

March 13, 2006

Mr. Bruce H. Hamilton  
Vice President, Oconee Site  
Duke Energy Corporation  
7800 Rochester Highway  
Seneca, SC 29672

SUBJECT: REQUEST TO USE ALTERNATIVE MATERIALS AND ASSOCIATED CODE CASE FOR THE REPAIR OF STEAM GENERATOR TUBES AT OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (TAC NOS. MC8852, MC8853, AND MC8854)

Dear Mr. Hamilton:

We have reviewed your submittal dated November 9, 2005, that requested approval of the proposed alternative to use an Alloy 690-type welding filler material (Alloy 52M) and associated American Society of Mechanical Engineers (ASME), *Boiling and Pressure Vessel Code*, ASME Code Case 2142-2. We conclude that the use of the proposed alternative for the repair of steam generator tubes will provide an acceptable level of quality and safety. Pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(a)(3)(i), we authorize the use of the proposed alternative. Our safety evaluation is enclosed. Verbal authorization for the use of this relief request on Unit 2 was granted to the licensee on November 15, 2005.

Sincerely,

*/RA/*

Evangelos C. Marinos, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
REQUEST TO USE ALTERNATIVE MATERIALS AND ASSOCIATED CODE CASE  
FOR THE REPAIR OF STEAM GENERATOR TUBES  
DUKE ENERGY CORPORATION  
OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3  
DOCKET NOS. 50-269, 50-270, 50-287

1.0 INTRODUCTION

By letter dated November 9, 2005, Duke Energy Corporation (the licensee) requested approval under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(i), to use an Alloy 690-type welding filler material (Alloy 52M) and associated American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), Section IX, Code Case 2142-2, "F-Number Grouping for Ni-Cr-Fe Filler Metals Section IX (Applicable to all Sections, including Section III, Division 1, and Section XI)," for the repair of steam generator tubes at the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee 1/2/3).

The applicable ASME Code to be utilized for the repairs in association with fusion-welded tube plugging of steam generator tubes at Oconee 1/2/3 is the ASME Code, Section XI, 1998 edition through 2000 addenda. IWA-4712 of ASME Code Section XI, for welded tube plugging requires that Section III weld filler metal meet NB-2000 of ASME Code, Section III (or an ASME-approved Code Case). The applicable Code allows the use of some Alloy 690 filler metal equivalents, but does not include the use of Unified Numbering System (UNS) N06054 (Alloy 52M).

ASME Code Case 2142-2 introduces and classifies a new nickel based weld filler metal that is equivalent to Alloy 690. Code Case 2142-1 contains Alloy 52 (UNS N06052) classification and is approved for use by the Nuclear Regulatory Commission (NRC). Code Case 2142-2 establishes welding classifications and other requirements for bare wire filler metal for UNS N06054 Ni-Cr-Fe filler metal (Alloy 52M). However, Code Case 2142-2 has not been incorporated by reference into the regulations; therefore, its use requires NRC prior approval.

Thus, the licensee requested the use of Alloy 52M welding filler material for the repair of steam generator tubes and requested the use of ASME Code Case 2142-2 that groups the new weld filler metal in the same welding category as other commonly used nickel-based weld filler metals. This Code Case allows the use of appropriate existing welding procedures and performance qualifications with the new weld filler metal.

2.0 REGULATORY EVALUATION

Enclosure

The inservice inspection, including repair and replacement of the ASME Code Class 1, 2, and 3 components, is to be performed in accordance with the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 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 applicant 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) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

### 3.0 TECHNICAL EVALUATION

Repairs to steam generator tubes with the use of a welded plug are common and are not a "first of a kind" repair. The identified usage was to plug a vacant tube location in the Unit once-through steam generator for the reason of tube sample removal. The tube removal task requires that the tubesheet penetration be plugged to establish a primary-to-secondary pressure boundary. The plugging method is an ASME Code, Section XI qualified technique for fusion welding. A certified vendor was utilized for this scope of work. This vendor is familiar with the benefits of this substitute material and has performed procedure qualifications and welding with this material with success.

Alloy 690 material has been shown to be a superior material in resisting primary water stress corrosion cracking (PWSCC). The Alloy 690 material in the specification form of Alloy 52M has demonstrated to have better weldability over similar Alloy 52 products.

ASME Code Case 2142-2 establishes the uniform chemical and material properties and the classification of the weld metal with respect to its welding characteristics. Code Case 2142-2 establishes the F-No. for the American Weld Society (AWS) specification AWS 5.14 and the UNS designation UNS N06054 (Alloy 52M) as F-No. 43 for both procedure and performance qualification purposes. This Code Case sets the specifications and F-No. assignments which completely describe this material. For welding purposes the filler metal is similar in welding characteristics to other approved nickel-based weld metals.

The use of Alloy 690 welding filler metal in the form of UNS N06054 (Alloy 52M) for the steam generator tube repairs at Oconee 1/2/3 will provide a superior corrosion protection and will provide improved weldability over Alloy 52. The licensee's evaluation of the specific application, which includes weld procedure and performance qualifications specifically performed on the Alloy 52M filler metal, has produced acceptable results and Code Case 2142-2 appropriately

specifies and classifies the necessary weld metal parameters; therefore, it is acceptable for use. The NRC staff finds that the use of Alloy 52M filler metal and Code Case 2142-2 provide an acceptable level of quality and safety.

#### 4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the proposed alternative to use Alloy 690 welding filler materials (Alloy 52M) and associated Code Case 2142-2 for the steam generator tube repairs at the Oconee 1/2/3 will provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the use of the proposed alternative.

Principal Contributor: E. Andruszkiewicz

Date: March 13, 2006