

TENNESSEE VALLEY AUTHORITY

6N 38A Lookout Place  
Chattanooga, Tennessee

February 17, 1988

50-390

Mr. Stewart D. Ebnetter, Director  
Office of Special Projects  
U.S. Nuclear Regulatory Commission  
MS 7D24  
Washington, D.C. 20555

Dear Mr. Ebnetter:

In order to address concerns raised within TVA, as well as by NRC, about the adequacy of TVA's Watts Bar Nuclear Plant (WBN) unit 1 welding program, TVA entered into a Technical Assistance Plan and Interagency Agreement with the U.S. Department of Energy (DOE) in December 1985. Under this agreement, DOE, through its contractor EG&G Idaho, Inc., completed a comprehensive, independent assessment of the quality of safety-related welding performed by TVA during construction of WBN unit 1. To perform this task, a DOE/Weld Evaluation Project (WEP) organization was established with DOE/EG&G personnel responsible for conducting an independent review of weld quality issues, performing actual weld examinations, interpreting examination results, and determining the need for expanded evaluations.

After two years of effort involving nearly 75 full-time contract personnel and a substantial number of supporting TVA Office of Nuclear Power personnel, and at a cost to date of nearly \$50 million, this task has been completed. I am enclosing a copy of the entire ten-volume report for your information.

DOE/EG&G's comprehensive analysis included both a review of TVA's weld program implementing documents for compliance with original licensing commitments, as well as an inspection of the installed hardware for acceptability under those commitments. DOE/EG&G has found:

With regard to the quality of safety-related welding performed by the TVA during the construction of WBNP-1 through February 1, 1986, the following conclusions, regarding each of the four program objectives . . . are made:

1. As a result of the weld program assessment, the DOE/WEP concludes that the documented TVA weld program met the commitments in the WBNP Final Safety Analysis Report, including amendments through February 1, 1986.

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2. As a result of the employee concern (EC) and quality indicator (QI) assessment, the DOE/WEP concludes that, while the EC/QI welding issues were numerous and potentially significant:
  - a. Only 4.4 percent of the employee concerns were confirmed upon evaluation.
  - b. Upon evaluation of those employee concerns that were confirmed, the reported condition was found to be code acceptable.
  - c. Less than 1 percent of the quality indicators were identified with weld quality problems that required corrective action in the plant. This small percentage supports the conclusion that the implemented quality assurance program, for those nonconforming items identified and documented (i.e., QIs), was effective.
3. As a result of the evaluation of the as-constructed plant welds, the DOE/WEP concludes that:
  - a. The welds evaluated either are in compliance with the applicable FSAR fabrication and inspection construction codes, or will be upon completion of the nine TVA-committed corrective actions. Two of the nine TVA actions involve correction of unsuitable for service deviations. The remaining seven involve further definition by the TVA of problems identified by the DOE/WEP that, while they have not been determined to be unsuitable for service, need further evaluation to ensure code compliance.
4. As a result of the evaluation of the sampled welds and root cause/generic problems analysis of the deviant conditions, the DOE/WEP concludes that:
  - a. There are no generic problems associated with the remaining unsampled components within the populations.
  - b. The unsampled components within these populations are, with a high degree of confidence, also in compliance with the applicable FSAR fabrication and inspection construction codes.

With respect to the nine TVA-committed corrective actions noted above, the two major actions with which you are familiar with are the repair work on the elevation 741 platform, which is essentially complete, and the repair of those pipe welds found by radiographic review to have indications, which is underway and should be completed during 1988. Evaluations by TVA are underway for all nine areas of corrective action and, to date, none of the conditions which have been evaluated would have had any impact on safe shutdown of the plant or the health and safety of the public had the condition gone undetected.

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Completion of DOE/EG&G review represents a significant milestone in the licensing process at WBN unit 1. This review confirms the overall acceptability of TVA's safety-related welding program at WBN, and concludes a major portion of TVA's overall effort to resolve welding-related issues. TVA expects that its corrective action plans upon completion will close out the remaining welding concerns for WBN unit 1.

The results of the DOE/EG&G review also indicate that earlier concerns regarding welding at WBN were overstated. In particular, of the employee concerns that involved the TVA-performed safety-related welds at WBN unit 1, 95.6 percent could not be specifically confirmed, and the majority of those which were confirmed did not require corrective action. Welding deficiencies were identified only in specific limited areas, and these deficiencies have been or are being corrected.

For the concerns raised, the DOE/EG&G evaluation has now confirmed the overall acceptability of TVA's safety-related welding program at WBN.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



S. A. White

Manager of Nuclear Power

Enclosure

cc: See page 4

Mr. Stewart D. Ebnetter

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Enclosure

cc (Enclosure):

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## Department of Energy

Idaho Operations Office  
785 DOE Place  
Idaho Falls, Idaho 83402

January 26, 1988

Dr. C. H. Fox, Jr.  
Deputy Manager  
Office of Nuclear Power  
Tennessee Valley Authority  
677 - 38A Lookout Place  
Chattanooga, TN 37402-2801

**SUBJECT:** Reports for Department of Energy Weld Evaluation Project

**REFERENCE:** Technical Assistance Plan and Interagency Agreement between Tennessee Valley Authority and U. S. Department of Energy (TV-68345A) of December 17, 1985 and Supplements Thereto

Dear Dr. Fox:

In accordance with the reference, the subject reports (listed in Enclosure 1) are forwarded to the Tennessee Valley Authority (TVA). For convenience, the Final Report Conclusions have been abstracted and are included as Enclosure 2.

As indicated in the various reports and the project management plan, the Department of Energy Weld Evaluation Project (DOE/WEP) work scope was defined as the reexamination of statistically valid samples of the as-constructed weld quality of the TVA welding performed on the safety related systems at Watts Bar Nuclear Plant Unit 1.

Evaluation performed by the DOE/WEP included:

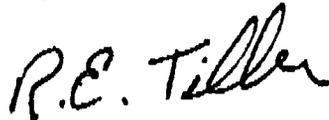
1. The translation of the FSAR welding commitments into the TVA implementing documents.
2. The intent of the overall Appendix B requirement (i.e., is the component/structure satisfactory for service?).
3. The validity of employee concerns related to code acceptability of welds.

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4. The effectiveness of resolution of identified TVA nonconformances.
5. The quality of the reinspected welds.
6. The statistical confidence level for code acceptability of plant safety related welds.
7. Problem areas requiring corrective actions by TVA to meet the committed code and the TVA proposed corrective action plans to bring the plant into compliance with these codes.
8. Retrievability and traceability of the final acceptance documentation for items sampled.
9. As constructed configuration versus drawing requirements for samples examined.

The transmittal of the DOE/WEP reports completes the major objective of the work scope of the reference. This work has been completed on the agreed upon schedule and significantly under the agreed upon cost. The Department of Energy will continue to assist TVA in work related to the results reported and any other work mutually agreed to between TVA and DOE, under the existing agreement.

Very truly yours,



R. E. Tiller  
Deputy Manager

Enclosures

cc: F. C. Fogarty, DOE/WEP, w/encs.  
C. G. Lundin, TVA (Watts Bar), w/encs.  
R. J. Wade, DOE/WEP, w/encs.

Enclosure 1

DOE/ID WELD EVALUATION PROJECT REPORTS

1. W. H. Borter, Weld Program Review, DOE/ID-10152, December 1986
2. S. M. Bradford, WEP Organization and Work Scope, DOE/ID-10175-1, November 1987
3. S. M. Bradford, WEP Formation of Homogeneous Groupings of Welds, DOE/ID-10175-2, November 1987
4. De Lon "H" Gardner, WEP Data Bases for Weld Reinspection Results and Status Reports, DOE/ID-10175-3, November 1987
5. D. A. Armour, WEP Component Inspection and Examination Process, DOE/ID-10175-4, November 1987
6. R. K. Blandford, WEP Suitability for Service Evaluation Engineering Process, DOE/ID-10175-5, November 1987.
7. L. C. Brown, WEP Generic Problem Analysis Process, DOE/ID-10175-6, November 1987
8. J. M. Savage, WEP Formation of Weld/Component Data Base, DOE/ID-10175-7, November 1987
9. L. C. Brown and R. J. Wade, WEP Aggregate Results of Weld Assessment, DOE/ID-10175-8, November 1987
10. F. C. Fogarty, WEP Final Report, DOE/ID-10175-9, November 1987

## CONCLUSIONS

With regard to the quality of safety-related welding performed by the TVA during the construction of WBNP-1 through February 1, 1986, the following conclusions, regarding each of the four program objectives (page 1 and 2), are made:

1. As a result of the weld program assessment, the DOE/WEP concludes that the documented TVA weld program met the commitments in the WBNP Final Safety Analysis Report, including amendments through February 1, 1986.
2. As a result of the employee concern and quality indicator assessment, the DOE/WEP concludes that while the EC/QI welding issues were numerous and potentially significant:
  - a. Only 4.4% of the ECs were confirmed upon evaluation
  - b. Upon evaluation of those ECs that were confirmed, the reported condition was found to be code acceptable.
  - c. Less than 1% of the QIs were identified with weld quality problems that required corrective action in the plant. This small percentage supports the conclusion that the implemented quality assurance program, for those non-conforming items identified and documented (i.e., QIs), was effective.
3. As a result of the evaluation of the as-constructed plant welds, the DOE/WEP concludes that:
  - a. The welds evaluated either are in compliance with the applicable FSAR fabrication and inspection construction codes, or will be upon completion of the nine TVA-committed corrective actions. Two of the nine TVA actions involve correction of unsuitable for service deviations. The remaining seven involve further definition by the TVA of problems identified by the DOE/WEP that, while they have not been determined to be unsuitable for service, need further evaluation to ensure code compliance.
4. As a result of the evaluation of the sampled welds and root cause/generic problem analysis of the deviant conditions, the DOE/WEP concludes that:
  - a. There are no generic problems associated with the remaining unsampled components within the populations.
  - b. The unsampled components within these populations are, with a high degree of confidence, also in compliance with the applicable FSAR fabrication and inspection construction codes.