



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 14, 2011

Mr. Edward D. Halpin
President and Chief Executive Officer/
Chief Nuclear Officer
STP Nuclear Operating Company
South Texas Project
P. O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 - REQUEST FOR RELIEF
RR-ENG-3-05 FROM ASME CODE, SECTION XI REQUIREMENTS FOR
ULTRASONIC EXAMINATION OF REACTOR PRESSURE VESSEL
SHELL-TO-FLANGE WELDS (TAC NOS. ME4975 AND ME4976)

Dear Mr. Halpin:

By letter dated October 18, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102950166), STP Nuclear Operating Company (the licensee) submitted request RR-ENG-3-05 in which it requested relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements applicable to ultrasonic (UT) examinations to be conducted in accordance with Section XI, Appendix I of the ASME Code, pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR) for South Texas Project (STP), Units 1 and 2.

Article IWA-2232 of the ASME Code, Section XI, requires that UT examinations be conducted in accordance with Section XI, Appendix I of the ASME Code. Appendix I, Article I-2110(b) requires that UT examinations of the reactor pressure vessel (RPV) shell-to-flange welds be examined in accordance with ASME Code, Section V, Article 4. The licensee has proposed an alternative using the performance-based methods of ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 50.55a(b)(2)(xxiv). The request is for the third 10-year inservice inspection (ISI) interval for STP, which ends on September 25, 2020, for Unit 1, and October 19, 2020, for Unit 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's request and determined that the proposed alternative provides an acceptable level of quality and safety. Based on the enclosed safety evaluation, the NRC staff concludes that procedures, personnel, and equipment qualified in accordance with the ASME Code, Section XI, Appendix VIII, demonstrate a high probability of detecting flaws and increase the reliability of examinations of weld configurations within the scope of the Performance Demonstration Initiative program. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the use of the proposed alternative for the third 10-year ISI interval for STP, Units and 2.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

E. Halpin

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If you have any questions, please contact the project manager, Balwant K. Singal, at 301-415-3016 or via e-mail at Balwant.Singal@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael T. Markley". The signature is written in a cursive style with a large initial "M".

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure:
As stated

cc w/encl: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME SECTION XI CODE REQUIREMENTS

FOR ULTRASONIC EXAMINATION OF REACTOR PRESSURE VESSEL

SHELL-TO-FLANGE WELDS

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated October 18, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102950166), STP Nuclear Operating Company (the licensee) submitted a request for relief (RR-ENG-3-05) from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements from ultrasonic (UT) examinations to be conducted in accordance with Section XI, Appendix I of the ASME Code pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR) for South Texas Project (STP), Units 1 and 2.

Article IWA-2232 of the ASME Code, Section XI, requires that UT examinations be conducted in accordance with Section XI, Appendix I of the ASME Code. Appendix I, Article I-2110(b) requires that UT examinations of the reactor pressure vessel (RPV) shell-to-flange welds be examined in accordance with ASME Code, Section V, Article 4. The licensee has proposed an alternative using the performance-based methods of ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 50.55a(b)(2)(xxiv). The request is for the third 10-year inservice inspection (ISI) interval for STP, which ends on September 25, 2020, for Unit 1, and October 19, 2020, for Unit 2.

2.0 REGULATORY EVALUATION

Inservice inspection of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). The regulations in 10 CFR 50.55a(a)(3) state that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if:

Enclosure

(i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulation requires that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12-months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable Code of record for the third 10-year interval ISI program at STP, Units 1 and 2 is the 2004 Edition of the ASME Code, Section XI, without Addenda.

3.0 TECHNICAL EVALUATION

3.1 Component Identification

RR-ENG-3-05 addresses the ASME Code Class 1, Examination Category B-A, Item No. B1.30 RPV shell-to-flange welds at STP, Units 1 and 2.

3.2 Code Requirements

The 2004 Edition of the ASME Code, Section XI, IWA-2232 requires that UT examinations be conducted in accordance with the ASME Code, Section XI, Appendix I. Appendix I, I-2110(b) requires UT examinations of RPV shell-to-flange welds to be conducted in accordance with the ASME Code, Section V, Article 4. Appendix I, I-2110(b) also requires that these examinations be further supplemented by Appendix I, Table I-2000-1. The required examination volume for RPV shell-to-flange welds is provided in the ASME Code, Section XI, Figure IWB-2500-4, as specified in the ASME Code, Section XI, Table IWB-2500-1 for these Examination Category B-A Item No. B1.30 welds.

3.3 Basis for Relief and Proposed Alternative (as stated by the licensee)

The RPV shell-to-flange weld is the only circumferential shell weld in the RPV not examined according to ASME [Code,] Section XI, Appendix VIII, Supplements 4 and 6 UT techniques [Article I-2110(a)].

Procedures, equipment, and personnel qualified by the Appendix VIII Performance Demonstration Initiative (PDI) Programs for Supplements 4 and 6 have demonstrated a high probability of detecting flaws, and are generally considered superior to those qualified under the [ASME Code,] Section V, Article 4 criteria.

3.4 Proposed Alternative and Basis for Relief (as stated by the licensee)

The RPV shell-to-flange weld will be examined in accordance with the performance-based methods of ASME [Code,] Section XI, 2001 Edition (no Addenda), Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 50.55a(b)(2)(xxiv).

ASME [Code,] Section XI, 2004 Edition 2005 Addenda, Appendix I, Article I-2600(a) states that for components to which Appendix VIII is not applicable, examination procedures, personnel, and equipment qualified in accordance with Appendix VIII may be applied, provided such components, materials, sizes, and shapes are within the scope of the qualified examination procedure.

Industry experience has shown that the Appendix VIII PDI approach for UT examinations equals or surpasses the UT examination techniques of the ASME Code, Section V, Article 4 for detection and characterization of flaws in reactor pressure vessels. The procedure requires the examiner to evaluate all indications determined to be flaws regardless of their amplitude.

The proposed qualification approach is more conservative. Therefore, the use of the proposed alternative will provide an acceptable level of quality and safety.

3.5 NRC Staff Evaluation

The 2004 Edition of the ASME Code, Section XI, IWA-2232 states that UT examinations shall be conducted in accordance with the ASME Code, Section XI, Appendix I. Appendix I, I-2110(b) states that UT examination of RPV shell-to-flange welds, closure head-to-flange welds, and integral attachment welds shall be conducted in accordance with the ASME Code, Section V, Article 4, as supplemented by Appendix I, Table I-2000-1. The ASME Code, Section V, Article 4 provides a prescriptive process for qualifying UT examination procedures and the scanning requirements for examinations. UT examinations performed in accordance with the ASME Code, Section V, Article 4 use detailed criteria for setting up and calibrating equipment, calculating coverage, and detecting indications. The capability of an ASME Code, Section V, Article 4 UT examination is demonstrated with calibration blocks made from representative material containing holes and notches.

In lieu of the ASME Code, Section V, Article 4 angle-beam UT examination requirements, the licensee proposed to perform the RPV shell-to-flange weld examination at STP, Units 1 and 2, using examination procedures, personnel, and equipment qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 50.55a(b)(2)(xxiv). The regulations in 10 CFR 50.55a(b)(2)(xxiv) limit the use of the ASME Code, Section XI, Appendix VIII to the 2001 Edition of the ASME Code with no Addenda. The ASME Code, Section XI, Appendix VIII is a performance-based UT examination method. Performance-based UT examination requires that detailed criteria be used for performance demonstration tests. The results for the tests are compared against statistically developed screening criteria. The tests are performed on representative mockups containing flaws similar

to those found in operating plants. The performance-based tests demonstrate the effectiveness of UT examination procedures, personnel, and equipment.

In accordance with 10 CFR 50.55a(b)(2)(xv)(G), UT examinations performed using procedures, personnel, and equipment qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, shall follow the following examination coverage requirements:

- (1) The clad to base metal interface, including a minimum of 15 percent T (measured from the clad to base metal interface), must be examined from four orthogonal directions using procedures and personnel qualified in accordance with Supplement 4 to Appendix VIII.
- (2) If the clad-to-base-metal-interface procedure demonstrates detectability of flaws with a tilt angle relative to the weld centerline of at least 45 degrees, the remainder of the examination volume is considered fully examined if coverage is obtained in one parallel and one perpendicular direction. This must be accomplished using a procedure and personnel qualified for single-side examination in accordance with Supplement 6. Subsequent examinations of this volume may be performed using examination techniques qualified for a tilt angle of at least 10 degrees.
- (3) The examination volume not addressed by paragraph (b)(2)(xv)(G)(1) of this section is considered fully examined if coverage is obtained in one parallel and one perpendicular direction, using a procedure and personnel qualified for single sided examination when the conditions in paragraph (b)(2)(xv)(G)(2) are met.

UT examination procedures, personnel, and equipment qualified in accordance with the ASME Code, Section XI, Appendix VIII, following the examination coverage stated above, demonstrate a high probability of detecting flaws and increase the reliability of examinations of weld configurations within the scope of the PDI program. Therefore, the NRC staff concludes that proposed alternative provides an acceptable level of quality and safety.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's proposed alternative to apply the ASME Code, Section XI, Appendix VIII performance demonstration requirements for UT examinations of the RPV shell-to-flange welds at STP, Units 1 and 2, and determined that the proposed alternative provides an acceptable level of quality and safety. The NRC staff concludes that procedures, personnel, and equipment qualified in accordance with the ASME Code, Section XI, Appendix VIII demonstrate a high probability of detecting flaws and increase the reliability of examinations of weld configurations within the scope of the PDI program. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the use of the proposed alternative for the third 10-year ISI interval for STP, which ends on September 25, 2020, for Unit 1 and October 19, 2020, for Unit 2.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the authorized Nuclear Inservice Inspector.

Principal Contributor: Chris Sydnor, NRR/DCI/CVIB

Date: October 14, 2011

E. Halpin

- 2 -

If you have any questions, please contact the project manager, Balwant K. Singal, at 301-415-3016 or via e-mail at Balwant.Singal@nrc.gov.

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure:
As stated

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***Memo dated 9/19/11**

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DATE	10/11/11	10/5/11	9/19/11	10/14/11

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