

October 15, 1999

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 - SECOND 10-YEAR INTERVAL  
INSERVICE INSPECTION PROGRAM PLAN - RELIEF REQUEST RR-ENG-2-4  
(TAC NOS. MA5872 AND MA5873)

Dear Mr. Cottle:

By letter dated June 9, 1999, STP Nuclear Operating Company (STPNOC) submitted relief request RR-ENG-2-4 for relief from the American Society of Mechanical Engineers Code, Section XI, nondestructive examination requirements applicable to the South Texas Project (STP), Units 1 and 2, reactor vessel closure head nuts. STPNOC proposes to perform an alternative ultrasonic examination from the outside and end surfaces of these nuts.

The Nuclear Regulatory Commission staff has evaluated the information provided by STPNOC. The staff concludes that STPNOC's proposed alternative to the Code requirement provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternative proposed in relief request RR-ENG-2-4 is authorized for the second 10-year inservice inspection interval of the STP, Units 1 and 2. Our related safety evaluation is enclosed.

Sincerely,

Original signed by:

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

RELATED TO THE SECOND 10-YEAR INSERVICE INSPECTION PROGRAM

RELIEF REQUEST RR-ENG-2-4

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated June 9, 1999, STP Nuclear Operating Company (the licensee) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Code, Section XI, nondestructive examination requirements applicable to South Texas Project (STP), Units 1 and 2, reactor vessel closure head nuts (Relief No. RR-ENG-2-4). The licensee proposes to perform an alternative ultrasonic examination from the outside and end surfaces of these nuts. The licensee's relief request is applicable to the second 10-year inservice inspection (ISI) interval for STP, Units 1 and 2.

2.0 BACKGROUND

ISI of the ASME Code Class 1, 2, and 3 components shall 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(6)(g)(i). The regulation at 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the 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. For STP Units 1 and 2 the applicable edition of Section XI of the ASME Code for the second 10-year ISI interval is the 1989 Edition.

Enclosure

### 3.0 LICENSEE'S REQUEST

#### Relief No. RR-ENG-2-4 Code Requirement

ASME Code, Section XI, Table IWB-2500-1, Examination Category B-G-1, Item No. B6.10, requires a surface examination (i.e., magnetic particle) of the inside (threaded) surface of the reactor pressure vessel closure head nuts.

#### Licensee's Basis for Requesting Relief from Code Requirements (as stated)

ASME Section XI requires surface examination of the reactor pressure vessel nuts (see Table IWB-2500-1, Examination Category B-G-1, Item No. B6.10). Although there is no description or figure reference in Section XI depicting the area of the examination, the requirement has been interpreted to include all surfaces of the nut (i.e., top, bottom, outside, and inside threads). Typically, a fluorescent magnetic particle examination is performed on threaded areas because of its suitability for discrimination of relevant indications in the root of the thread. However, due to the poor viewing angle and the limited access to the threaded surface with the magnetic particle equipment and black light, a technically adequate magnetic particle examination cannot be performed on the reactor pressure vessel nut threads.

In accordance with the provisions of 10 CFR 50.55a(a)(3)(i), the South Texas Project requests relief from the Section XI requirement to perform a surface examination on the inside surface (i.e., threaded portion) of the reactor pressure vessel closure head nuts. This relief request proposes application of an alternative ultrasonic examination in lieu of the magnetic particle examination of the threaded area of each nut.

#### Licensee's Proposed Alternative Examination (as stated)

In lieu of the magnetic particle examination of the threaded surfaces of the reactor pressure vessel nut, the South Texas Project will perform an alternative ultrasonic examination of the threaded region from the outside and end surfaces of the nut. This ultrasonic examination will provide coverage of the thread root area in two directions:

- A 0-degree ultrasonic examination is performed 360 degrees around the nut end surface to examine the threaded area for circumferential flaws (see Figure 1). No limitations are encountered with the 0-degree ultrasonic examinations.
- A 43-degree ultrasonic (UT43) examination from the outside surface is used to examine the threaded area in clockwise and counterclockwise directions to detect axial flaws (see Figure 2). Limitations are encountered with the UT43 examination in the area of the six wrench slots located on the upper end of the outside diameter. These slots

reduce the UT43 examination coverage of the threaded region by approximately 7.5 percent.

A spare reactor pressure vessel nut will be used for the calibration block (see Figure 3). Circumferential notches cut 0.115 inch deep and an axial notch cut through the threads to the thread root serve as bases for the sensitivity of the ultrasonic examinations.

Magnetic particle examinations will continue to be conducted on the outside and end surfaces of the reactor pressure vessel nuts.

#### 4.0 EVALUATION

The applicable code requirements for the licensee's second 10-year ISI interval requires a surface examination of all surfaces associated with the reactor vessel head closure nuts (top, bottom, inside threads, outside diameter). Performing a surface examination on the threaded area of the nuts is hindered by the viewing angle and limited access. As an alternative, the licensee proposes to use ultrasonic testing to examine the inside threaded region of the nuts. The licensee proposes to use a 0-degree ultrasonic examination technique on the nut end surface to examine the threaded area for circumferential flaws. No limitations are encountered with the 0-degree ultrasonic examinations. In addition, a 43-degree ultrasonic examination technique will be used on the outside diameter in clockwise and counterclockwise directions to detect axial flaws in the threaded region. Limitations are encountered in the 43-degree examination in the area of the six wrench slots located on the upper edge of the outside diameter. The wrench slots reduce the 43-degree examination coverage of the threaded region by approximately 7.5 percent.

The code-required magnetic particle examination is intended to provide detection of surface crack initiation, but does not provide information on the depth of the cracks. The proposed ultrasonic examination would be expected to reveal cracking before it becomes significant and provides an estimate of crack depth. The ultrasonic examination can be performed on the exterior surfaces of the reactor vessel head closure nuts and provides indication of discontinuities throughout the volume of the material including indications of cracking that initiate in the threaded region of the nut. Therefore, the staff finds the licensee's proposed alternative of performing an ultrasonic examination on the exterior surfaces of the nuts will provide acceptable assurance of structural integrity by identifying any significant indications in the threaded region of the nut.

#### 5.0 CONCLUSION

Based on the above evaluation, the staff has determined that the code-required examination is not feasible on the interior threaded region of the nuts. The staff concludes that the licensee's proposed alternative to the code requirement provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the alternative proposed in relief request RR-ENG-2-4 is authorized for the second 10-year ISI interval at STP, Units 1 and 2.

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Date: October 15, 1999

South Texas, Units 1 & 2

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