



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

Report Nos.: 50-259/92-07, 50-260/92-07, and 50-296/92-07

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: February 24-28, 1992

Inspector:

3/20/92

Date Signed

Approved by:

J. J. Blake, Chief  
Materials and Processes  
Engineering Branch  
Division of Reactor Safety

3/20/92

Date Signed

## SUMMARY

### Scope:

This routine, unannounced inspection was conducted in the areas of piping systems, audit programs, and previous open items.

### Results:

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

One previous open item for a single angle design problem was closed. One unresolved item was identified concerning large bore walkdown inspection problems, Unit 3. Two drawing transcription errors and three field inspection errors were found during this inspection. The types of error are similar to previous findings.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

\*M. Batjestani, Technical Support Manager  
R. Baird, Civil Engineer  
\*P. Baron, Licensing Manager  
\*R. Cutsinger, Lead Civil Engineer  
\*J. Davenport, Licensing Engineer  
\*T. Knuettel, Nuclear Engineer  
\*E. Long, Quality Specialist  
\*J. McCarthy, Restart Manager  
\*F. McCluskey, Vice President - Restart  
\*J. Rupert, Engineering Manager  
\*P. Salas, Compliance Licensing Manager  
\*J. Scalice, Plant Manager  
\*S. Schumitsch, Program Manager  
\*J. Valente, Project Civil Engineer  
\*O. Zeringue, Vice President - Operation

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

#### Bechtel Power Corporation

\*E. Fenska, IWD Supervisor  
\*D. Swaney, Quality Verification Supervisor  
\*D. McGlynn, Field Support Supervisor - Mechanical

#### NRC Resident Inspectors

\*C. Patterson, Senior Resident Inspector  
\*W. Bearden, Resident Inspector  
E. Christnot, Resident Inspector

\*Attended exit interview

### 2. Licensee Action on Pipe Support Modification for Unit 3

Reference 1: IE Bulletin 79-02, "Pipe Support Base Plate Design Using Concrete Expansion Anchor Bolts"

Reference 2: IE Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping System"



a. Status

The inspection involved pipe support modifications required to meet IEBs 79-02 and 79-14 before the restart of Unit 3. The last inspection in this area was in September 1991 and is documented in Inspection Report Nos. 50-259, 260,296/91-34.

The licensee has completed all field walkdown reinspections for approximately 730 large bore pipe supports under the 79-02/14 Large Bore Program. The following information shows the current status per the Hanger Status Sheet, 79-02/14 Program Large Bore Supports, dated February 21, 1992. The licensee is currently performing support calculation evaluations and issuing Field Change Notices (FCN) for modifications.

<u>Drywell</u>	<u>Total Stress Problems</u>	<u>Total Supports</u>	<u>Original Completed</u>	<u>Review Completed</u>	<u>Required Mods</u>	<u>Feasibility Completed</u>
Inside	18	392	210	136	185	131
Outside	29	333	114	92	174	23

b. Walkdown Reinspection

The inspector randomly selected 21 pipe supports which had been completed by the walkdown group since the inspection in September, 1991. The 21 pipe supports were in two systems and were located outside of containment. The inspector's walkdown reinspection was completed with assistance from licensee engineers and a quality control welding inspector. The procedure used for the walkdown reinspection was Procedure BC-005, Walkdown Instruction For Piping and Pipe Support (Large Bore). The supports were partially reinspected against detail drawings or sketches for configuration, identification, fastener/anchor installation, anchor size, anchor type, marking, anchor edge distance, anchor bolt minimum spacing violation, base plate size and thickness, plate warpage, member size, weld sizes, component identification numbers, component sizes and settings, dimensions, oxidation accumulation, maintenance, and damage/ protection. The supports reinspected during the current inspection are listed below.



Table 1Walkdown Reinspection Supports

<u>Item No.</u>	<u>Walkdown Package Support Tag No.</u>	<u>Discrepancies/Comments/ Licensee Remedies</u>
1	101781-H-4	
2	03318-H-6	
3	101780-H-5	
4	101788	
5	101837	
6	101894	
7	101796-H-1	The spherical bearing in the sway strut rear bracket was displaced 3/32". The licensee issued Request for Information (RFI) No. W-41190 to document the displacement.
8	03556	
9	04807-R-33	
10	102018-R-22	
11	04817	
12	04808	
13	03514	The welds between two plates and a 6"x6" tube steel were found to be on two sides only. The package drawing showed weld all around for both welds. The licensee found that it was a transcribing error from the original sketch to the final package drawing. One fillet weld at a connection between 4x4" and 6x6" tube steel was found to be 1/8" on two sides and 1/4" on the other two sides. The final walkdown package showed a 3/16" fillet weld all around. The licensee issued RFI No. 41191 to correct the above two discrepancies.



<u>Item No. (cont'd)</u>	<u>Walkdown Package Support Tag No.</u>	<u>Discrepancies/Comments/ Licensee Remedies</u>
14	02059	The anchor bolt washer plates were found to be $\frac{1}{2}$ " x $2\frac{1}{2}$ " x $2\frac{1}{2}$ ". The walkdown package showed plates as $\frac{1}{2}$ " x 2" x 2". The licensee issued RFI No. W-41192 to correct the plate sizes.
15	04810-R-24	
16	102057-H-51	
17	04821-H-59	
18	04819-H-60	Two plates were found to have $\frac{1}{2}$ " thicknesses. The $\frac{1}{2}$ " thicknesses were not shown in final walkdown drawings. A transcribing error was found by the licensee. RFI No. W-41193 was issued to add the $\frac{1}{2}$ " plate thicknesses.
19	04804	
20	03557	The anchor bolt at right, bottom corner was found to have a minimum spacing violation with the anchor bolt from the adjacent conduit support. The licensee issued RFI No. 41194 to record the anchor bolt spacing violation.
21	04741	<p>The discrepant findings are similar to previous inspection findings. The licensee's response to the information transcribing problems, was to indicate that they will give the walkdown personnel more training on inspection and document checking, and will perform audits to check the accuracy of the documentation and the process of transferring information from the field walkdown sketches to the final walkdown packages or drawings.</p> <p>Pending the licensee review of above problems, this item is identified as Unresolved Item 50-296/ 92-07-01, Large Bore Walkdown Inspection and Document Checking Problems.</p>



### 3. Bechtel 95/95 Audit and TVA Audit Programs for Large Bore

#### a. Bechtel 95/95 Audit Program

The Bechtel walkdown program involves three stages to complete; these are field walkdown, sanity check, and 95/95 audit. Bechtel compiles all the walkdown sheets and assigns each sheet a unique number; the walkdown sheets include the drawings, sketches, or inspection and information sheets. The computer is used to randomly select walkdown sheets and half of the attributes in each sheet selected. The QA Audit personnel perform a complete recheck on the attributes selected in each sheet. If the number of rejected items is less than five percent, the package is acceptable. If the number of rejected items is more than five percent, but it meets 95 percent criteria after the sample is expanded to include five or six attributes similar to the rejected items, in the same package or similar packages, it is acceptable. If the package cannot meet the 95 percent confidence level after the expanded inspection, the package is rejected and sent back to the walkdown group for reinspection. Walkdown packages will be released to document control after the packages reach a 95 percent confidence level. Per chart shown on 95/95 Program Results, Quality Trend Analysis Program, Bechtel Job 21042, dated December 20, 1991, the overall trend was 98.8 percent (cumulative) and was improving.

The inspector discussed the 95/95 audit program with Bechtel QA examiner and reviewed 95/95 audit packages provided. The inspector noted that approximately 55 percent of the attribute recheck was data information and 45 percent was drawing or isometric checks. The program lumps all the data sheets, drawings, sketches, and isometrics together. Because, most packages contained more data sheets than the combination of drawings, sketches, and isometrics, more data sheets are rechecked even though the information contained in the drawings, sketches and isometrics is more important than the information contained in the data sheets.

Bechtel uses this 95/95 audit program for civil structures, pipe stresses, pipe supports, conduit, electrical, equipment, etc. Every discipline has slightly different documentation requirements; for example, the electrical cable walkdowns have a large quantity of data sheets and few drawings. Therefore, in this cable area the data sheets contain the more important information, while in the piping area, isometrics and drawings contain the more important information. Bechtel QA Examiners and engineers and TVA QA Specialist agreed to review the Bechtel program and consider adjusting the audit method to emphasize the more importance attributes.

#### b. TVA Audit Program

TVA QA department performed a few audits of the Bechtel 95/95 audit program and did not find any significant discrepancies. TVA decided



that the Bechtel 95/95 audit program was acceptable. TVA presented four audit reports to the inspector which were Monitor Report Numbers QBI-M-91-3030, -3033, -3034, and -3040. TVA QA Specialist agreed to review the Bechtel 95/95 audit program per the inspector findings stated above.

No violation or deviations were identified in the area inspected.

#### 4. Action on Previous Inspection Findings (92701)

(Closed) Unresolved Item (UNR) 50-259,260,296/91-11-1, The design Method for Single Angle Supports Deviating from AISC Method

The matter concerned that the design method for single angle supports, used by Bechtel engineers, deviated from the Steel Construction Manual of the American Institute for Steel Construction (AISC). A pre-printed form which contained a formula for a single angle design was used without the official approval of TVA, and several non-QA controlled, desktop procedures and Project Engineering Guides (PEG) were not removed from the users' desks. TVA General Design Criteria No. BFN-50-C-7107, Design of Class 1 Seismic Pipe Tubing Supports, require that the design method specified in AISC shall be used for all steel members used in Civil Structures and pipe supports. Section 1.4.2.12 of BFN-50-C-7107 gives permission to use References 1.5.15a or 1.5.35 for a design of angle sections to meet the requirements of the laterally unbraced length. Reference 1.5.15a is "AISC Journal, 1st Quarter 1984, Page 35." Reference 1.5.35 is "Behavior and Design of Angle Compression members, proceedings of the AISC Conference, June 1988." Instead of using the AISC method, Bechtel engineers used the formula from Page 324, by Bruce G. Johnston, Fung-Jen Lin, and T. V. Galambos, published by Prentice-Hall, Inc, Englewood Cliffs, New Jersey. Bechtel engineers indicated that the method used was conservative when compared to the AISC Design Method, but no comparison was presented to show that the method used was conservative.

The inspector discussed the items with the licensee engineers and reviewed the information provided; memorandum to J. R. Rupert from R. D. Cutsinger, TVA, dated June 21, 1991, and Bechtel BFT 91/0162, dated May 17, 1991. Bechtel investigated all three problems and concluded that all were adequate and acceptable except the problem of not officially removing some PEGs. TVA independently reviewed Bechtel's investigation and concluded that Bechtel investigation action was adequate. Bechtel performed a comparison calculation using "Basic Steel Design" (the method used by Bechtel) and "Behavior and Design of Angle Compression Members, Proceedings, of AISC Conference, June 1988." The comparison calculation used an A-36 steel with unbraced lengths from 1' to 8' in a interval of 1' to develop the allowable bending stress for both methods, based on their design requirements. The allowable bending stress developed using the Basic Steel Design were always equal to or less than the AISC Conference Method. Particularly, the longer the unbraced length is, the more conservative it is. Therefore; the inspector concluded that the method used by Bechtel engineers is conservative in all cases and is acceptable.



The inspector disagreed with TVA and Bechtel investigation conclusions concerning procedural adequacy of the documentation of the design method that differed from the specification, the use of pre-printed technical form, and QA approval for document control. Per telephone conference between NRC and TVA licensing and engineers on March 5, 1992, TVA agreed to take the following actions to close out the above problems:

- TVA will require Bechtel to obtain an approval before using a design method differing from approved specifications.
- All the pre-printed technical forms for multiple uses (except the administrative forms such as calculation cover sheet, reference sheet, etc) should be approved by TVA design authority and put under QA control.
- No desktop procedures or PEG's can be used for design unless controlled under QA procedures. All important design document should be under QA procedure controlled for distribution, cancellation, or removal.

Based on the licensee actions and agreements taken to resolve the problems, this item is considered closed.

#### 5. Exit Interview

The inspection scope and results were summarized on February 28, 1992, with those persons indicated in paragraph 1. The inspector 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.

(Open) Unresolved Item 50-296/92-07-01, Large Bore Walkdown Inspection and Document Checking Problems.

