



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

Report No.: 50-261/92-11

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: April 11, 1992 - May 10, 1992

Lead Inspector: *L. W. Garner* 6/1/92  
 L. W. Garner, Sr. Resident Inspector Date Signed

Accompanying Personnel: C. R. Ogle, Resident Inspector

Approved by: *H. O. Christensen* 6/1/92  
 H. O. Christensen, Section Chief Date Signed  
 Division of Reactor Projects

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of operational safety verification, response to events, surveillance observation, maintenance observation, and modifications.

Results:

A violation was identified for failure to inhibit the north cable vault fire suppression system prior to performing hot work in the area. The actuation of the fire suppression system resulted in a declaration of an Alert due to a toxic gas release within the protected area. The event resulted from an established work practice involving signing a section of the hot work permit which indicated that the fire system had been inhibited before actually doing so (paragraph 3).

A violation was identified for failure to follow instructions, in that, service water system valves were removed before they were scheduled. This resulted in the operating portion of the service water system being in a configuration which had not been seismically evaluated (paragraph 5).

A violation was identified for failure to correctly translate a Residual Heat Removal system design basis into modification instructions (paragraph 6).

An unresolved item was identified involving strainers being installed in the component cooling water (CCW) pumps' suction piping (paragraph 5).

An inspector followup item was identified involving proposed control circuit modifications to allow both channels of the emergency bus undervoltage load shed logic to trip the C CCW pump (paragraph 4).

The emergency response to the unusual event and alert declarations of April 13 and 15, respectively, were good (paragraph 3).

The licensee demonstrated sensitivity to shutdown risk by securing all work in and around areas associated with the safety buses' normal offsite power source when both emergency diesel generators became inoperable (paragraph 3).

Actions to preclude inadvertent removal of core components during the upper internals package removal were well planned and implemented (paragraph 3).

## REPORT DETAILS

### 1. Persons Contacted

- \*R. Barnett, Manager, Outages and Modifications
- C. Baucom, Senior Specialist, Regulatory Compliance
- J. Benjamin, Shift Outage Manager, Outages and Modifications
- \*R. Beverage, Manager, Quality Assurance
- W. Biggs, Manager, Nuclear Engineering Department Site Unit
- \*S. Billings, Technical Aide, Regulatory Compliance
- \*R. Chambers, Plant General Manager, Robinson Nuclear Project
- T. Cleary, Manager - Balance of Plant Systems and Reactor Engineering, Technical Support
- \*D. Crook, Senior Specialist, Regulatory Compliance
- \*J. Curley, Manager - Robinson Engineering Support, Nuclear Engineering Department
- \*C. Dietz, Vice President, Robinson Nuclear Project
- \*D. Dixon, Manager, Control and Administration
- \*J. Dobbs, Manager, Nuclear Assessment Department Site Unit
- \*W. Flanagan, Manager, Operations
- \*W. Gainey, Manager, Plant Support
- B. Harward, Manager - Mechanical Systems, Technical Support
- P. Jenny, Manager, Emergency Preparedness
- D. Knight, Shift Supervisor, Operations
- \*R. Labelle, Project Engineer, Nuclear Assessment Department Site Unit
- A. McCauley, Manager - Electrical Systems, Technical Support
- R. Moore, Shift Supervisor, Operations
- \*P. Musser, Manager - Engineering Assessment, Nuclear Assessment Department Site Unit
- D. Nelson, Shift Outage Manager, Outages and Modifications
- A. Padgett, Manager, Environmental and Radiation Control
- \*M. Page, Manager, Technical Support
- D. Seagle, Shift Supervisor, Operations
- \*E. Shoemaker, Project Engineer, Operations
- \*R. Smith, Manager, Maintenance
- \*D. Stadler, Onsite Licensing Engineer, Nuclear Licensing
- G. Walters, Operating Event Followup Coordinator, Regulatory Compliance
- D. Winters, Shift Supervisor, Operations

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

H. Christensen, Section Chief, Division of Reactor Projects, was onsite April 14, 15, and 16, 1992, to meet with the resident inspectors and plant management. Mr. Christensen along with the inspectors observed the emergency preparedness response to the April 15 Alert (see paragraph 3).

\*Attended exit interview on May 13, 1992.

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

## 2. Plant Status

RO 14 continued during the report period with fuel reload scheduled for the third week of May. The core was fully off loaded on April 22, 1992, to allow work on the CCW and RHR systems, as well as to minimize shutdown risk. An NOUE occurred when both EDGs became inoperable on April 13 and an Alert was declared on April 15, when carbon dioxide gas was released in a vital area (see paragraph 3). At the end of the report period, preparations were in progress to support fuel reload.

## 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, 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, adhered to procedures and applicable administrative controls, and were aware of inoperable equipment status. Shift changes were observed, verifying that system status continuity was maintained and that proper control room staffing existed.

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.

### Upper Internals Package Removal

On April 20, 1992, the inspectors witnessed the upper internals package removal. Lighting and visibility in the refuel cavity was good. In addition to personnel visually observing the removal, a camera was utilized to look under the upper internals package as soon as it was lifted above the vessel flange. The inspectors concluded that the actions to preclude inadvertent removal of core components had been well planned and implemented.

### NOUE Declaration Due To EDG Inoperability

On April 13, at approximately 10:00 a. m., the B EDG was secured during routine surveillance testing because the fitting downstream of the engine driven fuel oil pump showed increased fuel oil leakage. At the time the B EDG was considered to be available for service (TS do not require any EDGs to be operable during cold shutdown). The A EDG was not available for service since it was partially disassembled for PM work activities. Plant management, after considering shutdown risk, decided to remove the B EDG from service to repair the fitting. The inspectors verified that appropriate considerations and actions were taken to ensure that the remaining power sources, normal offsite power and the dedicated shutdown DG were and would continue to be available. These actions included securing all work activities in the switchyard and around critical electrical distribution components. At 1:43 p.m. when the B EDG was placed under clearance, the plant entered a NOUE declaration in accordance with its emergency plan (i.e., loss of both EDGs). The inspectors witnessed replacement of the fitting and the subsequent successful fuel oil line leak test. After verifying that the B EDG would start and run without additional difficulties, the B EDG was considered to be available for service. The routine testing was completed later the same day. The inspectors verified by direct observations, record reviews, and personnel interviews that the emergency preparedness plan (including notifications) had been implemented as required.

### Alert Declaration Due To Carbon Dioxide Release Inside Vital Area

On April 15, 1992, at 12:23 p.m., fire detection system zone 9 actuated releasing carbon dioxide fire suppressant into the north cable vault area. Personnel evacuated the area and fire brigade members were on the scene within one to two minutes. The alarm and actuation were determined to be spurious (i.e., there was no evidence of a fire). At approximately 12:30 p.m., fire brigade members in SCBA initiated oxygen concentration measurements. At 12:42 p.m., the control room was informed that oxygen concentrations as low as 12 percent had been found. After evaluation of the EALs, an Alert declaration was issued at 12:53 p.m., based upon a toxic gas release inside a vital area. The approved emergency procedures classified gases which can create an oxygen deficient atmosphere (such as carbon dioxide) as toxic gases. Actions were taken to ventilate the affected area to the plant stack. At 1:28 p.m., oxygen measurements in the north cable spread area indicated normal air concentrations. At 1:56 p.m., a final oxygen concentration survey was completed in adjacent and lower elevations of

containment and the auxiliary building. This survey also confirmed oxygen concentrations were normal and there were no pockets of carbon dioxide trapped in low areas. Since turnover to the TSC was in progress at the time, it was decided to complete this process and allow the TSC to review the plant conditions and actions taken. The TSC was fully staffed and turnover from the control room was completed at 2:06 p.m. Based upon a review of the plant conditions, the SEC in the TSC declared the Alert condition terminated and the event over at 2:11 p.m. The inspectors verified by direct observation, record reviews, and personnel interviews that the emergency preparedness plan had been properly implemented during this event.

ACR 92-103 was issued to review the spurious actuation cause and develop corrective actions. The inspectors interviewed personnel involved in the event and reviewed applicable records and the draft ACR conclusions. The ACR indicated, and the inspectors confirmed, that the event had occurred due to a long standing work practice (over 11 years) of authorizing hot work permits prior to defeating the fire detection or suppression systems. In this specific instance, the fire technician had signed and dated the hot work permit no. 92-247, FP-005 attachment 7.1 section III item 3, before inhibiting the fire suppression system for zone 9. Item 3 states "Hot Work Permit approved, system(s) inhibited (if applicable), ready for shift foreman's approval." The fire technician had identified on the hot work permit that the fire suppression system for zone 9 would need to be inhibited. The person receiving the permit was unaware that he was to contact the fire technician prior to beginning work so that the fire technician would inhibit the zone 9 fire suppression system. Thus, when grinding activities for M-1074, Electrical Penetration Replacement Project - Phase II, began at 12:41 p.m., the system had not been inhibited. This work practice had apparently existed as a method to expedite work activities by already having the authorized hot work permit at the location when the fire detection or suppression system was inhibited. The circumstances surrounding this event was of concern because of the long duration involved and that individuals in Operations outside the fire protection group should have been aware of the practice. The failure to inhibit the zone 9 fire suppression system was identified as a VIO: Failure To Implement FP-005 Resulted In Alert Declaration, 92-11-01.

One violation was identified. Except as noted above, this program area was adequately implemented.

## 4. 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 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:

OST-401	Emergency Diesels (Slow Speed Start)
SP-1080	Safety Injection System Flow Test
SP-1128	Bus Undervoltage And Load Shed Test For Emergency Bus E1
SP-1129	Bus Undervoltage And Load Shed Test For Emergency Bus E2

SP-1080

SP-1080 was performed to obtain flow, pressure, and temperature test data to be used for future system evaluations such as determining the feasibility of balancing the SI cold leg flows. Preliminary evaluation of the data confirmed that either the A or B SI pump could deliver, via any two cold leg injection pathways, a flow rate in excess of that assumed in the accident analyses. However, the data contained discrepancies which appeared to limit the data's usefulness for rigorous analyses. Specifically, the inspectors observed that when the minimum flow isolation valves SI-856A and B were closed, the pressure in the three injection paths increased; however, the flow rates in two paths increased as expected while the flow rate in the third path decreased by approximately 5 percent (13 gpm). This may have resulted from inaccuracies in the flow measuring instrumentation. Also, the pressure gauges used to measure pressure in the three injection headers were in 10 psig divisions. Thus, the pressure instruments could not provide the necessary precision to measure the small pressure

changes with sufficient accuracy to allow the data to be used in analyses. Additional testing during the next RO was being considered.

#### Emergency Bus UV Trip Channel Functional Testing

On September 27, 1991, the NRC issued TS Amendment no. 136 to authorize operation until RO 14 without the E1 and E2 UV trip channels being fully tested as required by TS (see IR 91-20). The inspectors observed performance of SP-1128 and 1129 which tested the previously untested portions of the UV trip logic. SP-1128 was satisfactorily completed; however, three problems were identified during performance of SP-1129. The first problem involved a wiring discrepancy between the as built configuration and the actual field installation. The labels on two wires were switched inside the electrical panel. This resulted in the test procedure not working as written; however, the load shed function was unaffected. Testing was continued after the wires were labeled in accordance with the CWD. The second problem involved the 480V Bus 3 Main Breaker (52/15B) not reclosing after having been cycled once. The test was continued after the breaker latching mechanism and alarm switch were repaired. The third problem involved the discovery that the C CCW pump received a trip signal from only one UV trip channel. The B CCW pump received a trip signal from both UV trip channels. The UV CWDs B-190628 sheets 276 and 277 showed contacts from both UV trip channels being in the C CCW pump circuit, whereas the C CCW pump CWD B-190628 sheet 209 showed that only the channel 1 UV trip channel was part of the pump control circuit. The C CCW pump breaker was confirmed to be wired in accordance with the C CCW pump drawing. SP-1129 was then completed without any further major difficulties. At the end of the report period, a temporary modification was being developed to wire the other trip channel into the C CCW pump trip circuit. The temporary modification will install wiring in the breaker side of the cubical prior to restart. When the emergency bus is de-energized during the next refueling outage for PMs, a permanent modification will rewire the circuit in a more conventional manner (i.e., in the back of the breaker cubical). Installation of the permanent modification is identified as an IFI: Review C CCW Pump Trip Circuit Modification Installation, 92-11-02.

No violations or deviations were identified. Except as noted above, this program area was adequately implemented.



## 5. 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, material, testing, radiological, and fire prevention controls were adhered to. In particular, the inspectors observed/reviewed the following maintenance activities:

CM-031	Service Water Booster Pump Maintenance
PM-302	Crane Swing Check Valve Inspection
WR/JO 90-ANRZ1	A EDG Exhaust Expansion Joint Replacement
WR/JO 91-AIGA1	A MDAFW Pump Inspection/PM
WR/JO 91-ANGR1	Unit Auxiliary Transformer Bus Bar Inspection
WR/JO 92FLJ525	MCC 6 Compartment Inspection/PM

A MDAFW Pump Impeller Inspection

On April 16, 1992, while observing work activities associated with WR/JO 91-AIGA1, the inspectors examined the visible part of the A MDAFW pump rotating assembly. There was no evidence of recirculation damage as observed in 1989 (see IR 89-17).

SW Valve Removal Prior To Scheduled Removal

On April 21, SW valves SW-374 and 376 (the A and B SW pump discharge check valves, respectively) were removed from the piping system. These valves had been scheduled to be removed after the fuel was off loaded from the reactor vessel due to SW system seismic considerations. Since all four SW pumps discharge into a common header, the removal of the valves placed the operating portion of the SW in a configuration which had not been seismically evaluated. An engineering evaluation later determined that the piping in the operating portion of the SW system had remained seismically qualified. The early removal was in part caused

by the A and B SW pumps being under clearance, which allowed personnel to believe that it would be alright to work these valves early if they had the opportunity. Prior to their removal, personnel failed to adequately coordinate the work activity with the planning and scheduling organization. At the end of the report period, long term corrective actions had not been developed. The failure to implement instructions appropriate to the circumstances (i.e., the work schedule) was a violation of 10 CFR 50 Appendix B Criterion V. This item is identified as a VIO: Failure To Implement Appropriate Instructions During SW-374 and 376 Valve Maintenance, 92-11-03.

#### MCC 6 Inspection

On April 27, 1992, the inspectors witnessed performance of PM route E-023 on safety related MCC 6. The route required inspection of the motor starter contacts, circuit bridging and meggering, and general inspection and cleaning. The route also specified that the thermal overload be checked for wear. Discussion with the I & C technicians performing the work revealed that this instruction appeared not to be very meaningful. The only check being performed for wear was a visual external examination for signs of overheating. The inspectors discussed this item with the WR/JO planner. The planner indicated that he was unfamiliar with the intent of this step. The planner initiated a note to the maintenance procedure writers to clarify this item when the route is revised under the rewrite program. The inspectors observed that the MCC compartment components were in good condition. Work requests were being issued to replace pitted contacts when necessary.

#### B SWBP Discharge Check Valve Inspection

On May 6, 1992, the inspectors witnessed the B SWBP discharge check valve (SW-560) disassembly in accordance with PM-302. During B SWBP operation, this valve had been identified via the deficiency tag program as emitting an unusual noise. Valve inspection revealed that the hinge pin's staking pin had come out. This allowed the hinge pin to wobble inside the disc arm causing significant wear to the arm. However, the valve disc seated properly. The worn components were replaced and the valve returned to service. The staking pin was missing and could not be located. The A SWBP discharge check valve is also to be inspected during this RO.

#### CCW Pump Suction Strainers

During replacement of the three CCW pump suction isolation valves, a strainer was found in the each of the pumps'

suction piping. P&ID no. 5379-376, sheet 1, revision 25, contained a note which indicated that the temporary pump suction strainers had been removed. Based upon this note, the strainers were removed. A large rubber piece, possibly part of a butterfly valve disc seal, was found in one of the strainers. Actions were initiated via ACR 92-127 to locate the source of the rubber piece and repair the component as deemed necessary. The cognizant engineer indicated that the rubber piece could have potentially restricted flow at the pump impeller inlet. Engineering was evaluating the desirability of installing new strainers in the CCW system. The inspectors noted that the removed strainers were more typical of permanently installed strainers than of the kind usually used as temporary strainers. Whether or not the strainers found in the piping were intended to be installed is considered as an URI: Determine If CCW System Design Included Pump Suction Strainers, 92-11-04.

One violation was identified. Except as noted above, this program area was adequately implemented.

6. Modifications (37828)

During revision of operating procedures, it was discovered that the RHR recirculation piping configuration being installed per M-1087, RHR Pumps Minimum Flow Recirculation, would not allow the RHR Hx outlet temperature to be heated to within 25 degrees F of the RCS prior to placing the RHR system in shutdown cooling. The existing recirculation line, located downstream of the RHR Hx bypass line, allowed flow to bypass the RHR Hxs as necessary to allow warm-up of the RHR system. The new RHR recirculation piping configuration, involving larger and separate recirculation flow paths for each RHR pump, was connected upstream of the RHR Hx bypass line. The new configuration would recirculate only cooled water back to the RHR pump suction line. Thus, the new configuration did not provide the ability to warm the RHR system to the above stated temperature criteria. The temperature criteria is contained in GP-007, Plant Cooldown From Hot Shutdown To Cold Shutdown, revision 24, step 5.2.32.10. M-1087 has been revised to retain the existing recirculation line as well as installing the new recirculation flow paths.

The normal development and review processes for M-1087 failed to detect the above described design deficiency. The problem was detected by Operations personnel during development of procedure changes required by M-1087. The inspectors noted that the procedures could have easily been revised without detecting this problem; therefore, the discovery reflected outstanding attention to detail by the procedure preparer. During M-1087 development, the

responsible engineer apparently knew that the RHR system was to be warmed prior to placing it in shutdown cooling. However, he failed to understand that in this process the bypass flow around the RHR Hxs was more significant than the heat added by the RHR pumps. A contributor to the design activity breakdown was the lack of documentation for the functional or operating basis of the RHR recirculation line. An ACR has been issued to review the design activities associated with M-1087. However, corrective action to preclude future similar events has not been developed. The failure to assure that the design basis for the RHR system was correctly translated into specifications, drawings, procedures, and instructions as required by 10 CFR 50 Appendix B Criterion III is identified as a VIO: Failure To Translate RHR System Design Basis Into M-1087, 92-11-05.

One violation was identified. Except as noted above, this program area was adequately implemented.

7. Exit Interview (71707)

The inspection scope and findings were summarized on May 13, 1992, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection findings listed below and in the summary. Dissenting comments were not received from the licensee. 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>
92-11-01	VIO - Failure To Implement FP-005 Resulted In Alert Declaration (Paragraph 3)
92-11-02	IFI - Review C CCW Pump Trip Circuit Modification Installation (Paragraph 3)
92-11-03	VIO - Failure To Implement Appropriate Instructions During SW-374 and 376 Valve Maintenance (Paragraph 5)
92-11-04	URI - Determine If CCW System Design Included Pump Suction Strainers (Paragraph 5)
92-11-05	VIO - Failure To Translate RHR System Design Basis Into M-1087 (Paragraph 6)

## 8. List of Acronyms and Initialisms

a.m.	Ante Meridiem
ACR	Adverse Condition Report
CCW	Component Cooling Water
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CWD	Control Wire Diagram
DG	Diesel Generator
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
F	Fahrenheit
FP	Fire Protection
GP	General Procedure
gpm	gallons per minute
Hx	Heat Exchanger
I & C	Instrument And Control
i.e.	That is
IFI	Inspector Followup Item
IR	Inspection Report
LCO	Limiting Condition for Operation
M	Modification
MCC	Motor Control Center
MDAFW	Motor Driven Auxiliary Feedwater
NOUE	Notice of Unusual Event
NRC	Nuclear Regulatory Commission
OST	Operations Surveillance Test
p.m.	Post Meridiem
P&ID	Piping and Instrumentation Diagram
PM	Preventive Maintenance
psig	pounds per square inch - gage
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RO	Refueling Outage
SCBA	Self-contained Breathing Apparatus
SEC	Site Emergency Coordinator
SI	Safety Injection
SP	Special Procedure
SW	Service Water
SWBP	Service Water Booster Pump
TS	Technical Specification
TSC	Technical Support Center
URI	Unresolved Item
UV	Undervoltage
V	Volts
VIO	Violation
WR/JO	Work Request/Job Order