



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

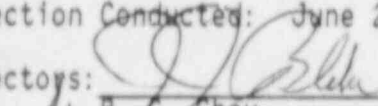
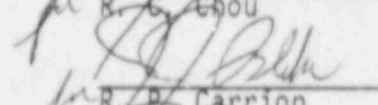

Report Nos.: 50-259/88-19, 50-260/88-19, and 50-296/88-19

Licensee: Tennessee Valley Authority
 6N 38A Lookout Place
 1101 Market Street
 Chattanooga, TN 37402-2801

Docket Nos.: 50-259, 50-260 and 50-296 License Nos.: DPR-33, DPR-52,
 and DPR-68

Facility Name: Browns Ferry 1, 2, and 3

Inspection Conducted: June 20-24, 1988

Inspectors:		<u>6/22/88</u>
	R. G. Ghou	Date Signed
		<u>6/22/88</u>
	R. P. Carrion	Date Signed
Approved by:		<u>6/22/88</u>
	J. J. Blake, Chief	Date Signed
	Materials and Processes Section	
	Engineering Branch	
	Division of Reactor Safety	

SUMMARY

Scope: This routine, announced inspection was in the areas of Mark I Containment Long Term Program Modification, IEB 79-02, and IEB 79-14.

Results: In the areas inspected, no violations or deviations were identified. The following was identified as a refuel: IFI 50-260/88-19-01, Torus Temperature Monitoring System Installation Completion.

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 PDR ADOCK 05000259
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REPORT DETAILS

1. Persons Contacted

Licensee Employees

R. V. Baird, Civil Engineer
*R. R. Baron, Assistant Manager
*B. D. Burke, Task Engineer
B. B. Caldwell, Task Engineer
A. Cooke, Mechanical Engineer
*T. Cureton, Civil Engineer
*J. E. Emens Jr., Associate Electric Engineer
*C. S. Hsieh, Compliance Licensing Engineer
*N. C. McFall, Acting Compliance Licensing Manager
*B. C. Morris, Assistant to Site Licensing Engineer
C. W. Pratt, Maintenance Section Supervisor
J. Rochelle, Principal Engineer, Knoxville
*J. G. Walker, Plant Manger
*J. E. Wallace, Compliance Licensing Engineer
*R. B. Willis, IS EG Supervisor

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

Other Organizations

Stone and Webster Engineering Corporation
D. Pike, IEB 79-02/79-14 Verification Program Coordinator
W. Hurt, Senior QC Inspector
L. Baker, Walkdown Engineer

NRC Region II

*W. S. Little, TVA Projects, Section Chief

NRC Resident Inspectors

*C. Brooks, Resident Inspector
*W. C. Searden, Resident Inspector

*Attended exit interview

2. Action on Previous Inspection Findings

(Open) Inspector Followup Item (IFI) 50-260/88-12-01, Size Discrepancy at End Attachment in Torus External Pipe Support

The calculations and drawing are being revised per F-DCN F0958A. Because the revisions have not been incorporated, this IFI remains open.

3. (Closed) Mark I Containment Long Term Program Modification (25585, TI 2515/85, Unresolved Safety Issue A-7)

This inspection is a continuation of Inspection Report No. 50-259, 260, 296/88-12 and final inspection for Mark I Containment Long Term Program Modification. This inspection focused on the documentation and system installation review.

a. Work Plans Reviewed

Most of the standard contents in work plans were reviewed. This included work descriptions, instructions, welding procedure numbers, welder qualification verifications by QC signature, cognizant engineer verifications, weld data sheets, weld maps, certified records of chemical and mechanical properties for materials, (mill test reports, chemical analysis, electrode heat number, materials used etc.) The following special items were reviewed for each work plan. All Work Plans reviewed were for Unit 2.

(1) T-Quencher and Supports

Work Plan 6578, ECN No. P0093, DWG No. 47W401-5, R2 and Work Plan 6766, ECN No. P0555, Work Items 2-433-36 and 2-433-39, Rev. 1 were used for (MSRV Tailpipes) T-Quenchers and support fabrication and installation. Twenty six quenchers, 12" schedule 80 stainless steel pipes, were fabricated and installed with Weld Procedure G-29M and Penetrant Test inspection according Nuclear Penetrant Testing Procedure. Work Plans 6626, 6693, 6709 were used for T-Quencher collar fabrication and end arm fabrication and installation.

(2) Tiedown Supports

Work Plan 6683, ECH No. P0360 and Work Plan 6759, DWG 48W1246-2, R0 were used for Tiedown fabrication and installation.

(3) Snubber Attachment Fixtures

Work Plan 6812, R1 included the following references as ECH No. P0360, DCR No. 2161, FCR No. 1169, RI, Dwg. 48W1265-1, R0, 48W1265-3, R0, and 48W1248-1, R5. The attachment fixtures included wall ring girder brackets and associated stiffener plates. The special items include such things as record of Magnetic Particle Examination, Cognizant Engineer Verification of Torus Bracket Alignment, Verification of Bolt Tension at Ring Girder, Power Store Room Requisition (Material) and 1-1/4" ϕ Maxi-Bolt Receipt Inspection.

(4) Vacuum Breaker

Work plan 2114-84 referenced ECH No. P0684, Dwg. 47W403-21, R6, and 47W403-22, R6. The work plan included the fabrication and replacement of hinge arms, hinge pins, bushings, lower and upper limit switches, hinge arm to pallet bolts (machine screws) and pallet gasket. The vacuum breaker primary function is to prevent the formation of a negative pressure on the drywell containment during rapid condensation of steam in the drywell and in the final stage of a LOCA. The licensee in response to Generic Letter 83-08 dated November 5, 1984, committed to modify the vacuum breakers using higher strength materials to meet the reanalysis requirements. The NRC approved the vacuum breaker reanalysis based on the steam condensation and LOCA on November 25, 1986, and attached the Structural Evaluation of the Vacuum Breakers, TER-C5506-323 which agreed with the licensee committed modification. The inspector reviewed the materials listed in the Work Plan against Drawing Nos. 47W403-22, R6 and 47W403-21, R6 and P.15 and 16 of TER-C5506-323. Materials of the hinge arms, hinge pin, hinge bushing, hinge arm to pallet bolts and pallet gasket met the requirements.

b. Temperature Monitoring System

Seven Transient Events Requiring S/RV Actuation were identified and analyzed by General Electric Company using two proprietary computer codes to evaluate the water temperature of the suppression pool. The GE Report, "Browns Ferry Nuclear Power Plant, Units 1, 2, and 3, Suppression Pool Temperature Response" (Document No. N&B 340223060), was reviewed to assure compliance with NRC requirements. The results of the study indicate that in all cases evaluated, the pool temperature remains within the NRC limits.

To accurately monitor the water temperature in the suppression pool, the licensee committed to installing a system to measure the temperature of the bulk pool water and display that reading to the operators in the main control room. The temperature monitoring system has been installed in Units 1 and 3. It is being installed in Unit 2 and the licensee has assured the inspector that it will be functional before fuel load. Paragraph 3.7.A.1.C, Technical Specification, Unit 2, dated May 2, 1988, states "with the suppression pool water temperature $> 95^{\circ}\text{F}$ initiate pool cooling and restore the temperature to $\leq 95^{\circ}\text{F}$ within 24 hours" which was the assumed temperature limit for normal power operation in the analysis in Paragraph 10.4 of PUAR. Dwg. Nos. 1-47E610-64-3, 2-47E610-64-3, 3-47E610-64-3, and 791E345 were reviewed against the display on the control room panels and Paragraph 10.5 of PUAR.

c. Drywell to Wetwell (Suppression Pool) Differential Pressure System
Pressure Systems

Per Paragraph 1.4 of PUAR, a differential pressure (Δp) system was installed during the Mark I Short Term Program (STP) Activities in each Browns Ferry Nuclear (BFN) unit to mitigate pool swell load effects by maintaining the drywell airspace pressure higher than the torus (wetwell) airspace pressure. The BFN STP plant unique analysis considered the beneficial effects of the Δp system in evaluating torus support system and attached piping system load. Per discussion with the licensee engineer, the Δp of 1.5-psi_d was used in STP analysis and the differential pressure system was installed base on the 1.5 psi_d. The system was revised to 1.1 psi_d to reduce the pool swell load impact based on the subsequent tests and analyses combined with the modification of downcomer in PUAR which the downcomer was reduced one foot of length from four feet to three feet which submerged into water. Therefore, PUAR shows 1.1 psi_d on Tables 8-3, Column 6B & 6C and A-2, Sheet 1. the Δp was shown on Paragraphs 4.2.5.1 and 5.4.2.7 without figures which means $\Delta p = 1.1$ psi_d. Drawing 47W600-133, Rev. K, Drywell to Suppression Pool Differential Pressure Transmitter Panel, Units 1 and 2 shows Panel 25-307, PDT-64-138 at EL. 565' - 0" and Panel 25-306, PDT-64-137 at EL 519' - 0". The above panels for Unit 2 were inspected to assure field installation. Drawing 47W600-133, Rev. J, Mechanical Instruments and Controls, Unit 3 was reviewed for identity. Drawings 47W605-5, Rev. B and 2-47E610-64-2, Rev. 0 for Unit 2 were reviewed for Display Panel 9-6 in the control room and flow diagram from the suppression pool to Panel 9-6. The inspectors reviewed the display at Panel 9-6 and the Technical Specification at control room for Unit 2. Paragraph 3.7.A.6.a., Technical Specification, Unit 2, dated May 2, 1988, states the limiting conditions for operation as "Differential pressure between the drywell and suppression chamber shall be maintained at equal to or greater than 1.1 psi_d except..." which confirms the $\Delta p = 1.1$ psi_d used in PUAR analyses as stated above.

d. Calculations Reviewed

(1) Downcomer Tie Bar Bracing

Calculation No. P0093, "Downcomer Tie Bar Bracing", was reviewed to assure that PUAR commitments of Section 6.7 have been met. The calculations satisfy PUAR commitments for materials, geometric configuration, etc. The tie bars and bracing are required to minimize the lateral response to the downcomer, which is induced by condensation oscillation effects.

(2) T-Quencher Support System

Calculation No. P0093, "Torus Integrity Long Term Program (Quencher Support)," was reviewed to assure that its PUAR commitments of section 7.2.1.1 had been fulfilled. The calculations appear to be done in a competent, professional manner and satisfy the PUAR commitments. The analysis includes a detailed computer model which incorporates the support geometry, design loads, material properties, etc. The assumptions made during the analysis are reasonable and acceptable.

(3) Torus Tiedowns

Calculation No. P0360, "Torus Tiedown", was reviewed to assure that commitments made in Section 5.2.3 of the PUAR have been met. The purpose of the tiedowns is to prevent the uplift calculated for various loading combinations, thereby eliminating the potential for damage to either the torus or attached piping. The calculations, including their supporting assumptions and conclusion, are satisfactory.

(4) Torus Ring Girder External Reinforcement

Calculation No. P0360, "Torus Ring Girder External Reinforcement", was reviewed for compliance to PUAR commitments of Section 5.2.2. Analyses indicated that the ring girder required additional stiffness to increase the frequency of its ovaling modes and to reduce effect of dynamic loads. The addition of the reinforcement increases the effectiveness of the large 78000 series Bergen-Paterson snubber, dispensing its influence over a larger portion of the circumference of the ring girder, and reduces the ring girder and shell stresses. The calculations adding the external reinforcement are satisfactory.

(5) Bergen-Paterson 78000-Series Hydraulic Snubber

The Bergen-Paterson structural and performance analytical verification calculation (Calculation No. 1080-197A, Rev. 3) of its 78000-Series hydraulic snubber was reviewed for compliance to Sections 5.2.1 and 5.3.3 of the PUAR. Also reviewed for compliance was the 300-kip functional test, Document NO. MEB '830119 902. The functional test established a spring rate of 7000 kips/inch as well as a static compression test of 300 kips. The detailed calculations qualified the snubber for the required design parameters.

e. Findings and Conclusions

Overall, the licensee performance on Mark I Containment Long Term Program Modification conformed to commitments of the PUAR with good workmanship. Pending the completion of the suppression pool temperature monitoring system for Unit 2 before fuel loading, this item is identified as a new open item, Inspector Followup Item (IFI) 50-260/88-19-01.

With the exception of IFI 50-260/88-12-01 and IFI 50-260/88-19-01, it appears that all commitments of the PUAR have been satisfied. Commitments to complete the referenced IFIs before fuel load have been made. Due to the current re-start schedule, the inspector concentrated their resources on Unit 2, extrapolating their findings to include Units 1 and 3. Therefore, the Mark I Containment Long Term Program Modifications are deemed to be complete for all three units and this issue is closed.

4. (Open) Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts - IEB 79-02 (25528) and (Open) Seismic Analysis for As-Built Safety-Related Piping Systems-IEB 79-14 (25529) for Unit 2.

As a part of Phase II of the 79-14/79-02 program, Stone and Webster is conducting verification walkdowns of Phase I. To assure that the verification teams are consistent in their measurements and observations, the inspector observed the activities of one of the teams as they re-verified two supports which had been previously completed by a different team. The two supports are R-59(RR) and R-60 (DS), located on the 20"φ RHR line of Drawing No. 47W452-281, Revision 0 in the RHR heat exchanger room of Unit 2. The two-man team consisted of a walkdown engineer and a Senior QC Inspector, both trained on the "Pipe Support Walkdown Procedure" (SWEC-005, Revision 0). The results of their re-verification found that the two teams generally measured weld sizes, lengths, etc comparably, with weld differences of 1/16" and linear dimension differences of 1/8". It therefore is concluded that the verification walkdown teams are providing accurate as-built information for the 79-14/79-02 program.

5. Exit Interview

The inspection scope and results were summarized on June 24, 1988, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Closed) TI 2515/85 or Module 25585, Unresolved Safety Issue A-7: Mark I Containment Long Term Program Modification. (Closed for 50-259, 260, and 296)

(Open) IFI 50-260/88-19-01, Torus Temperature Monitoring System
Installation Completion.