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

Report No.: 50-261/93-05

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 Unit 2

Inspection Conducted: February 13 - March 19, 1993

Lead Inspector: _____ 4/6/93
L. W. Garner, Senior Resident Inspector Date Signed

Other Inspector: C. R. Ogle, Resident Inspector

Approved by: _____ 4/9/93
H. O. Christensen, Chief Date Signed
Reactor Projects Section 1B
Division of Reactor Projects

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of operational safety verification, maintenance observation, and followup.

Results:

A non-cited violation (NCV) was identified for failure to adequately implement a procedure. During surveillance testing of the A emergency diesel generator, manipulation of the incorrect governor control resulted in an unplanned shutdown of the emergency diesel generator. Although adequate corrective actions to preclude recurrence were taken or planned, the failure of Adverse Condition Report 93-041 to identify comprehensive corrective actions for this event reflected a weakness in the corrective action program (paragraph 3).

A second NCV was identified concerning inadequately specified post maintenance testing requirements after repair of a heat trace circuit (paragraph 4).

A third NCV was identified for failure to maintain a procedure in that a step in a previous procedure revision to preclude a safety-related check valve failure was deleted from the procedure (paragraph 5).

REPORT DETAILS

1. Persons Contacted

*R. Barnett, Manager, Outages and Modifications
C. Bethea, Manager, Training
*R. Chambers, Plant General Manager, Robinson Nuclear Project
B. Clark, Manager, Maintenance
*T. Cleary, Manager, Technical Support
*D. Crook, Senior Specialist, Regulatory Compliance
C. Dietz, Vice President, Robinson Nuclear Project
R. Downey, Shift Supervisor, Operations
W. Flanagan, Manager, Operations
*J. Harrison, Manager, Regulatory Compliance
D. Knight, Shift Supervisor, Operations
*A. McCauley, Manager - Electrical Systems, Technical Support
R. Moore, Shift Supervisor, Operations
D. Morrison, Shift Supervisor, Operations
*P. Musser, Manager, Engineering Assessment
A. Padgett, Manager, Environmental and Radiation Control
M. Scott, Manager, Performance Engineering
*R. Steele, Manager Maintenance Support
W. Stover, Shift Supervisor, Operations
A. Wallace, Manager - Shift Operations, Operations
D. Winters, Shift Supervisor, Operations

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

*Attended exit interview on March 22, 1993.

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

2. Plant Status

Except for a power reduction for monthly turbine valve testing, the unit operated at full power during the report period.

3. 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, Operation's 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 except as discussed below, cognizant of in-progress 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 were appropriate.

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.

C RCP Seal Leakoff Low

During February and March 1993, a number of C RCP seal number 1 leakoff low flow alarms were received. The low flow alarm setpoint was 0.8 gpm. At the end of the report period, the seal leakoff was slowly oscillating between approximately 0.75 and 0.95 gpm. Attempts to correct the situation or to verify that the indicated reduced leakoff resulted from additional leakage through the number 2 seal were unsuccessful. The seal leakoff flow rate was sensitive to almost any change in CVCS temperature and pressure. After consultation with Westinghouse (the RCP supplier), a leak off flow rate of 0.6 gpm was established as the minimum acceptable value. Operation with flow rates less than this value would require further review and analyses. Seal leakoff flow rates from A and B RCPs were normal, approximately 1.5 gpm.

Operator Error Resulted In A EDG Shutdown During Surveillance Test

On March 1, 1993, at 10:52 a.m. the A EDG shutdown when the governor load limit control was inadvertently set to the zero position. At the time of the event, the EDG was in the process of being secured from OST-409, Emergency Diesels (Rapid Speed Start - Semi-annually). The EDG had been separated from its emergency bus and its normal cooldown/shutdown sequence had been initiated. At step 7.1.34, the AO was instructed to "Set the Governor Speed Droop Control For EDG "A" to zero." However, he set the governor load limit control to zero. With the load limit set at zero, the fuel racks closed and the diesel engine shutdown. The A EDG was declared inoperable and TS 3.7.2.d LCO was entered. After a review of the event, the A EDG was re-started, and OST-409 was completed. The A EDG was returned to operable status at 2:00 p.m. utilizing applicable sections of OP-604, Emergency Diesels "A" And "B". The TS LCO was also exited at this time.

Through reviews of records, interviews, and discussions with licensee personnel, the inspectors determined that a non-licensed AO read the

governor label which reads "speed droop" but manipulated the control below the label instead of above the label. Below the English nomenclature, there were three foreign language translations. According to the AO, he placed his finger on the label and ran his finger across the translations which ended at a knob. He then proceeded to adjust this knob to zero.

Operation of the EDGs was a job task assigned to licensed operators. Thus, the surveillance test was being performed by a licensed operator with assistance from the AO. The AO had completed his EDG qualifications per TI-104, Attachment 3, Qualification Program For Auxiliary Operators, on June 7, 1991. Since that time he had not participated in EDG operations. Thus, a lack of familiarity with the equipment and a lack of attention to detail were the major contributors to the event. In addition, the AO failed to recognize that the EDG slow down was an abnormal response to a change in speed droop setting.

Adjustment of the wrong EDG governor control was a failure to follow procedure OST-409. Immediate corrective actions included shift discussions of the event by the Operations Manager and discontinuation of EDGs operations by AOs unless they are under the direct supervision of a licensed operator. This directive also applied to the dedicated shutdown and EOF/TSC/security diesel generators and was to continue in effect until additional training is provided to the AOs. Previous initiatives addressed comprehensive corrective actions necessary to preclude recurrence. The initiatives that relate directly to the EDG event included: development of a two and one-half day training class on diesel generators and electrical theory (training to be conducted during the third week of LOR, starting April 26, 1993) and development and implementation of a new AO EDG qualification card (i.e., AOs are not to be grandfathered). The inspectors reviewed the training course objectives and the new qualification card. Implementation of these should greatly enhance the AOs knowledge and provide needed operating experience on diesel generator operations.

Comprehensive corrective actions to address AO deficiencies involving other safety-related evolutions were also in progress. In particular, existing JPMs for licensed operators were reviewed and 45 evolutions (safety-related and nonsafety-related) were selected for study. The tasks were selected to enhance AOs knowledge so they could better support plant operations during normal, off-normal, and accident conditions. For each JPM, all AOs were expected to complete walkdowns/simulations and demonstrate knowledge to a licensed operator before December 31, 1993. In addition, a review of AO training identified several tasks that required the development of new JPMs.

The above described corrective actions should reduce the probability for AO errors due to lack of knowledge/familiarity involving equipment operation. This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the

Enforcement Policy. This item is identified as a NCV: Failure To Properly Perform EDG Test Procedure OST-409, 93-05-01.

During the inspection, the inspectors review ACR 93-041 which addressed this event. Corrective actions identified in the ACR were 1) counsel the individual on self-checking practices; 2) remark/label the controls for easier identification; 3) implement dual concurrent verification versus independent verification for operation of selected equipment; and 4) require AOs complete the new EDG qualification card prior to participating in EDG testing. Except for item 3, the corrective actions were directed at the prevention of this specific problem or personnel errors associated with EDG operation. Item 3 proposed additional controls to preclude similar personnel errors on the EDGs and other safety-related components. However, none of the ACR identified corrective actions addressed the applicability of the lack of equipment/tasks familiarity to other AOs or other safety-related equipment, i.e., the ACR failed to identify comprehensive corrective actions. Furthermore, the ACR failed to identify all the corrective actions taken or planned to be taken. Failure to capture all the corrective actions limits the ability to subsequently evaluate the effectiveness of the corrective action program, (i.e., determine what corrective actions were effective and which ones were ineffective). Failure of ACR 93-041 to identify and document comprehensive corrective actions for this event reflected a weakness in the corrective action program.

Spurious OT Delta T Alarms/Trips

During March 1993, spurious OT delta T bistable trips or alarms on instrument loops 2 and 3 were received. The loop 2 indications occurred on March 3 and March 9. The loop 3 bistable actuation also occurred on March 3 but it was several hours after the loop 2 event. The licensee reviewed work activities in process at the time of the events; however, no relationship between the events and the work activities was established. Troubleshooting on March 4 twice demonstrated that plugging a cabinet fan in a nearby instrument cabinet would cause spurious OT delta T alarms. Since the fan was powered from house power, i.e., nonsafety-related power, these induced events were attributed to electromagnetic noise. Subsequent attempts to repeat this phenomena were unsuccessful. A chart recorder was connected to loop 2 after the March 9 event; however, at the end of the report period, no additional spurious events had occurred on either loop 2 or 3. The licensee has contacted an outside noise expert for assistance. As part of the routine inspection program, the inspectors will continue to monitor the licensee's efforts in resolving this issue.

One NCV and one weakness was identified. Except as noted above, the area/program was adequately implemented.

4. 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 and approved procedures except as noted below. 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:

WR/JO 93-ACXG1 Repair Primary Heat Trace Circuit No. 1

WR/JO 93-ACYJ1 Repair Secondary Heat Trace Circuit No. 1

Inadequate Heat Trace Post-Maintenance Test Requirement

At 8:30 a.m. on March 2, 1993, primary heat trace circuit number 1 was declared out of service following detection of an open circuit during performance of MST-101, Boric Acid Heat Trace Operability. The circuit provided heating for the suction and discharge piping associated with the B BATP, i.e., between valves CVC-379, CVC-341, CVC-334, and CVC-336. To ensure that a flow path from the BAST was available with two channels of heat trace as required by TS 3.2.2, the A BATP was placed in service. Repairs to the primary circuit were initiated at 2:27 p.m. but were suspended at approximately 9:15 p.m. due to unavailability of parts. During the performance of MST-101 on March 3, secondary heat trace circuit number 1 was declared out of service at 9:00 a.m. due to an open circuit indication. With both heat trace circuits for the suction and discharge piping of the B BATP out of service, the licensee declared the pump out of service and entered TS 3.2.3.b. This TS allowed continued operation for 24-hours with one BATP out of service before placing the reactor in hot shutdown. At 7:20 p.m. on March 3, repairs to the primary and secondary heat trace circuit number 1 were completed and the TS LCO exited.

Throughout the repair effort, the licensee monitored the temperature of the piping served by heat trace circuit 1 and recirculated the heated B BAST contents as necessary to prevent boric acid crystallization. Thus, the pump remained available and the entry into the LCO had minimal safety significance.

The inspectors witnessed repairs to the primary circuit accomplished on March 3. Although the repair efforts were accomplished satisfactorily, the inspector concluded that the primary circuit work activities on March 2 probably damaged the secondary circuit. The inspector further concluded that the tight confines and difficult working conditions in the vicinity of the circuit contributed more to this collateral damage than did poor workmanship.

After the repairs, the inspectors noted from conversations with individuals involved in the repairs and from a review of heat trace

temperature chart recordings that within 30 minutes of declaring heat trace circuit 1 operable, the B BATP suction and discharge piping exceeded 240° F. The shift supervisor indicated that he was aware of a high temperature alarm condition (>210° F) on the circuit when it was declared operable and that watchstanders were monitoring the temperature and adjusting the thermostat to remedy this condition. The high temperature condition was initially remedied by recirculating the contents of the B BAST while waiting for the effect of the thermostat adjustments.

From IEEE Standard 622-1979, IEEE Recommended Practice For The Design And Installation of Electric Pipe Heating Systems for Nuclear Power Generating Stations, the inspectors determined that at concentrations maintained in the CVCS system, the boric acid solution boils at between 214° F and 215° F. The licensee is not committed to this standard. Engineering personnel determined that operation of the system for the period immediately following circuit restoration at the temperatures above the boiling point had no detrimental effect on the system. The inspectors reviewed this conclusion and have no further questions at this time.

The inspectors determined that the specified post-maintenance testing was inadequate in that the heat trace circuit was declared operable without the thermostat being properly adjusted. The applicable WR/JOs specified accomplishment of portions of MST-101 to check the heat trace circuit downstream of the thermostat. The capability of the circuit to properly control heat trace temperature was not addressed. This was in direct conflict with MMM-003, Appendix A, Attachment 7.43 which recommended that the capability of the heat trace circuit to maintain correct temperature be included as a post-maintenance test requirement. The inspectors interviewed the work planner and his supervisor. Apparently, the specification of MST-101 as a post-maintenance test requirement was a longstanding practice, i.e., the suitability of this MST as a post-maintenance test requirement had been previously evaluated by the planner in conjunction with I&C supervisors.

Failure to specify adequate post-maintenance test requirements for an activity affecting quality was a violation. Corrective actions implemented included counseling the individual involved and development of a proposed change to MMM-003, Appendix A, to more clearly delineate heat trace post-maintenance test requirements. In addition, training on these requirements will be provided to other maintenance planners. These corrective actions should preclude repetition of this violation. Thus, this NRC identified violation is not being cited because criteria specified in Section VII.B of the NRC enforcement Policy were satisfied. This violation is identified as a NCV: Failure To Specify An Adequate Post Maintenance Test For Repairs To Heat Trace Circuit, 93-05-02.

During these repairs, the technician noted that the output of the heat trace power transformer was 110 V instead of the 88 V specified on the system drawing. This was brought to the attention of the system engineer who developed calculations to demonstrate that the resulting

heat trace circuit power densities were acceptable. The inspectors independently calculated similar results and concurred that the condition was acceptable. The licensee indicated the transformer output would be reduced during upcoming maintenance activities.

One NCV was identified. Except as noted above, the area/program was adequately implemented.

5. Followup (92700, 92701, 92702)

(Closed) IFI 90-30-03, Review Periodic Inspection Frequency Determination For B RHR Pump Impeller. An engineering evaluation of the as found condition of the B RHR pump impeller concluded that the indication observed was not attributed to cavitation and thus, not susceptible to rapid degradation. Periodic performance testing and vibration checks should be sufficient to provide indications of degradation before this type of wear becomes significant. The inspectors concurred with this assessment. This item is considered closed.

(Closed) VIO 90-30-04, Procedure PM-300 Was Inadequate In That Condition Of The Aloyco Check Valve Travel Stop Was Not Specifically Required To Be Evaluated And Documented. The inspectors reviewed 'Reply To A Notice Of Violation,' dated February 28, 1991. In their reply the licensee acknowledged the violation: however, an exception was taken to a statement in the report which indicated that a worn travel stop was a known failure mode for this type of valve. Further review by the inspectors indicated that this statement in the report was erroneous.

The inspectors verified that PM-300, Aloyco Swing Check Valve Inspection, revision 2 had been revised, as committed in their reply, to incorporate a step to evaluate the condition of the travel stop. However, the current upgraded procedure, revision 3 dated May 4, 1992, was inadequately established in that it no longer contained this step. The maintenance procedure upgrade project failed to identify that this step had been added as committed in a Reply To A Notice Of Violation and that failure to adequately evaluate the condition of the travel stop had resulted in a safety-related check valve failing full open. The licensee indicated that PM-300 would be revised again to specifically address the travel stop. Since PM-300 revision 2 was implemented, a more exact method was implemented to track why each procedure step is changed. In addition, revised maintenance procedures now incorporate references to corrective actions which are associated with issues identified through both licensee and non-licensee audits, reviews, and inspections. Furthermore, a review will be initiated to review previous NRC IR to ensure that other maintenance commitments have been properly retained.

Failure to adequately maintain PM-300 is a violation. However, the actions previously taken and those planned by the maintenance organization should preclude further violations due to the deletion of corrective actions. Thus, this NRC identified violation is not being

cited because criteria specified in Section VII.B of the NRC enforcement Policy were satisfied. This violation is identified as a NCV: Failure To Maintain PM-300 In That A Step To Preclude A Previous Equipment Malfunction Was Deleted From The Procedure, 93-05-03. This item is considered closed.

(Closed) VIO 91-01-02, Activities Affecting Quality Were Not Performed In Accordance With Procedures And Drawings In That Modification Testing Was Not Performed As Specified And An Incorrect Sized Fuse Was Installed. The inspectors reviewed the 'Reply To A Notice Of Violation,' dated April 3, 1991. In the reply, the licensee committed to include modification testing requirements in the Continuous Training Program for Instrumentation and Control personnel. The inspectors verified that the training material incorporated in the fourth quarter retraining package, IC/EL-910R, was adequate to inform personnel of the problems and associated corrective actions involving the failure to properly implement M-1016 acceptance testing.

The second example contained in the violation involved discovery of an incorrectly sized fuse in the A SI pump control circuitry. An investigation into this deficiency was unable to determine how and when the incorrect fuse was installed. However, since this issue was identified, a fuse control program has been implemented. During the fuse control program development, all safety-related fuses were verified to be the correct type and size for their application. The inspectors reviewed the fuse control program and determined that the additional controls involved in fuse replacement should preclude recurrence of this problem. This item is considered closed.

(Closed) VIO 91-01-03, Modification M-1016 Acceptance Tests Were Inadequate. The inspectors reviewed 'Reply To A Notice Of Violation,' dated April 3, 1991. To preclude recurrence of the violation, DG-V.0076, NED Design Guide For Testing & Operability Verification Of Electrical And I&C Modifications, was issued on June 29, 1991. The inspectors reviewed DG-V.0076, revision 0, and determined that if the requirements contained in the design guide had been in place and properly implemented during M-1016 development, then the subject violation would not have occurred. This item is considered closed.

(Closed) VIO 91-17-01, Failure To Establish Procedures As Required. The inspectors reviewed 'Reply To A Notice Of Violation, dated September 19, 1991, and verified that the actions taken to correct the cited problems were adequate. The reply indicated that implementation of a revised EOP verification and validation process would address the problem that contributed to the inadequate EPP. IR 91-22 discussed the proposed EOP verification and validation process and determined that it would be adequate. Inspection of this process will be conducted after completion of the EOP upgrade project. At that time, the adequacy of the process to preclude recurrence of similar EPP deficiencies will be addressed (reference: IFI 91-22-01). This item is considered closed.

(Closed) IFI 91-27-01, Review Position On Design Basis Criteria For ESF Support Systems. The inspectors reviewed the licensee's position with NRR and verified that their position concerning design standards for support systems was consistent with the plant's licensing basis. The specific deficiency involving the EDGs and the fire protection system was corrected by M-1120, FDAP Cable Replacement For Diesel Generators. This item is considered closed.

One NCV was identified. Except as noted above, the area/program was adequately implemented.

6. Exit Interview (71701)

The inspection scope and findings were summarized on March 22, 1993, 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. During the exit, item 93-05-01 was identified as a violation; however, the licensee indicated that the item met the qualifications to be a NCV and agreed to provide additional information to the inspectors. After subsequent review of this material, the item was reclassified as a NCV and paragraph 3 was modified to include the additional inspection activities. The item reclassification and the weakness associated with ACR 93-041 were discussed with the Plant General Manager on March 25, 1993. Other dissenting comments were not received from the licensee. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

The following NCVs were identified and reviewed during this inspection period.

Item Number	Description/Reference Paragraph
93-05-01	Failure To Properly Perform EDG Test Procedure OST-409 (paragraph 3)
93-05-02	Failure To Specify An Adequate Post Maintenance Test For Repairs To Heat Trace Circuit (paragraph 4)
93-05-03	Failure To Maintain PM-300 In That A Step To Preclude A Previous Equipment Malfunction Was Deleted From The Procedure (paragraph 5)

7. List of Acronyms and Initialisms

ACR	Adverse Condition Report
a.m.	Ante Meridiem
AO	Auxiliary Operator
BAST	Boric Acid Storage Tank
BATP	Boric Acid Transfer Pump
C	Centigrade

CVC	Chemical & Volume Control
CVCS	Chemical & Volume Control System
DG	Design Guide
EDG	Emergency Diesel Generator
EOP	Emergency Operating Procedures
EPP	End Path Procedure
ESF	Enineered Safeguards Feature
F	Fahrenheit
FDAP	Fire Detector Auxiliary Panel
gpm	Gallons Per Minute
I&C	Instrumentation & Control
i.e.	That is
IEEE	Institute of Electrical and Electronic Engineers
IFI	Inspector Followup Item
IN	Information Notice
IR	Inspection Report
JPM	Job Performance Measure
LCO	Limiting Condition for Operation
LOR	Licensed Operator Requalification
M	Modification
MMM	Maintenance Management Manual
MST	Maintenance Surveillance Test
NCV	Non-cited Violation
NED	Nuclear Engineering Department
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
OP	Operations Procedure
OST	Operations Surveillance Test
OT Delta T	Overtemperature Delta Temperature
p.m.	Post Meridiem
PM	Preventive Maintenance
RCP	Reactor Coolant Pump
RHR	Residual Heat Removal
SI	Safety Injection
TI	Training Instruction
TS	Technical Specification
TSC	Technical Support Center
V	Voltage
VIO	Violation
WR/JO	Work Request/Job Order