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

Report Nos.: 50-259/85-26, 50-260/85-26, and 50-296/85-26

Licensee: Tennessee Valley Authority
500A Chestnut Street
Chattanooga, TN 37401

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: April 22-26, 1985

Inspector: W C Liu 5/9/85
W. C. Liu Date Signed

Approved by: E A Ward 5/9/85
J. J. Blake, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This special announced inspection involved 35 inspector-hours on site in the areas of seismic analysis for as-built safety-related piping systems (IE Bulletin 79-14), and pipe support base-plate designs using concrete expansion anchor bolts (IE Bulletin 79-02) in conjunction with the torus modification program.

Results: One violation was identified - Failure to follow procedures for support inspection - paragraph 5.b.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Pittman, Superintendent - Maintenance
*J. Savage, Modifications - Mechanical
*C. Simmis, Office of Engineering (OE)
*J. Beason, OE
*J. Traglia, Modifications - Mechanical
*L. Parvin, Quality Control (QC) Supervisor
*A. Gordon, Plant Compliance
B. Rosberg, Section Supervisor, OE
R. Baird, Civil Engineer, OE

Other licensee employees contacted included QC inspectors, engineers, technicians, and office personnel.

NRC Resident Inspectors

*G. Paulk, Senior Resident Inspector
*C. Brook, Resident Inspector
*C. Patterson, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on April 26, 1985, 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 following new items were identified during this inspection:

(Open) Violation 259, 296/85-26-01, Failure to follow procedures for support inspection (paragraph 5.b.)

(Open) Unresolved Item 296/85-26-02, Drawing control for RBCCW support H17A (paragraph 5.c.)

(Open) Unresolved Item 259, 260, 296/85-26-03, Interim acceptability of plant operation for IE Bulletin 79-02 requirements (paragraph 6.)

(Open) Unresolved Item 259, 260, 296/85-26-04, Acceptance criteria for pipe support inspections (paragraph 7.)

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. Three new unresolved items identified during this inspection are discussed in paragraphs 5, 6, and 7.

5. Seismic Analysis for As-Built Safety-Related Piping System (IE Bulletin 79-14)

a. Piping Stress Analysis

The inspector held discussions with licensee representatives in the areas of piping stress analyses associated with thermal movement and seismic applications. It was found that the analysis methods used for the stress analyses were generally conservative. This included the use of low damping values and the enveloped seismic response spectra at various locations.

b. Pipe Support Inspection

The inspector selected and examined the following pipe supports that had been QC inspected for a verification inspection to determine the effectiveness of the licensee's program.

Support Number	Piping System	BFN Unit No.
*R-108, Rev. 1	Residual Heat Removal (RHR)	1
*H-83, Rev. 1	Core Spray (CS)	1
*R-62, Rev. 2	RHR	3
*R-11, Rev. 3	RHR	3
*R-105, Rev. 2	RHR	3
R-10, Rev. 2	RHR	3
R-61, Rev. 0	RHR	3

*Indicates discrepancies identified during the inspection.

The above seven pipe supports were partially inspected against their detail drawings for configuration, identification, location, fastener installation, welds, and damage/protection. These supports were associated with the torus modifications and were reanalyzed based on the latest design loads. In general, the supports were installed in accordance with design documents with the exception of five supports identified below:

(1) Support No. R-108, Rev. 1, in the Unit 1 RHR system was inspected. It was noted that portions of the support were not installed in accordance with the design drawing and the manufacturer's instructions. Three bolts which were used for connecting the snubber housing and the transition tube were loose. These bolts should have been torqued to 22 in-lb. as specified by the manufacturer's instruction. Furthermore, the pipe clamp was installed with a single nut. Per the manufacturer's instruction, the pipe clamp should have been installed with double nuts. No locking devices were provided for the clamp installation.

(2) Support No. H-83, Rev. 1, in the Unit 1 CS system was examined. It was found that the strut connection was not installed in accordance with the design drawing in that a pin with cotters should have been utilized for the connection. There were no notes to indicate that a pin connection could be replaced with a bolt connection. The pipe clamp was installed with three double nuts for which each of the second nut had a recess of 3/16" to 1/4", an indication of inadequate thread engagement as specified per instruction BF MAI-23.

(3) Support No. R-62, Rev. 2, in the Unit 3 RHR system was inspected. It was noted that a 5/16" fillet weld specified by the design drawing was not achievable because the flange of the steel beam which provided weld attachment for the snubber installation was 1/4" thick. Two U-bolts were installed with double nuts. However, each of the four lock nuts showed a lack of full thread engagement by a 1/4" recess.

(4) Support No. R-11, Rev. 3, in the Unit 3 RHR system was observed. It was found that the lock nut was loose for the strut installation.

(5) Support No. R-105, Rev. 2, in the Unit 3 RHR system was inspected. It was noted that a 3/16" fillet weld was missing at two weld attachments for which the bars 3 1/2"x1/4"x0'-3 3/4" were not welded to two embedded steel beams. In addition, the pipe clamp was installed with a single nut without any locking device. The manufacturer's instructions required double nut installation.

Browns Ferry Instruction BF MAI-23, Support of Piping Systems in Category I Structures contains the following requirements: Paragraph 6.1.1., states that manufacturer's recommended installation procedures shall be followed. Paragraph 6.1.6 states that all threaded fasteners shall be provided with locking devices to prevent loosening during service. Paragraph 6.4.2 states that component standard supports, except sway struts and snubbers, shall be within the range of support adjustment and that full thread engagement of all parts must be maintained. Paragraph 7.3 states that for new supports, the craft

foreman and QC inspector shall verify that the general configuration is correct. Paragraph 7.4 states that the craft foreman and QC inspector shall verify all threaded connections are installed snug plus 1/4 turn with full thread engagement and locking devices.

Discrepancies identified from the aforementioned five supports indicate that portions of these supports were not installed and verified in accordance with the design drawings and the above instruction requirements. As a result, these supports may not be able to perform their intended function as required by the design. This is a violation of 10 CFR 50, Appendix B, Criterion V, and is identified as Violation 259, 296/85-26-01, Failure to follow procedures for support inspection.

c. Field Installed Support

During the inspection, the inspector noted that support No. H17A in the Unit 3 reactor building closed cooling water (RBCCW) system was found in an unacceptable condition. Of the four anchor bolts installed, one was without a nut, the two others were with loose nuts. The inspector held discussions with licensee representatives with regard to the status of the support. It was found that this support was installed by the field and was not addressed in the stress analysis nor could it be found in the stress isometric. The licensee's 79-14 program had identified this support on July 14, 1980. No corrective action had been taken in terms of fixing the aforementioned discrepancies. The licensee could not find the design drawings, engineering evaluations and inspection records associated with this support at the time of this inspection. Pending further evaluations with regard to the above concerns, this matter is identified as Unresolved Item 296/85-26-02, Drawing control for RBCCW support H17A.

Within the areas inspected, one violation was identified.

6. Pipe Support Base-Plate Designs Using Concrete Expansion Anchor Bolts (IE Bulletin 7902)

The inspector held discussions with licensee representatives in the areas of IE Bulletin 79-02 program with regard to the evaluation of pipe supports and anchor bolts for which the minimum factor of safety had to be met in order to determine whether a reasonable assurance was achieved for the safe operation of the plant. It was noted that Browns Ferry had about 1,200 attachments, including base plates, that had not been inspected and thereby had not been evaluated in terms of meeting the 79-02 requirements. The licensee representative indicated that approximately 660 attachments were field-run pipe supports that were added by the Office of Engineering (OE). In 1984, the raw cooler water system was added to the scope of work on IEB 79-14, resulting in 400 more supports to be added to the 79-02 inspection.

The licensee representatives could not assure that all of the above 1200 attachments would meet the IEB 79-02 requirements, particularly in terms of meeting the factor of safety of two or greater for the plant operation on an

interim basis. Pending further evaluations with respect to the aforementioned concern, this matter is identified as Unresolved item 259, 260, 296/85-26-03, Interim acceptability of plant operation for IEB 79-02 requirements.

Within the areas inspected, no violations or deviations were identified.

7. Acceptance Criteria for Pipe Support Inspections

During the field inspection, the inspector noted that a number of newly designed/modified supports were installed with double nuts. Many of the second nuts, acting as locking devices, showed a lack of thread engagement. The inspector reviewed a letter from Bergen-Paterson to Tennessee Valley Authority (TVA) dated May 11, 1983, which states that the nuts supplied for locking are heavy hex nuts. These nuts are twice as thick as a standard jam nut. Bergen-Paterson only requires a minimum of 50% thread engagement to ensure locking.

The inspector reviewed Browns Ferry instruction MAI-23 which was used by the QC inspectors to perform inspections for safety-related pipe supports. Paragraphs 6.4.2 and 7.4 of the instruction require full-thread engagement for threaded connections. The instruction did not refer to the Bergen-Paterson letter nor did it provide acceptance criteria as to how much thread engagement would be acceptable other than stated in the aforementioned paragraphs.

Instruction MAI-23 did not specify that the QC inspectors were required to verify torque values when bolts were used for connecting snubber housing and transition tube/forward bracket. The snubber installation for support No. R-108 of the RHR system was examined. It was found that three bolts were not torqued to the specified value as required by the manufacturer's instructions. Pending further evaluations with regard to the aforementioned concerns, this matter is identified as Unresolved Item 259, 260, 296/85-26-04, Acceptance criteria for pipe support inspections.

Within the areas inspected, no violations or deviations were identified.