

50-390/391



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

JAN 0 5 1987

Mr. C. H. Dean, Jr., Chairman  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902

Dear Mr. Chairman:

SUBJECT: THE WELDING ASPECTS OF TVA'S QA PROGRAM

This letter provides NRC's preliminary assessment of your responses to our requests for additional information and a reassessment of the welding aspects of the quality assurance program delineated, respectively, in our letters of July 24 and October 14, 1986. The NRC staff is still reviewing information provided in your letters of December 5 and December 16, 1986. Nevertheless, our preliminary conclusion is that your response is deficient in the treatment of welding and QA issues at Watts Bar. Some of the major deficiencies on the technical aspects were conveyed to Mr. Lundin of your staff on December 12, 1986, by Dr. Liaw, the NRC Program Manager on TVA Welding, during his recent visit to the Watts Bar Site. As a result, it was mutually agreed that a meeting between our staffs and including our respective consultants should be arranged as soon as practicable. This meeting is scheduled for January 21, 1987. This letter addresses only the QA aspect of your response.

In our October 14, 1986, letter, we specifically requested that TVA reassess the welding aspects of the quality assurance program and your position discussed in the letters of March 20 and June 5, 1986. In your December 5, 1986, letter, you reiterated your commitment to the implementation of the requirements of 10 CFR, Part 50, Appendix B and discussed significant deficiencies in two specific areas. These regard the structural platform at 741.0' elevation and the radiographic examinations of piping welds. You indicated that "These are instances where the QA program, or its implementation, did not provide adequate confidence that TVA's licensing commitments were fully met," and "...other issues have been identified and reported which have required and will require rework....will be described in more detail in Volume IV of TVA's Nuclear Performance Plan."

As delineated in the Enclosure, we believe sufficient information exists to make a judgement on whether there was a breakdown in the QA aspects of your welding program implementation during the construction of Watts Bar Unit 1.

Mr. C. H. Dean

-2-

In view of the forthcoming meeting to discuss the TVA QA program and Appendix B issues on January 12, 1987, I believe that it is important that you be aware of the NRC staff position on these matters before the meeting. Based on an evaluation of the information available, the NRC Senior Management Team has concluded that there was a significant QA breakdown, as delineated in 10CFR 50.55(e), in the inspection of structural steel welding as well as in the area of interpretation of code required radiographs of piping welds.

The degree to which these matters are addressed and resolved will determine whether the staff will be able to support the licensing of Watts Bar. Accordingly, we intend to closely monitor and evaluate the extent and effectiveness of TVA's corrective actions to ensure that the structural and piping welding are in conformance with your licensing commitments.

Original signed by  
Victor Stello

Victor Stello, Jr.  
Executive Director for Operations

Enclosure:  
As stated

Revised in EDO

Distribution: s/f (QA, Welding), c/f, r/f, COMMS 5520.901  
Service List, EDO r/f, Stello, Roe, Sniezek, Denton, Taylor, Murray, Grace,  
Westman, Thompson, Hayes, Lieberman, Liaw, Zech/RII, PDR

NRR	TVAPS:AD	OGC	RII	OI	IE	NRR	EDO
BDLiaw	HThompson	JLieberman	GZech	BHayes	JTaylor	HDenton	VS Stello
01/ /87	01/ /87	01/ /87	01/ /87	01/ /87	01/ /87	01/ /87	1/5/87
EDO							

ENCLOSURE

QA/QC BREAKDOWNS IN WELDING AREA

Watts Bar Unit 1

Structural Welding

- QC inspector training/qualification was questionable, resulting in a breakdown of the inspection process. This is attested by the reinspection results which show that a large percentage (approximately 35%) of structural connections/components reinspected contain rejectable/reportable indications that were not identified by the acceptance inspections.
- The deficient 741-ft platform (10 unsuitable-for-service connections) is a good example that indicates the following:
  - Poor connection design details
  - Field Change Requests (FCR) should have been made
  - The welder(s) did not weld connections in accordance with the design drawings or did not report the inability to weld the connections as designed
  - QC inspectors accepted the platform apparently out of incompetence or simply did not look
- Wall mounted instrument panel supports which require full penetration welds were found by TVA to be partial penetration welds. As a result, 118 wall mounted panels will have to be replaced by properly fabricated panels.
- Circumferential welds in spiral HVAC ducts and hydrogen collection piping were found to have partial penetration welds instead of the required full penetration welds. TVA's disposition of these deficiencies is pending.
- There are some cracked welds which may indicate some lack of control over the weld rod material, heat-input during welding, or improper weld design configuration.
- Prior to about 1980-1981, TVA did not have an adequate training program for visual inspection of structural welds. See TVA internal document QAE-80-2.

Piping Welds (ASME and B31.1)

- The process that allowed a single Level-II examiner to interpret the radiograph films during construction inspection is clearly a serious deficiency in the implementation of the QA/QC program.
- The NRC staff reviewed 52 TVA audit reports to determine whether there were audits of film interpretation during construction. Between April 1979 and November 1985, there were only 5 audits made.
- The staff could not find any evidence to indicate the presence of Level III examiners in reviewing the RT films.
- About 10% of pipe weld radiographs reexamined contained one or more rejectable indications. This indicates the inadequacy of QC acceptance inspections during construction.
- The EG&G Raw Data Report was reviewed. About 23% of ASME and 51% of ANSI B31.1 piping welds reinspected contained rejectable indications. These high rejection rates indicate the inadequacy in the QC acceptance inspections during construction.

Mr. C. H. Dean, Jr.  
Tennessee Valley Authority

Watts Bar Nuclear Plant

cc:

Mr. L. Tomasic  
Westinghouse Electric Corporation  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230

R. L. Gridley  
Tennessee Valley Authority  
5N157B Lookout Place  
Chattanooga, Tennessee 37402-2801

J.A. Kirkebo  
ATTN: D.L. Williams  
Tennessee Valley Authority  
400 West Summit Hill Drive, W12 A12  
Knoxville, Tennessee 37902

Resident Inspector/Watts Bar NPS  
c/o U.S. Nuclear Regulatory  
Commission  
Rt. 2 - Box 700  
Spring City, Tennessee 37381

Regional Administrator, Region II  
U.S. Nuclear Regulatory Commission,  
101 Marietta Street, N.W., Suite 2900  
Atlanta, Georgia 30323

J. A. McDonald  
Tennessee Valley Authority  
Watts Bar Nuclear Plant  
P.O. Box 800  
Spring City, Tennessee 37381

George Toto  
Tennessee Valley Authority  
Watts Bar Nuclear Plant  
P.O. Box 800  
Spring City, Tennessee 37381



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

Docket Nos.: 50-390/391

Mr. C. H. Dean, Jr., Chairman  
Tennessee Valley Authority  
400 West Summit Hill Drive  
Knoxville, Tennessee 37902

Dear Mr. Chairman:

SUBJECT: THE WELDING ASPECTS OF TVA'S QA PROGRAM

This letter provides NRC's preliminary assessment of your responses to our requests for additional information and a reassessment of the welding aspects of the quality assurance program delineated, respectively, in our letters of July 24 and October 14, 1986. The NRC staff is still reviewing information provided in your letters of December 5 and December 16, 1986. Nevertheless, our preliminary conclusion is that your response is deficient in the treatment of welding and QA issues at Watts Bar. Some of the major deficiencies on the technical aspects were conveyed to Mr. Lundin of your staff on December 12, 1986 by Dr. Liaw, the NRC Program Manager on TVA Welding, during his recent visit to the Watts Bar Site. As a result, it was mutually agreed that a meeting between our staffs and including our respective consultants should be arranged as soon as practicable. This letter addresses only the QA aspect of your response.

In our October 14, 1986, letter, we specifically requested that TVA reassess the welding aspects of the quality assurance program and your position discussed in the letters of March 20 and June 5, 1986. In your December 5, 1986, letter, you reiterated your commitment to the implementation of the requirements of 10 CFR, Part 50, Appendix B and discussed significant deficiencies in two specific areas. These regard the structural platform at 741.0' elevation and the radiographic examinations of piping welds. You indicated that "These are instances where the QA program, or its implementation, did not provide adequate confidence that TVA's licensing commitments were fully met," and "...other issues have been identified and reported which have required and will require rework...will be described in more detail in Volume IV of TVA's Nuclear Performance Plan."

As delineated in the Enclosure, we believe sufficient information exists to make a judgement on whether there was a breakdown in the QA aspects of your welding program implementation during the construction of Watts Bar Unit 1.

Mr. C. H. Dean

-2-

Based on an evaluation of the information available, the NRC Senior Management Team has concluded that there was a significant QA breakdown, as delineated in 10 CFR 50.55(e), in the inspection of structural steel welding as well as in the area of interpretation of code required radiographs of piping welds. Your corrective actions must be sufficiently comprehensive to assure confidence in the quality of construction at the Watts Bar facility.

The degree to which these issues are resolved will determine whether the staff will be able to support the licensing of Watts Bar. Accordingly, we intend to closely monitor and evaluate the extent and effectiveness of TVA's corrective actions to ensure that the structural and piping welding are in conformance with your licensing commitments.

Sincerely,

Victor Stello, Jr.,  
Executive Director for Operations

Enclosure:  
As stated

Distribution: s/f (QA, Welding), c/f, r/f, COMMS 5520.901  
Service List, EDO R/F, Stello, Sniezek, Denton, Taylor, Murray, Grace, Wessman, Thompson  
Hayes, Lieberman, Liaw, Zech/RII

BDL						
NRR	TVAPS:AD	OGC <sup>JL</sup>	RII <sup>GrZ</sup>	OI <sup>BH</sup>	IE-JMT	NRR <sup>with for</sup>
BDLiaw	PTHompson	JLieberman <sup>tele</sup>	GZech <sup>tele</sup>	BHayes <sup>tele</sup>	JTaylor <sup>tele</sup>	HDenton
12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/31/86
EDO						
VStello						
12/ /86						

## ENCLOSURE

### QA/QC BREAKDOWNS IN WELDING AREA

#### Watts Bar Unit 1

#### Structural Welding

- QC inspector training/qualification was questionable, resulting in a breakdown of the inspection process. This is attested by the reinspection results which show that a large percentage (approximately 35%) of structural connections/components reinspected contain rejectable/reportable indications that were not identified by the acceptance inspections.
- The deficient 741-ft platform (10 unsuitable-for-service connections) is a good example that indicates the following:
  - Poor connection design details
  - Field Change Requests (FCR) should have been made
  - The welder(s) did not weld connections in accordance with the design drawings or did not report the inability to weld the connections as designed
  - QC inspectors accepted the platform apparently out of incompetence or simply did not look
- Wall mounted instrument panel supports which require full penetration welds were found by TVA to be partial penetration welds. As a result, 118 wall mounted panels will have to be replaced by properly fabricated panels.
- Circumferential welds in spiral HVAC ducts and hydrogen collection piping were found to have partial penetration welds instead of the required full penetration welds. TVA's disposition of these deficiencies is pending.
- There are some cracked welds which may indicate some lack of control over the weld rod material, heat-input during welding, or improper weld design configuration.
- Prior to about 1980-1981, TVA did not have an adequate training program for visual inspection of structural welds. See TVA internal document QAE-80-2.

Piping Welds (ASME and B31.1)

- The process that allowed a single Level-II examiner to interpret the radiograph films during construction inspection is clearly a serious deficiency in the implementation of the QA/QC program.
- The NRC staff reviewed 52 TVA audit reports to determine whether there were audits of film interpretation during construction. Between April 1979 and November 1985, there were only 5 audits made.
- The staff could not find any evidence to indicate the presence of Level III examiners in reviewing the RT films.
- About 10% of pipe weld radiographs reexamined contained one or more rejectable indications. This indicates the inadequacy of QC acceptance inspections during construction.
- The EG&G Raw Data Report was reviewed. About 23% of ASME and 51% of ANSI B31.1 piping welds reinspected contained rejectable indications. These high rejection rates indicate the inadequacy in the QC acceptance inspections during construction.

Mr. C. H. Dean, Jr.  
Tennessee Valley Authority

Watts Bar Nuclear Plant

cc:

Mr. L. Tomasic  
Westinghouse Electric Corporation  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230

R. L. Gridley  
Tennessee Valley Authority  
5N157B Lookout Place  
Chattanooga, Tennessee 37402-2801

J.A. Kirkebo  
ATTN: D.L. Williams  
Tennessee Valley Authority  
400 West Summit Hill Drive, W12 A12  
Knoxville, Tennessee 37902

Resident Inspector/Watts Bar NPS  
c/o U.S. Nuclear Regulatory  
Commission  
Rt. 2 - Box 700  
Spring City, Tennessee 37381

Regional Administrator, Region II  
U.S. Nuclear Regulatory Commission,  
101 Marietta Street, N.W., Suite 2900  
Atlanta, Georgia 30323

J. A. McDonald  
Tennessee Valley Authority  
Watts Bar Nuclear Plant  
P.O. Box 800  
Spring City, Tennessee 37381

George Toto  
Tennessee Valley Authority  
Watts Bar Nuclear Plant  
P.O. Box 800  
Spring City, Tennessee 37381

Mr. C. H. Dean

-2-

Based on an evaluation of the information available, the NRC Senior Management Team has concluded that there was a significant QA breakdown, as delineated in 10CFR 50.55(e), in the inspection of structural steel welding as well as in the area of interpretation of code required radiographs of piping welds. Your corrective actions must be sufficiently comprehensive to assure that the technical issues referred to in the first paragraph of this letter are adequately addressed.

The degree to which these issues are resolved will determine whether the staff will be able to support the licensing of Watts Bar. Accordingly, we intend to closely monitor and evaluate the extent and effectiveness of TVA's corrective actions to ensure that the structural and piping welding are in conformance with your licensing commitments.

Victor Stello, Jr.  
Executive Director for Operations

Enclosure:  
As stated

Distribution: s/f (QA, Welding), c/f, r/f, COMMS 5520.901

<i>BDL</i>	<i>TV</i>	<i>JL</i>	<i>RIF</i>	<i>OI</i>	<i>BH</i>	<i>IE</i>	<i>JMT</i>	<i>NRR</i>
NRR	TVAPS:AD	OGC	GZech	BHayest	JTaylor	HDenton		
<i>tele</i> BDLiaw	<i>HT</i> Thompson	JLieberman	<i>tele</i> GZech	<i>tele</i> BHayest	<i>tele</i> JTaylor			
12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/31/86	12/ /86

EDO  
VStello  
12/ /86