

June 25, 2003

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, RR-ENG-2-31, FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE REQUIREMENTS FOR APPROVAL OF ASME SECTION IX CODE CASES 2142-1 AND 2143-1 FOR THE SECOND 10-YEAR INSPECTION INTERVAL (TAC NOS. MB9098 AND MB9099)

Dear Mr. Cottle:

By letter dated May 15, 2003, STP Nuclear Operating Company (STPNOC or the licensee), requested relief from the requirements of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Article IWA-4000. The licensee proposed to follow the guidelines of ASME Code Case 2142-1, "F-Number Grouping for Ni-Cr-Fe, Classification UNS N06052 Filler Metal, Sections III, IX, and XI" and Code Case 2143-1, "F-Number Grouping for Ni-Cr-Fe, Classification UNS W86152 Welding Electrode, Sections III, IX, and XI."

STPNOC requested relief from the requirements of ASME Code Section XI, Article IWA-4000 in accordance with Section 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations* in order to perform repair welds and installation welds for replacement items. The ASME Section III codes applied to the original construction and the corresponding ASME Section II material codes for most South Texas Project (STP) components do not address the welding materials specified in Code Cases 2142-1 and 2143-1. STPNOC requested that the U.S. Nuclear Regulatory Commission (NRC) approve the use of ASME Code Cases 2142-1 and 2143-1 at STP, Units 1 and 2 on the basis that it provides an acceptable level of quality and safety.

Code Cases 2142-1 and 2143-1 have classified the welding filler material group number as F-No. 43 for the Alloy 690 shielded metal arc welding electrode designated as UNS W86152 and the bare filler wire designated as UNS N06052. Since these weld filler materials are similar in welding characteristics to many other Code nickel-based filler weld materials and have metallurgical properties similar to the base metals, separate procedure and performance qualifications for these materials are not warranted. Affirming this Code F-number designation for Code Cases 2142-1 and 2143-1 permits the specified filler weld material to be used in previously qualified weld procedures, thus eliminating the need for creating new procedures and performance qualifications.

On the basis of its evaluation, the NRC staff concludes that the proposed alternative to use Alloy 690 (Inconel 52/152) as weld material in accordance with the Code Cases 2142-1 and 2143-1 for the repair of instrument nozzle welds will provide an acceptable level of quality and

W. Cottle

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safety. Therefore, the use of the Code Cases 2142-1 and 2143-1 as requested in the Relief Request RR-ENG-2-31, is authorized pursuant to Section 10 CFR 50.55a(a)(3)(i) at STP, Units 1 and 2, for the second 10-year inservice inspection interval. When these code cases are approved by reference in Regulatory Guide (RG) 1.85, "Materials Code Case Acceptability - ASME Section III, Division 1," the licensee is to follow all provisions in the code cases with limitations issued in RG 1.85, if any, as discussed with Mr. John T. Conly, Licensing, STPNOC, in the telephone conversation on June 23, 2003.

The NRC staff's evaluation and conclusions are contained in the enclosed safety evaluation.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
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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Docket Nos. 50-498 and 50-499

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF NO. RR-ENG-2-31

USE OF AMERICAN SOCIETY OF MECHANICAL ENGINEERS

CODE CASES 2142-1 AND 2143-1

SOUTH TEXAS PROJECT NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated May 15, 2003, STP Nuclear Operating Company (STPNOC or the licensee), requested relief from the requirements of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Article IWA-4000. The licensee has proposed to follow the guidelines of ASME Code Case 2142-1, "F-Number Grouping for Ni-Cr-Fe, Classification UNS N06052 Filler Metal, Sections III, IX, and XI" and Code Case 2143-1, "F-Number Grouping for Ni-Cr-Fe, Classification UNS W86152 Welding Electrode, Sections III, IX, and XI" as an alternative to the requirements in the ASME Code. Code Cases 2142-1 and 2143-1 provide criteria for weld material F-number group classifications.

2.0 BACKGROUND

The inservice inspection (ISI) of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Section 50.55a(g) of Title 10 of the *Code of Federal Regulations* (10 CFR), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulation in Section 10 CFR 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (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 Regulation" required 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 the limitations and modifications listed therein. The Code of record for the second 10-year ISI interval at STP, Units 1 and 2, is the 1989 Edition of Section XI and the ASME Code.

ASME Code Section XI, Article IWA-4120(a) states that “repairs shall be performed in accordance with the Owner’s Design Specification and the original Construction Code of the component or system. Later editions and addenda of the Construction Code or of Section III, either in their entirety or portions thereof, and code cases may be used.”

STPNOC requested approval under the provisions of 10 CFR 50.55a(a)(3)(i) to use Alloy 690 (Inconel 52/152) weld materials in accordance with ASME Code Cases 2142-1 and 2143-1. The Alloy 690 weld materials would be used for repairing the bottom mounted instrument nozzles in the Unit 1 Reactor Pressure Vessel. The referenced code cases introduce and classify new nickel-base weld metals that are compatible with Alloy 690 base material. Code Case 2142-1 establishes welding classifications and other requirements for a bare filler material. Code Case 2143-1 establishes welding classifications and other requirements for coated electrodes. These two code cases have not been incorporated by reference into the regulation and, therefore, their use requires NRC approval.

Thus, the licensee’s request consists of two issues:

1. The use of Alloy 690 (Inconel 52/152) as weld material for repairing the instrument nozzles in lieu of Alloy 600 (Inconel 82/182) as welding material,
2. The use of two ASME code cases that group the new weld materials in the same weld categories as other commonly employed nickel-base weld materials. This allows the use of appropriate existing welding procedures and performance qualifications with the new weld materials.

The Code of Record to be used to repair the instrument nozzle at STP is ASME Code, Section XI, 1989 Edition with no Addenda. This code allows by reference the use of Alloy 600 (Inconel 82/182) as weld material, but does not include the use of Alloy 690 (Inconel 52/152) weld materials. Industry studies indicate that Alloy 690 (Inconel 52/152) as weld materials are less susceptible to intergranular stress corrosion cracking than the Alloy 600 (Inconel 82/182) weld materials.

3.0 EVALUATION OF RELIEF REQUEST

APPROVAL OF ASME SECTION IX CODE CASES 2142-1 AND 2143-1 FOR THE SECOND 10-YEAR INSPECTION INTERVAL.

3.1 The Items for which Relief is Requested:

Components, component supports, or other items that are fabricated from Alloy 690 (Inconel 52/152) material and requiring the use of Universal Numbering System (UNS) N06052 filler metal or UNS W86152 electrodes for welding operations.

3.2 Code Requirement:

The applicable ASME Code Edition and Addenda are ASME Code, Section XI, 1989 Edition with no Addenda. ASME Code, Section XI, Article IWA-4000, Code of Record for STP, Units 1

and 2, requires that repair welds and installation welds for replacement items meet the requirements of the original construction codes, or later approved code, including materials requirements. The ASME Section III codes are applicable codes for the original construction and the corresponding Section II material codes for most STP components do not address the welding materials specified in Code Cases 2142-1 and 2143-1.

3.3 Reason for the Request (as stated):

STP Nuclear Operating Company (STPNOC) requests relief to employ the alternative welding materials of ASME Section IX Code Cases 2142-1 and 2143-1 as necessary during the second ten-year inservice inspection interval of South Texas Project Units 1 and 2. The immediate need for these Code Cases is for repairing the bottom mounted instrument nozzles in the Unit 1 reactor vessel.

3.4 Licensee's Proposed Alternative and Basis for Use (as stated):

Industry studies have demonstrated that Alloy 690 (Inconel 52/152) weld materials possess a high resistance to primary water corrosion. The use of Alloy 690 (Inconel 52/152) weld materials has been previously approved for other applications at several operating nuclear power plants.

Code Cases 2142-1 and 2143-1 introduce and classify nickel-based weld materials that closely match and are intended for welding Alloy 690 (Inconel 52/152). Code Case 2142-1 establishes welding classifications and other requirements for bare filler metal. Code Case 2143-1 establishes welding classifications and other requirements for coated electrodes. The Code Cases were approved by ASME on June 5, 1995, and published in the 1995 Edition of the ASME Boiler and Pressure Vessel Code, Code Cases Supplement No.1.

Code Case 2142-1 lists the American Welding Society (AWS) specification A5.14 and Universal Numbering System (UNS) designation N06052 for a filler metal conforming to Inco 52 (Inconel 52). It establishes this weld metal as F-No. 43 for both procedure and performance qualification purposes. Code Case 2143-1 lists appropriate AWS specification A5.11 and UNS specification W86152 for a coated electrode conforming to Inco 152 (Inconel 152) and establishes F-No. 43 for this material for welding purposes. By this set of specifications and F-No. assignments, the materials are completely described for welding purposes as similar in their welding characteristics to many other Code nickel-based weld metals. These materials are similar in composition and mechanical and thermal properties to approved metals; thus, existing welding procedures may be used with the Inco 52 or 152 (Inconel 52/152) type weld metals.

STPNOC has determined that the proposed alternative to employ the alternative welding materials of Code Cases 2142-1 and 2143-1 provides an acceptable level of quality and safety.

3.5 Duration of Proposed Alternative (as stated):

This relief request will be implemented during the second ten-year inservice inspection interval of South Texas Project Units 1 and 2.

3.6 Evaluation:

3.6.1 Use of Alloy 690 Weld Materials:

The licensee stated that the industry studies have demonstrated that Alloy 690 (Inconel 52/152) weld materials possess a high resistance to primary water corrosion. This is due to the presence of higher chromium content of the as deposited weld metal of Alloy 690 (Inconel 52/152) weld material. The licensee has proposed the use of alternative Inconel Alloy 690 (Inconel 52/152) weld materials for the repair weld of the bottom head instrument nozzle. Laboratory test data have shown that Inconel Alloy 690 (Inconel 52/152) weld materials are resistant to stress corrosion cracking in simulated Pressurized Water Reactor (PWR) environments. The NRC staff has approved the use of Alloy 690 (Inconel 52/152) in the replacement of steam generators (SGs) for a number of PWRs including: V.C. Summer; St. Lucie, Unit 1; McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Unit 1; and Oconee Nuclear Station Units 1, 2, and 3 and also for new construction and other repair activities.

Therefore, on the basis of above discussion, the NRC staff concludes that the use of Alloy 690 (Inconel 52/152) weld materials in the repair of bottom head nozzle at STP, Units 1 and 2 as proposed by the licensee, is acceptable because it will provide an acceptable level of quality and safety.

3.6.2 Use of Code Cases 2142-1 and 2143-1:

The purpose of a weld metal code case is to establish the weld metal classification based on the welding characteristics of the welding materials. The "welding characteristics classification" is defined in ASME Section IX as a "F-No." Weld materials with similar characteristics are grouped together under the same F-No. in order to reduce the duplication of welding procedure and welder qualifications.

Code Case 2142-1 lists AWS specification (AWS 5.14) and UNS designation (UNS N06052) as conforming to Inconel 52. It establishes the F-No. of this weld metal as F-No. 43 for both procedure and performance qualification purposes. Code Case 2143-1 lists appropriate AWS specification (AWS 5.11) and UNS designation (UNS W86152) for a coated electrode matching Inconel 152 and establishes F-No. 43 for welding purposes. Weld filler materials that are similar to Alloy 690 (Inconel 52/152) were approved by the Code on June 5, 1995, in Code Cases 2142-1 and 2143-1. These code cases were reaffirmed July 22, 1998. The code cases established the F-No. 43 for the specified weld filler material under nickel-base alloys. By allowing the licensee to use Code Cases 2142-1 and 2143-1, the NRC staff is affirming the Code designation of F-No. 43. Affirming this Code designation for Code Cases 2142-1 and 2143-1 permits the specified filler weld material to be used in previously qualified weld procedures, thus eliminating the need for creating new procedures and performance qualifications. Since the specified filler weld materials are similar in its welding characteristics

to many other Code nickel base filler weld materials and have metallurgical properties similar to the base metals, the NRC staff has concluded that separate procedure and performance qualifications for these materials are not warranted. The use of previously qualified procedure and performance standards for welding with the filler weld metals described in Code Cases 2142-1 and 2143-1 will provide an acceptable level of quality and safety. Adoption on these code cases will enable the licensee to use Alloy 690 (Inconel 52/152) weld materials on code welds.

The NRC staff finds that these two code cases appropriately specify and classify the necessary weld metal characteristics and are acceptable for use. The NRC staff has approved the use of Alloy 690 (Inconel 52/152) weld materials in the replacement of SGs for a number of PWRs including: V.C. Summer; St. Lucie, Unit 1; McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Unit 1; and Oconee Nuclear Station, Units 1, 2, and 3.

4.0 CONCLUSION

On the basis of its evaluation, the NRC staff concludes that the proposed alternative to use Alloy 690 weld materials in accordance with the Code Cases 2142-1 and 2143-1 for the repair of instrument nozzle welds will provide an acceptable level of quality and safety. Therefore, the use of the Code Cases 2142-1 and 2143-1 as requested in the Relief Request RR-ENG-2-31, is authorized pursuant to Section 10 CFR 50.55a(a)(3)(i) at STP, Units 1 and 2, for the second 10-year inservice inspection interval. When these code cases are approved by reference in Regulatory Guide (RG) 1.85, "Materials Code Case Acceptability - ASME Section III, Division 1," the licensee is to follow all provisions in the code cases with limitations issued in RG 1.85, if any, as discussed with Mr. John T. Conly, Licensing, STPNOC, in the telephone conversation on June 23, 2003.

Principal Contributor: Ganesh Cheruvenki

Date: June 25, 2003

South Texas, Units 1 & 2

cc:

Mr. Cornelius F. O'Keefe
Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77414

A. Ramirez/C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Mr. L. K. Blaylock
Mr. W. C. Gunst
City Public Service Board
P. O. Box 1771
San Antonio, TX 78296

Mr. C. A. Johnson/A. C. Bakken
AEP Texas Central Company
P. O. Box 289
Mail Code: N5022
Wadsworth, TX 77483

INPO
Records Center
700 Galleria Parkway
Atlanta, GA 30339-3064

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

D. G. Tees/R. L. Balcom
Texas Genco, LP
P. O. Box 1700
Houston, TX 77251

Judge, Matagorda County
Matagorda County Courthouse
1700 Seventh Street
Bay City, TX 77414

A. H. Gutterman, Esq.
Morgan, Lewis & Bockius
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Mr. T. J. Jordan, Vice President
Engineering & Technical Services
STP Nuclear Operating Company
P. O. Box 289
Wadsworth, TX 77483

S. M. Head, Manager, Licensing
Nuclear Quality & Licensing Department
STP Nuclear Operating Company
P. O. Box 289, Mail Code: N5014
Wadsworth, TX 77483

Environmental and Natural Resources
Policy Director
P. O. Box 12428
Austin, TX 78711-3189

Jon C. Wood
Matthews & Branscomb
112 East Pecan, Suite 1100
San Antonio, TX 78205

Arthur C. Tate, Director
Division of Compliance & Inspection
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756

Brian Almon
Public Utility Commission
William B. Travis Building
P. O. Box 13326
1701 North Congress Avenue
Austin, TX 78701-3326

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Susan M. Jablonski
Office of Permitting, Remediation
and Registration
Texas Commission on
Environmental Quality
MC-122
P.O. Box 13087
Austin, TX 78711-3087

Mr. Terry Parks, Chief Inspector
Texas Department of Licensing
and Regulation
Boiler Division
P. O. Box 12157
Austin, TX 78711

Mr. Ted Enos
4200 South Hulen
Suite 630
Ft. Worth, Texas 76109