



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

Report No.: 50-261/90-08

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 16-20, 1990

Inspectors: *T. E. Conlon for* 5-8-90
 N. Merriweather Date Signed

T. E. Conlon for 5-8-90
 M. N. Miller Date Signed

Approved by *T. E. Conlon* 5-8-90
 T. E. Conlon, Chief Date Signed
 Plant Systems Section
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was conducted in the areas of the licensee's conformance to Regulatory Guide (RG) 1.97, Instrumentation for Light-Water cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident and previously identified open items.

Results:

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

The licensee has performed the necessary installation or modification of plant instruments to comply with Regulatory Guide 1.97, Revision 3 and/or the SER and their submittals to NRC. The program was considered adequate with the exception of a few minor weaknesses as described below. Management acknowledged the concerns and committed to provide both short term and long term corrective action which was considered acceptable by the inspectors. In addition, the licensee was extremely cooperative in resolving these technical

RG 1.97 Master Equipment List an excellent reference document to assess the requirement for RG 1.97 equipment. Although the inspectors considered some of the licensee's activities in this area to be weak, overall the program was considered to be average. Weaknesses considered in the licensee's program are as follows:

Weaknesses: The electrical drawings are inconsistent.

The calibration program does not require verifying signals from loops to ERFIS computer output.

Q-list does not identify by tag number all RG 1.97 instruments.

Not all RG 1.97 instruments and indicators are uniquely identified and labeled.

Containment water level and pressure recorder is not tagged and has been out of service for over a year.

The strengths and weaknesses are discussed further in paragraph 2.b.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *C. W. Coffman, Project Engineer - Onsite Nuclear Safety
- *T. P. Kinnamn, Engineer Supervisor - Technical Support
- *J. D. Kloosterman, Director - Regulatory Compliance
- *L. Lynch, QC Supervisor
- *R. E. Morgan, Plant General Manager
- *M. F. Page, Manager - Technical Support
- *F. Roy, Engineer - Technical Support
- *J. J. Sheppard, Manager - Operations
- R. Shoemaker, Project Engineer - Operations
- *R. M. Smith, Manager - Maintenance
- *D. C. Stadler, Onsite Licensing Engineer
- *K. Williams, Senior Engineer - Technical Support

Other licensee employees contacted during this inspection included engineers, operators, technicians, and administrative personnel.

NRC Resident Inspectors

- *L. Garner, Senior Resident Inspector
- K. Jury, Resident Inspector

*Attended exit interview

2. Inspection of Licensee's Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (25587).

Criterion 13, "Instrumentation and Control," of Appendix A to 10 CFR Part 50 includes a requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. Regulatory Guide 1.97 (RG 1.97) describes a method acceptable to the NRC staff for complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following an accident.

The licensee responded to Reg Guide 1.97 (NUREG 0737, Supplement 1) in letters dated December 31, 1984, July 18, 1985, July 28, 1986, and October 20, 1986. A Safety Evaluation Report covering the above responses was issued to the licensee on March 5, 1987. The SER concluded that the licensee's instrumentation for RG 1.97 either conforms to, or an acceptable justification exists, for deviating from the guidance of Regulatory Guide 1.97, Revision 3 with the exception of the

instrumentation for containment sump water temperature, which will be evaluated by NRC on a generic basis. This inspection assessed the licensee's RG 1.97 instrumentation system using (1) the design and qualification criteria described in Table 1 of RG 1.97, Revision 3; (2) Technical Evaluation Report No. EGG-NTA-7113, conformance to Regulatory Guide 1.97 H. B. Robinson Steam Electric Plant, Unit 2; and (3) licensees' submittals as described above; and (4) 10 CFR 50. A random sample of 22 variables from the licensee's submittal were selected to evaluate the licensee's program. The variables selected were classified as Category 1 and 2 which require the most stringent design requirements of all Reg Guide 1.97 instruments. The instruments reviewed and the results achieved are discussed in the paragraphs and tables below.

a. Category 1 and 2 Instruments

The instrumentation listed in the following Tables were examined to verify that the design and qualification criteria of RG 1.97 or the SER and licensee commitments had been satisfied. The instrumentation was inspected by reviewing drawings, procedures, data sheets, and other documentation; and performing walkdowns for visual observation of selected installed equipment including CR indicators and recorders. The following areas were inspected:

- (1) Equipment Qualification - The EQ Master Equipment List and the Q-list were reviewed for confirmation that the licensee had addressed environmental qualification requirements and seismic qualification. A concern was identified in this area as discussed in paragraph 2.b.
- (2) Redundancy - Walkdowns were performed to verify by visual observation that selected instruments were installed as specified and that separation requirements were met. In addition, loop drawings for all listed Category 1 instrumentation were reviewed to verify redundancy and channel separation.
- (3) Power Sources - Loop drawings were reviewed to verify the instrumentation is energized from a safety-related power source.
- (4) Display and Recording - Walkdowns were performed to verify by visual observation that the specified display and recording instruments were installed. Loop drawings were reviewed to verify there was at least one recorder in a redundant channel and two indicators, one per division (channel) for each measured variable. A concern was identified in this area as discussed in paragraph 2.b.
- (5) Range - Walkdowns were performed to verify the actual range of the indicator/recorders was as specified in RG 1.97 or as stated in the licensee's submittal. Review of calibration procedures verified sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.

- (6) Interfaces - The loop drawings and Q-list were reviewed to verify that safety-related isolation devices were used when required to isolate the circuits from non-safety systems.
- (7) Direct Measurement - Loop drawings were reviewed to verify that the parameters are directly measured by the sensors.
- (8) Service, Testing, and Calibration - The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration. A concern was identified in this area as discussed in paragraph 2.b.
- (9) Equipment Identification - Walkdowns were performed to verify that types A, B and C instruments designated as Categories 1 and 2 were specifically identified with a common designation on the control panels. A concern was identified in this area and is discussed in paragraph 2.b.

CATEGORY 1 INSTRUMENTS

<u>Variable</u>	<u>Instrument Number, Channel or Train</u>
Neutron Flux	RE-582 RI-590 & 592 RR-594 RE-583 RI-591 & 593 RR-594
Reactor Coolant Pressure (Wide Range)	PT-402 PI-402 PR-444 PT-501 PI-501

Variable
(cont'd)

Instrument Number, Channel or Train

Core Exit Temperature

TE-472-496
TE-523-528
TM-578
TM-579
TR-581
TI-579(A)
TI-580(B)

Refueling Water Storage Tank Level

LT-948
LI-948
LT-969
LI-969
ERFIS

Containment Hydrogen Concentration
(PAM Panel)

AET-8100-1
AI-8100-1
AR-(Not Tagged)
PT-8100-1
AET-8110-2
AI-8110-2
AR-(Not Tagged)
PT-8110-2

Steam Generator Level (Narrow Range)

LT-474
LI-474
LT-475
LI-475
LT-476
LI-476
FR-478
LT-484
LI-484
LT-485
LI-485
LT-486
LI-486
FR-478
LT-494
LI-494
LT-495
LI-495
LT-496
LI-496
FR-478

Variable
(cont'd)

Instrument Number, Channel or Train

Steam Generator Pressure

PT-474
PI-474
PT-475
PI-475
PT-476
PI-476
PT-484
PI-484
PT-485
PI-485
PT-486
PI-486
PT-494
PI-494
PT-495
PI-495
PT-496
PI-496
ERFIS

Reactor Coolant System Hot Leg
Temperature

TE-413
TI-413C
TR-413
TE-423
TI-423
TR-413
TE-433
TI-433
TR-413

Reactor Coolant Cold Leg
Temperature

TE-410
TI-410
TR-410
TE-420
TI-420
TR-410
TE-430
TI-430
TR-410

Pressurizer Level

LT-459
LI-459
LR-459
LT-460
LI-460
LR-459
LT-461
LI-461
LR-459

Variable
(cont'd)Instrument Number, Channel or TrainContainment Pressure
(PAM Panel)PT-956
PI-956
PR-(Not Tagged)
PT-957
PI-957
PR-(Not Tagged)

Containment Water Level

LT-801(A-E)
LI-801
LR-(Not Tagged)
LT-802(A-E)
LI-802
LR-(Not Tagged)CATEGORY 2 INSTRUMENTSVariableInstrument Number, Channel or TrainPrimary Safety Relief Valves
Position (Acoustical Flow Switches)RC-551A
RC-551B
RC-551CPrimary Power
Operate Relief
Valves (PORV) PositionPCV-455C
PCV-456
Limit SwitchesResidual Heat Removal (RHR)
Heat Exchanger Outlet
TemperatureTE-606
TR-604Residual Heat Removal
FlowFT-605
FI-605Heat Removal by the
Containment Fan Heat
Removal System
Fan Motor Status
(Switches & Indicating Lights)HVH-1
HVH-2
HVH-3
HVH-4Containment Spray
FlowFT-958A
FI-958A
FT-958B
FI-958B

Containment Cooling
Service Water Low Flow
(Annunciator - ANN)

DPS-1698A
ANN-A2-8
DPS-1698B
ANN-A2-1
DPS-1698C
ANN-A2-24
DPS-1698D
ANN-A2-32

Charging Flow

FT-122
FI-122A

Containment Isolation
Valves Position

All Valves
Limit Switches

b. Discussion and Conclusion

The inspectors concluded that the licensee has made the necessary installation and/or modifications of plant instruments to comply with Regulatory Guide 1.97, Revision 3 as described in their responses to NRC and as discussed in the SER. The implementation of their RG 1.97 program was considered adequate in most areas, with the exception of a few minor weaknesses in the areas of Q-list identification, ERFIS calibration, equipment identification, drawings, and maintenance. To resolve these weaknesses the licensee management committed to certain short term and long term corrective actions. The inspectors considered these commitments acceptable to resolve all concerns. A brief discussion of the areas reviewed and the results achieved including any licensee commitments are summarized below:

(1) Q-list

The inspectors reviewed the Q-list for those Reg Guide 1.97 instruments identified in the tables above. In many instances, the Q-list did not specifically list Category 1 and 2 instruments by "Tag Number". Instead the Q-list specified equipment on the process flow drawings as being classified Q. The inspectors determined this method was not satisfactory and the licensee agreed to correct the Q-list. The licensee agreed to specifically list all RG 1.97 Category 1 and 2 instruments by tag numbers.

This corrective action will be completed in two phases. The short term phase is to add within three months all Category 1 and Category 2 safety-related variables to the Q-list. The long term phase is to add all non-safety related Category 2 variables to the Q-list within 18 months.

(2) Calibration Program for RG 1.97 Instruments

The inspectors reviewed the instrument calibration program, calibration procedures, and data sheets for RG 1.97 instruments. These documents were found to be satisfactory except for the calibration method used for the ERFIS computer. The licensee's method is to calibrate the ERFIS computer inputs and the instruments loops independently of each other. This does not require the technicians to verify the computer reading during the loop calibration. The inspectors did not consider this practice to be acceptable for the following instrument channels described in their submittal:

- Containment Spray Addition Tank Level (A1)
- Steam Generator Pressure (A1)
- Condensate Storage Tank (CST) Level (A1)
- Refueling Water Storage Tank Level (A1)
- Containment Isolation Valve Position (B1)
- RCDT Temperature or Pressure (C3)
- Engineered Safety Features (ESF) Actuated Valve Position (D3)
- Liquid Hold-up Tank Level (D3)
- Gas Decay Tank Pressure (D3)
- Emergency Ventilation Damper Position (D2)
- DC Bus Voltage and Current (MCC A/B) (D2)
- Plant Vent Flow Rate (E3)

For those instruments identified above the licensee specifically states in their submittal that trend information or indication on demand will be provided by the ERFIS computer. Based on the above statements it appears that the licensee has taken credit for ERFIS providing recording or indication for RG 1.97 instrument loops. Based on this assessment the inspectors concluded that the output of the loops to the ERFIS computer should be calibrated to verify accuracy of the computer output the same as the other recorders or indicators in the instrument loop. Subsequent to the inspection, during a conference call with NRC staff on May 3, 1990, the licensee made verbal commitments to validate the ERFIS outputs for the containment water level and containment pressure channels prior to the end of the next refueling outage and to revise procedures by December 31, 1991, to validate 132 limit switches of 66 containment isolation valves and 25 various other instruments including the containment water level and containment pressure channels. The NRC staff considered this to be acceptable based on the licensee's current plans to upgrade procedures.

(3) Drawings

The controlled wiring drawings (CWD) and the Hagan instrument loop drawings were reviewed by the inspectors to verify adequacy and determine power requirements. The inspectors noted that the licensee did not have a CWD for the Post Accident Monitoring (PAM) panel detailing 120 VAC power. However, the licensee did have a sketch (no. M872-E-3640) from the plant modification package detailing the power to and within the PAM panel. The inspectors did not consider this as an acceptable way to control drawings. The inspectors verified the power requirements by walking down the PAM panel and reviewing other documentation. The licensee acknowledged the inspectors concerns and agreed to review and revise the CWDs as appropriate for the PAM panel by July 27, 1990. In addition, the licensee agreed to review and revise as appropriate all other Hagan drawings within a year. This will entail reviewing approximately 30 to 50 drawings.

(4) Equipment Identification and Labeling

The inspectors toured the control room and examined the selected RG 1.97 instruments for proper range and identification. During the inspection the inspectors noted: (a) that not all type A, B and C variables designated as Category 1 and 2 were uniquely identified on the control boards as RG 1.97; and (b) that not all instruments located on the PAM panel were always identified with equipment ID numbers.

The Reg Guide requires that type A, B and C, Category 1 and 2 variables be marked with a common designation. The only instruments that were marked were the indicators and recorders with a blue border. Other components such as switches, annunciators and valve position indicators for containment isolation valves were not marked for type A, B and C, Category 1 and 2 variables on the control boards. The inspectors questioned the licensee regarding their position on the designation of instruments for RG 1.97. The licensee indicated that because of the size of the control boards and considering the fact that the switches are specifically addressed in EOP's, that it was not desirable or necessary to color designate with a blue border those specific components on the control boards. The licensee also considered it would clutter the control board and could lead to operator confusion. The inspectors requested that if this position was not already documented that the licensee should document their justification or reasons for not marking all type A, B, and C category 1 and 2 variables on the control boards. The licensee agreed to document their justification for not marking these variables and include this information in their plant files within three months. The

inspectors noted that the recorder for both containment water level and containment pressure did not have an equipment ID number. This was found to be inconsistent with other Reg Guide 1.97 instruments located in the control room. The licensee was made aware of the concern and committed to identify all instruments on the PAM panel with equipment numbers consistent with the plant equipment ID numbering system. The licensee indicated that the labeling of these instruments would be completed within three months.

(5) Maintenance of Reg Guide 1.97 Equipment

During the control room walkdown, the inspectors noted that the recorder for both containment water level and pressure on the PAM panel was tagged out of service. Further investigation of this matter revealed that the recorder has been out of service since March 1989. The licensee provided the inspectors a copy of a project improvement report (PIR) which proposes that the recorder should be replaced in 1991 due to lack of replacement parts and obsolescence. However, it does not make reference to the work request or the fact that the recorder is out of service. The licensee informed the inspectors that they have redundant indicators in the control room for both variables and that all channels are inputted into the ERFIS computer. Thus, adequate information has always been available in the control. However, to resolve the concern the inspectors have about the ERFIS computer calibration, the licensee committed to have both the containment water level and containment pressure channel calibrated with the ERFIS computer outputs verified prior to startups from the next refueling outage. The expected completion date for implementation of the modification to replace the PAM recorder will be in 1991.

3. Action on Previous Inspection Findings (92701)

(Closed) Inspector Followup Item 50-261/90-18-01, Periodic Testing/Surveillance of Appendix R Protective Devices Associated with Appendix R Coordination Study

The licensee had initiated Plant Change Notice (PCN) 87-026/00, approved on December 27, 1988, which evaluated the need for additional maintenance surveillance testing, and administrative controls for Appendix R protective devices in associated circuits of concern (ACC). The PCN recommended testing every refueling outage 10 percent of all 480V switchgear power circuit breakers and 480/208/120V Molded Case Circuit Breakers that are required to function in the licensee's Appendix R associated circuit analysis. For each breaker not meeting the acceptance criteria, an additional 10 percent of that breaker type would be tested until either no failures occur or until all ACC breakers of that type have been tested. The PCN also recommended that procedures be developed to

control the replacement of fuses in Appendix R circuits. To accomplish all of the above recommendations, the PCN suggested that two new procedures should be developed for fuse control and molded case circuit breaker testing. In addition, an existing plant procedure should be revised to ensure that 10 percent of all types of Appendix R 480V switchgear breakers are tested each outage. The proposed testing of molded case circuit breakers would include testing the thermal element at 300 percent of the trip rating for appropriate time delay and testing the instantaneous element for appropriate pickup current. The recommendations of PCN-87-026/00 have not been completed due to lack of funding for calendar years 1989 and 1990. However, during this inspection the licensee committed to incorporate this item on the work management prioritization system as an NRC commitment. This will ensure that this item receives proper management attention for scheduling the completion of this item.

4. Exit Interview

The inspection scope and results were summarized on April 20, 1990, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results discussed above. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

Subsequent to the inspection, the licensee made certain verbal commitments to the NRC in telephone conferences on April 26 and May 3, 1990. These commitments specifically relate to the licensee's proposed corrective actions and expected completion dates for the weakness identified during the inspection. These commitments are also described in the report details.

5. Acronyms and Initialisms

AET	Analyzer Element (H ²)
AI	Analyzer Indicator
AR	Analyzer Recorder
ANN	Annunciator
DPS	Differential Pressure Switch
ERFIS	Emergency Response Facilities Information System
FI	Flow Indicator
FR	Flow Recorder
FT	Flow Transmitter
HVH	Heating Ventilation Handling
LI	Level Indicator
LR	Level Recorder
LT	Level Transmitter
PAM	Post Accident Monitoring
PCV	Pressure Control Valve
PI	Pressure Indicator
PR	Pressure Recorder

PT	Pressure Transmitter
RC	Reactor Coolant (Acoustical Flow Switches)
RG	Regulatory Guide
RE	Reactivity Element (Neutron)
RI	Reactivity Indicator
RR	Reactivity Recorder
TE	Temperature Element
TI	Temperature Indicator
TM	Temperature Monitor
TR	Temperature Recorder