

September 19, 2002

Mr. M. S. Tuckman  
Executive Vice President, Nuclear Generation  
Duke Energy Corporation  
526 South Church Street  
P. O. Box 1006 (EC07H)  
Charlotte, North Carolina 28201-1006

SUBJECT: 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN REQUEST FOR RELIEF NO. 02-GO-0001 FOR OCONEE NUCLEAR STATION, UNITS 1, 2 AND 3, MCGUIRE NUCLEAR STATION, UNITS 1 AND 2, CATAWBA NUCLEAR STATION, UNITS 1 AND 2, (TAC NOS. MB4510, MB4511, MB4512, MB4513, MB4514, MB4515 AND MB4516)

Dear Mr. Tuckman:

By letter dated February 14, 2002, as supplemented by letter dated September 5, 2002, Duke Energy Corporation (the licensee), proposed 10-year interval inservice inspection (ISI) Program Plan Request for Relief No. 02-GO-0001 for Oconee Nuclear Station, Units 1, 2, and 3, McGuire Nuclear Station, Units 1 and 2, and Catawba Nuclear Station, Units 1 and 2. The relief request seeks Nuclear Regulatory Commission's (NRC's) approval to use Wire-Type Image Quality Indicators (IQIs) for radiographic examinations as provided for in American Society of Mechanical Engineers Section III, 1992 Edition with 1993 Addenda for welded repairs or installation of replacement items by welding of Class 1, 2 and 3 components.

The staff has reviewed the information provided for this relief request. The staff's evaluation and conclusions are provided in the Enclosure. Based on the information provided by the licensee, the staff concludes that the proposed alternative to use IQIs for radiographic examinations provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval for Catawba Nuclear Station, Units 1 and 2, and McGuire Nuclear Station, Unit 2. The proposed alternative is also authorized for the third 10-year ISI interval for Oconee Nuclear Station, Units 1, 2 and 3, and McGuire Nuclear Station, Unit 1.

Sincerely,  
*/RA/*

John Nakoski, Chief, Section 1  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 , 50-414, 50-369, 50-370,  
50-269, 50-270 and 50-287

cc: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. 02-GO-0001

OCONEE NUCLEAR STATION, UNITS 1, 2 AND 3,

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 AND

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DUKE ENERGY CORPORATION

DOCKET NOS. 50-269, 50-270, 50-287, 50-369, 50-370, 50-413 AND 50-414

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states 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) shall meet the requirements, except the design and access provisions and the pre-service 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The Code of record for the Oconee Nuclear Station, Units 1, 2 and 3, third 10-year ISI interval is the 1989 Edition. The Code of record for the McGuire Nuclear Station, Unit 2 and Catawba Nuclear Station, Units 1 and 2 second 10-year ISI interval is the 1989 Edition. The Code of record for the McGuire Nuclear Station, Unit 1 third 10-year ISI interval is the 1995 Edition through the 1996 Addenda of the ASME B&PV Code.

Regulatory Guide 1.147, Revision 12, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," finds the use of Code Case N-416-1, "Alternative Pressure Test Requirements for Welded Repairs of Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1," acceptable. Code Case N-416-1 invokes the 1992 Edition of the ASME Code, Section III in the performance of nondestructive examinations (NDE) of welded repairs or installation or replacement components by welding.

## 2.0 EVALUATION

The Nuclear Regulatory Commission (NRC) staff has reviewed the information concerning the 10-year ISI Program Plan Request for Relief No. 02-GO-0001 for Oconee Nuclear Station, Units 1, 2, and 3 (third 10-year ISI interval), McGuire Nuclear Station, Unit 2 (second 10-year interval) and McGuire Nuclear Station, Unit 1 (third 10-year ISI interval), and Catawba Nuclear Station, Units 1 and 2 (second 10-year ISI interval), provided by Duke Energy Corporation (DEC, the licensee) in its letter dated February 14, 2002, as supplemented by letter dated September 5, 2002.

The staff's evaluation and the basis for disposition is discussed below.

### 2.1 Request for Relief No. 02-GO-001

#### 2.2 Code Requirements (as stated)

ASME Section III NB and NC (1989 and 1992 Editions) stipulates the use of the IQI's [image quality indicators] listed in Tables NB-5111-1 and NC-5111-1, respectively. ASME Section III NB and NC do not state that the use of wire-type IQI's is unacceptable, it just does not include a listing of the wire diameters that will provide equivalent sensitivity for the specified plaque-type IQI and essential hole.

The Oconee steam generator replacement outages for Units 1, 2, and 3 will invoke Code Case N-416-1, "Alternate Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3, Section XI, Division 1." ASME Code Case N-416-1 invokes the 1992 Edition, no Addenda, of the ASME Section III Code in the performance of nondestructive examination of piping weldments. The 1993 Addenda to the 1992 Edition incorporated equivalent wire type IQI's into Tables NB-5111-1 and NC 5-1111.

#### 2.3 System/Component(s) for Which Relief is Requested

Class 1, 2, and 3 components with welded repairs or replacement installed by welding.

#### 2.4 Licensee's Basis for Requesting Relief (as stated)

DEC considers that plaque-type IQI's are in some cases impractical for use due to physical placement and radiographic characteristics. Placement of flat plaque-type IQI's on curved surfaces of pipe components normally require shimming. When using Plaque-type IQI's, the recorded radiographic characteristics of the essential T-hole is often obscured or distorted due to

specimen anomalies or part geometry. These difficulties create re-shoot conditions. Re-shoots have a negative ALARA impact due to the additional personnel radiation exposure.

Wire-type IQIs have been shown to provide quality and sensitivity equivalent to plaque-type IQI's as documented in Table 4 of ASTM E747-87, ["Standard Practice for Design, Manufacture, and Material Grouping Classification of Wire Image Quality Indicators (IQI) Used for Radiology."] Equivalent sensitivity has also been demonstrated in ASME Section V, Article 22, SE-747 and in ASME Section III, 1992 Edition, 1993 addenda, Tables NB and NC 5111-1. Because of the equivalent sensitivity, the proposed alternative provides equivalent or superior results to current exam method utilizing only plaque-type IQI's. Therefore, the quality of the examination and resulting safety of the plant, based on the exam results are not impacted by this proposed alternative.

The intent of this request for relief is to apply the sensitivity level specified in Tables NB-5111-1 and NC-5111-1 to the selection of the appropriate wire diameter or plaque-type IQI size as provided for in ASME Section III, 1992 Edition, with 1993 Addenda. DEC will comply with all related requirements of ASME Section III, 1992 Edition, with 1993 Addenda for the selection and use of IQI's.

Information provided above supports the proposed use of wire-type IQIs and provides an acceptable level of quality and safety. The use of only plaque-type IQI's may result in unusual difficulty and additional personnel radiation exposure with no benefit of quality and safety.

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

DEC is requesting NRC approval to use wire-type penetrameters in addition to plaque-type IQI's for performing radiographic examinations. The current code of record does not list wire-type IQI's for use. DEC has determined that the proposed alternative would provide an acceptable level of quality and safety.

## 2.6 Staff's Evaluation

IWA-4700 and IWA-5000 require a hydrostatic test following repairs. However, Code Case N-416-1 that the NRC has approved for use allows the use of a system leakage test in lieu of the hydrostatic test provided certain requirements are met. One of those requirements states, "NDE shall be performed in accordance with the methods and acceptance criteria of the applicable Sub-section of the 1992 Edition of Section III." With respect to radiography, the pertinent articles of Section III are NB-5111 and NC-5111 and Tables NB-5111-1 and NC-5111-1. The 1992 Edition of Section III did not include the use of wire type IQIs. Wire penetrameters were not included in Section III of the ASME Code until the 1992 Edition with 1993 Addenda. The 1992 Edition with 1993 Addenda of the ASME Code has been endorsed by NRC in 10 CFR 50.55a.

Volume 17 of the Ninth Edition of the American Society of Materials (ASM) Handbook Series, published in 1989, states that wire-type penetrameters are widely used in Europe, including the United Kingdom, Germany, the Netherlands and Scandinavia. International organizations have

also incorporated the use of wire penetrameters such as the International Organization for Standardization and the International Institute of Welding. The ASM handbook goes on to state that wire penetrameters specified in ASTM E 747-87 are widely used in the United States. ASTM developed this specification using a public forum with approval by public consensus. The ASTM Standard E 747 referenced in the ASM Handbook is the same as ASME's Standard SE-747.

The NRC staff made a comparison to determine the equivalency of the previously allowed plaque-type penetrameters with the proposed alternative of wire-type penetrameters. The comparison showed that the wire diameters were essentially the same. Of the 18 wire diameters compared, two wire diameters were more conservative (smaller diameters), two wire diameters interpolated from two known values were less conservative (larger diameters), and 14 wire diameters were identical to the wire diameters in Table NB-5111-1 (NC-5111-1) of the 1992 Edition with 1993 Addenda of the ASME Code. Based on the above comparison of commonly used industry references and the widespread use of wire penetrameters in industry, the staff believes that the wire penetrameters listed in Table NB-5111-1 (NC-5111-1) of the 1992 Edition with 1993 Addenda of the ASME Code will provide an acceptable level of quality and safety.

### 3.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the proposed alternative to use IQIs for radiographic examinations as provided for in ASME Section III, 1992 Edition with 1993 Addenda, provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval for Catawba Nuclear Station, Units 1 and 2, and McGuire Nuclear Station, Unit 2. The proposed alternative is also authorized for the third 10-year ISI interval for Oconee Nuclear Station, Units 1, 2 and 3, and McGuire Nuclear Station, Unit 1.

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Date: September 19, 2002

Catawba Nuclear Station

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