Performance

This item involved several radiological survey areas which were not completed within their prescribed set frequency. A total of nine areas were identified during a walkdown of the RCA. Based on a review of the licensee's radiological procedures, the inspectors noted that this was allowed. The inspectors believed that the procedures allowed considerable flexibility and potential for extending survey frequencies that may not be reasonable for the changing radiological conditions.

During this report period, the inspectors reviewed documentation of monthly, quarterly, and semi-annual surveys performed during 1995 and 1996. While some of the surveys were not performed at their exact frequency, only slight variations from their set frequencies were found. This provided some degree of confidence that excessive abuse of the allowed deviation from the set frequency was not occurring. Following a review of this issue, the licensee agreed that more stringent controls may be necessary to prevent exceeding reasonable periodic survey frequencies. The licensee indicated that procedure HPP-001, Radiological Controlled Area Surveillance Program, would be revised to only allow a 25% grace for conducting periodic surveys. The inspectors considered this adequate corrective to address this concern. This item is closed.

Item #3: Local Area Survey Map Updates

This item involved questions that were raised regarding how the licensee ensured that local area survey maps that depict the radiological conditions in a given area were updated following identification that radiological conditions had changed. This stemmed from an observation that the local area map for the RHR room had not been updated over a four month period even though non-routine survey data was known to have been collected in the area in support of various maintenance work that was performed in the room. Upon completion of the maintenance work, the local area survey map had not been updated to reflect the radiological results from these non-routine surveys.

During this inspection period, the inspectors reviewed all of the non-routine survey results that were conducted in the RHR room since the area map was last updated in January 1996. A total of six non-routine surveys had been performed. The inspectors determined that significant radiological changes from the January survey results had not occurred. Regardless, the licensee indicated that HPP-001 would be revised to require specific actions for updating local survey maps when significant changes are identified in radiological conditions between routine survey intervals. The inspectors considered this acceptable corrective action to address this concern. This item is closed.

S1 Conduct of Security and Safeguards Activities (71750)

During the inspection period, the inspectors toured the protected area and observed the condition of the protected area fence and perimeter to assess security and general barrier conditions. No deficiencies were identified.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on July 17, 1996. An interim exit was conducted on June 7, 1996. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Cafarella, Superintendent, Mechanical Systems
J. Clements, Manager, Site Support Services
D. Crook, Senior Specialist, Licensing/Regulatory Compliance
C. Hinnant, Vice President, Robinson Nuclear Plant
J. Keenan, Director, Site Operations
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G. Miller, Manager, Robinson Engineering Support Services
R. Moore, Manager, Outage Management
J. Moyer, Manager, Maintenance
D. Stoddard, Manager, Operating Experience Assessment
R. Warden, Acting Manager, Nuclear Assessment Section
T. Wilkerson, Manager, Environmental Control
D. Young, General Manager, Robinson Plant

NRC

P. Byron, Resident Inspector, Brunswick
J. Zeiler, Acting Senior Resident Inspector

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726: Surveillance Observations
IP 62703: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 82701: Operational Status of the Emergency Preparedness Program
IP 92901: Followup - Operations
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Type	Item Number	Status	Description and Reference
URI	50-261/96-08-01	Open	Review Licensee Investigation and Resolution of SOV Discrepancies (Section E1.1)
IFI	50-261/96-08-02	Open	Review Licensee Actions to Resolve UFSAR Inconsistencies (Section E8.1)

Closed

Type	Item Number	Status	Description and Reference
VIO	50-261/94-27-01	Closed	Operator Procedure Non-Compliance Results in Control Room Ventilation Inoperability (Section O8.1)
URI	50-261/95-07-02	Closed	Initial Evaluation for Removal of Safety Pump Room Coolers from Service was Inadequate. Review the Reanalysis (Section O8.2)
URI	50-261/95-14-05	Closed	Operations Surveillance Test 621 Deficiency (Section O8.3)
VIO	50-261/93-19-04	Closed	Inadequate Calibration Procedures (Section M8.1)
VIO	50-261/93-33-04	Closed	Failure To Take Adequate Corrective Action For Pressurizer Pressure Transmitters Found Out Of Tolerance (Section M8.2)
VIO	50-261/93-35-01	Closed	Both Emergency Diesel Generators Inoperable With Unit At Power (Section M8.3)

VIO	50-261/93-35-02	Closed	Inadequate Corrective Action for EDG "B" Failure to Start on October 25, 1993 (Section M8.4)
LER	50-261/93-19-00	Closed	Degraded Condition Due to EDG Inoperability (Section M8.5)
LER	50-261/93-19-01	Closed	Degraded Condition Due to EDG Inoperability (Section M8.5)
VIO	50-261/94-16-05	Closed	Inadequate Corrective Action Concerning MSIV Accumulator Volume (Section M8.6)
LER	50-261/94-02-00	Closed	Plant Condition Outside Design Basis due to MSIV Inoperability (Section M8.7)
URI	50-261/94-27-06	Closed	Resolution of Feedwater Nozzle Performance and Impact on Calorimetric (Section M8.8)
URI	50-261/96-05-03	Closed	Followup on Radiological Survey and Posting Issues (Section R8.1)