



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE PROPOSED USE OF ASME CODE CASE N-524

NORTH ATLANTIC ENERGY SERVICE CORPORATION, ET AL

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

The Technical Specifications for the Seabrook Station, Unit No. 1 (Seabrook), 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 (ASME 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). 10 CFR 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 ten-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 twelve 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 Seabrook, during the first ten-year inservice inspection (ISI) interval is the 1983 Edition though the Summer 1983 Addenda. The components (including supports) may meet the requirements set 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 October 22, 1996, North Atlantic Energy Service Corporation (North Atlantic), requested approval for the implementation of the alternative rules of ASME Section XI Code Case N-524 dated August 9, 1993, titled "Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping Section XI, Division 1," pursuant to 10CFR 50.55a(a)(3) to be applied to the Inservice Inspection (ISI) program for Seabrook.

## 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 of ASME Code, Section XI, 1983 Edition through Summer 1983 Addenda.

#### Code Requirement: (As stated)

"ASME Class 1 longitudinal seam welds require examination of one pipe diameter in length, but no more than 12 inches. ASME Class 2 longitudinal seam welds require examination of  $2.5t$  (where  $t$  is the thickness of the weld) in length. The weld length is measured from the intersection of the circumferential weld and longitudinal weld."

#### Code Requirement From Which Relief is Requested: (As stated)

"Relief is requested from performing the Code required examination of Class 1 and 2 longitudinal piping seam welds for the lengths identified above."

#### Basis for Relief: (As stated)

"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 for characteristics and performance of materials and products, and specifies the examination requirements during the manufacture 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 performed by North Atlantic have provided assurance of the structural integrity of ASME Code longitudinal welds during the service life of Seabrook to date. The experience in the United States has been that ASME Code longitudinal welds 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 which 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 provision of Code Case N-524."

Alternative Examination: (As stated)

"Perform the alternative examination requirements specified in Code Case N-524."

Justification for Relief:

Compliance with the existing ASME Section XI requirements in lieu of the Code Case results in unnecessary personnel exposure to complete the required examinations without commensurate increase in the level of quality and safety.

3.0 EVALUATION

The ASME Section XI Code (1983 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  $2.5t$ , where  $t$  is the thickness of the weld. These lengths of weld are measured from the intersection of the circumferential weld and longitudinal weld. North Atlantic'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, which 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 1983 ASME Code, Section XI, Appendix III, "Ultrasonic Examination of Piping Systems," which is applicable to the subject plant, 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 further will 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 North Atlantic's proposed use of Code Case N-524 as an alternative to the Code requirements provides an acceptable level of quality and safety in that the alternative will provide adequate assurance of weld integrity. Therefore, North Atlantic's proposed alternative to use Code Case N-524 is authorized for Seabrook, pursuant to 10CFR50.55a(a)(3)(i). North Atlantic is authorized to use Code Case N-524 until such time as the code case is included in a future revision of Regulatory Guide (RG) 1.147. At that time, should North Atlantic continue to implement this relief request, North Atlantic is to follow all provisions in Code Case N-524, with limitations issued in RG 1.147, if any.

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