



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON ASME CODE CASE N-524

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, 50-287

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369, 50-370

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413, 50-414

1.0 INTRODUCTION

The Technical Specifications for the Oconee Nuclear Station, Units 1, 2, and 3; the McGuire Nuclear Station, Units 1 and 2; and the Catawba Units 1 and 2, state that the inservice inspection and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 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) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for Oconee Units 1, 2, and 3; McGuire Units 1 and 2; and Catawba Units 1 and 2, for the current inservice inspection (ISI) interval is the 1989 edition. The components (including supports) may meet the requirements set

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forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

By letter dated September 4, 1996, Duke Power Company (licensee) requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-524 dated August 9, 1993, entitled "Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping Section XI, Division 1," pursuant to 10 CFR 50.55a(a)(3) to be applied to the ISI program for Oconee Units 1, 2, and 3; McGuire Units 1 and 2; and Catawba Units 1 and 2.

The staff has reviewed and evaluated the licensee's request and supporting information to use Code Case N-524 as a proposed alternative to the Code requirements for these plants as described below.

## 2.0 DISCUSSION

### CODE CASE N-524 ALTERNATIVE EXAMINATION REQUIREMENTS FOR LONGITUDINAL WELDS IN CLASS 1 AND 2 PIPING - SECTION XI, DIVISION 1

#### Component Identification

Longitudinal Welds in Class 1 and 2 Piping:  
Examination Categories B-J, C-F-1 and C-F-2 of ASME Code, Section XI, 1989 Edition.

#### Code Requirement: (as stated by licensee)

It is required by the 1989 ASME Section XI Code (no addenda) that for surface and volumetric examinations of Class A piping longitudinal welds, Table IWB-2500-1 Examination Category B-J, the examination include at least a pipe-diameter length but not more than 12 inches of each longitudinal weld intersecting the circumferential welds. For Class B piping longitudinal welds, Table IWC-2500-1, Examination Categories C-F-1 and C-F-2, requires that surface and volumetric examination of the longitudinal weld include  $2.5t$  at the intersecting circumferential weld [, where  $t$  is the thickness of the weld].

Licensee's Basis for Requesting Relief: (as stated)

Utilization of the above Code Case will reduce personnel radiation exposure with the reduction of necessary prep time, insulation [removal] and surface and volumetric inspection time. Duke Power believes the same level of quality can be maintained and personnel safety improved by implementing the alternative means provided by Code Case N-524. It is estimated that approximately 3.75 man-hours per examination can be saved if Duke is permitted to use Code Case N-524. It is further estimated that these examinations will be performed on a total of approximately 347 welds during [a] future outage[.]. Each of these examinations typically results in an average personnel radiation exposure [rate] of 25 mr/hr per longitudinal weld.

Proposed Alternative Examination

The alternative requirements of Code Case N-524 limit the surface and volumetric examination requirements of longitudinal welds to the area or volume contained within the examination requirements of the intersecting circumferential weld. Duke Power requests approval of Code Case N-524 and proposes to apply it as an alternative to the rules for surface and volumetric examination of longitudinal piping welds specified in Table IWB-2500-1, Examination Category B-J and Table IWC-2500-1, Examination Categories C-F-1 and C-F-2.

3.0 EVALUATION

The ASME Section XI Code (1989 Edition) requires one pipe diameter in length, but no more than 12 inches, be examined for Class 1 longitudinal piping welds. Class 2 longitudinal piping welds are required to be examined for a length of 2.5t. These lengths of weld are measured from the intersection of the circumferential weld and longitudinal weld. The licensee's proposed alternative, Code Case N-524, limits the volumetric and surface examination requirements of the longitudinal weld to the volume or area contained within the examination requirements of the intersecting circumferential weld.

Longitudinal welds are produced during the manufacturing process of the piping, not in the field as is the case for circumferential welds. The Code contains requirements on characteristics and performance of materials and products, and specifies the examination requirements during the manufacturing of the subject longitudinal piping welds.

In addition, there are material, chemical, and tensile strength requirements in the Code. The manufacturing process that is specified by the Code provides assurance of the structural integrity of the longitudinal welds at the time the piping is manufactured.

The preservice examination and initial inservice examinations have provided assurance of the structural integrity of the longitudinal welds. The experience in the United States has been that pipes with shop welded longitudinal seams have not experienced degradation that would warrant continued examination beyond the boundaries required to meet the circumferential weld examination requirements. No significant loading conditions or known material degradation mechanisms have become evident to date that specifically relate to longitudinal seam welds in nuclear plant piping.

If any degradation associated with a longitudinal weld were to occur, it is expected that it would be located at the intersection with a circumferential weld. This intersection is inspected in accordance with the provisions of Code Case N-524. Furthermore, the 1989 ASME Code, Section XI, Appendix III "Ultrasonic Examination of Piping Systems," which is applicable to the subject plants, requires scanning for reflectors parallel and transverse to the weld seam in case of ferritic piping, contrary to the requirement in some older Code editions to only scan for reflectors oriented parallel to the weld seam. The transverse scan of a circumferential weld will further detect reflectors oriented parallel to a longitudinal weld at the root of intersection of a longitudinal seam.

#### 4.0 CONCLUSION

Based on the above discussions, the staff concludes that the licensee's proposed use of Code Case N-524 as an alternative to the Code requirements, provides an acceptable level of quality in that it provides reasonable assurance of structural integrity. Therefore, the licensee's proposed alternative to use Code Case N-524 is authorized for Oconee Units 1, 2, and 3, McGuire Units 1 and 2, and Catawba Units 1 and 2, pursuant to 10 CFR 50.55a(a)(3)(i). The licensee is authorized to use Code Case N-524 until such time as the Code Case is included in a future revision of Regulatory Guide 1.147. At that time, the licensee is to follow all provisions in Code Case N-524, with limitations issued in Regulatory Guide 1.147, if any, should the licensee continue to implement this relief request.

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Date: October 29, 1996