

June 20, 2001

Mr. William T. Cottle
President and Chief Executive Officer
STP Nuclear Operating Company
South Texas Project Electric
Generating Station
P. O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 REQUEST FOR RELIEF FOR
REACTOR PRESSURE VESSEL WELD NONDESTRUCTIVE EXAMINATION
COVERAGE FOR THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL
(TAC NOS. MA9920 and MA9921)

Dear Mr. Cottle:

By letter dated August 24, 2000, STP Nuclear Operating Company (the licensee) submitted a request for relief concerning the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI requirements for South Texas Project Electric Generating Station Units 1 and 2. The licensee requested approval for the use of alternative ultrasonic examination coverage requirements. The Nuclear Regulatory Commission (NRC) staff reviewed the relief request against the requirements of the 1983 Edition through the Summer 1983 Addenda and the 1989 Edition of the ASME Code Section XI, and 10 CFR 50.55a(g)(6)(ii)(A)(5). Pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) provisions, the licensees that are unable to completely satisfy the augmented reactor pressure vessel (RPV) shell weld examination requirement may submit information to the NRC to support that determination and propose an alternative to the examination requirements.

The NRC staff has reviewed the licensee's submittal related to welds RPV1-101-141 (Unit 1) and RPV2-101-141 (Unit 2) and finds that reasonable assurance of structural integrity of the vessel will be provided by the alternative examinations proposed. Therefore, the licensee's proposed alternative provides an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) for the licensee's first 10-year inservice inspection interval.

The NRC staff's evaluation and conclusions are contained in the enclosed safety evaluation (SE). Should you have questions regarding this SE, please contact Mr. Mohan C. Thadani, at 301-415-1476.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REQUEST FOR RELIEF FROM REQUIREMENTS OF AMERICAN SOCIETY OF
MECHANICAL ENGINEERS (ASME)
INSERVICE INSPECTION (ISI) REQUIREMENTS
REGARDING REACTOR PRESSURE VESSEL SHELL WELDS
SOUTH TEXAS PROJECT, UNITS 1 AND 2
SOUTH TEXAS PROJECT NUCLEAR OPERATING COMPANY (STPNOC)
DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated August 24, 2000, STP Nuclear Operating Company (the licensee) submitted a request for relief from certain examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI for South Texas Project Electric Generating Station Units 1 and 2. The information provided by the licensee in support of the request for relief from Code requirements has been evaluated. The basis for disposition is documented below.

2.0 BACKGROUND

ISI of the ASME Code Class 1, 2, and 3 components are to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Pursuant to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if (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 regulations require 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 edition of Section XI of the

ASME Code for the first 10-year ISI interval at South Texas Project Electric Station Units 1 and 2 is the 1983 Edition though the Summer 1983 Addenda.

3.0 LICENSEE'S REQUEST FOR RELIEF

The licensee provided the following information supporting the relief request.

The components for which relief is requested:

ASME B&PV Code, Section XI, Subsection IWB, Examination Category B-A, Item B1.10, reactor vessel welds.

Specifically, the reactor pressure vessel lower shell-to-bottom head circumferential welds identified as RPV1-101-141 (Unit 1) and RPV2-101-141 (Unit 2). These welds are located at the intersection of the lower shell ring plates with the bottom head torus plates, approximately four feet below the core beltline region.

Code Requirements:

Code of Federal Regulations

10 CFR 50.55a(g)(6)(ii)(A)(2) states:

All licensees shall augment their reactor vessel examination by implementing once, as part of the inservice inspection interval in effect on September 8, 1992, the examination requirements for reactor vessel shell welds specified in Item B1.10 of Examination Category B-A, "Pressure Retaining Welds in Reactor Vessel", in Table IWB-2500-1 of subsection IWB of the 1989 Edition of section XI, Division 1, of the ASME Boiler and Pressure Vessel Code....For the purpose of this augmented examination, 'essentially 100%' as used in Table IWB-2500-1 means more than 90 percent of the examination volume of each weld, where the reduction in coverage is due to interference by another component, or part geometry.

10 CFR 50.55a(g)(6)(ii)(A)(4) states:

The requirement for augmented examination of the reactor vessel may be satisfied by an examination of essentially 100 percent of the reactor vessel shell welds specified in § 50.55a(g)(6)(ii)(A)(2) that ... is required by § 50.55a(g)(4)(i), during the inservice inspection interval in effect on September 8, 1992.

ASME Boiler and Pressure Vessel Code Section XI

ASME Section XI Code, Table IWB-2500-1, Examination Category B-A, Note (2) requires nondestructive examination of essentially 100 percent of reactor pressure vessel weld lengths.

Licensee's Basis for Relief from Requirements:

10 CFR 50.55a(g)(6)(ii)(A)(5) states:

Licensees that make a determination that they are unable to completely satisfy the requirements for the augmented reactor vessel shell weld examination specified in § 50.55a(g)(6)(ii)(A) shall submit information to the Commission to support the determination and shall propose an alternative to the examination requirements that would provide an acceptable level of quality and safety....

Pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5), the South Texas Project previously requested Nuclear Regulatory Commission authorization to use an alternative to the requirement to examine greater than 90 percent (essentially 100 percent) of reactor vessel shell welds RPV1-101-141 and RPV2-101-141. This was based on the impracticality of achieving essentially 100% coverage. Obtaining essentially 100 percent examination coverage of welds RPV1-101-141 and RPV2-101-141 is not practical due to:

- the configuration of reactor pressure vessel components;
- part geometry; and
- examination equipment and techniques utilized for the automated ultrasonic examinations.

The Nuclear Regulatory Commission approved relief (Reference 3 of the licensee's submittal dated August 24, 2000) from these requirements for the South Texas Project for an estimated examination coverage range of 68% to 76% for RPV1-101-141 and 75% to 83% for RPV2-101-141. However, the actual amounts of coverage of these welds by the examination were found to be 62% and 69%, respectively.

Licensee's Proposed Alternative Examination (as stated):

As an alternative to examining the subject welds as discussed in the safety evaluation report (Reference 3 of the licensee's submittal dated August 24, 2000), the South Texas Project proposes the actual coverages achieved, 62% and 69%, be approved for use.

Licensee's Justification for Granting Relief (as stated):

Ultrasonic examination coverage for reactor pressure vessel circumferential welds RPV1-101-141 and RPV2-101-141 from the interior is limited by the proximity of the core support lugs. The six core support lugs are the primary interference limiting the ultrasonic examination of circumferential welds RPV1-101-141 and RPV2-101-141. The core support lugs are mounted on the lower shell plate, equally spaced at 60-degree intervals, and are approximately 13 inches high, 24 inches wide, and 8 inches deep. The inside circumference of the lower shell plate is approximately 544 inches. The core support lugs are located within one-half inch of the lower shell ring to bottom head weld and do not allow access from that side of the subject welds. Sketch 1 (see licensee's submittal dated August 24, 2000) depicts the limited scan area.

Performing nondestructive examinations from the outside of the reactor pressure vessel is not practical based on limited physical access and radiation exposure. Based on previous radiation

surveys, general exposure rates at the exterior of the reactor pressure vessel are expected to range from 200 mrem/hr to 700 mrem/hr at the specified circumferential shell welds.

The subject welds were volumetrically examined during fabrication of the vessel in accordance with the applicable construction code and during a limited preservice inspection. The welds were found to be free of unacceptable indications.

There is no change in the justification for reduced weld examination coverage from that presented in references 1, 2, and 3 (of the licensee's submittal dated August 24, 2000).

The Nuclear Regulatory Commission safety evaluation report (Reference 3, of the licensee's submittal) included the following comments:

- There are no mechanisms for damage other than fatigue.
- The subject welds are outside the beltline region and are not subject to irradiation embrittlement due to high neutron fluence.
- The probability of initiation of a flaw and subsequent propagation of the inservice flaw to an extent causing concern during the first ten-year interval is extremely small due to the low number of operating transients. In addition, any degradation mechanism residing in the welds is likely to be detected during the examination.
- The probability of a rejectable indication being present in the unexamined weld volume is extremely low.

Based upon the above, in accordance with the provisions of 10 CFR 50.55a(g)(6)(ii)(A)(5), the proposed alternative examination coverage, in combination with examination coverage of the other reactor vessel shell welds, will provide an acceptable level of quality and safety.

4.0 EVALUATION

The 1983 Edition, through the Summer 1983 Addenda of the ASME Code Section XI Table IWB-2500-1, examination category B-A, item number B1.10, Shell Welds, requires examination of all welds in the 1st inspection interval and one beltline region weld in successive inspection intervals. However, 10 CFR 50.55a(g)(6)(ii)(A)(2) requires all licensees to augment their RPV examinations by implementing once, as part of the inservice inspection interval in effect on September 8, 1992, the examination requirements for RPV shell welds specified in item B1.10 of Examination Category B-A, "Pressure Retaining Welds in Reactor Vessel," in Table IWB-2500-1 of Subsection IWB of the 1989 Edition of Section XI, Division 1, of the ASME B&PV Code, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(A)(3) and (4). The licensee is requesting the Nuclear Regulatory Commission (NRC) staff authorization of its alternative to the requirements of 10 CFR 50.55a(g)(6)(ii)(A)(2) which requires an augmented examination of essentially 100% of the vessel welds. The licensee received approval for the anticipated examination coverage range of 68% to 76% coverage for RPV1-101-141 and 75% to 83% coverage for RPV2-101-141 documented in a NRC staff SER dated March 2, 1999. However, the licensee was only able to obtain 62% coverage for RPV1-101-141 and 69% coverage for RPV2-101-141. The primary interference which limits the ultrasonic examination are the six core support lugs in each RPV. Performing nondestructive examinations from the outside of the RPV is not practical based on limited physical access and radiation exposure.

Based on the percentage of weld volume examined of the subject welds, in combination with the examinations of other reactor vessel shell welds, the NRC staff finds that any patterns of degradation would be detected, if present. On this basis, the NRC staff finds that reasonable assurance of structural integrity of the vessel will be provided by the examinations performed and that the alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) the licensee's proposed alternative is authorized for the licensee's first 10-year ISI interval at STP Units 1 and 2.

5.0 CONCLUSION

The NRC staff concludes that the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, relief is authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) for the first ISI interval at STP, Units 1 and 2.

Principal Contributor: A. Kiem

Date: June 20, 2001