



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

APR 11 1991

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of ) Docket Nos. 50-390  
Tennessee Valley Authority ) 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - 10 CFR 50.55a(a)(3) -  
PROPOSED ALTERNATIVE TO THE MATERIALS REQUIREMENTS OF SECTION III,  
SUBSECTION ND-2000 OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)  
BOILER AND PRESSURE VESSEL CODE

Pursuant to 10 CFR 50.55a(a)(3), TVA is requesting NRC authorization to use an alternative to the testing requirements of Section III, subsection ND-2000 of the ASME Boiler and Pressure Vessel Code. TVA has determined that the proposed alternative provides an acceptable level of quality and safety, and that compliance with the specified requirements of subsection ND-2000 would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety.

Enclosure 1 is a description of the proposed alternative. Enclosure 2 identifies the commitment made in this report.

If there are any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*R. H. Shell*  
for E. G. Wallace, Manager  
Nuclear Licensing and  
Regulatory Affairs

Enclosure  
cc: See page 2

9104150252 910411  
PDR ADDCK 05000390  
A PDR

*Aool  
11*

U.S. Nuclear Regulatory Commission

APR 11 1991

cc (Enclosures):

Ms. S. C. Black, Deputy Director  
Project Directorate II-4  
U.S. Nuclear Regulatory Commission  
One White Flint, North  
11555 Rockville Pike  
Rockville, Maryland 20852

NRC Resident Inspector  
Watts Bar Nuclear Plant  
P.O. Box 700  
Spring City, Tennessee 37381

Mr. P. S. Tam, Senior Project Manager  
U.S. Nuclear Regulatory Commission  
One White Flint, North  
11555 Rockville Pike  
Rockville, Maryland 20852

Mr. B. A. Wilson, Project Chief  
U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

ENCLOSURE 1

PROPOSED ALTERNATIVE TO THE MATERIALS  
REQUIREMENTS OF SECTION III  
SUBSECTION ND-2000 OF THE AMERICAN  
SOCIETY OF MECHANICAL ENGINEERS (ASME)  
BOILER AND PRESSURE VESSEL CODE

In 1983, TVA's review of Inspection and Enforcement Bulletin No. 83-06, nonconforming material supplied by Tube-Line Corporation, identified approximately 430 fittings from several heats which had been received at WBN. TVA initiated Nonconforming Condition Report (NCR) WBN 4866 in response to this bulletin. A review of documentation determined that TVA had installed 197 of these fittings, all in the Essential Raw Cooling Water (ERCW) System. The installed fittings were evaluated use-as-is based on chemical and hardness tests, a pressure test of 1530 to 1540 psig on one fitting from each heat installed, stress corrosion cracking tests, and sample radiographs. The fittings which had not been installed were returned to the vendor.

A review of vendor radiographs by NRC during the broad-based construction assessment in August 1989 identified linear indications in the longitudinal welds of 6-inch diameter schedule 40 stainless steel elbows supplied by Tube-Line. These elbows were supplied to meet the requirements of ASME Section II, 77, Summer 78 for SA-403 material welded with filler metal. During this inspection, the linear indications identified were associated with one heat of material marked ABMG.

NRC's review looked at 179 Tube-Line radiographs and identified 15 that exhibited linear indications due to oxidation. The radiographic acceptance criteria for this material is described in ASME Section VIII Part UW 51.

Neither ASME Code Section III subsection ND for Class 3 components nor material specification SA-403 require traceability of the film to the welds; requiring only that a certificate be furnished which certifies that the code has been met. Therefore, the radiographs did not have unique identification which could be traced to specific elbows after manufacture. Because of this, TVA maintains the radiographs representing the installed as well as the returned fittings (only 2 of 430 radiographs could not be located).

TVA has determined that there were 12 heats involving approximately 430 Tube-Line stainless steel fittings welded with filler metal received at WBN. Of these fittings, 197 were installed in the ERCW System, 4 have since been removed, and the remaining fittings were returned to the vendor. To determine the extent of this condition, TVA expanded the inspection to include the other heats that made up the total 430 fittings. Results indicate that the majority of the linear indications are associated with heat ABMG. The heat code information is as follows:

<u>HEAT</u>	<u>SIZE</u>	<u>QUANTITY SUPPLIED</u>	<u>QUANTITY INSTALLED</u>	<u>REJECTED</u>	<u>WORST INDICATION</u>
ABMI	8" LR 90° EL	97	23	6	5/8" linear; 1" screen defect
AACBJ	6" X 3" CR 6" X 4" CR	19	17	1	3/8" linear
AADAM	6" X 45° EL	23	9	0	No indications
ABGT	6" X 45° EL	14	2	0	No indications
AAGK	8" Tee	5	3	0	No indications
AACAQ	8" X 10" CR	9	4	1	1/4" linear
ABLAG	8" X 45° EL	20	12	1	1/4" linear
AACAP	8" X 6" CR	3	2	0	Only 1 film located
ACKAS	6" LR 90° EL	12 (note 1)	7 (note 2)	2	0.310" linear 0.090" linear transverse
ABMH	6" LR 90° EL	107	45	0	No Indications
ADFX	6" X 45° EL	10	00	NA	Did not review because none were installed
ABMG	6" LR 90° EL	111	69	24 41 1 3	Multiple indications max < 1" linear Single < 5/8" linear 1 1/2" linear (assumed worst case for this heat) Single 1" linear

(1) Original receiving documentation indicated that 25 fittings were in this particular heat; however, further investigation revealed that only 12 were received at WBN.

(2) Four of these fittings have been removed during a modification by Engineering Change Notice E110011.

The original radiographs were exposed using an X-ray machine providing radiographs with contrast and sensitivity superior to minimum code requirements. The majority of the images on the radiographs have the appearance of indications typical of root oxidation resulting from inadequate backpurge. The flaws are very faint and linear type. Because of the characteristics of root oxidation combined with the high contrast and sensitivity of the radiographs, TVA considers these indications to be internal surface conditions.

TVA requests relief pursuant to 10 CFR 50.55a(a)(3) to apply an alternative to the ASME requirements to radiograph the longitudinal seams in these fittings. To radiograph these fittings for further evaluation would result in hardship and unusual difficulties without a compensating increase in the quality and safety of WBN. Since individual records for each fitting were not maintained, all of the subject fittings installed (193) would have to be reradiographed. This would require TVA to locate each fitting and determine the seam location using eddy current. Once the seam was located, a portable X-ray machine would have to be employed to duplicate the contrast and sensitivity of the original radiographs. Since the ERCW System is inservice, any repairs would require the lines to be drained and dried. In the event some moisture remained, through wall repairs would have a tendency to attract that moisture to the area being repaired. This moisture would affect the repair, possibly rendering the fitting unacceptable for use.

TVA considers that a "use-as-is" disposition of these welds is technically acceptable for the following reasons:

1. A worst-case flaw identified for each size fitting was assumed to be located at the area of the highest stress with an assumed depth of  $1/2t$  (where  $t$  is nominal pipe wall). The flaw was analyzed and found acceptable using the methodology provided by ASME Code Section XI for evaluation of flaws in stainless steel piping. The single, 8- by 10-inch reducer which did not pass this analysis (based on calculation WCQ-ACQ-0238) was located, radiographed, and found acceptable.
2. Those fittings (three) for which two radiographs could not be located (heat AACAP) were evaluated utilizing the maximum size flaw identified in the radiographs reviewed. Each was found acceptable.
3. A comparison evaluation was made which verified that, even with the worst-case flaw for each size fitting, the ASME Section III analysis stress limits were still met (calculation WCQ-ACQ-0238).
4. Radiography is not a fabrication requirement for ASME Section III Class 3 Systems unless the design requires a longitudinal weld joint efficiency factor greater than 0.80. Although the original minimum wall calculations used a joint efficiency factor of 1.00, a review of the ERCW System design indicated that a weld joint efficiency factor of greater than 0.80 is not required.
5. The ERCW System is an ASME Section III Class 3 System with a maximum design pressure of 160 psig. The fittings in question have been successfully pressure tested during system hydrostatic tests at 200 psig.
6. A sample fitting from each of the heats installed was hydrostatically tested at 1530 to 1540 psig without evidence of leakage or deformation as part of disposition for NCR WBN 4866.
7. The piping analysis procedure, Watts Bar Engineering Procedure (WBEP)-5.38, has been revised to reflect the reduced allowables presented in calculation WCQ-ACQ-0238. This will assure compliance for any future piping analysis performed on the ERCW System.

The proposed alternative does not affect the plant configuration; therefore, drawings do not need to be revised. However, because its use can affect future analysis, the piping analysis procedure WBEP-5.38 for System 67 has been revised to reflect the lower stress allowable limits for Tube-Line fittings welded with filler metal.

Upon receiving approval for this exception, TVA will revise the Final Safety Analysis Report to document deviation from ASME Section III for radiographic acceptance of these fittings.

ENCLOSURE 2

LIST OF COMMITMENTS

Upon receiving approval for this exception, TVA will revise the Final Safety Analysis Report to document deviation from ASME Section III for radiographic acceptance of these fittings.