February 16, 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 APPROVAL TO USE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE, SECTION XI, CODE CASE N-416-2, RELIEF REQUEST RR-ENG-2-20 (TAC NOS. MB0382 AND MB0383)

Dear Mr. Cottle:

By a letter dated October 10, 2000, South Texas Project Nuclear Operating Company (STPNOC or licensee) requested relief (RR-ENG-2-20) from the ASME Code Section XI. The licensee requested implementation of ASME, Section XI, Code Case N-416-2, “Alternative Pressure Test Requirement for Welded Repairs, Fabrication Welds for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding, Class 1, 2, and 3," in lieu of the requirement of ASME Code, Section XI, Paragraph IWA-4700. The Code Case N-416-2 allows use of a system leakage test, in conjunction with specified non-destructive examination in lieu of a system hydrostatic test required by IWA-4700.

Based on the U.S. Nuclear Regulatory Commission (NRC) staff’s review of your October 10, 2000 submittal, we have concluded that Compliance with Code hydrostatic testing requirements for welded repairs or replacements, or piping subassemblies or installation of replacement of Code Class 1, 2, and 3 components would result in a hardship without a compensating increase in the level of quality and safety. The licensee’s proposed alternative provides reasonable assurance of structural integrity of the subject components. Therefore, the proposed alternative is authorized, pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year inservice inspection interval or until such time as the code case is referenced in 10 CFR 50.55a. At that time, if the licensee intends to continue to implement this code case, the licensee should follow all provisions referenced in Code Case N-416-2, with limitations issued in 10 CFR 50.55a, if any.

The NRC staff's evaluation and conclusions are contained in the enclosed safety evaluation. Should you have questions regarding this safety evaluation, 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

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

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cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INSERVICE INSPECTION (ISI) PROGRAM

REQUEST FOR RELIEF FROM REQUIREMENTS OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

CODE SECTION XI, 1989 EDITION, PARAGRAPH IWA-4700; AND AUTHORIZATION TO IMPLEMENT CODE CASE N-416-2

SOUTH TEXAS PROJECT, UNITS 1 AND 2

SOUTH TEXAS PROJECT NUCLEAR OPERATING COMPANY (STPNOP)

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

The 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 Code (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). Section 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the [Nuclear Regulatory Commission] NRC, if (i) the proposed alternative 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 ISI Code of Record for the second 10-year ISI interval of South Texas Project, Units 1 and 2, is the 1989 Edition of ASME Section XI.

By letter dated October 10, 2000, STNPOC submitted a request for relief (RR-ENG-2-20) from the paragraph IWA-4700 of the ASME Code, Section XI, 1989 Edition regarding implementation

of ASME Section XI Code Case N-416-2, "Alternative Pressure Test Requirement for Welded Repairs, Fabrication Welds for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding, Class 1, 2, and 3," at South Texas Project, Units 1 and 2 for the second 10-year ISI interval.

The staff has evaluated the licensee's request for relief No. RR-ENG-2-20, pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year ISI interval of South Texas Project, Units 1 and 2.

2.0 DISCUSSION - RELIEF REQUEST NO. RR-ENG-2-20 ON USE OF CODE CASE N-416-2

2.1 Components for which Relief is Requested:

Class 1, 2, and 3 components subject to pressure testing following repair, fabrication or installation by welding.

2.2 Code Requirement:

ASME Section XI, 1989 Edition, paragraph IWA-4700 requires a system hydrostatic test for detection of leakage after a welded repair on a pressure-retaining boundary or installation of a replacement by welding.

2.3 Licensee's Code Relief Request

Relief is requested from the requirements specified in paragraph IWA-4700 of the ASME Code, Section XI, 1989 Edition. The South Texas Project is requesting approval to use ASME Section XI Code Case N-416-2, "Alternative Pressure Test Requirement for Welded Repairs, Fabrication Welds for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding, Class 1, 2, and 3," which allows use of a system leakage test, in conjunction with specified non-destructive examination, in lieu of a system hydrostatic test.

2.4 Licensee's Proposed Alternative

Code Case N-416-2 allows performance of a system leakage test in lieu of a Code-required system hydrostatic pressure test for welded repairs, fabrication welds for replacement parts and piping subassemblies, or installation of replacement items by welding provided the following requirements are met:

a. NDE shall be performed on welded repairs and fabrication and installation joints in accordance with the methods and acceptance criteria of the applicable Subsection of the 1992 Edition of Section III.

b. Prior to or immediately upon return to service, a visual examination (VT-2) shall be performed on welded repairs and fabrication and installation joints in conjunction with a system leakage test, using the 1992 Edition of Section XI, in accordance with paragraph IWA-5000, at nominal operating pressure and temperature.

c. Use of this Case shall be documented on an NIS-2 form.

In addition to the above, the South Texas Project will comply with the additional limitations stated in Regulatory Guide 1.147 for Code Case N-416-1 requiring additional surface examinations on the root pass layer of butt and socket welds of the pressure-retaining boundary of Class 3 components when the surface examination method is used in accordance with Section III. Consequently, there is no change in non-destructive examination and pressure test requirements from what has already been approved by the NRC.

2.5 Licensee's Basis for Relief Request (as stated)

"The South Texas Project Nuclear Operating Company has concluded that system hydrostatic testing requirements impose significant hardships, while adding marginal (if any) value, without a compensating increase in the level of quality and safety.

Hydrostatic testing subjects the components to a relatively small increase in pressure over the nominal operating pressure and is not intended to present a significant (potentially destructive) challenge to pressure boundary integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during examination of components under pressure, rather than a measure of the structural integrity of the components.

Industry experience has demonstrated that leaks are not discovered as a result of hydrostatic test pressures propagating a pre-existing flaw through the wall of a component. In most cases, leaks are found when the system is at normal operating pressure. Hydrostatic pressure testing other than that following welded repair or replacement is required only upon installation and at 10-year inspection intervals for Class 1, 2, and 3 systems. System leakage tests at normal operating pressure are conducted a minimum of once each refueling outage for Class 1 systems and portions of Class 2 systems, and once each 40-month inspection period for Class 3 and the remainder of Class 2 systems. Leaks may also be identified during routine system walkdowns by plant operators and system engineers.

Hardships associated with hydrostatic testing performed in accordance with the referenced Code are as follows:

- Hydrostatic pressure testing frequently requires significant effort in preparation and performance. Since the testing is of questionable benefit, the required resources could be better spent in activities that more effectively assure plant safety and reliability.

- Special valve lineups for these tests add unnecessary challenges to maintaining system configuration.

- Tests performed inside the radiologically restricted area increase the total exposure to plant personnel performing the tasks of modifying and restoring system lineups and removing contaminated test equipment.

In addition, hydrostatic tests have the added potential to initiate leak paths at mechanical connections (e.g., valve packing gland, flange joints)."

3.0 EVALUATION

ASME Section XI, 1989, IWA-4000 (a) requires that a system hydrostatic test be performed in accordance with IWA-5000 after repairs by welding in a pressure-retaining boundary. The licensee proposes to implement the alternative to hydrostatic pressure tests contained in Code Case N-416-2 for Code Class 1, 2, and 3 repairs/replacements parts and piping subassemblies, or installation of replacement items. In addition, for Class 3 repair/replacement welds or welded areas the licensee will supplement the pressure test with an additional surface examination on the root pass layer. The NRC has already approved use of the previous revision to this code case which is N-416-1 in Regulatory Guide 1.147. The revised Case N-416-2 has made the same provision as that of its previous revision regarding alternative pressure test but includes fabrication welds for replacement parts and piping subassemblies in addition to welded repairs and installation of replacement items that are exclusive to Code Case N-416-1. Moreover, there has been no change to the technical and the non-destructive examination requirements in the revised Code Case N-416-2 in comparison to that of Code Case N-416-1.

ASME Section XI Code prior to the 1999 Addenda provides rules for the pressure testing of welded repairs and installation of items by welding (reference Section XI, IWA-4540 and Code Case N-416-1). However, until the approval of Code Case N-416-2 by ASME, there was a gap between the published Construction Codes and the ASME Code, Section XI, in regard to the requirement for pressure testing of fabrication welds. ASME Code Case N-416-2, therefore, has clarified an acceptable pressure testing along with nondestructive examination (NDE) requirements for these fabrication welds. Code Case N-416-2 permits fabrication welds in replacement parts to be pressure tested along with the installation welds.

Hardships are generally encountered with the performance of hydrostatic testing in accordance with the Code. Hydrostatic pressure testing frequently requires a significant effort to set up and perform due to the need to use special equipment, such as temporary attachment of test pumps and gages, and the need for unique valve lineups.

Code Case N-416-2 specifies that NDE of the welds be performed in accordance with the applicable subsection of the 1992 Edition of Section III. This code case also allows a VT-2 visual examination to be performed at nominal operating pressure and temperature in conjunction with a system leakage test, in accordance with paragraph IWA-5000 of the 1992 Edition of Section XI. Comparison of the system pressure test requirements of the 1992 Edition of Section XI to those of the 1989 Edition of Section XI, the Code of record shows that:

- The test frequencies and pressure conditions are unchanged;
- The hold times either remained the same or increased;
- The terminology associated with the system pressure test requirements for all three Code classes has been clarified and streamlined; and
- The NDE requirements for welded repairs remain the same.

Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure and, therefore, does not present a significant challenge to pressure boundary

integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leak detection during the examination of components under pressure, rather than as a measure of the structural integrity of the components.

Following welding, the Code requires volumetric examination (depending on wall thickness) of repairs or replacements in Code Class I and 2 piping components, but only requires a surface examination of the final weld pass in Code Class 3 piping. There is no NDE requirement for Code Class 3 components regarding inservice inspection except for VT-2 visual examination for leaks in conjunction with the 10-year hydrostatic tests and the periodic pressure tests.

Considering the NDE performed on Code Class 1 and 2 systems, and considering that the hydrostatic pressure tests rarely result in pressure boundary leaks that would not occur during system leakage tests, the staff believes that the increased assurance of the integrity of Class I and 2 welds that could be achieved is not commensurate with the burden of performing hydrostatic testing. It is also believed that the added assurance provided by a hydrostatic test of Class 3 welds is not commensurate with the burden of hydrostatic testing when (1) a surface examination is performed on the root pass layer of butt and socket welds, and (2) a system pressure test is performed.

4.0 CONCLUSION

Compliance with Code hydrostatic testing requirements for welded repairs or replacements, or piping subassemblies or installation of replacement of Code Class 1, 2, and 3 components would result in a hardship without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject components. Therefore, the proposed alternative is authorized, pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year inservice inspection interval or until such time as the Code Case is referenced in 10 CFR 50.55a. At that time, if the licensee intends to continue to implement this code case, the licensee should follow all provisions referenced in Code Case N-416-2, with limitations issued in 10 CFR 50.55a, if any.

Principal Contributor: P. Patnaik

Date: February 16, 2001