



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

Report No.: 50-261/93-10

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: April 17 - May 14, 1993

Lead Inspector: *L. W. Garner* 6/7/93
 L. W. Garner, Senior Resident Inspector Date Signed

Other Inspector: C. R. Ogle, Resident Inspector

Approved by: *H. O. Christensen* 6/8/93
 H. O. Christensen, Chief Date Signed
 Reactor Projects Section 1A
 Division of Reactor Projects

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of operational safety verification, surveillance observation, maintenance observation, loss of decay heat removal, and followup.

Results:

A violation was identified for failure to prescribe appropriate procedures to verify the proper operation of the AMSAC A microprocessor after its replacement (paragraph 5).

A non-cited violation was identified, in that, the provisions of Technical Specification 6.2.3.b regarding authorization of shift-work hours in excess of those specified was not implemented (paragraph 6).

An inspector followup item was identified concerning spare part availability for the Anticipated Transient Without Scram Mitigation Actuation Circuitry System (paragraph 5).

Greater than 10 gpm Reactor Coolant System leakage from a charging pump relief valve resulted in a Notice Of Unusual Event emergency classification (paragraph 6).

While inspecting the inside of a emergency diesel generator panel, the inspectors observed that a capacitor in the voltage regulator circuit was damaged (paragraph 3).

REPORT DETAILS

1. Persons Contacted

- *D. Bauer, Regulatory Compliance Coordinator, Regulatory Compliance
- *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
- J. Eaddy, Manager, Environmental and Radiation Support
- S. Farmer, Manager - Engineering Programs, Technical Support
- R. Femal, Shift Supervisor, Operations
- *W. Flanagan Jr., Acting Plant General Manager, Robinson Nuclear Project
- *W. Gainey, Manager, Plant Support
- *H. Habermeyer, Vice President, Nuclear Services
- *J. Harrison, Manager, Regulatory Compliance
- *P. Jenny, Manager, Emergency Preparedness
- D. Knight, Shift Supervisor, Operations
- *A. McCauley, Manager - Electrical Systems, Technical Support
- R. Moore, Acting Manager - Shift Operations, Operations
- D. Morrison, Shift Supervisor, Operations
- *P. Musser, Manager - Engineering/Technical Support, Nuclear Assessment Unit
- *A. Padgett, Manager, Environmental and Radiation Control
- E. Shoemaker, Manager, Mechanical Systems, Technical Support
- W. Stover, Shift Supervisor, Operations
- *D. Taylor, Manager, Materials & Contract Services
- *A. Wallace, Acting Manager, Operations
- *L. Williams, Manager, Security
- D. Winters, Shift Supervisor, Operations

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

*Attended exit interview on May 24, 1993.

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

2. Plant Status

Except for a power reduction to perform turbine generator valve testing, the unit operated at full power during the report period. RCS leakage greater than 10 gpm from the A charging pump stabilizer relief valve resulted in the unit being in a NOUE emergency classification for approximately four and one-half hours on May 12, 1993. See paragraph 3 for additional information.

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, 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 routinely 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.

Security Force Member Vacated Compensatory Post

The inspectors reviewed the licensee's investigation report concerning an alarmed door to a vital area that was left unattended with the alarm function non-operational. The incident occurred on April 22, 1993. This incident will be followed up by a regional security inspector.

Radiation Monitor Deficiencies

IR 93-08 discussed a 10 CFR Part 21 Report concerning a deficiency in the electrical design of the process and area radiation monitors utilized at the site. Specifically, an internal 5 volt power supply could fail without the failure being annunciated. However, the loss of this power supply would also result in the loss of the digital readout and thus was readily detectable. The vendor, Nuclear Research Corporation, designed a circuit change to correct the deficiency. The change involved installation of a jumper on the printed circuit boards associated with the ratemeters. By April 21, all 22 radiation monitors had been modified. The inspectors witnessed portions of the tests performed to return the radiation monitors to service. The modified units appeared to function correctly.

A EDG Partial Start During Barring Evolution

IR 93-07 described an events in which during barring over of the A EDG, the engine speed began to rapidly increase and the engine was shutdown by the operator. The barring evolution after each EDG run was a vendor recommendation. The barring clears lube oil from the top of the bottom pistons, i.e., reduces the likelihood of an exhaust manifold fire during a subsequent start.

During this report period, additional testing was performed to recreate the events and determine probable cause. The licensee utilized a Woodward governor vendor representative to assist in this effort. The testing verified that the governor will move the fuel racks partially open and then if the operator does not intervene, the fuel racks will subsequently close. Thus, operator action was not required to shut the engine down before it reached full speed. The inspectors witnessed performance of some of the tests and reviewed the operation of the governor with the vendor representative. From a schematic which shows the hydraulic operation of the governor, the observed phenomena was not explainable. No diagram was available which showed the actual flow paths and design of the internal components and clearances. The vendor representative indicated that the phenomena was not unheard of and that adjustment to shutdown solenoid may correct this condition. Both the vendor representative and the cognizant engineer continued to support the licensee's position that the phenomena did not adversely affect the function of the governor, i.e., the A EDG. The inspectors agreed with their assessment. Engineering was evaluating replacing the governor with one from stock and shipping the governor to the vendor for bench testing. The inspectors will continue to monitor the licensee's efforts in this area.

Failure of Capacitor C-8 in A EDG Voltage Regulator Circuit

On April 26, 1993, the inspectors observed that capacitor C8 on the EDG A voltage regulator circuit board was damaged. At the time of this observation, the EDG was inoperable as a result of ongoing maintenance and testing. A subsequent inspection by the licensee confirmed the inspectors observation and the capacitor was replaced later that day. To ensure no collateral damage to other components in the voltage regulator circuit, the licensee also performed a satisfactory resistance check of diode CR8 in the voltage regulator circuit on April 28, 1993. The EDG was returned to service on April 29, 1993, following satisfactory operation of the voltage regulator at an EDG loading of 2500 KW during performance of OST-401.

Capacitor C8 was wired across a rectifier bridge in the automatic voltage regulator circuit for the EDG. After analyzing the regulator circuit and discussions with the voltage regulator vendor, the licensee stated that the damaged capacitor acted as a filter for the output of the rectifier bridge. The licensee also stated their conclusion that failure of the capacitor would not adversely impact the ability of the regulator circuit to perform its function. Additionally, the licensee

concluded that if collateral damage occurred to the circuit with the failure of C8, the most likely component to be degraded would be diode CR8.

The inspectors independently reviewed the circuit schematic and, after discussions with NRC Region II staff, concurred with the licensee's conclusion regarding the function of the capacitor. The inspectors also concurred with the licensee's conclusions regarding diode CR8 as the most likely component for collateral damage. The inspectors witnessed the replacement of the capacitor per WR/JO-AEWW1 and the restoration of EDG A to service in accordance with OST-401. The inspectors also reviewed the results of the satisfactory electrical checks on diode CR8. The inspectors have no further question on this issue at this time.

B Fuel Oil Transfer Pump Frequent Cycling

At 9:36 p.m. on April 27, 1993, during an operability run of B EDG in accordance with OST-409, operators noted that B fuel oil transfer pump was cycling frequently. The pump was observed to run for 30 seconds out of every two minutes. At the time of this observation, A EDG was inoperable as a result of ongoing repair/testing activities associated with failed capacitor C8 and the barring anomaly discussed in the preceding paragraphs. An operability determination was initiated for the B fuel transfer pump at 10:43 p.m. on April 27, 1993. At 4:59 p.m. on April 29, 1993, following the restoration of EDG A to service, B EDG was declared inoperable and TS 3.7.2.d LCO was entered to allow repairs to the day tank level circuitry. The LCO allowed operation to continue for seven days before placing the reactor in hot shutdown. Following replacement of the day tank low level switch, B EDG was returned to service at 10:30 p.m. on April 29, 1993, and the TS LCO was exited. The operability determination was completed at 10:18 p.m. on April 29, 1993, and concluded that the fuel oil transfer pump and its associated starting circuitry components would continue to operate satisfactorily at the observed cycling frequency.

The inspectors independently reviewed the operability determination and the completed work request and have no further question at this time.

No violations or deviations were identified.

4. 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 obtained 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:

OP-604	Operating Procedure Diesel Generators A and B (Section 8.6: Barring Over Diesel Generator A)
OST-051	Reactor Coolant System Leakage Evaluation
OST-352	Containment Spray System Component Test
OST-409	Emergency Diesels (Rapid Speed Start)
OST-401	Emergency Diesels (Slow Speed Start)

No violations or deviations were identified. Based on the information obtained during the inspection, the area/program was adequately implemented.

5. 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. The inspectors determined that these activities did not violate LCOs and that required redundant components were operable. The inspectors verified that required administrative, material, testing, radiological, and fire prevention controls were adhered to. In particular, the inspectors observed/reviewed the following maintenance activities:

WR/JO 93-AEWW1	Replace Capacitor C-8 On A EDG Voltage Regulator Circuit Card
WR/JO 93-ADFN1	Replace Mechanical Seal On A EDG Standby Coolant Pump
WR/JO 93-AEMQ1	Troubleshoot A EDG Control Circuit

Inadequate Post-Maintenance Testing Of AMSAC

IR 93-07 discussed the March 31, 1993, failure of both AMSAC channels. Due to the unavailability of spare parts, only the A channel was repaired and returned to service on April 10. The repair was accomplished by replacement of the A channel microprocessor. Satisfactorily performance of the new microprocessor was considered to be demonstrated by performance of SP-1198, AMSAC System Test (At Power). On April 20, the inspectors reviewed SP-1198 and determined that it did not functionally test the entire A channel. During subsequent discussions with engineering personnel, the inspectors were informed that the circuitry not tested by SP-1198 was periodically, automatically tested by AMSAC's self-test feature. The inspectors requested the

licensee provide documentation which would described the self-test feature in sufficient detail such that one could verify that the entire circuitry had been tested. While reviewing the applicable sections of the AMSAC vendor manual, the licensee discovered that the self-test feature of a channel was not performed when the other channel's microprocessor is out of service. Since the B channel microprocessor was not functional, portions of the A channel remained untested after it was returned to service on April 10. Essential elements of the A channel that were not tested included the logic output contacts. SP-1198 was revised to perform a complete logic test of the A channel. Satisfactorily performance of the revised SP-1198 was witnessed by the inspectors on April 23.

Operability and testing of AMSAC was not addressed in TS. However, the system was required to be installed by 10 CFR 50.62 and thus is considered as important to safety. Failure to provide an adequate test procedure for testing essential elements of the circuitry associated with the replaced microprocessor constituted a failure to establish procedures appropriate to the circumstances as required by 10 CFR 50 Appendix B Criterion V. This is identified as a VIO: Failure To Establish Adequate Procedures To Verify Proper AMSAC Operation After Microprocessor Replacement, 93-10-01.

As discussed above, the B channel was not returned to service at the time the A channel was placed in service due to the unavailability of another microprocessor. A microprocessor was obtained from the vendor, Modicon Sealed Support Center, and the B channel was successfully tested and returned to service on May 7. However, the vendor has no additional microprocessors in stock and no longer manufactures this component. Apparently, the AMSAC system installed at the site was installed in only two other nuclear facilities. HBR was unable to obtain from either of these two sites a spare microprocessor that was compatible with the system installed here. Hence, for future failures availability of parts to repair AMSAC in a timely manner was a concern. At the end of the report period, the licensee had initiated efforts to address this concern. This item is identified as an IFI: Lack Of Spare Parts Could Result In Prolonged Unavailability Of AMSAC, 93-10-02.

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

6. Event Followup (92701, 93702)

At 6:13 p.m. on May 12, 1993, an NOUE was declared, in accordance with EAL-2 flowchart criteria, for RCS leakage greater than 10 gpm. At 8:54 p.m. A charging pump and associated piping was isolated after it was determined to be the source of the leakage. Utilizing OST-051, the RCS leakage rate was confirmed to less than 10 gpm, i.e., had decreased to 0.0796 gpm. The NOUE was exited at 10:36 p.m..

The inspectors were notified of the event via the licensee's beeper notification system. The inspectors reported to the site and from

approximately 6:45 p.m. to 11:00 p.m. witnessed the licensee's event response. The inspection included observations both in the control room, the OSC, and the TSC. In general, the response was deemed satisfactory. The inspectors also verified that state, local, and NRC notifications were performed in accordance with regulatory requirements.

The source of the leakage was determined to be the A charging pump suction relief valve, CVC-2080. An inspection of the valve by the licensee revealed that the setpoint adjusting bolt nut had loosened from its snug position against the bonnet face. This allowed the adjusting bolt to loosen and resulted in a lowering of the valve lift setpoint from 75 psig to 10 psig. The valve was disassembled and inspected; however, the cause of the loose adjusting bolt nut could not be definitely determined. The root cause of the loose adjusting nut will be addressed by the licensee as part of the ACR process. During the inspection light scoring was observed on the valve disc. Following replacement of the disc, nozzle, and spindle, the valve was satisfactorily retested and reinstalled in the system.

An inspection of the suction relief valves for the B and C charging pumps indicated that the adjusting bolt nuts for those valves were in the correct position. A review of plant and industry experience by the licensee, as well as, discussions with the valve vendor failed to reveal any prior occurrences of this problem. Thus, the licensee considered this an isolated event.

The inspectors witnessed a portion of the repair and testing efforts associated with the A charging pump suction relief valve. Additionally, the inspectors reviewed WR/JO 92-AKWG1, under which the last maintenance was performed on CVC-2080 on October 9, 1992. No abnormalities were identified in that WR/JO which could have resulted in the loose adjusting nut.

On May 13, a licensee review identified that during the event, key personnel had exceeded the working hour guidelines of TS 6.2.3.b. without approval from the Plant General Manager or his designee. Specifically, the TS guideline states that "An individual should not be permitted to work more than ... 24 hours in any 48-hour period ... excluding shift turnover time. Any deviation from the above guidelines shall be authorized by the Plant General Manager or his designee ... in accordance with established procedures..." PLP-015, Program For Nuclear Power Plant Staff Working Hours, implements this requirement. ACR 93-084 was initiated to address this TS violation. 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. Thus, this item is identified as a NCV: Failure To Authorize Shift Work Hours In Excess Of Those Specified In TS 6.2.3.b, 93-10-03.

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

7. Loss Of Decay Heat Removal (TI 2515/103)

By letter dated February 1, 1989, the licensee described commitments to address the six programmed enhancement recommendations identified in GL 88-17. The inspectors verified that M-1011, Instrumentation For Midloop Operation, installed instrumentation for midloop operation as committed in their February 1, 1989 letter. The inspectors also verified that requirements for equipment availability and key parameter monitoring were contained in GP-008, Draining The Reactor Coolant System, and OMM-030, Control Of CV Penetrations During Midloop Operation as required. Current procedures did not allow perturbations of the RCS and thus additional procedures were not necessary to address this area. The inspectors also reviewed the February 1, 1989 response against the six items discussed in GL 88-17. Based upon the inspection activities, the inspectors concluded that licensee met the intent of GL 88-17 items 1 through 4 and 6 by a combination of procedure revisions and new hardware installations. In response to item 5, the licensee determined that no TS changes were required. This temporary instruction is considered closed.

8. Followup (92701, 92702)

(Closed) VIO 92-11-01, Failure To Implement FP-005 Resulted In Alert Declaration. The inspectors confirmed that FP-005, Hot Work Permit, was revised to help ensure that all actions required to be performed prior to work authorization are completed. Training records were reviewed to confirm that designated plant personnel were trained on the procedure revision. In addition, the inspectors verified that ACRs 92-284, 285 and 291 were initiated to review other key plant work processes, i.e., RWPs, confined space and equipment clearance programs. The reviews required by these ACRs have been completed. The inspectors noted that action items were identified to address the ACR findings; however, the inspectors did not review the adequacy of the proposed corrective actions for the these findings. This item is considered closed.

(Closed) VIO 92-11-03, Failure To Implement Appropriate Instructions During SW 374 and 376 Valve Maintenance. The inspectors verified that the current revisions of MMM-001, Maintenance Administration Program, and MMM-003, Maintenance Work Requests, contained the information specified in the Reply To A Notice Of Violation, dated July 1, 1992. Specifically, MMM-001 step 5.5.14 required Technical Support perform a seismic review prior to removal of a safety related component that results in loose piping or anchorage. MMM-003 Attachment 6.5, Work Request Planning Checklist, referenced MMM-001 step 5.5.14 if a safety-related component is to be removed. These actions should preclude recurrence of this violation. This item is considered closed.

(Closed) VIO 92-11-05, Failure To Translate RHR System Design Basis Into M-1087. The inspectors verified that the following corrective actions were adequately implemented as committed in the Reply To A Notice Of Violation, dated July 1, 1992. RHR System DBD and SD-003, Residual Heat Removal, were revised. A memorandum was issued to engineering personnel

requiring that when a modification is released to the plant for review, a marked up copy of each affected plant procedure accompany the transmittal. NED procedure 3.3, Design Verification/Technical Review, was established to institute a formal qualification program for engineering personnel. This item is considered closed.

(Closed) VIO 92-16-03, CM-508 Was Not Adequately Established In That Steps Provided For EDG Fuel Filter Assembly Were Out Of Sequence And Failure To Adequately Establish Procedure CM-303 For EQ Splices. The inspectors verified that CM-303 and CM-508 were revised as necessary to provide adequate instructions for their respective activity. MI-506-0, Maintenance Procedures Program, was implemented, as committed in the Reply To A Notice Of Violation, dated August 20, 1992, to require validation of procedure revisions. In addition, MI-506-0 addressed tracking and trending of the validation process to determine the effectiveness of the program. This item is consider closed.

(Closed) VIO 92-16-04, Instructions In M-1128 Were Not Appropriate To The Circumstances In That The Modification Created An Unmonitored Release Pathway. The inspectors reviewed the Reply To A Notice Of Violation dated August 20, 1992. The inspectors verified that the procedure were revised or in the process of being revised as committed in the reply. Specifically, the inspectors verified that Attachment 6.3, Review Assignment Criteria, of AP-22, Document Change Procedure, revision 11, dated March 27, 1993, required evaluation for unmonitored release pathways. The inspectors also verified that a check sheet had been issued for interim use until a similar change could be implemented into the Nuclear Plant Modification Program manual. These actions should be sufficient to preclude recurrence of this event. This item is considered closed.

No violations or deviations were identified. Based on the information obtained during the inspection, the area/program was adequately implemented.

9. Exit Interview (71701)

The inspection scope and findings were summarized on May 24, 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. 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.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
93-10-01	VIO - Failure To Establish Adequate Procedures To Verify Proper AMSAC Operation After Microprocessor Replacement (paragraph 5).

93-10-02 IFI - Lack Of Spare Parts Could Result In
Prolonged Unavailability Of AMSAC (paragraph 5).

The following NCV was identified and reviewed during this inspection period.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
93-10-03	Failure To Authorize Shift Work Hours In Excess Of Those Specified In TS 6.2.3.b (paragraph 6).

10. List of Acronyms and Initialisms

a.m.	Ante Meridien
ACR	Adverse Condition Report
AMSAC	ATWS Mitigation System Actuation Circuitry
AP	Administrative Procedure
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CV	Containment Vessel
CVC	Chemical & Volume Control
DBD	Design Basis Documentation
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EQ	Environmental Qualification
FP	Fire Protection
gpm	Gallons Per Minute
GL	Generic Letter
GP	General Procedure
HBR	H. B. Robinson
IFI	Inspector Followup Item
IR	Inspection Report
KW	Kilowatt
LCO	Limiting Condition for Operation
M	Modification
MI	Maintenance Instruction
MMM	Maintenance Management Manual
NCV	Non-cited Violation
NED	Nuclear Engineering Department
NOUE	Notice of Unusual Event
NRC	Nuclear Regulatory Commission
OMM	Operations Management Manual
OP	Operations Procedure
OSC	Operations Support Center
OST	Operations Surveillance Test
p.m.	Post Meridien
PLP	Plant Program
Psig	Pounds per square inch - gage
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RWP	Radiation Work Permit
SD	System Description

SP	Special Procedure
SW	Service Water
TI	Temporary Instruction
TS	Technical Specification
TSC	Technical Support Center
VIO	Violation
WR/JO	Work Request/Job Order