

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

September 21, 1983

USNEC  
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WBRD-50-390/83-23  
WBRD-50-391/83-22  
BLRD-50-438/83-27  
WBRD-50-439/83-22

U.S. Nuclear Regulatory Commission  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR AND BELLEFONTE NUCLEAR PLANTS UNITS 1 AND 2 - QA PROGRAM ON  
TUBELINE MATERIALS SUPPLIED BY CAPITOL PIPE - WBRD-50-390,391/83-  
23,22, BLRD-50-438,439/83-27,22 - THIRD INTERIM REPORT

The subject deficiency was initially reported to NRC-OIE Inspector  
Linda Watson on March 29, 1983 in accordance with 10 CFR 50.55(e)  
as NCR GEN MEB 8301. Interim reports were submitted on April 28 and  
June 23, 1983. Enclosed is our third interim report. We expect to submit  
our next report by November 8, 1983.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*DS Kammer*

*for* L. M. Mills, Manager  
Nuclear Licensing

Enclosure

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

Records Center (Enclosure)  
Institute of Nuclear Power Operations  
1100 Circle 75 Parkway, Suite 1500  
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## ENCLOSURE

WATTS BAR AND BELLEFONTE NUCLEAR PLANTS UNITS 1 AND 2  
QA PROGRAM ON TUBELINE MATERIALS SUPPLIED BY CAPITOL PIPE  
WBRD-50-390,391/83-23,22, AND BLRD-50-438,439/83-27,22  
NCR GEN MEB 8301  
10 CFR 50.55(e)  
THIRD INTERIM REPORT

### Description of Deficiency

Capitol Pipe and Steel Products Company, Bala Cynwyd, Pennsylvania, supplied carbon steel (CS) and stainless steel (SS) flanges and butt welding fittings manufactured by Tube-Line (T-L), Incorporated, Long Island, New York, and Carroll Stream, Illinois, to TVA during the period February 3, 1982, to January 27, 1983, which Capitol sold as ASME Section III material. However, it has now been determined that the material was not manufactured under a QA program. Recent experience with T-L by other companies has shown that material did not meet the material specification for heat treatment.

### Interim Progress

TVA has made much progress on the resolution of the T-L problem at Watts Bar (WBN). However, since virtually all of our efforts toward the resolution of the problem have been concentrated on WBN, at this time, all we can report on Bellefonte Nuclear Plant is that appropriate stop work orders have been issued and no more T-L fittings/flanges are being installed in safety-related systems. All noninstalled T-L fittings/flanges have been placed on QA hold as nonconforming material.

### Progress for WBN

A stop work order has been issued at WBN and no more carbon or stainless T-L fittings/flanges are being installed in safety-related systems. In addition, all T-L material has been placed on QA hold.

TVA's detailed progress on WBN is broken into two major areas:

#### Carbon Steel

TVA and Capitol audited two of the Japanese manufacturers, who supplied some of the subject carbon steel fittings to T-L, during the period July 18 - August 28, 1983. They were audited to the criteria of our Carbon Steel Program Plan submitted to the NRC with our interim report No. 2 on this item. One of the manufacturers, Nippon Benkan Kogyo Company (Benkan), was found to have manufactured their material to a QA program which met the intent of ASME NCA-3800, except for the areas specifically excluded by T-L's purchase order to Benkan. TVA has evaluated the results of the product analyses performed on the Benkan fittings and has found that the fittings are as represented on the Certified Mill Test Reports (CMTRs) furnished by T-L and Benkan. Therefore, TVA feels that the Benkan fittings would be acceptable for use in any system in the plant.

The other Japanese manufacturer who was audited was Awaji. The audit revealed that Awaji did not have a QA program which was ASME NCA-3800 equivalent, nor one which was in effect at the time the fittings were manufactured. Our evaluation of the results of the product analyses performed on the Awaji fittings concluded that the fittings were as represented on the CMTR's furnished by T-L. A comparison by Awaji and by T-L (on a per heat basis) of the Mill Test Reports (MTRs) furnished by the base material manufacturers shows some wide variations in both the chemical and physical properties. This would indicate that Awaji did not really control their material to the point that TVA can be sure that what we were furnished is what T-L's CMTR represents it to be. Based on this data and the fact that approximately 48 of the Awaji fittings were installed in the high pressure, safety-related portion of the steam generator (SG) blowdown system of WBN unit 1 which cannot be isolated from the SG with isolation valves, TVA has made the decision to cut out these SG fittings and replace them with fittings manufactured in full compliance with ASME Section III.

It is our intention to leave all T-L carbon steel fittings which are installed in nonsafety, low pressure applications in place. We will leave them in place provided they meet item II of our Carbon Steel Program Plan as provided in our second interim report.

#### Stainless Steel

TVA has prepared a Stainless Steel Program Plan for the resolution of the disposition of all T-L stainless steel fittings which are installed. A copy of this Program Plan is attached to this report.

TVA and Capitol audited the two Japanese manufacturers, who manufactured for T-L all of the stainless steel fittings involved in this problem, at the same time as they were in Japan to audit the carbon fitting/flange manufacturers. The audit of Benkan's stainless steel facility produced the same findings as did the audit of their carbon steel facility, with the additional factor that Benkan does have an ASME NPT stamp (the welded with filler metal fittings they furnished were not made to their NCA-4000 program). The results of the Fuji Acetylene Industrial Company (Fuji) shows that Fuji does not have an ASME NPT stamp, nor could it be determined that an ASME equivalent QA program was used during the manufacture of these fittings. Fuji does have ASME Section IX qualified welders, but it could not be documented that Section IX equivalent procedures were utilized during the manufacture of these fittings.

The status of our Stainless Steel Program Plan work to date is: The audits have been completed. The product analysis, solution annealing, and hydrostatic testing of the welded with filler metal fittings will be completed by mid-September 1983. The inplace testing of the welded with filler metal fittings, to confirm that the installed material's chemical properties match the test specimen, and the radiography of the seam weld will be scheduled after the results of all other tests are evaluated and accepted by TVA.

The location of all welded without filler metal fittings installed in safety systems is being determined by WBN personnel. The sample sizes for item III of the Stainless Steel Program Plan will be determined after the total number of welded without filler metal fittings per heat, which are installed in safety systems, has been determined. This effort and some of the testing should be completed before the end of September 1983.

Our data to date indicates that Benkan manufactured for T-L all of the welded without filler stainless fittings at WBN, and that they also manufactured for T-L 49 of the welded with filler metal fittings installed in a safety system (ERCW) at WBN. Fuji manufactured for T-L 148 of the welded with filler metal fittings installed in safety system (ERCW) at WBN.

WATTS BAR NUCLEAR PLANT  
PROGRAM FOR RESOLUTION OF THE STAINLESS STEEL PORTION  
OF THE TUBELINE FITTING AND FLANGE PROBLEM

**Purpose:** This Program Plan is prepared for the purpose of qualifying, to the criteria contained in section 3b. of NRC IE Bulletin (IEB) 83-06, all of the Tube-Line (T-L) stainless steel fittings which are installed at Watts Bar Nuclear Plant (WBN). The Plan will be used to "post facto" establish ASME Code equivalence for all manufacturing operations, except NPT stamping and third party inspection, where they are applicable, for all of these fittings.

- I. Capitol Pipe and Steel Products Company and TVA will audit the two manufacturers who made the fittings for T-L, which were audited post facto by T-L. The purpose of these audits is to independently verify the results of the T-L audits. The scope of these audits is to verify compliance with the requirements of ASME B&PV Code, Section III, 1971 edition, Summer 1973 Addenda, subarticle NB-2600. In particular, the auditors shall look at the manufacturers' documentation program, their calibration procedures, and test coupon preparation control. They shall establish that no weld repair was performed, that no NDE was required for those fittings which were welded without filler metal, and that the manufacturer of welded with filler metal fittings has a radiographic procedure to meet the requirements of UW-51 of ASME Code Section VIII (1971 Code, Summer 1973 addenda) so that the criteria of paragraphs 1 through 3 of Code Case N-242-1 can be met by TVA for fittings welded without filler metal.

The audits shall be performed with checklists which will serve to verify that each of the foreign manufacturers have good material control practices to ensure that heat traceability can be maintained during all facets of the manufacturing process, including the marking of the heat number (code) on the fittings, and that these practices were in effect at the time the material in question was manufactured. The procedures for crating of the fittings and marking of heat numbers on the crates which are shipped to T-L will be reviewed and approved (during the audit). The manufacturers' capability of implementing all of these procedures will be thoroughly evaluated during these audits.

Capitol's November, 1982 audit of T-L will be used as the basis for acceptance of T-L's QA program for their portion of the manufactured fittings.

The name(s) of Capitol's auditor(s) and their qualifications shall be submitted to TVA for review and approval prior to performing the audits.

If the audits do not result in approval of T-L's vendor qualification, all stainless steel material supplied by Capitol from T-L shall be suspect.

- II. All steel manufactured for these fittings must be made to the requirements of TVA's Attachment FS (Special Requirements for Steel Produced in a Foreign Country) except that the third paragraph of the attachment does not apply.

For each heat involved in this problem, T-L shall transmit to TVA a copy of the original mill test report for the base material from which each of the fittings were manufactured; and in addition, T-L shall furnish any other MTR's which are applicable to each of these heats (T-L has already furnished their own CMTR's for these items). All original mill test reports shall be issued by the base material manufacturer, shall be written in English, and shall be on company letterhead, or equivalent. Any other applicable CMTRs shall be issued by the manufacturer doing the work and shall be on company letterhead, or equivalent. These reports shall be the basis for acceptance of the test(s) performed in accordance with section III below.

- III. For all stainless steel fittings supplied by T-L, TVA will either perform, or have T-L perform at a laboratory approved by TVA, a product analysis on each size, each product form (ell, tee, reducer, etc.), in a heat. The number of fittings tested and the acceptance numbers will be determined in accordance with Table II-C of MIL-STD-105D. The Acceptable Quality Level (AQL) for all sample size codes A-D will be 15 and for all sample size codes E-H will be 25. The number of fittings making up a lot for each heat will be determined by the total number of fittings of a given product type in that heat which are installed. The product analysis of the tested fittings shall be within the tolerances for the original chemistry stated in the applicable ASTM standards. If the product analysis tests for a heat meet the AQL criteria stated above, then that heat shall be considered to meet the requirements of the Code. (Note: For certain heats of welded with filler metal fittings, manufactured by Nippon Benkan, the number of fittings available for test do not meet the above stated requirements. For those heats only, TVA proposes to test only the number of uninstalled fittings available, and use the results of product analysis and proof tests (see IV) for these fittings, along with the fact that TVA's auditor feels that Benkan's QA program was ASME Code equivalent, with the exception of NPT stamping and third party inspection, to accept the fittings as being ASME Code equivalent.) In addition to the product analysis, TVA will do a hardness test on these fittings to determine the approximate tensile strength of the fitting, and an ASTM A262 practice A test will be performed on each of these fittings to assure that the fitting was solution heat treated as required by section 6 of ASME SA-403. TVA will then use these tested fittings as a baseline to perform a fluorescent X-ray analysis test, using a CSI model 740 materials analyzer, on each accessible installed fitting of the same heat to serve as a check that all fittings with the same heat number have, within normally accepted limits, the same chemistry as the tested fitting. This in place test will concentrate on those elements for which the CSI model 740 has been shown to be the most sensitive and accurate.

For welded without filler metal material which is installed and no identical product is available with the same heat number, TVA will do an in-place product analysis for all elements determinable by TVA's test equipment and will do a hardness test to determine approximate tensile strengths.

Any physical or chemical testing required by the material specification which was not documented by the mills or T-L will be done by TVA or T-L during this program.

- IV. For all of the T-L fittings which are welded with filler metal, the following additional tests are to be performed:
- a. One fitting per product type per size per manufacturer, and from the same T-L heat as was installed by TVA (11 fittings) will be hydrostatic pressure tested in accordance with the section 9.0 requirements of ANSI B16.9-1978, except that the proof test pressure shall be 1500 lb/in<sup>2</sup>g minimum. However, the fittings shall not exhibit any deformation or indications of failure to withstand this test pressure. Any fitting which does deform or otherwise show indications of failure shall be deemed to have failed the test. Should the fitting fail this test, 2 more identical fittings shall be tested. If they both pass the test, the heat shall be acceptable for use. This test will serve as a confirmation of its pressure retaining capabilities as stipulated in subparagraph NX-3642.2 of the ASME Code. This test also will verify that the fittings will withstand operating pressures in excess of both the system design and hydrostatic test pressures (150 lb/in<sup>2</sup>a and 275 lb/in<sup>2</sup>a, respectively), and that the weld seam is not the weakest portion of the fitting. These tests shall be conducted and documented by TVA personnel at WBN in accordance with procedures written specifically for these tests. The tests may be witnessed, at their option, by the WBN Authorized Nuclear Inspector (ANI) and other interested parties.
  - b. The original T-L furnished radiographic (RT) film of the seam weld for all fittings tested in (a) will be reviewed by both TVA and the WBN ANI. TVA will RT the seam weld of at least 2 more fittings (when available at WBN) per size per product type of the same heats in (a) above and compare this film to the original T-L furnished RT film. These RT film reviews, the results of the hydrostatic tests in (a) above, and the results of tests in III above will be utilized by TVA to "post facto" show welder qualification to ASME Section IX criteria.
  - c. Each of the fittings which are qualified by this Program Plan will be permanently marked by TVA with a unique TVA identification number, which is cross-referenced to T-L's heat code. The fitting's location will be noted on the appropriate TVA weld map for the ERCW system.

- d. For all fittings meeting (a), (b), and (c), TVA will note on the ASME Code N-3 and N-5 Data Report Forms for the Unit 1 and common portions of the WBN ERCW system that these fittings were not NPT stamped as required by Sections II and III of the ASME B&PV Code and will make references to the work done as a part of this Program Plan as a basis for acceptance of the fittings as ASME Section III Code equivalent. In addition, the applicable portion(s) of the WBN FSAR will be modified to reflect that these fittings are acceptable in accordance with 10 CFR 50.55a. This action will not prevent TVA from N-stamping the Unit 1 and common portions of the ERCW system.
- V. On the basis of successful completion of sections I through III above, TVA will, for all fittings welded without filler metal, perform the certification required by paragraph 4 of Code Case N-242-1. Certification by TVA to Code Case N-242-1 does not change our licensing commitment nor does it impact WBN's FSAR except as explicitly stated in IV above.
- VI. The following action will be taken for any fittings which cannot meet I through V above for ASME Section III class 2 or 3 systems: if installed, they will be cut out and replaced; if welded with or without filler metal and have not been installed, they will be replaced with fittings complying with ASME Section III requirements. All replacement fittings must be manufactured by a manufacturer approved by TVA.
- VII. T-L supplied material is not acceptable for TVA use at Watts Bar Nuclear Plant until their QA program is revised to correct vendor qualification and traceability procedures to meet ASME Code Section III requirements.



TENNESSEE VALLEY AUTHORITY

ATTACHMENT FS

SPECIAL REQUIREMENTS FOR STEEL PRODUCED IN A FOREIGN COUNTRY

Material meeting the requirements of the specified ASTM/ASME specifications their location is not restricted by the ASTM/ASME specifications.

Foreign-produced steel is acceptable for meeting the requirements of this specification provided the steel is produced to ASTM/ASME specifications by an established and reputable steel mill. Steel produced to foreign standards which by virtue of overlapping chemical and mechanical properties is considered to be "identical" or "similar" to the ASTM/ASME specification and grade, shall not be supplied. Other requirements applicable to surface conditions, cleanliness, and when required, weldability shall be satisfied.

To ensure that foreign-produced steel meets the ASTM/ASME specifications, the Contractor shall provide, at its cost and for each heat of steel, results of product analyses and tension tests performed by a domestic independent commercial laboratory approved by TVA. Such analyses and tests are to be conducted in the presence of a TVA Inspector unless he waives the right to be present. The Contractor shall be responsible technically and financially for quality assurance audits of the product analyses and tension tests. These results shall be attached to the certified mill test reports submitted by the material manufacturer. The certified mill test reports and the results of the product analyses and tension tests shall be submitted with the material at delivery. Subsequent product analyses and tension tests for the purpose of verification may be performed by TVA at its cost, and shall be a basis for rejection of any and all material if the results prove to be significantly different than the results of the supplier furnished product analyses, or if the requirements of the specification have not been met.

The Contractor shall perform sufficient dimensional checks to verify compliance with the tolerances tabulated in ASTM A 530 for pipe, ANSI B16.9 and B16.11 for fittings, ANSI B16.5 for flanges, and ASTM A 568 for sheet steel. TVA may perform subsequent receiving inspection dimensional checks at its cost. These inspections may be a basis for rejection if the results show that the material supplied does not meet the requirements of the specification.

All documents shall be written in the English language. All markings on the material shall meet the requirements of the applicable ASTM/ASME standard listed in the specifications/schedule of prices and shall be written in the English language.

All steel shall be protected during shipment to prevent damage or deterioration and shall meet the other conditions of this specification.