

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

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November 19, 1984

BLRD-50-438/83-30  
BLRD-50-439/83-26

U.S. Nuclear Regulatory Commission  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

Dear Mr. O'Reilly:

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 - DEFECTS IN PIPE CLAMPS BY ITT  
GRINNELL - BLRD-50-438/83-30, BLRD-50-439/83-26 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector Linda Watson on April 6, 1983 in accordance with 10 CFR 50.55(e) as NCR 2318. This was followed by our interim report dated May 6, 1983. Related NCR 2917 was later initiated and is now being reported on with NCR 2318. This was followed by our interim reports dated May 24, 1983 and August 28, 1984. Enclosed is our final report. We consider 10 CFR Part 21 to be applicable to this deficiency.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*J. A. Damer*

for J. W. Hufham, Manager  
Licensing and Regulations

Enclosure

cc (Enclosure):

Mr. Richard C. DeYoung, Director  
Office of Inspection and Enforcement  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

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ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2  
DEFECTS IN PIPE CLAMPS BY ITT GRINNELL  
BLRD-50-438/83-30, BLRD-50-439/83-26  
10 CFR 50.55(e)  
NCRs 2318 AND 2917  
FINAL REPORT

Description of Deficiency

TVA has encountered the following problems with pipe clamps furnished by ITT Grinnell (ITTG), Providence, Rhode Island.

1. Four-inch pipe clamps for use with figure 211 size A sway struts, supplied per Bill Of Material Mark No. 3BW0336-500 (Grinnell Shop Order No. EBH-517), will not tighten sufficiently on the pipe to provide firm two-point contact in order to maintain proper alignment between the load stud and clamping bolt. This problem was verified by the ITTG field representative and was documented on nonconformance report (NCR) 2318.

As part of the indicated resolution of nonconformance report (NCR) 2318, 64 of the 75 affected clamps were returned to ITTG for rework. When the reworked clamps were returned to TVA, the clamps still could not achieve firm two-point contact. A new NCR, 2917, was initiated documenting the subsequent problem and is referenced above.

The root cause of the nonconformance has been traced to a miscommunication of allowable clamp installation and inspection tolerances. TVA used an installation procedure in accordance with ITTG erroneous instructions which did not allow the clamp ears on the single-bolt side of the clamp to contact each other. These instructions have now been superseded.

2. All sizes of pipe clamps for use with figure 306/307 mechanical shock suppressors (all sizes) were manufactured with an incorrect dimension from the load pin/bolt to end of clamp (ear) causing an interference with the "snubber." This condition was documented on quality control inspection report (QCIR) 1563 and NCR 1710 as a generic condition and included numerous other QCIRs relative to individual components. A dimensional change made to the snubber design by the Pacific Scientific Company was not incorporated into the clamp design by ITTG.
3. Many sizes of figure 40 riser clamps used in conjunction with pipe lugs on horizontal runs of piping would not tighten sufficiently on the pipe to provide firm two-point contact in order to maintain proper orientation on the pipe. This failure to maintain orientation causes (1) the associated sway struts or snubber to exceed the 4° tolerance which result in binding and (2) the clamp to pipe lug gaps to be inconsistent due to irregularities in the clamp width (reference QCIR 13844 and NCR 1633). This problem is attributable to an ITTG design error.

4. Two 1/2-inch pipe clamps for use with figure 211 size A sway struts, supplied per Bill of Material 3BW0336-504 (ITTG shop order Nos. EBH-149, EBH-521, and EBH-531) were fabricated such that the clamp bolt head falls in the radius of the clamp. Other dimensions also do not meet fabrication drawings (reference QCIR 29835 and NCR 2252). This problem and the following problems (items 5 through 10) are attributable to ITTG manufacturing errors.
5. A pipe clamp, item 6 of drawing 1KE-MPHG-0765, sheet 2, revision 1 (detail A) varies in thickness from 1.509-inch to 1.350-inch as measured across the ears of the clamp. As the drawing calls for a stock thickness of 1.500-inch the item is out of allowable tolerance (reference QCIR 28005 and NCR 2265).
6. A 32-inch pipe clamp, item 1.c of drawing 1SM-MPHG-0295, revision 3, will not tighten down on the pipe. The resultant installed position leaves approximately a 1/2-inch gap between the clamp and the pipe at a point 90° to the clamp split line (reference QCIR 30588 and support modification request 13845).
7. A 30-inch pipe clamp, item 1 of drawing 1SV-MPHG-0261, sheet 2, revision 1, will not tighten down sufficiently to obtain firm two-point contact with the pipe (reference QCIR 30589).
8. A 22-inch pipe clamp, item 1 of drawing 2CF-MPHG-0044, sheet 2, revision 4, will not tighten down sufficiently to obtain firm two-point contact with the pipe (reference QCIR 30905).
9. A 24-inch pipe clamp, item 1 on drawing 1KC-MPHG-0003, sheet 1, would not fit the pipe properly. The clamp was returned to the vendor (reference QCIR 4676).
10. A 24-inch pipe clamp, item 1 of drawing 1KC-MPHG-0010, revision 4, would not fit the pipe properly due to a twist in the clamp. The clamp was returned to the vendor (reference QCIR 4639).

#### Safety Implications

Some of the affected pipe clamps are used on primary safety-related systems. Should the clamps fail to perform their intended function, the integrity of the affected system could be degraded, thus, adversely affecting the safe operation of the plant.

#### Corrective Action

1. ITTG has indicated that there is no problem with these clamp ears touching and in fact the ears can be brought into complete surface contact with each other to achieve the required tightness with the pipe (reference ITTG's letter dated August 29, 1984). The 64 clamps that were returned to ITTG a second time were installed on 4-inch outside-diameter pipe by ITTG. They were inspected by TVA personnel and were found completely acceptable. TVA has asked ITTG to return the clamps to the site for TVA use.

In order to prevent recurrence of this condition, TVA's Office of Construction (OC) has agreed to revise site quality control procedure (QCP) 6.17 to clarify the allowable clamp installation and inspection tolerances. This procedure revision will be accomplished by December 14, 1984.

2. TVA has reworked all the affected clamps in accordance with ITTG's instructions. QCP 6.17 has been revised to incorporate ITTG's inspection and rework procedures. ITTG clamp manufacturing drawings were revised to cover all clamps manufactured after April 1980.
3. TVA has reworked all identified nonconforming clamps in accordance with QCP 6.17, and the ITTG procedures which are included in disposition of NCR 1633. Any remaining unidentified clamps will be worked on a case-by-case basis. As of April 26, 1983, ITTG designs all figure 40 riser clamps used with sway struts and snubbers such that the clamps will maintain firm two-point contact.
4. The ASME code contains the NF minimum edge distance criteria; however, the lower bolt does not have a load towards the edge of the clamp. Consequently, the dimensional discrepancy is acceptable. Also, although the bolt head is on the clamp bend radius, the structural integrity of the lower bolt is not impaired. Based on this evaluation ITTG concluded, in their letter dated April 4, 1983, that the clamps can be used as-is.
5. ITTG verified by analysis that the clamp is acceptable "as is" for the design intended. This is documented by ITTG's letter to TVA dated May 11, 1983.
- 6, 7, and 8 TVA has reworked the clamps at the jobsite in accordance with site QCP 6.17, and ITTG procedure.
- 9 and 10 ITTG replaced the clamp with a new one on February 27, 1981.

In addition, ITTG notified its manufacturing and quality control personnel on June 1, 1983, of the specific problems identified in items 5 through 10 above and cautioned them to be more careful in the future.