



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

Report No.: 50-261/90-03

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

Docket No.: 50-261

License No.: DPR-23

Facility Name: H. B. Robinson

Inspection Conducted: February 11 - March 10, 1990

Inspectors:	<u>H C Garner / Sr</u> L. W. Garner, Senior Resident Inspector	4/5/90 Date Signed
	<u>H C Jury / Sr</u> K. R. Jury, Resident Inspector	4/5/90 Date Signed
Approved by:	<u>H C Dance</u> H. C. Dance, Section Chief Division of Reactor Projects	4/5/90 Date Signed

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of operational safety verification, surveillance observation, maintenance observation, ATWS rule compliance, onsite followup of events and onsite followup of written reports of nonroutine events.

Results:

Weaknesses were identified in the specification of adequate post-maintenance functional testing.

The SI system DBD incorrectly identified the SI-890A and B valves as containment isolation valves.

A PNSC approved TS interpretation involving containment integrity was later determined to be invalid and was cancelled.

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## REPORT DETAILS

### 1. Persons Contacted

C. Baucom, Senior Specialist, Regulatory Compliance  
\*D. Baur, Manager, Quality Assurance  
C. Bethea, Manager, Training  
\*W. Biggs, Manager, Site Engineering Support  
D. Crook, Senior Specialist, Regulatory Compliance  
\*J. Curley, Manager, Environmental and Radiation Control  
\*C. Dietz, Manager, Robinson Nuclear Project  
\*S. Edwards, Senior Engineer, Technical Support  
R. Femal, Shift Foreman, Operations  
\*S. Griggs, Technical Aide, Regulatory Compliance  
\*E. Harris, Director, Onsite Nuclear Safety  
\*J. Kloosterman, Director, Regulatory Compliance  
D. Knight, Shift Foreman, Operations  
R. Moore, Shift Foreman, Operations  
\*R. Morgan, Plant General Manager  
\*P. Odom, Project Specialist, Maintenance  
\*M. Page, Manager, Technical Support  
\*S. Pruitt, Senior Specialist, Technical Support  
D. Quick, Manager, Plant Support  
D. Seagle, Shift Foreman, Operations  
\*J. Sheppard, Manager, Operations  
R. Smith, Manager, Maintenance  
R. Steele, Shift Foreman, Operations  
H. Young, Director, Quality Assurance/Quality Control

Other licensee employees contacted included technicians, operators, mechanics, security force members, and office personnel.

\*Attended exit interview on March 14, 1990

Acronyms and initialisms used throughout this report are listed in the last paragraph of the inspection report.

### 2. Operational Safety Verification (71707)

The inspectors evaluated licensee activities to confirm that the facility was being operated safely and in conformance with regulatory requirements. These activities were confirmed by direct observation, facility tours, interviews and discussions with licensee personnel and management, verification of safety system status, and review of facility records.

To verify equipment operability and compliance with TS, the inspectors reviewed shift logs, operations' records, data sheets, instrument traces, and records of equipment malfunctions. Through work observations and

discussions with Operations Staff members, the inspectors verified the staff was knowledgeable of plant conditions, responded properly to alarms, adhered to procedures and applicable administrative controls, cognizant of in-process surveillance and maintenance activities, and aware of inoperable equipment status. The inspectors performed channel verifications and reviewed component status and safety-related parameters to verify conformance with TS. Shift changes were observed, verifying that system status continuity was maintained and that proper control room staffing existed. Access to the control room was controlled and operations personnel carried out their assigned duties in an effective manner. Control room demeanor and communications continued to be informal yet effective.

Plant tours and perimeter walkdowns were conducted to verify equipment operability, assess the general condition of plant equipment, and to verify that radiological controls, fire protection controls, physical protection controls, and equipment tagging procedures were properly implemented.

No violations or deviations were identified.

### 3. Monthly Surveillance Observation (61726)

The inspectors observed certain safety-related surveillance activities on systems and components to ascertain that these activities were conducted in accordance with license requirements. For the surveillance test procedures listed below, the inspectors determined that precautions and LCOs were adhered to, the required administrative approvals and tagouts were performed prior to test initiation, testing was accomplished by qualified personnel in accordance with an approved test procedure, test instrumentation was properly calibrated, the tests were completed at the required frequency, and that the tests conformed to TS requirements. Upon test completion, the inspectors verified the recorded test data was complete, accurate, and met TS requirements, test discrepancies were properly documented and rectified, and that the systems were properly returned to service. Specifically, the inspectors witnessed/reviewed portions of the following test activities:

OST-051 (revision 11)	Reactor Coolant System Leakage Evaluation
OST-406 (revision 2)	TSC/EOF/PAP Diesel Generator
OST-910 (revision 11)	Shutdown Diesel Generator
MST-007 (revision 8)	Reactor Coolant Low-Temperature Overpressure Protection System Test
MST-552 (revision 6)	Turbine Redundant Overspeed Trip System Testing

No violations or deviations were identified.

## 4. Monthly Maintenance Observation (62703)

The inspectors observed safety-related maintenance activities on systems and components to ascertain that these activities were conducted in accordance with TS, approved procedures, and appropriate industry codes and standards. The inspectors determined that these activities did not violate LCOs and that required redundant components were operable. The inspectors verified that required administrative, testing, and radiological controls were adhered to. In particular, the inspectors observed/reviewed the following maintenance activities:

PIC-301 (revision 1)	Pressure Switches and Vacuum Switches
WR/JO 90-ABUF1	Repair of SI-890B Bonnet to Body Leak
WR/JO 90-ACKK1	Repair Leak on PI-151A, Charging Pump C Pressure Switch

#### Inadequate Post-maintenance Functional Testing of SI-890B

On February 6, 1990, WR/JO 90-ABUF1 was initiated to replace the gasket on SI-890B, the B CS pump discharge check valve. Boric acid crystals had been observed around one of the bonnet studs. Replacement of the bonnet to body gasket involved removal of the flapper assembly which is attached to the bonnet. The flapper assembly was visually inspected for degradation and freedom of movement prior to reassembly. The seating surface was also inspected. Unsatisfactory material conditions were not observed. After reassembly, the bonnet to body connection was satisfactorily leak checked. The discharge piping was then drained and an air test was performed to demonstrate that the disc would partially open. The inspection and testing described is consistent with relief request no. 8 as granted by the H. B. Robinson IST SER dated July 23, 1985.

On February 14, 1990, the inspectors reviewed the completed work package and determined that appropriate post-maintenance functional testing was not performed. Upon review of the function of the CS discharge check valves, it appeared that under certain postulated accident scenarios one of the check valves would be relied upon to prevent containment atmosphere from entering the common suction associated with the other CS pump, the SI pumps and RHR pumps. The scenarios of concern involve a postulated rapid containment pressurization which automatically initiates the CS system concurrent with either a failure of one of the CS pumps to start or the manual securing of a CS pump without closure of any system MOV. Paragraph 4.9.11.1.1 of the SI system DBD states that check valves SI-890A and B function as outside containment isolation valves for CV penetrations P-44 and P-45. As such, post-maintenance testing would have to include testing as required by 10 CFR 50 Appendix J. As discussed above, no functional testing was performed to quantify the amount of leakage, if any, after reassembly of the SI-890B valve. This was discussed with the acting plant general manager on February 14, 1990.

Review of the safety significance of this item indicates that the probability of an accident is not increased but the consequences of certain accidents could be exacerbated. Gross leakage (e.g., a check valve sticking open) could potentially air bind one or more of the above listed pumps. However, the inspection performed on SI-890B provides a reasonable level of confidence that the check valve would not exhibit this failure mode if the above postulated scenarios were to occur. The licensee demonstrated per calculation RNP-C/MECH-1070, dated March 5, 1990, that leakage rates of 2.23 scf/hr or less would not result in air introduction into the suction header during the injection phase of a large break LOCA. During the recirculation phase of an accident the RHR pump(s) supply pressure to the CS pump suction line. This supply pressure precludes any CV atmosphere leakage through the CS check valves. As a comparison, the licensee indicated that the check valves were purchased to MSS SP-61, 1961, Pressure Testing of Steel Valves, which allows only 10 cubic centimeters per hour of water or 0.1 scf of air per hour per inch of diameter of nominal valve size (SI-890A and B are six inch valves). The inspectors agreed that for the small leakage rates discussed above, there would be no adverse impact on the function of any (excluding containment integrity) ESF system. However, the testing and the inspections performed were not sufficient to assure such small leakage rates. The licensee contended that the testing and inspections supported the specified leak rate. It is not unreasonable however, to assume a higher leakage rate (e.g., 5 scfm or more) since leak testing was not performed. Higher leakage rates could result in introduction of gas into the suction side of a running CS pump. This could degrade pump performance, i.e., reduced flow rates. Reduced CS flow with minimum ESF equipment operating could put the plant in an unanalyzed condition.

At the end of the report period, the licensee was in the process of developing a leakage test for these check valves and plans to test them no later than the September 1990 refueling outage or before if maintenance must be performed on the check valves. The NRC has agreed that the licensee's proposed plan is acceptable due to the small probability of occurrence of the postulated scenarios prior to the outage.

Prior to the inspectors raising the concern about the adequacy of the post-maintenance testing performed, the licensee had identified that SI-890A and B valves perform two safety functions. One function is "to close to protect the pumps from reverse flow". This was documented in Calc # 89-29, revision 0, which was performed December 1, 1989, reviewed December 4, 1989, design verified February 12, 1990, and approved on February 14, 1990. During the exit on March 14, 1990, the inspectors proposed a NOV for failure to perform adequate post maintenance testing as

required by 10 CFR 50 Appendix B Criterion V. Subsequent to the exit, the licensee provided the following paragraph concerning the proposed violation.

"For valve SI-890B, performance of the tests which comply with the inservice testing program requirements of 10 CFR 50.55a(g) and Plant Technical Specifications constitutes adequate post-maintenance testing. As allowed by 10 CFR 50.55a(g), relief from ASME XI for this valve (Relief Request No. 8) was addressed by CP&L and NRC. This Relief Request identified valve disassembly as an acceptable method of demonstrating proper valve operability. Valve disassembly, visual inspection, a check for freedom of movement, and partial stroke testing were performed on SI-890B following maintenance and serve as the basis for demonstrating the ability of the valve to perform its opening and closing functions."

After consultation with Region II management, it was determined that similar concerns raised during maintenance team inspections had been identified as weaknesses and not as violations. Thus, the proposed violation was withdrawn by the inspectors. The following weaknesses were identified as a result of consideration of the licensee's position and decision making processes:

- 1) The relief request from ASME Section XI failed to provide a basis for not performing a reverse flow test.
- 2) Understanding that meeting GL 89-04 guidance would result in reverse flow testing, the licensee elected to comply with their approved ASME Section XI program as documented in TMM-004, In-service Inspection Testing. Since Robinson 2 was listed as a Table 1 plant (GL 89-04 Table 1, Plants With SERs To Be Issued In The Near Future) it was deemed acceptable to await the SER issuance prior to implementing GL 89-04 for corrective maintenance.
- 3) The licensee has stated that disassembly and inspection constitutes adequate testing. Response to question 15 contained in "Minutes Of The Public Meetings On Generic Letter 89-04", dated October 25, 1989, stated that "disassembly and inspection of a check valve is not considered a test."
- 4) There appears to be an erroneous plant perspective involving post-maintenance testing, e.g., specify the ASME Section XI Program and/or TS surveillance tests associated with the components versus accessing the scope of maintenance performed, determining what design function may be affected, and then identifying appropriate functional testing to demonstrate that the component can perform its intended functions.

The inspectors reviewed several documents which identified that the containment isolation valves for P-44 and P-45 are the manual operated double disc gate valves designated SI-891A and B respectively, not the SI-890A and B check valves. The licensee plans to correct the error in the SI system DBD. Review of the previously performed ILRT Test (April 1987) revealed that the CS piping was vented upstream of the SI-880A, B, C, and D valves, the motor-operated pump discharge valves. Hence, a combination of the check valves SI-890A and B, and the SI-880A, B, C, and D valves formed a containment boundary during the ILRT. The inspector questioned whether the NRC approved design utilizing SI-891A and B as containment isolation valves meets the 10 CFR 50 Appendix A GDC. This question is being reviewed within the NRC and is identified as an IFI: Review CS Header CV Penetration Isolation Configuration with GDC, 90-03-01.

No violations or deviations were identified.

5. ATWS Rule Compliance (2500/20)

In response to the requirements imposed by 10 CFR 50.62, the licensee installed the Westinghouse designed AMSAC. This system provides a means to automatically trip the turbine and actuate AFW flow in the event of a complete loss of feedwater transient. Per Westinghouse analysis, documented in WCAP 8330, this mitigating action prevents RCS overpressurization and exceeding DNB limits. The AMSAC system was installed during the 1988-1989 refueling outage.

The inspectors walked down selected portions of the AMSAC system. This walkdown included, but was not limited to: the controlling unit, the safety-related signal isolators, relays, portions of cabling, the RTGB controls, and associated annunciators. Additionally, the inspectors verified proper wiring configuration for the signal isolators and selected output relays. A review was conducted of: selected procurement documentation, bills of materials, receipt inspection documentation, the isolators specification and qualification reports, the installing modification package (M-942 ATWS Mitigation) and applicable safety evaluations, DCNs, weld data reports (including verification of QC inspection), the modification's acceptance test, and the systems design basis document, DBDR-85-080/00-1. The inspectors also verified that the FSAR was updated and that selected operating procedures were revised to incorporate ATWS mitigation and AMSAC operation.

Conditions were not identified which would render the system inoperable and plant operators have an acceptable understanding of the system's purpose and operation. One discrepancy was identified in that revision 1 of the isolators' vendor qualification report, EIP-QR-002, had not received all required reviews. This discrepancy was not significant as the only change between revision 0 and revision 1 was an administrative

change specifying the specific series (SC993) that the qualification report covered. These changes had no impact on actual isolator qualification.

The AMSAC system does not compromise the safety features of the existing safety-related protection system and the licensee's design as endorsed through the SER was being properly implemented with no major exceptions. It appeared that proper configuration and control of installed instrumentation was established and being maintained. Through discussions with operation's staff it was determined that system bypassing occurs during related maintenance. There is continuous indication of the bypass status in the control room. The system as installed appeared to meet 10 CFR 50.62 rule requirements and applicable QA controls were evidently adequately applied during the design, procurement, installation, and testing. As a result of this inspection, this module is considered closed.

No violations or deviations were identified.

6. Onsite Followup of Events (93702)

On February 26, 1990, numerous alarms were received on the LPMS system. From 0047 hours to 1115 hours, approximately 65 "events" or impacts, were recorded on two reactor vessel head monitoring channels. The licensee originally believed the events to indicate a separated control rod guide tube flexure; however, after analysis by Westinghouse, it was determined that loose part impacts had not occurred. The alarms were coming from channel electrical noise. The cause of the electrical noise was not determined and subsequent to the 1115 hour event, no further alarms were received. The electrical noise was considered to be an anomaly and according to Westinghouse, frequently occurs at other units.

No violations or deviation were identified.

7. Onsite Followup of Written Reports of Nonroutine Events (92700)

(Closed) LER 87-03 and LER 87-07 EQ Cable Splice Deficiencies. The specific items addressed in the reports were corrected. Corrective actions to prevent recurrence were not effective as documented by the findings of Inspection Reports 87-10 and 87-19. A subsequent Notice of Violation and Proposed Imposition of Civil Penalty was issued on June 16, 1988, in this area. See Inspection Report 89-26 for closeout of the violation associated with cable splice deficiencies.

(Closed) LER 87-28 Diesel Generator B Air Start Failure While Diesel Generator A Inoperable. The failure to start was attributed to the air start solenoids and/or check valves malfunctioning. The licensee replaced the A and B EDG air start valves and check valves (WR 87-AQUK1, 88-ADZB1, 88-ADZW1 and 88-AEBQ1) as committed in the LER. However, a licensee



review of the LER in July 1989 discovered that the air start valves were not in a regularly scheduled PM program as stated in the August 9, 1988, LER supplement. The inspectors verified that PM-406, revision 0, EDG Air Start Solenoid Valve Inspection, was issued November 30, 1989, to correct this deficiency.

(Closed) LER 87-27 Inoperability of Redundant Equipment Due to Inadvertent Loss of Motor Control Center 6. The event was attributed to the accidental actuation of the MCC-6 feeder breaker trip button while removing a protective cover. The cover had been installed to preclude accidental actuation of the trip button. However, poor design did not allow for easy removal of the cover. The inspectors verified that a new type cover has been installed over the trip buttons on both MCC-5 and 6 feeder breakers. This corrective action should prevent recurrence of the event.

(Closed) LER 90-04 Breach of Containment Integrity Due To Failure of the Personnel Airlock Door. The inspector reviewed the licensee's proposed corrective actions to periodically check airlock components. If properly implemented, these actions should be sufficient to preclude recurrence. The inspectors attended the PNSC on February 2, 1990, which approved TS interpretation 90-001 involving the TS phrase "properly closed and sealed" as applied to the airlock door. After the meeting, the inspectors voiced concern about the potential for violating TS if this interpretation would be used under other circumstances. Subsequent discussions with NRR and Region II personnel revealed that the interpretation was invalid. The licensee was informed and the TS interpretation was cancelled. As discussed in the subject LER, an instance occurred where the Licensee relied upon the interpretation instead of entering TS 3.0 as required. Voluntary entry into in TS 3.0 is typically strongly discouraged by the NRC. However, entry into TS 3.0 in the instances discussed in the LER were considered appropriate due to of the short duration (2 to 3 minutes) each time the outer airlock door was opened for passage of personnel and equipment to repair the inner airlock door. A PNSC action item, 90-02, dated February 2, 1990 has been issued to submit a TS revision for incorporation of an LCO for an inoperable airlock door.

(Closed) P2187-01, Colt Industries D/G Indicator Valve Plug Thread Deterioration. The inspectors verified that the subject plugs were replaced on A and B EDG per WR 87-AHPA1 (December 1988) and WR 87-AHNZ1 (January 1989) respectively. The inspectors also verified that these plugs are to be replaced every other refueling outage per step 7.6.2.18 of PM-009, Emergency Diesel Generator Inspection - Number 3, revision 5. This satisfactorily implements the vendor recommendations contained in Colt Industries/CP&L letter dated April 30, 1987.

No violations or deviations were identified.

## 8. Exit Interview (30703)

The inspection scope and findings were summarized on March 14, 1990, 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. As discussed in the exit meeting, the licensee provided a written statement concerning a proposed violation. Excluding this position which is provided in paragraph 4, dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
90-03-01	IFI - Review CS Header CV Penetration Isolation Configuration with GDC

## 9. List of Acronyms and Initialisms

AFW	Auxiliary Feedwater
AMSAC	ATWS Mitigation System Actuation Circuit
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CP&L	Carolina Power & Light
CS	Containment Spray
CV	Containment Vessel
DBD	Design Basis Document
DBDR	Design Basis Document Reconstitution
DCN	Design Change Notice
D/G	Diesel Generator
DNB	Departure from Nucleate Boiling
EDG	Emergency Diesel Generator
EOF	Emergency Operation Facility
EQ	Environmental Qualification
ESF	Engineered Safety Feature
FSAR	Final Safety Analysis Report
GDC	General Design Criteria
GL	Generic Letter
IFI	Inspector Followup Item
ILRT	Integrated Leak Rate Test
IST	Inservice Testing
LCO	Limiting Conditions for Operation
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LPMS	Loose Parts Monitoring System
M	Modification

MCC	Motor Control Center
MOV	Motor Operated Valve
MSS	Manufacturer's Standardization Society
MST	Maintenacne Surveillance Test
NOV	Notice Of Violation
NRR	Nuclear Reactor Regulation
NRC	Nuclear Regulatory Commission
OST	Operations Surveillance Test
PAP	Personnel Access Portal
PIC	Process Instrument Calculation
PM	Preventative Maintenance
PNSC	Plant Nuclear Safety Committee
QA	Quality Assurance
QC	Quality Control
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RNP	Robinson Nuclear Project
RTGB	Reactor Turbine Generator Board
scf	Standard Cubic Feet
scfm	Standard Cubic Feet Per Minute
SER	Safety Evaluation Report
SI	Safety Injection
TMM	Technical Support Management Manual
TS	Technical Specification
TSC	Technical Support Center
WCAP	Westinghouse Corporate Atomic Power
W/R	Work Request
WR/JO	Work Request/Job Orde