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400 Chestnut Street Tower II

October 13, 1981

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - FAULTY FILLET WELDS - NCR 2111R - SEVENTH INTERIM REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. W. Wright on February 20, 1980 in accordance with 10 CFR 50.55(e) in conjunction with similar deficiencies designated as NCR's 2806R, 2091R, 2101R, 2120R, 2128R, 2137R, and 2375R. Interim reports were submitted on March 19, May 6, August 8, and October 31, 1980, and February 6 and June 17, 1981. TVA is still in the process of reinspecting and repairing fillet welds. We expect to provide additional information by December 21, 1981.

If you have any questions concerning this matter, please get in touch with M. R. Wisenburg at FTS 857-2778.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

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MRW:DAK:KEH
cc: Mr. Victor Stello, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

cc: ARMS, 640 CST2-C
A. W. Crevasse, 401 UBB-C
H. N. Culver, 249A HBB-K
H. J. Green, 1750 CST2-C
J. A. McDonald, Watts Bar-NRC
J. A. Raulston, W10C126 C-K
H. S. Sanger, Jr., E11B33 C-K
F. A. Szczepanski, 417 UBB-C
J. E. Wilkins, Watts Bar

COORDINATED: SStout/EN DES

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WANN87-726 PDR

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UNITED STATES GOVERNMENT

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Memorandum

TENNESSEE VALLEY AUTHORITY

TO : L. M. Mills, Manager, Nuclear Regulation and Safety, 400 CST2-C

FROM : George F. Dilworth, Chief Nuclear Engineer, W10C126 C-K

DATE : MAY 2 1980

SRS

SUBJECT: WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - QC BREAKDOWN, FAULTY FILLET WELDS - REPORT NO. 2 (INTERIM) - NCR 2111R

Attached is our approved report on the subject nonconformance for your forwarding to NRC-OIE Region II. The NRC-OIE Inspector, R. W. Wright, was notified initially on February 20, 1980. We expect to supply you with additional information by August 1, 1980. If your staff has any questions on this matter, have them contact S. R. Stout, extension 4395, who is the contact on this matter for OEDC. An advance copy of the attached approved report was transmitted to D. P. Ormsby of your staff on May 1, 1980.

Original signed by
John A. Roulston

George F. Dilworth

SRS:CY
Attachment
cc (Attachment):
H. N. Culver, 249A HBB-K
J. P. Knight, W12B30 C-K
J. L. Parris, W11C126 C-K
R. M. Pierce, 204 GB-K (2)
M. N. Sprouse, W11A9 C-K

MNS:CY MAY 2 1980
cc (Attachment):
MEDS, E4B37 C-K
H. H. Mull, E7B24 C-K
J. E. Wilkins, Watts Bar Nuclear CONST (3)

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MAY 2 1980

A27 811223 ... SRS

400 Chestnut Street Tower II

December 23, 1981

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - FAULTY FILLET WELDS - NCR 2111R - EIGHTH INTERIM REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. W. Wright on February 20, 1980 in accordance with 10 CFR 50.55(e) in conjunction with similar deficiencies designated as NCR's 2806R, 2091R, 2101R, 2120R, 2126R, 2137R, and 2375R. Interim reports were submitted on March 19, May 6, August 8, and October 31, 1980, and February 6, June 17, and October 13, 1981. TVA is still in the process of reinspecting and repairing fillet welds. We expect to provide additional information by February 23, 1982.

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 855-2676.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

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JRL
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NSA
JFC
SHR
GRJ

RMS:DAK:TAS

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

cc: APMS, 640 CST2-C
A. M. Crevasse, 401 UBB-C
H. N. Culver, 249A HBB-K
H. J. Green, 1750 CST2-C
J. A. McDonald, Watts Bar-NRC
J. A. Raulston, WBN126 C-K
H. S. Sanger, Jr., FIIR33 C-K
F. A. Szczepanski, 417 UBB-C
J. E. Wilkins, Watts Bar
MEDS, 100 UB-K

SRS

COORDINATED: SStout/EN DES

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400 Chestnut Street Tower II

February 25, 1982

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - FAULTY FILLET WELDS - NCR 2111R - NINTH INTERIM REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. W. Wright on February 20, 1980 in accordance with 10 CFR 50.55(e) in conjunction with similar deficiencies designated as NCR's 2806R, 2091R, 2101R, 2120R, 2128R, 2137R, and 2375R. Interim reports were submitted on March 19, May 6, August 8, and October 31, 1980 and February 6, June 17, October 13, and December 23, 1981. We expect to provide additional information by April 21, 1982.

Nonconforming condition report (NCR) 2111R documents a QA program breakdown in the inspection of ASME Code fillet welds used on socket weld fittings on branch connections to process piping. The inspection requirements for these welds are defined in General Construction Specification G-29M. To date, over 10,600 welds have been identified as requiring additional weld metal. Of these, approximately 8700 have been repaired. TVA is continuing the program for inspection and repair or disposition of these welds. In isolated cases, socket welds are accessible for inspection but not accessible for addition of filler metal. These situations will be documented on NCRs and referred to the Division of Engineering Design (EN DES) for disposition.

Nonconforming Condition Report 2375R documents a similar deficiency with fillet welds on cable tray supports, conduit supports, and miscellaneous steel. The inspection requirements for these welds are defined in General Construction Specification G-29C. Welds had been previously accepted but did not meet the requirements for visual examination. This conclusion was determined from a random sample. Seventy cable tray supports were inspected, nonconformed, and referred to the design project organization for disposition. These welds were subsequently dispositioned "use as is" based on reanalysis of the supports showing that the supports were adequate for design loadings. The defects reported included oversized welds,

MEDS. 100 UB-K

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overlap, poor surface conditions, lack of fusion, and weld spatter. No excess undercut, porosity, weld craters, excess convexity, or arc strikes were reported. Forty conduit supports were inspected and eight were nonconformed. Twenty-two miscellaneous steel items were inspected, and 13 were nonconformed. Further corrective measures are pending, based on the results of EN DES evaluation and disposition.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

RHS:DAK:ATK
cc: Mr. Richard C. DeYoung, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

cc: ARMS, 640 CST2-C
A. W. Crevasse, 401 UBB-C
H. N. Culver, 249A HBB-K
H. J. Green, 1750 CST2-C
J. A. McDonald, Watts Bar-NRC
J. A. Ramlston, W10C126 C-K
H. S. Sanger, Jr., E11B33 C-K
F. A. Szczepanski, 417 UBB-C
J. E. Wilkins, Watts Bar

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JUN - 6 '83

400 Chestnut Street Tower II

June 1, 1983

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 NUCLEAR PLANT UNITS 1 AND 2 - FAULTY FILLET WELDS -NCRs 2806R, 2091R, 2101R, 2111R, 2120R, 2128R, 2137R, AND 2375R - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. W. Wright on February 20, 1980 in accordance with 10 CFR 50.55(e) in conjunction with similar deficiencies designated as NCRs 2806R, 2091R, 2101R, 2111R, 2120R, 2128R, 2137R, and 2375R. Interim reports were submitted on March 19, May 6, August 8, and October 31, 1980 and February 6, June 17, October 13, and December 23, 1981 and February 25, and April 28, and May 20, 1982. Enclosed is our final report.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

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

Records Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

cc (Enclosure):
ARMS, 640 CST2-C
L. W. Iridensee, W10C60 MTB-K
H. N. Culver, 249A HBB-K
H. J. Green, 1750 CST2-C
R. L. Lumpkin, 401 UBB-C (2)
T. Heatherly, Watts Bar-NRC
*J. A. Raulston, W10C126 C-K
H. S. Sanger, Jr., E11B33 C-K
F. A. Szczepanski, 417 UBB-C
G. Wadewitz, Watts Bar

COORDINATED: OEDC/KMall

*The content of this report was coordinated with K. Mall of your staff on May 31, 1983.

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FAULTY FILLET WELDS
NCRs 2806R, 2091R, 2101R, 2111R, 2120R,
2128R, 2137R, AND 2375R
10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

NCRs 2806R, 2091R, 2101R, 2111R, 2120R, 2128R, and 2137R

Numerous fillet welds on socket weld fittings, located in safety-related systems, do not meet ASME code and/or TVA Construction Specification G29M requirements due to insufficient weld metal buildup. These deficiencies occurred on Schedule 40 and heavier pipe that is two inches and less in diameter since these welds are only used on this type of piping. These repeated occurrences are due to improper inspection by welding inspectors. This quality control breakdown was due to the fact that: (1) the welding inspection procedure at Watts Bar does not specifically require the use of mechanical aids (fillet gauges) to determine proper weld metal buildup and (2) a visual inspection of heavy walled pipe is susceptible to error because weld metal requirements are a function of wall thickness. However, the welding inspection procedure does state that the inspector should use any means at his disposal, including mechanical aids, to determine if the weld is of proper size. Therefore, due to the large number of undersized welds that passed inspection, this represents a failure to follow inspection procedures.

NCR 2375R

NCR 2375R documents a deficiency with fillet welds on cable tray supports, conduit supports, and miscellaneous steel items. A random sample was done and of the 70 cable tray supports inspected, 68 were rejected as well as 8 out of 40 conduit supports and 13 out of 22 miscellaneous steel items. These welds passed inspection as inspectors were unsure of drawing requirements as well as use of inadequate inspection methods by inspectors.

Safety Implications

NCRs 2806R, 2091R, 2101R, 2111R, 2120R, 2128R, and 2137R

A large number of welds on small piping in safety-related systems have insufficient weld metal buildup which might affect the strength of the weld. Therefore, if this condition had gone uncorrected, leaks or small pipe breaks could have occurred (especially during a seismic event) which may have adversely affected the safe operations of the plant.

NCR 2375R

Due to the lack of adequate weld inspections for fillet welds on cable tray supports, conduit supports and miscellaneous steel items, deficient welds could have been determined acceptable. Therefore, this condition, had it remained uncorrected, could have jeopardized the integrity of safety-related supports, which upon failure, could have adversely affected the safe operations of the plant.

Corrective Action

NCRs 2806R, 2091R, 2101R, 2111R, 2120R, 2129R, and 2137R

In order to assure that the design and quality requirements of fillet welds are met, a 100-percent reinspection of the following ASME code welds will be performed: (a) TVA Drawing 478001 support attachment welds accepted before September 29, 1980, (b) small bore branch connection welds accepted before August 15, 1980, and (c) any other fillet welds accepted before April 1, 1980.

Welds that have been reinspected will be marked on shop sketches for tracking purposes. All welds requiring repair will be listed on continuation sheets by system. Each system's continuation sheets can be closed after those repairs have been completed. Some systems contain welds that are inaccessible for inspection and/or repair. As these welds are identified, they shall be listed on continuation sheets and attached to transmittal memoranda for individual disposition by TVA's Division of Engineering Design (EN DES).

As the applicable welds in each code piping system have been reinspected and repaired, quality assurance (QA) repair documents have been prepared and accumulated. All necessary repairs for the unit 1 (and common) piping have been identified, with the exception of isolated instances of inaccessibility for reinspection, as in the case of embedded or buried piping. EN DES is determining the disposition of the inaccessible welds on an individual basis.

To date, approximately 34,000 fillet welds have been reinspected with approximately 11,500 having to be repaired. One hundred and fifty-one welds have been identified as inaccessible for reinspection due to pipe embedded in concrete or burial of pipe. One weld has been identified as inaccessible for repair due to the proximity of a hanger member. The original finalized inspection documentation is available and, as stated above, these inaccessible welds have been referred to EN DES for individual disposition. In addition to the welds which are inaccessible for reinspection/repair, approximately 2000 welds (all in unit 2) remain to be reinspected.

To prevent recurrence, welding inspection personnel now utilize clarified inspection criteria and mechanical inspection aids (fillet gauges) in both routine visual inspections and in the extensive reinspection and repair program. Inspection personnel have received additional instruction to emphasize and clarify the criteria provided in the following sections of General Construction Specification G-29M: P.S.1.M.1.2, "General Welding Procedure Specification" and P.S.3.M.5.1, "Visual Examination of Weld Joints." These Process Specifications are implemented by site Quality Control Procedure 4.13, "Nondestructive Examination Procedure." All action will be completed by September 15, 1983 for unit 1 and by June 1, 1984 for unit 2.

NCR 2375R

TVA identified each weld that was visually inspected and found to be inadequate and has made an evaluation of all reported welds in order to determine their adequacy for the applied or postulated load. Welds which were inadequate for the designed load value were reviewed to determine if conservative assumptions could be safely reduced. The factors used in the weld analysis were undercut, lack of fusion, weld size, and concavity. Unacceptable undercut as defined in G-29C was subtracted from the cross section of the undercut metal, and that parent material was analyzed with the reduced cross section and resulting section modulus for the applied load. No parent material was found deficient due to undercut in this sample. Lack of fusion in a run of weld was handled as a reduction of weld length for that distance. Concavity was handled as a reduction in throat.

All welds have been repaired as required and applicable drawings clarified. A total of 49 drawings were revised and about 25,000 linear inches of weld, of which 18,000 were on miscellaneous steel, 3,000 were on cable tray supports, and 4,000 were on conduit supports were inspected during a random inspection program. This random inspection program has provided TVA with a 95+-percent confidence level that welds on both miscellaneous steel items and conduit supports are acceptable and a 100-percent confidence level for the welds on cable tray supports. To prevent recurrence, welding inspectors have been retrained to the requirements of Construction Specification G-29C and now use mechanical aids during their inspections. All work relating to this NCR has been completed.