



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

Report No.: 50-261/87-17

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: May 26-29, 1987

Inspectors: <u><i>M.B. Shymlock</i></u> M. B. Shymlock, Section Chief Operations Branch, Team Leader	<u><i>July 8, 1987</i></u> Date Signed
<u><i>S.D. Stadler</i></u> S. D. Stadler, Reactor Inspector Assistant Team Leader	<u><i>7-2-87</i></u> Date Signed

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Approved by: <u><i>Caudle A. Julian</i></u> Caudle A. Julian, Chief, Operations Branch Division of Reactor Safety	<u><i>7/15/87</i></u> Date Signed
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SUMMARY

Scope: This special, announced inspection was conducted as a follow-up to the Safety System Functional Inspection (SSFI) conducted March 9 - April 15, 1987 inspection report 50-261/87-06. The scope of this inspection included a review of the adequacy of the implementation of unit restart issues and associated licensee commitments. These restart issues were summarized in the licensee's April 15, 1987 Regional Presentation. Additional restart issues and/or commitments identified as a result of this follow-up inspection were summarized in the licensee's submittal to the Regional Office dated June 4, 1987. Areas inspected were as follows:

Appendix R Dedicated Shutdown

- Procedures
- Training
- Communications
- Emergency lightning

- ° Emergency Diesel Generators (EDG)
 - Scavenging Air Blowers
 - Service Water Coolers
 - Load Control
 - Vendor Recommendations

- ° Electrical Coordination
 - Batteries
 - DC Circuit Breakers
 - DB 50 Circuit Breakers
 - Molded Case Circuit Breakers

Results: No violations or deviations were identified.

It should be noted that the original actions taken by the licensee to correct deficiencies associated with Appendix R Dedicated Shutdown were insufficient. Satisfactory attention and corrective plans were implemented upon conveyance of these concerns to plant management.

REPORT DETAILS

1. Licensee Employees Contacted

J. Barlow, Senior Engineer, Nuclear Engineering and Licensing
Department (NELD)

- *G. P. Beatty, Vice President
- *J. F. Benjamin, Operations Support Supervisor
- C. A. Bethea, Manager - Training
- *J. M. Curley, Acting General Manager (Director Regulatory Compliance)
- *W. J. Flanagan, Manager - Design Engineering
- *S. A. Griggs, Regulatory Compliance
- *E. M. Harris, Jr., Director Onsite Nuclear Safety
- *F. L. Lowery, Manager, Operations
- *R. E. Morgan, General Manager
- *R. M. Oates, Principal Engineer
- *D. R. Quick, Manager - Maintenance
- *J. O. Royal, Project Engineer
- *D. A. Sayre, Acting Director - Regulatory Compliance
- *A. H. Shepherd, Regulatory Compliance
- *J. J. Sheppard, Manager - Planning and Scheduling
- *A. W. Wallace, Manager - Technical Support
- *H. J. Young, Director - QA/QC

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

NRC Resident Inspectors

H. Krug
R. Latta

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 29, 1987, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were 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.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Appendix R Dedicated Shutdown

The Safety System Functional Inspection (SSFI) conducted March 9 - April 15, 1987, had identified significant deficiencies involving the implementation of 10 CFR 50, Appendix R Dedicated Shutdown capabilities. These deficiencies included inadequate procedures, communications, human factors, emergency lighting, and training. In a presentation to Regional management on April 15, 1987, the licensee committed to upgrade dedicated shutdown capability prior to return to power including the following:

- Upgrade dedicated shutdown procedures including technical content, human factors, and procedure entry requirements.
- Conduct training for those operators required to use the procedures.
- Ensure operators can conduct required communications to support dedicated shutdown of the plant.
- Ensure sufficient emergency lighting is available to support dedicated shutdown of the plant.

This follow-up inspection conducted May 26-29, 1987, indicated that the licensee's corrective actions associated with most of the above commitments were not adequate to meet the requirements of Appendix R, and to support power operation. Details of the continuing deficiencies observed in each area, as well as additional licensee commitments, are listed below:

a. Dedicated Shutdown Procedures

The licensee had written a new procedure DSP-001, Alternate Shutdown Diagnostic, bringing the total number of dedicated shutdown procedures to 13. The two individuals assigned responsibility for the short term upgrade of the procedures had accomplished a number of technical and human factors improvements. Major improvements noted included the following:

- Deleted local Auxiliary Feedwater (AFW) speed control
- Increased number of natural circulation indications
- Added alternate access route to D. C. breakers
- Added transition to general procedures
- Matched procedures to plant labeling
- Upgraded fire damage assessment instructions
- Upgraded entry conditions

The licensee also changed the philosophy utilized in DSP-002, Hot Shutdown using the Dedicated/Alternate Shutdown System. This

procedure had previously required the deenergizing of all onsite and offsite AC power prior to energizing the dedicated shutdown (DS) diesel and bus. The revised procedure still requires deenergizing the onsite emergency power sources, but provides an option of supplying the dedicated shutdown bus from offsite power if available. The ramifications of this change and the effect on Appendix R requirements will be an inspection follow-up item (IFI-261/87-17-01) pending review of the licensee's associated safety evaluation.

During the course of this inspection, the inspectors walked several licensed operators and senior operators through selected dedicated shutdown procedures. These procedures included DSP-007, Cold Shutdown using the Dedicated/Alternate Shutdown System, and several of the "repair" procedures including DSP-013, RHR Flow Control Valves Repair Procedure. The inspectors also reviewed other DS procedures including DSP-002. Despite the improvements made by the licensee, numerous deficiencies were observed to still exist in the DS procedures, particularly DSP-007. These deficiencies included the failure to provide specific acceptable criteria for parameters related to control and verification, to provide charts and tables required for operator calculations, to provide response not achieved directions, and to provide local valve and breaker locations. The entry conditions and symptoms associated with DSP-002 also still appeared to be inadequate to ensure the procedure is only entered when required, and to provide adequate interface with the emergency operating procedures (EOPs) and abnormal operating procedures (AOPs).

In response to these deficiencies, the licensee committed to perform additional short term reviews and revisions to the DS procedures prior to power operation, as well as additional long term enhancements. The pre-power operation commitments were summarized in the licensee's June 4, 1987, letter to Region II and include:

- A review of the DS procedures by a human factors consultant.
- An in-depth technical review by a team assembled from the Corporate Nuclear Safety Department (Onsite Nuclear Safety).

The purpose of the above reviews were to (1) identify essential needs to ensure short-term procedure adequacy from the standpoint of human factors, technical accuracy, and procedure entry requirements, and (2) to identify any enhancements that should be considered in the long-term. Essential needs identified during operator training were also to be factored into the DS procedures prior to power operation. These licensee commitments should result in adequate DS procedures to support power operations and to meet Appendix R requirements.

b. Dedicated Shutdown Training

The licensee conducted training for all licensed operators and senior operators on dedicated shutdown. This training covered all 13 DS procedures and the recent revisions. In addition, the licensee indicated in their June 4, 1987 letter, that because inadequate time remained prior to unit startup to train maintenance personnel on the DS repair procedures, the operators would be trained to direct the repair activities by maintenance. This training was conducted by the two Operations representatives who also revised the DS procedures, without involvement by the Training Department. The entire training class on all 13 procedures was conducted in 1.5 hours of classroom training. There were no procedure walkthroughs or in-plant training sessions conducted. The original training on the draft DS procedures, in May 1985, included only about 50 minutes in-plant training on all 12 procedures. This training had not included the direction of maintenance personnel in the use of DS repair procedures, and no requalification training had ever been conducted. This amount of classroom training appeared inadequate.

The inadequacy of this latest training was evident during walkthroughs of the DS procedures with licensed operators and senior operators by the inspectors. Operators could not locate significant valves and breakers associated with the DS procedures, and on several occasions led the inspectors to the wrong valves and breakers, and even to the wrong rooms and/or buildings. An inability to locate essential DS equipment under controlled non-emergency conditions, would appear to indicate the task to be nearly impossible given the added stress of fire, smoke, and a loss of normal lighting. Other deficiencies noted during the walkthroughs included a lack of operator familiarity in the following areas:

- Location of DS repair equipment
- Knowledge of specific setpoints and limits
- Response not achieved and alternative actions
- Key availability (security and health physics locks)
- Alternate access routes
- Availability and use of related charts and tables
- Logistics associated with the movement and placement of DS equipment such as cable reels and instrument carts

Most operators indicated to the inspectors that they had never walked through the DS procedures, and were not familiar with the specific equipment locations.

In response to the above training deficiencies, the licensee committed to have a team of Nuclear Training personnel accomplish the following actions:

- Develop and utilize new lesson plans.

- Provide a total of 16 hours of training based on the approved revised DS procedures.
 - 8 hours classroom.
 - 8 hours in-plant walkthroughs.
- Provide testing and grading to assess proficiency including:
 - written examination for classroom training.
 - drill-type testing for in-plant training.
- Assure all shift licensed operators attend and successfully complete the training prior to assuming watch at power.

The licensee also indicated that controlled copies of the procedures, along with required charts and tables, would be made available at appropriate locations throughout the plant. These actions, as described, should provide an adequate level of operator proficiency in the area of DS procedures. In the long-term, the licensee indicated that this DS procedure training would be factored into initial licensed operator training and licensed operator requalification training. The licensee also indicated that a conspicuous color coding would be added to components associated with DS equipment to enhance operator proficiency.

c. DS Communications

The portable radios previously utilized to support DS did not have an installed repeater, and were inadequate for this purpose. The licensee subsequently obtained an FCC license for a repeater and radio system that had formerly been used by Security. The inspectors reviewed the adequacy of this new radio system to support DS and found it to be a major improvement. DS communications were satisfactory between all applicable locations with the use of the repeater. As noted in the licensee's June 4 letter, however, this repeater is presently powered from MCC-5 which would not be available under one fire scenario. The licensee has committed to provide an alternative, reliable power source to the repeater by December 1987. The inspectors tested these new radios without the repeater, in the radio to radio mode. While the reception was less than ideal between some DS areas, it was much better than the "old" radios without a repeater. This new communication system appeared adequate to support startup and DS and should be fully adequate when a new repeater power source is added.

d. Emergency Lighting

The SSFI identified several DS areas which did not appear to be provided with adequate emergency lighting per the requirements of Appendix R III J. The licensee conducted a reevaluation of the existing emergency lighting in each DS location and the access and egress routes associated with these locations. This evaluation indicated that there were several DS areas that did not have

adequate emergency lighting, or did not have any emergency lighting. Some of these deficient areas were newly established by contingent actions added to the revised DS procedures. The licensee had originally proposed the use of flashlights to support unit startup and to provide installed emergency lighting in these areas by mid 1988. Since flashlights do not meet the requirements of Appendix R III J, and Appendix R was required to be implemented by February 1986, this proposal would have required NRC approval of a formal exemption request for each area prior to restart. In the licensee's June 4, 1987 letter, this commitment was revised to include the installation or relocation of 18 emergency lights. These emergency lighting units will satisfy the requirements in that:

- (1) Emergency lighting units will have an 8 hour battery supply, and
- (2) Emergency lighting will be provided in areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

The licensee committed that the emergency lighting additions necessary to support DS operations would be installed prior to power operation. There were also a significant number of DS emergency lighting units which were out of service for repair, and the licensee committed to complete this maintenance before power operation. These commitments in the area of emergency lighting should be adequate to support dedicated shutdown activities and to allow power operations. On a long-term basis, however, the licensee needs to improve their maintenance program associated with the emergency lighting units and improve controls to ensure that adequate units are in service at all times to ensure the ability to implement dedicated shutdown.

The licensee's commitment to implement additional short and long term improvements in the areas of dedicated shutdown procedures, training, and communications will be an inspector followup item (216/87-17-02).

6. Emergency Diesel Generators

Following the SSFI conducted March 9 - April 15, 1987, several unit restart issues involving the Emergency Diesel Generators (EDGs) were identified with several areas including EDG scavenging air blower operability, EDG lube oil cooler integrity, and EDG load control. In a presentation to Regional management on April 15, 1987, the licensee made the following commitments in response to the restart issues:

- Ensure that the scavenging air blower (SAB) on each EDG is operated in accordance with vendor recommendations prior to return to power.
- Replace the service water coolers (3) on each EDG during the current refueling outage.

- Ensure that the load drop-off observed on the "A" EDG during operation paralleled to the grid does not occur while operating separated from the grid.
- Review all current vendor recommendations regarding operation of the EDGs and to implement applicable recommendation prior to return to power.

This follow-up inspection reviewed the implementation of these commitments as follows:

a. Emergency Diesel Generator (EDG)

On March 10, 1987, while conducting a test run, "B" EDG scavenging air blower failed. The vendor technical representative on site stated the most likely cause of failure was thermal expansion.

After the failure occurred, the licensee removed the damaged blower and installed a modified assembly. The modification had been previously performed by the vendor to give the blower increased clearances which reduces the possibility of thermal failure. Additionally, to preclude repetition of the same failure and ensure operability, the licensee measured and recorded scavenging air blower clearances on the "A" EDG. The "as found" clearances were within limits recommended by the vendor.

Due to the blower clearances meeting specifications recommended by the vendor, restrictions previously imposed on light load operation of the EDG have been removed.

These actions agree with the vendor recommendations in this area and meet the licensee's power operation commitment.

b. EDG Service Water Coolers

During the inspectors initial inspection activities the licensee noted a problem with the lube oil cooler on the "A" EDG. This problem resulted in water intrusion in the lube oil as well as accounting for several trips of the EDG on high crankcase pressure. In order to preclude repetition of this problem the licensee committed to replacing the remaining support system coolers during the recent refueling outage. The inspectors reviewed work packages, which implemented replacement of the coolers and inspected the EDGs. The licensee's resolution to this issue was acceptable.

c. EDG Load Control

Another restart issue identified by the inspectors was the concern over the load drift on "A" EDG. The inspectors observed several diesel surveillance operations during which once a load was established on the EDG, it began drifting down with time, and

required almost constant attention to maintain the required load. In response to this deficiency, the licensee wrote and performed Special Procedure (SP-750) to determine the frequency control ability of the "A" EDG. The data collected indicated that with the unit operating in parallel with offsite power, the electrical load still decreased; however, with the generator supplying the emergency bus only, speed and frequency remained constant.

Further evaluation was performed during the recent refuel outage. The governor was removed from the EDG and returned to the vendor for rebuilding and testing. Initial factory test results indicated a definite speed decrease occurred with an increase in oil temperature. The governor was subsequently removed from the test stand, disassembled and rebuilt. Several parts were replaced during the rebuild due to wear. To adequately address the temperature dependent speed drift, the existing speeder spring in the governor was replaced with a temperature compensated speeder spring. Following reassembly the governor was placed back on the test stand for post rebuild testing. Data collected indicated little or no speed drift with increasing oil temperature.

The governor was returned to the facility and reinstalled on the EDG. Subsequent testing indicated the load drift problem still existed. At this point the licensee prepared Special Procedure (SP-776 and SP-777) to test the frequency decay characteristics of "A" and "B" EDGs. The intent of the procedure was to establish a load on the Emergency Diesel Generators, while supplying the emergency bus, of 2500kw, +0kw, -100kw. The test would be considered acceptable and the diesel declared operable if EDG frequency remained at 60 Hz, + or - 2.5 Hz., and voltage between 430 and 520 volts a.c.

The test was initially performed on "A" EDG on May 23, 1987. Due to a steady drop in generator voltage and load, the test was unsuccessful. The licensee determined that the voltage regulator was not functioning properly and issued a work request to investigate and repair. Inspection of the voltage regulator revealed a faulty transistor which was subsequently replaced.

The test was performed a second time on May 24; this time successfully. The data indicated the EDG exhibited good frequency, voltage and load stability characteristics. The same test was performed on "B" EDG on May 23, 1987. Although the test was successful in that it met the acceptance criteria, the load requirement established under Step 6.7 was not satisfied. Step 6.7 required 2500kw, +0kw, -100kw. The data indicates the highest load achieved was 2360kw. This error did not technically invalidate the test results. This test was subsequently re-performed at or about the minimum required load and the acceptance criteria were met. The licensee appears to have met their commitment in this area.

Based on this information, Inspector Followup Item 50-261/87-06-10 is closed.

d. Vendor Recommendations

Possible contribution to the failure of "B" EDG scavenging air blower was the licensee's lack of review and incorporation of applicable EDG vendor recommendations.

In order to resolve this issue, the licensee performed a review of existing plant procedures against current vendor recommendations during the recent refueling outage. The inspectors reviewed the licensee's procedure changes against the list of vendor recommendations and found the licensee's proposed changes acceptable. The only problem noted during the review was annunciator response procedure alarm setpoints. The vendor, as part of the recommendation list, called out diesel instrumentation setpoint changes. The field changes have been implemented, however, the alarm procedures had not yet been changed. The procedures are noted below:

- APP-010-2
- APP-010-34
- APP-010-35
- APP-010-42
- APP-010-43

These discrepancies were brought to the attention of the licensee. The response was to initiate changes to the procedures such that they reflect the correct value. The licensee's response to the commitment in this area of EDG vendor recommendation incorporation appeared to be adequate.

Based on this information, Inspector Followup Item 50-261/87-06-09 is closed.

7. Electrical Coordination

a. Batteries

The licensee conducted an overall review of their batteries. This review included a review of design documentation, actual field verification of design, establishment of "as-built" load profiles, and generation of "as-built" loading calculations to demonstrate adequacy of batteries.

The surveillance program was also reviewed and revised. A performance test was conducted, and IEEE standard 450 was used as guidance for the upgrade. The licensee determined that the batteries would not meet an 8 hour duty cycle. They performed a 10 CFR 50.59 review to reduce the station safety-related batteries duty cycle to one hour. The basis for this reduction is that the implementation of the Emergency Operating Procedure network requires AC power to be restored to at least one of the two associated safety-related battery chargers within thirty minutes. This will assure that power will be restored to the battery chargers. The 10 CFR 50.59 review was reviewed by the inspectors and appeared adequate.

b. D.C. Circuit Breakers

The inspector's concern in this area was that the fault current ratings published per Underwriters Laboratories (UL) were exceeded.

The licensee has completed coordination studies of the DC buses. They have also received from Westinghouse test results which demonstrate that the breakers will interrupt fault current in the analyzed range of their plant.

c. DB-50 Circuit Breakers

The licensee was informed that the inspector's concerns in this area related to ability of these breakers to interrupt fault current which the DB-50 breakers may experience.

The licensee performed a Probabilistic Risk Assessment (PRA) on these breakers. The inspectors had reviewed this PRA earlier and identified several concerns. The licensee had revised the PRA based on the inspectors concern. This PRA was subsequently submitted to the NRC for review.

d. Molded Case Circuit Breakers

The licensee had been informed of the inspectors concern. The molded case circuit breakers concern also relates to the interrupting ability of these breakers.

The licensee received from the vendor (Westinghouse) a letter stating that the molded case (EHB) breakers were capable of safely interrupting the circuits.

Within these areas inspected no new violations or deviations were identified.