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

Report No.: 50-261/88-33

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: November 14-18, 1988

Inspector: Keith R. Jury 12/20/88
K. Jury, Reactor Inspector Date Signed

Accompanying Personnel: T. Cooper
E. Lea
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Approved by: Candle Julian for 12/20/88
G. A. Belisle, Chief Date Signed
Quality Program Section
Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection was conducted in the areas of design control, design changes, and modifications.

Results: In the areas inspected, violations or deviations were not identified.

REPORT DETAILS

1. Persons Contacted:

Licensee Employees

S. Allen, Supervisor, License Training
D. Bower, Supervisor, Quality Assurance
*S. Clark, Project Engineer, Configuration Control
*J. Curley, Director, Regulatory Compliance
R. Dayton, Supervisor, System Engineering
*W. Flanagan, Manager, Modifications and Projects
B. Harward, Principal Engineer, Modifications and Projects
F. Legette, Senior Reactor Operator, Regulatory Compliance
*R. Morgan, Plant General Manager
B. Skinner, Senior Specialist, Technical
R. Steel, Acting Supervisor, Operations
R. Williamson, Senior Specialist, Modifications and Projects
*H. Young, Director, Quality Assurance/Quality Control

NRC Resident Inspector

*L. Garner, Senior Resident Inspector

*Attended exit interview

Acronyms used thoughout this report are listed in the last paragraph

2. Modification Control Program

Licensee personnel identify problems/concerns requiring technical/engineering assistance by utilizing EWRs and PIRs to obtain this assistance. PIRs are generally initiated in situations where work requests cannot handle the scope of the work or evaluations desired. PIRs may also be initiated to incorporate administrative or procedural changes. EWRs are a nonproceduralized method by which Maintenance requests assistance from Engineering to resolve technical questions. EWRs were reviewed briefly during this inspection.

The inspector reviewed open and closed PIRs which were initiated by licensee personnel from various departments. Those PIRs were initiated and processed per the licensee's administrative procedure, Integrated Planning, Budgeting, and Scheduling/Long Range Planning System Manual, Revision 2, December 1985 Guide, 7-01. Approximately 400 PIRs were open at the time of the inspection. The scope and amount of technical assistance required varied for each PIR. Most PIRs resulted in a modification being generated; however, as previously stated, some PIRs resulted in administrative procedural changes. All PIRs are reviewed by immediate supervisors and the subunit head who then assigns the PIR to the appropriate department for review. These reviews provide a mechanism for assessing the request's need and the priority that should be assigned to the PIR.

PIRs deemed necessary are assigned a project control number (PCN) by the Long Range Planning group. PCNs provide a mechanism for tracking the PIRs. Those PIRs not deemed necessary are cancelled and returned to the originator with a written evaluation. For those PIRs reviewed by the inspector, adequate evaluations were performed.

Those PIRs assigned a PCN were placed on a five year evaluation and implementation plan (integrated schedule). Design Engineering assign modification numbers to the PCNs as necessary. This integrated schedule consisted of the following phases:

a. Proposal/Engineering Study/Proposal Review/Approval
b. Plan/Plan Review/ Approval
c. Design/Design Review/Approval
d. Implementation
e. Closeout

Sufficient time is allowed in each phase for completing the respective phase.

For PIRs that were given emergency status, the licensee was prompt in providing thorough engineering evaluations. An example of the promptness and thoroughness is evident by the attention given to PIR 87-116. PIR 87-116 was initiated on July 1, 1987, following a letter issued by Westinghouse on June 19, 1987. The Westinghouse Letter, CPL-87-581, was titled "Component Cooling Water System - Potential Violation of Containment Isolation Capability". The PIR was initiated to resolve 10 CFR 21 concerns regarding a potential violation of containment isolation capability for the Unit 2 CCW system, while ensuring adequate overpressure protection for the CCW system. Engineering Evaluation No. 87-127 written on July 10, 1987, provided a history of events that resulted in the concerns addressed in PIR 87-116. The engineering evaluation was detailed and addressed UFSAR, Technical Specification, and unreviewed safety questions concerns. Supporting documents from Westinghouse and the NRC were also included in the evaluation. Based upon the evaluation performed and the updating of supporting documentation, the licensee concluded that the 10 CFR 21 concerns reported by Westinghouse in letter CPL-87-581 were not applicable to H. B. Robinson Unit 2. The PIR was closed September 17, 1987.

A second example of promptness and thoroughness provided by the Technical Support group was evident following a review of PIR 87-046. Design Engineering identified a discrepancy in the cable/conduit routing of the AFW system while reviewing conduit and cable lists on May 21, 1987. The discrepancy identified affected AFW train redundancy; the PIR was given an emergency priority. The evaluation addressed potential regulatory issues, operations, maintenance, and safety concerns. Effective communication between the various departments contributed to resolving the problem.

The PIR resulted in the initiation and implementation of design modification M-920. Modification M-920 corrected the safety train separation problems associated with the AFW system. Design modification implementation was initiated May 10, 1988. System testing was completed on May 18, 1988.

Modification M-959

This modification replaced the existing RTD bypass system with a thermowell system mounted directly into the main RCS piping. The purpose of this modification was to reduce the probability of primary leakage, install a system for which spare RTDs are available, and reduce long term radiation exposure. Modification implementation was scheduled for the refueling outage that began on November 11, 1988. This modification was not reviewed as part of this inspection; however, it is discussed due to the fact that during implementation on November 14, 1988, deficiencies in the modification package and miscommunication led to an SI. This report only addresses the modification package deficiency and the miscommunication which led to the SI. Technical details are discussed in NRC Inspection Report 50-261/88-34.

The SI occurred due to the order in which the Hagan Racks, which provide electrical power to the RTDs, were de-energized. Normally, no more than one RPS channel (Hagan Rack Group) is de-energized at a time during cold shutdown (per the modification implementing procedures); this was clearly detailed in a caution notice contained in the implementing procedure. The cognizant engineer removed this caution notice from the implementing procedures as he assumed safeguards (SI feature) would be de-energized during the modification and all RPS channels could be worked on simultaneously if necessary. This would allow de-energization of the Hagan Racks in any order. Safeguards is normally de-energized once the unit is in cold shutdown as specified per procedure SPP-011, Removal and Restoration of SI actuation. The reason safeguards was not defeated is that the licensee had just completed Operation Surveillance Test Procedure OST-162, Emergency Diesel Generator Auto Start on Loss of Power and Safety Injection - Emergency Diesel Trips Defeat. During this test the SI feature is energized, and the licensee was in process of restoring the system to normal configuration when modification implementation began.

The miscommunication aspect of this event is what lead to the Hagan Racks being de-energized incorrectly (breakers were de-energized in incorrect sequence necessary to prevent a SI). The actual miscommunication occurred between the Outage Coordinator and the SRO controlling clearances. There was a misunderstanding of which breakers were to be de-energized and in which order. Additionally, the impact the order of de-energization would have on the plant as configured, was not fully realized by all parties involved.

This event could have been mitigated or prevented by three methods, two of which involve modification package enhancement. The first and most obvious would have been to leave the caution notice in the procedure to only work on one Hagan Rack Group at a time. There is indication of a lack of

communication and planning between Operations and Engineering. The engineer should not have assumed Safeguards would be defeated, and Operations should have been aware of the interrelation and effect of implementing the modification immediately after OST-162. The second prevention method could have consisted of a simple prerequisite that Safeguards be de-energized before implementing the modification. This too could have been deterred with more effective planning and coordination. The third prevention method deals with human error. Had the Outage Coordinator and the SRO directing clearances been more effective in their communication and direction, this event could have been prevented.

This example of inadequate planning and communication was promptly recognized by the licensee and appeared to be an isolated incident; the licensee was also prompt in evaluating corrective actions to preclude recurrence. Due to these factors this event did not prove to be an enforcement issue; however, it indicated a weakness in the planning, scheduling, and coordinating modification implementation.

Modification M-951-1

This modification was developed and implemented to correct a single failure of an emergency diesel generator that would render two safety injection pumps incapable of performing their design function. The original design basis and plant configuration of the SI system provided for operating three SI pumps during a LOCA coincident with a loss of offsite power. SI pumps A and C are sequenced on to emergency buses E1 and E2 respectively, upon loss of offsite power and are fed from their respective emergency diesel generator. SI pump B is subsequently sequenced on to emergency bus E1; its preferred onsite emergency power source. This SI pump can also be fed from the E2 emergency bus via bus-tie breakers that initiate automatic transfer and are interlocked to prevent both emergency buses being connected in parallel. Pursuant to an engineering evaluation performed by the licensee, it was determined that a postulated failure of a diesel control feature could cause a voltage or frequency anomaly that would result in losing two of the three SI pumps.

The scope of the design change involved the following hardware changes:

Removal of the SI auto-close signal from SI pump B circuit breaker 52/29C

Removal of the SI signal auto-close feature from the E1/E2 bus tie circuit breaker 52/22 B

Removal of the SI signal auto-close feature from the E2/E1 bus tie circuit breaker 52/29 B

The inspector independently verified by reviewing logic diagrams, engineered safeguard control schematics, and technical system descriptions, that deleting the contact inputs to the closing breaker circuits was consistent with the design objective of the modification.

Review of the Safety Analysis, Attachment 2 to the modification package, and interviews with licensee personnel was also performed to assess the technical adequacy of the 10 CFR 50.59 evaluation. The inspector verified that the above design changes resolved the loss of an emergency diesel scenario in that the A and C SI pumps will start automatically on a SI signal. The B SI pump, however, would be inoperable. This pump is capable of manual start only, after the operator has selected the emergency bus to which it will be connected using control switches located on the RTGB. An evaluation was performed by Westinghouse demonstrating that plant operation at 100% power is acceptable with only SI pumps A and C being available for auto-start to mitigate a DBA. Additionally, the licensee has received an amendment to the TS to reflect plant changes implemented to Modification M-951.

Additional modification package reviews were performed to verify procedural compliance with the design change program and the TS. Plant Operating Manual procedures impacted by plant modification M-951 were identified in attachment 3, Training Summary. These procedures were revised to reflect the new plant configuration and operating requirements. The inspector verified that training was given to operations personnel regarding this modification. Attachment 13 to the modification provided a list of effective pages of the FSAR that needed to be revised. Applicable marked pages of the FSAR were reviewed by the inspectors to verify conformance with the design scope of the plant modification. The inspector was informed by the licensee that changes to the FSAR would be incorporated into the next annual update.

Post modification test requirements and acceptance criteria were specified in Attachment 9. The implementing procedure for the post modification test, Special Procedure SP-798, was reviewed by the inspector to verify design objective achievement. Adequate guidance regarding prerequisites, precautions, and limitations were specified prior to the start of the test. Additionally, acceptance criteria and procedural steps were clearly stated. Based on review of completed procedure SP-798, the design objectives were met.

Modification M-922

This modification was developed and implemented to correct a design deficiency involving a lack of electrical coordination between transfer switch circuit breakers and MCC-5 feeder breakers. The circuit breakers are used in a transfer switch providing 480 V power supply to MCC 5 from the 480 V Emergency Bus E1 or the DS bus. Automatic transfer from the 480 V Emergency Bus to the DS bus occurs upon loss of

voltage on the E1 bus. Lack of electrical coordination between the switch breakers and the MCC feeder breakers could result in the loss of the entire MCC load in the event of a fault downstream of the MCC.

The inspector reviewed the modification package and conducted interviews with licensee management to determine the technical adequacy of the developed corrective actions. The modification's scope required removing the trip function from the existing breakers. Defeating the overcurrent trip function was accomplished by removing the trip adjusting screws inside the circuit breakers. The breakers involved are Gould ITE K line power circuit breakers, type K-600 with 600 ampere coils and OD-5 overcurrent device. The inspector reviewed vendor installation/maintenance publication 1B6.1.2.7-10 and verified that the overcurrent device provides long time, short time, and instantaneous trip functions. Additional reviews of the vendor instructions and modification package attachment 9.0, Acceptance Test Procedure, was performed by the inspectors to verify defeat of the overcurrent trip device. No deficiencies were identified.

The modification package was also reviewed to verify procedural compliance with the design change program and the requirements of the TS. Root cause analysis of the design deficiency revealed that the transfer switch breakers were procurred and installed under plant modification M-01. Licensee management stated that the original procurement specification did not specify the use of a overcurrent trip device with the circuit breakers; however, the circuit breakers were shipped to the site with the OD-5 electromechanical overcurrent protective component . Upon identifying the lack of electrical coordination, a PIR was initiated for development of corrective action. The inspectors verified implementation of the plant modification did not require a change to the FSAR, TS, or any plant operating procedure. Additionally, retraining of Operations personnel was not required.

Modification M-958

This modification involved: (1) adding an auto-start feature to the B SI pump and designating this pump as a maintenance replacement for the A and C SI pumps, and (2) establishing administrative controls that will align the bus-tie feeder breakers to prevent automatic transfer of the B SI pump from the E1 bus to the E2 bus. A human factor evaluation of the modification also resulted in additional changes that require relocating the control switches for circuit breakers 52/22B and 52/29B from their present position to module M-35 on the RTGB.

The safety evaluation performed in accordance with 10 CFR 50.59 was reviewed to assess the technical adequacy of the evaluation. Pursuant to an evaluation performed by NED electrical group, it was determined that emergency buses E1 and E2 no longer had the capacity to support starting two SI pumps on one emergency bus. Due to the finding, licensee management made the B SI pump a maintenance replacement pump that could not be fed from an emergency bus when either the A or C SI pumps was in service.

Plant hardware changes addressed in the safety evaluation involved replacing of the auto-start feature to bus-tie breakers 52/22B and 52/29B that were deleted in plant modification M-951. Additional changes included modifications to the engineered safeguard sequencing logic and the SI pump room cooling fan logic.

Changes to incorporate the human factors engineering review required removing the overcurrent protective device from circuit 52/29 and operating this breaker as a manual disconnect switch that is normally closed. Additional changes included removing the breaker controls or the bus-tie breakers from their present location on the RTGB to module M-35, and adjusting the circuit breaker's overcurrent trip set points to provide protection to the B safety injection pump.

Changes to the Plant Operating Manual procedures were required to implement the administrative controls which aligned the E1-E2 tie breakers 52/22B and 52/29B so that both breakers will normally be racked out. The administrative controls will provide for either 52/22B or 52/29B to be racked in when the B safety injection pump is used to replace the A or C safety injection pumps when they are out of service.

Attachment 12 of the modification provided copies of design engineering sketches to be used for implementating the hardware changes. The inspector performed a detailed review of these sketches and the implementing procedure (Attachment 8) to verify that the logic changes were technically correct and were consistent with the design scope of the modification. No technical inadequacies were identified; however, the scope of the hardware changes appear to include removing wiring and components not previously addressed in the safety evaluation. Specifically, sketches SK-958-Z-7016, SK-958-Z-7019, SK-958-Z-7023, and SK-968-7024, show removing the second shunt trip coil and its associated interlocks for bus-tie breakers 52/22B and 52/29B. These components were previously added by plant modification M-947-2. The changes are required to make the auxiliary contacts from the bus-tie breakers available for use in the SI Pump Room fans HVH-6A and HVH-6B control circuits.

The inspector reviewed the modification package to verify procedural compliance with the design engineering program and the TS requirements. It was determined that the modification package is still in the review cycle as required by the modification program. Implementating this modification will require changes to the FSAR and Plant Operating Manual procedures. In particular, many of the changes submitted as a result of this modification under Amendment No. 7, FSAR Change Request No.A7-001, will require revision. The proposed changes do not require a change to the TS since two SI pumps will still be available for automatic start after modification implementation. Licensee management has therefore decided to implement this plant modification prior to the end of the 1988 refueling outage.

Modification M-872

This modification was developed and installed in response to a licensee commitment to the NRC contained in the H.B. Robinson Unit 2 Regulatory Guide 1.97 submittal. The inspector reviewed the modification package and other supporting documentation to specifically address corrective actions taken by the licensee regarding a 10 CFR 21 report issued by Gamma Metrics. Pursuant to tests conducted by Gamma Metrics, a 10 CFR 21 report was issued. This indicated a significant possibility of moisture intrusion into cable assemblies used with excore neutron flux detectors. The inspector verified that a JCO was prepared by the licensee on June 6, 1988. The JCO stated that with the EQ of the excore monitors being suspect, actions had been completed to ensure emergency boration upon failure of the regular Nuclear Instrumentation System (NIS). Licensee management stated that permanent corrective actions (repairs) would be completed prior to unit startup from the present outage. The inspector reviewed the vendor's recommended corrective actions contained in their letter dated May 10, 1988, to the Senior Executive Vice President, Nuclear Operations. Additional reviews were performed of procedure NCN-2975, Disposition 10, Attachment 1, which specified the method and acceptance criteria for pressure testing the sealed conduit assemblies. Instructions for installing and connecting the neutron flux detector cables into the junction boxes were also provided in a field service procedure.

The inspector reviewed selected modification packages for; design input documentation of design input, 10 CFR 50.59 safety evaluation adequacy, administrative control, and close-out activities (if any) associated with the packages. The review included packages which had been completed and closed-out and packages which were in process of being implemented.

The licensee TS 6.5.1.2.5 states:

> Modifications which constitute changes to the facility as described in the FSAR shall also be reviewed by the Corporate Nuclear Safety Section. This review may be conducted after plant management approval, and implementation may proceed prior to completion of review.

The inspector reviewed the program for this requirement and determined that the Modification and Setpoint Revision Form, for procedure, TMM-011, Plant Design Control, Revision 16, included a sign-off identifying the review requirement, but did not include a sign-off for completion. The inspector reviewed procedure MOD-011, Turnover and Closeout of "As-Built" Modification Packages, Revision 8, and determined that this procedure does not require the completing or verifying the review prior to

closing out the modification package. The inspector chose four modifications that required corporate review, as per the TS, to determine if the review had been performed:

Modification No.	Title
M-947	SI Pump Availability Upgrade
M-951	SI Pump B Deletion of Auto Start
M-899	Add Second 115KV Bus Tie Breaker and Upgrade Breaker Scheme
M-932	Relocate Alternate Shutdown Transceiver

Memoranda from the Corporate Nuclear Safety section documenting the reviews were cross-referenced against the modifications with the exception of M-932. The corporate offices located the memorandum for this modification in the review cycle and provided a draft copy to the inspector. No other problems were noted in the performance of the required reviews.

The design basis documentation and 10 CFR 50.59 safety evaluations were reviewed for the following modifications:

Modification No.	Title
M-947	SI Pump Availability Upgrade
M-955	Emergency Diesel Generators A & B Upgrade
M-948	Upgrade of Pressurizer PORVs

The design basis review was well documented and appeared comprehensive and complete. The basis consisted of a standard checklist and references which fully described the design document input. Safety evaluations were comprehensive and fulfilled 10 CFR 50.59 and licensee TS section 6.5.1.2, Modifications, requirements.

The inspector reviewed the Carolina Power & Light Nuclear Plant Modification Program, which is a company wide modification program for the nuclear plants. This new program is scheduled to be implemented in 1989. One modification, M-953,PASS - Move Primary Water Flushing Line, had been performed under this program at RNP. Except for one safety related penetration, this modification is non-safety related. A determination of the programs effectiveness cannot be performed until it has been implemented and multiple safety related modifications have been performed under it.

Licensee procedure, MOD-018, Temporary Modifications, Revision 1, controls the use of temporary changes to the plant design. If the change is on operable equipment, an engineering evaluation is required to be performed, which provides a safety evaluation, if required, and a technical review of the change. This procedure also limits the length of time the temporary modification is to remain active. If the modification remains active beyond three months, the engineering evaluation and management

approvals must be performed again. Three temporary modifications were reviewed; TEM 88-010, which installed a gauge on the Auxiliary Feedwater System, TEM 88-001, SW HVH Piping, and TEM 88-700, Belzona Repairs on SW Leaks. Each TEM contained a comprehensive and technically accurate engineering evaluation. All required approvals were obtained prior to implementing the change. An expected removal date was established for TEM 88-010 that was within the three month limit. TEMs 88-001 and 88-700 both addressed repairing SW system leaks, caused by MIC. These repairs were part of continuing problems the licensee had experienced with MIC in the SW system. There were numerous temporary repairs and JCOs addressing this issue, coupled with a major effort in 1984 to repair all welds in containment affected by MIC. JCO 88-005 and the associated Engineering Evaluation, EE 88-121, addressed MIC indications in the weld heat affected zone of the pressure boundary for SW pipe welds in containment. The EE reviewed was technically accurate and reassessed the CV integrity issue addressed in EE 88-073. These temporary modifications also appeared to be technically sound, and were utilized until the affected SW piping could be replaced (1988 refueling outage). Discrepancies were not identified with the temporary modifications or the JCO.

The inspector interviewed a liasion engineer from the site to determine if the procedural description of the modification program agreed with routine implementation practices. The engineer displayed an adequate knowledge of the procedural and Technical Specification requirements of the modification process.

The inspector reviewed the process used to incorporate PMs into the site training program. A training summary is provided by design engineering to the training department. Training specialists review these summaries to determine if changes need to be incorporated into requalification training for the licensed operators or if modifications need to be incorporated into training lesson plans. The inspector reviewed records for PM 947 and found records of requalification training for the licensed operations staff. The record of the review for incorporating modifications into the lesson plans was reviewed and stated that due to further changes from PMs 951 and 958, no changes were needed to the lesson plans for PM 947.

QA Interface

In evaluating the licensee's design control program, the critical QA/QC design process interface was reviewed. Site QA Engineering is the first quality element involved with the design process. During initial modification package review/approval, this group reviews the package for applicable QA requirements, QA commitments, design requirements, and hold/witness points (with the author, engineering, and QC). Effective January 1, 1989, it is expected this review responsiblity will be transferred to NED QA Engineering as NED is the modification process focal point.

During modification implementation, QA/QC is usually involved by inspection and surveillance activities. QA Engineering performs surveillances on a high percentage of modifications during implementation, while QC performs random type surveillances as well as normal inspection activities. The inspector reviewed the modification checklist utilized by QA Engineering and it appeared that the checklist was broad enough to encompass and evaluate several different aspects of a modification package; however, many of the checklist questions are compliance oriented versus performance or implementation effectiveness oriented. This does not pose a major concern however, as the audit checklist reviewed was much more comprehensive and incorporated performance oriented activities in the audit methodology, which by nature appeared to be much more detailed.

QA is also normally involved in modification walkdowns and turnovers. Although QA participation in the walkdowns is not mandatory, QA usually participates with other respective departments to improve turnover coordination. QA attends all turnover meetings, at which time incomplete items identified during the walkdowns are addressed as far as the impact on turnover. QA has signature authority on modifications before turnover. QA is involved after modification turnover/closure through audits conducted by the Performance Evaluation Unit, which performs a check and evaluation function on the design change program.

3. Exit Interview

The inspection scope and results were summarized on November 18, 1988, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

4. Acronyms

AFW - Auxiliary Feedwater System
CCW - Component Cooling Water
CFR - Code of Federal Regulations
CPL - Carolina Power and Light Company
CV - Containment Volume
DBA - Design Base Accident
DS - Dedicated Shutdown
EE - Engineering Evaluation
EQ - Environmental Qualifications
EWRs - Engineering Work Request
FSAR - Final Safety Analysis Report
JCO - Justification for Continued Operation
LOCA - Loss of Coolant Accident
MCC - Motor Control Center
MIC - Microbiology Induced Corrosion
NED - Nuclear Engineering Department
NRC - Nuclear Regulatory Commission

PCN - Project Control Number
PIR - Plant Improvement Request
PM - Plant Modification
PORV - Power Operated Relief Valve
QA - Quality Assurance
QC - Quality Control
RCS - Reactor Coolant System
RNP - Robinson Nuclear Plant
RPS - Reactor Protection System
RTD - Resistance Temperature Detector
RTGB - Reactor Turbine Generator Board
SI - Safety Injection
SP - Special Procedure
SRO - Senior Reactor Operator
SW - Service Water
SWHVH- Service Water Heating and Ventilation and Air Handling
TEM - Temporary Engineering Modification
TS - Technical Specification
UFSAR- Updated Final Safety Analysis Report