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

Report No.: 50-261/89-02

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: January 9-13, 1989

Inspector: Nick Economos 2/10/89
Nick Economos Date Signed

Approved by: 2/10/89
Jerome Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope

This routine unannounced inspection was conducted in the areas of resistance temperature detector (RTD) bypass elimination, service water piping replacement modifications, main feedwater pump flow testing, steam generator (SG) tube eddy current test (ET) results and previously identified inspection findings.

Results

Work on the service water pipe replacement and resistance temperature detector (RTD) bypass elimination modification is essentially completed. Therefore, the inspector reviewed the documentation packages and conducted a field inspection to verify as-built conditions including pipe configuration, dimensions, elevation, etc. Flow testing of the main feedwater pumps (FWP) was in progress using an ultrasonic flow detection device produced by Controllatron. Current and previous flow test data was reviewed and discussed with cognizant personnel. A review of FWP maintenance procedures and historical corrective maintenance records disclosed that the approved procedure used to perform this activity was inadequate and, therefore, a violation was issued.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

S. B. Clark, Project Engineer Configuration Control
R. Cox, Modification Project Liaison Engineer
*J. M. Curley, Director, Regulatory Compliance
*R. H. Dufresne, Project Engineering Supervisor, Civil Engineering
W. Farmer, System Supervisor Technical Support
B. Harward, Principal Engineer Modification Projects
J. Latimer, Welding Engineer
*R. E. Morgan, General Manager
R. Munday, Engineering Technician I, Modifications Projects
*M. F. Page, Manager, Technical Support
*S. M. Pruitt, Inservice Inspection (ISI) Coordinator
*D. R. Quick, Manager, Maintenance
*D. Sayer, Senior Specialist Regulatory Compliance
H. J. Young, Director, Quality Assurance (QA)

Other licensee employees contacted during this inspection included craftsmen, engineers, operators, mechanics, security force members, technicians, and administrative personnel.
NRC Resident Inspector

*Attended Exit Interview

2. Follow-up on Inspector Identified Problems and unresolved Items (92701)

a. (Closed) Inspector Follow-up Item (IFI), 88-24-01 Setpoint Basis for HVH Cooler Low Water Flow Alarm

This item was identified when the inspector ascertained that a remote HVH flow indication was not available in the control room. This would preclude verification of HVH cooler operability in case of emergency. There is a low setpoint alarm which activates when outlet flow is 700 gpm. Because the 700 gpm setpoint was determined by analysis to be lower than the minimum required flow for full cooler operability, the licensee revised upward the minimum set point to 750 gpm. The new setting was established by analysis performed by Westinghouse, Mechanical Equipment Design (MED), and documented by letter, S/N MED-FCE-6583, dated 9/9/88.

b. (Closed) Unresolved Item (URI), 88-24-02, UV/SW Relay Timing and the Impact on Cooling Water Flows During Safety Inspection Sequel.

This item was identified following review of SAR Section 6.2.2.3.2 and Operation Surveillance Procedure OST-301 to determine availabilty of full flow to the HVH cooler following a safety injection (SI) signal. The review indicated that full flow would probably not be available to the HVH coolers for up to ninety (90) seconds following an SI signal. At the time, the inspector of record felt that this delay was in part due to diversion of water flow to non safety related loads. Moreover, the inspector reported that the licensee could not determine at that time, July 25-29, 1988, the affect of partial flow on the HVH coolers for the first ninety seconds of an SI signal. Following discussions with cognizant personnel, conducted during this inspection, the inspector ascertained that by using special procedure SP-814 Rev. 1, written to address Region II concerns on the service water system, the licensee demonstrated that there would be sufficient flow to the HVH coolers following SI initiation to allow them to perform their design function.

3. Eddy Current Examination (ET) of Steam Generator (S/G) Tubes - Record Review and Evaluation - Inservice Inspection (ISI) (73755)

Activities during this refueling outage included eddy current examination of tubes in "A," "B" and "C" S/Gs. Data acquisition and analysis was performed by Westinghouse personnel using a multifrequency ET technique with the MIZ-18 system to analyze tube integrity. The inspection was performed per requirements of ASME Code Section XI (77S78) and Technical Specifications (TS) 4.2.1., Inservice Inspection of Steam Generator Tubes. At the time of this inspection, the ET examination was complete. However discussions with cognizant licensee personnel disclosed that a total of 626 tubes were examined in S/G "A", 627 tubes in S/G "B" and 643 tubes in S/G "C". In addition certain tubes, within each S/G, were examined through the U-Bend region. The number of tubes examined per S/G in this area included 17 in S/G "A", 16 in S/G "B" and 12 in S/G "C". The Licensee stated that one tube in S/G "C", located in Row 7, Column 92, had exceeded the acceptance criteria of 47% thru-wall thickness and was plugged. The flaw was analyzed as a mechanically induced gouge. The licensee indicated that these were preliminary results. The official results will be included in the report on ISI activities performed during this outage to be submitted to Region II at a later date. No violations or deviations were identified.

4. Design, Design Changes and Modifications (37700)

a. Service Water System Piping Replacement Modification

This work effort was performed as a follow-up to that documented in report 50-261/88-35. The work effort during this inspection included the following:

(1) The inspector selected the following as-built drawings for review and conduct of walkdown inspections to verify configuration, dimensions, elevations, instrument location and tie-in to existing system:

858-2480 Rev. 0 HVH 2 Motor Cooler Line, Supply.
858-2481 Rev. 0 HVH No. 2 Motor Cooler, Return.
858-2494 Rev. 3 HVH 4 Supply Side
858-2501 Rev. 3 HVH 4 pipe to penetration @ containment.
858-2503 Rev. 0 HVH No. 4 Return Line

(2) Service Water Pipe Replacement Modification package MOD-858 was reviewed to verify that certain line item sign-offs i.e., system walkdown, FSAR changes and system turnovers had been completed and signed as appropriate.

(3) Acceptance Test Procedure, Attachment 9, was reviewed to verify that hydrostatic testing for each of the four, HVH 1 through 4, trains had been performed at designated temperature and pressure, with calibrated instruments and that it had been witnessed by trained personnel and the code inspector.

b. RTD bypass Elimination

At the time of this inspection, work on this modification had been completed except for the hydrostatic test which will be performed during plant start-up. In that administrative controls and procedures on this modification were reviewed and the work effort documented in Report 50-261/88-35, the inspector discussed field work activities and progress with cognizant personnel. Field generated records/documents selected for review included Westinghouse Field Service Procedure MPII 2.7.2 CPL-1 Rev. 1, RTD Bypass Elimination for H.B. Robinson, field change requests CPL-88-001 through 005 and nonconformance reports NR-CPL-88-00001 through 00004. Three field welds requiring volumetric examination (radiography) were shot using procedure RT-101 Rev. 11, and evaluated per ASME Code Section III, 1983 Edition requirements. The radiographed welds were as follows:

1-7A	3"d schedule 160	Crossover Leg nozzle
2-5Ac	" "	" "
3-5A	" "	" "

The inspector reviewed the above identified radiographs to verify that the welds and radiographic technique used met applicable code requirements. The radiographs and the welds were found to be satisfactory. Within the areas inspected no violations or deviations were identified.

5. Service Water Pumps - Performance and Corrective Maintenance (73756).

On an earlier Region II inspection, documented in report 50-261/88-24, the inspector of record performed a design verification and survey of the service water system. Potential deficiencies were identified with respect to system design. Two unresolved items were identified. One, pertained to the timing of the closure signal to the turbine building service water isolation valves, and another was

for the purpose of assessing the impact of the current throttle valve alignment and associated controls. Three inspector follow-up items were identified to document inspector concerns in this area and to allow for documentation of their resolution. In order to address the issues and concerns raised in the aforementioned report, the licensee generated special procedure SP-814. The service water system at H.B. Robinson consists of four main service water pumps and two service water booster pumps. These pumps are included in the licensee's pump and valve program which is governed by ASME Code Section XI (77S78) requirements. Relief requests to code required tests for these pumps were documented in the Technical Support Management (TMM) Manual, under TMM-04 inservice inspection, Rev. 18 and were as follows:

5.2.1 Monthly Inservice Test per IWP-3400
5.2.2 Measurement of bearing Temperature (Tb) annually per IWP-3300
5.2.3 Flow Rate Measurements per IWP-3000 Differential Pressure (AP) Measurements per IWP-3000

In discussions held with the cognizant engineer in order to review corrective actions on the two open items in paragraph 2 above of this report, the inspector ascertained that lack of instrumentation precluded direct measurement of WP and flow rate on these pumps. It is the inspector's understanding that part of the problem was due to the fact that certain sections of these pipes were lined with concrete which made installation of instruments difficult and impractical. To overcome this obstacle, the licensee has recently contracted the services of Controllatron, who uses an ultrasonic multipulse transitetime system to measure flow through a pipe with a surprising degree of accuracy. Also the licensee indicated that flow measurements taken on systems supplied by service water, as part of the effort to address concerns discussed in the aforementioned report, revealed disparities between design requirements and existing field conditions. Specific plant components where flow discrepancies were identified were as follows:

	Component	Design Requirement	Measured Flow
(1)	HVH 1-4 Motor Cooler	50 GPM	30.1 to 36.4 GPM
(2)	"A" & B Diesel Cooling	600 GPM	564.5-591 GPM
(3)	Steam Driven AFW Pump	9.0 GPM	5.65 GPM
(4)	"A"&"B" Motor Driven AFW Pump	15 GPM	1.0 GPM

The licensee indicated that engineering was evaluating these problems in order to resolve them prior to plant startup. These items are being followed more closely by the resident inspector(s) and will be discussed further in Report 50-261/89-03. Further discussions on the activities/ flow balance tests, which were in progress, disclosed that the main feedwater pump head pressure was approximately 20% below reference curve values even though the pumps had been checked and found to be satisfactory in accordance with approved corrective maintenance (CM) procedure CM-010,

Rev. 1, "Service Water Pump Overhaul." Moreover, the licensee stated these pumps had been operating for years in this degraded condition without the licensee knowing the root cause of the problem. Upon further discussion, the licensee stated that following consultations with the pump vendor, Johnston Pump Company, and an in-depth review of Procedure CM-010, Rev. 1, 11/7/83, they determined that the pump shaft adjustment as described in the procedure was incorrect and was therefore directly responsible for the degraded pump performance experienced over the past five to six years. More specifically the procedural instruction applicable to rotating assembly adjustment requires the pump shaft to be lowered until the impeller rests on the pump bowl and subsequently raised enough to provide for the shaft to turn freely. Following this step, the procedure calls for raising the shaft/impeller the height of an additional two full turns of the adjusting nut. Mistakenly, this in affect raises the impeller approximately 200 mils instead of the 20 to 40 mils range recommended by the vendor. The licensee therefore concluded that the additional two full turns of the adjusting nut, called for in step 7.3.45 of the procedure, should have read two flats of the adjusting nut instead of "two full turns." Performance data taken after the rotating assembly had been adjusted to the new setting, raised the pump reference curves back to normal output levels. Following these discussions and the related disclosure, the inspector performed an in-depth review of procedure CM-010, Rev. 1, and associated records generated each time the procedure was utilized, for corrective maintenance on these pumps. Records reviewed covered a period of about two years, dating back to 1986. The stated purpose of Procedure CM-010, Rev. 1, was to address disassembly and reassembly of the service water pumps. This included the removal and installation of the motor, pump casing disassembly and reassembly, pump rotating element repairs, pump replacement and lubrications. In reference to the stated purpose, the inspector found the procedure inadequate in that it:

a. Failed to identify the vendor's specific technical manual applicable to these pumps. The only reference to the vendor was that updated technical information was forthcoming. The procedure contained no other creditable reference except to state that it had been drafted from technical notes taken by maintenance supervision during a service water pump overhaul.

b. Lacked specific bolt torquing requirements with tolerances specified by referenced vendor documents.

c. Lacked requirements for using, calibrated tools i.e. torque wrenches dial indicators, micrometers or other specified materials, i.e. gaskets, packing, and lubricants.

d. Contained no requirements for documenting field assembly information, i.e. total indicated shaft runout, bearing clearances, torque values, lubricants used, rotating element adjustments.

e. Contained no requirement for line item sign-offs by craft and/or QC to verify adherence to procedural requirements.

The inspector outlined these procedural deficiencies to management and stated that running these pumps in a degraded condition over the last five or six years is more than sufficient evidence to verify the procedure's inadequacy.

Following is a list of work requests issued for corrective maintenance to be performed on these pumps in accordance with the aforementioned procedure over the last two years.

Work Request (W/R)	Date	Scope
W/R J 08 G - AIVJ1	10/27/86	SW pump "A" install motor and set impeller clearances as per applicable steps in CM-010
H12Z32-529	12/11/85	SW Pump "B" - pump removed for maintenance and reinstalled. Checked for proper rotations.
H12Z33-529	1/8/86	SW pump "B" - Following repairs install pump as per CM-010.
W/R/J087-AFSI1	5/4/87	SW pump "B" - Adjust pump per CM-010 correct low discharge pressure.

These records were reviewed to ascertain to what extent procedural requirements were followed and weather field measurements taken by the craft were documented. In these cases, the inspector found that the records outlined the work assignment, referenced applicable procedure, CM-010, and the action taken to correct the existing problem but, provided none of the information discussed above which made it impossible to audit this maintenance activity. The inspector stated that the failure of the procedure to contain provisions for documenting field measurements and inspections and specifying applicable vendor manual and correct acceptance criteria was in violation of 10CFR 50, Appendix B, criterion V and the licensee's accepted QA program, FSAR section 17.2.5. This violation was identified as 50-261/89-02-01, Inadequate Corrective Maintenance Procedure CM-010, Revision 1, Service Water Pump Overhaul.

Except for the violation identified above there were no deviations or other violations identified.

6. Exit Interview

The inspection scope and results were summarized on January 13, 1989, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed the inspection finding listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

(Open) violation 261/89-02-01 Inadequate Corrective Maintenance Procedure CM-010 Revision 1, Service Water Pump Overhaul (paragraph 5).