



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-522

FOR

SOUTH CAROLINA ELECTRIC AND GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

DOCKET NUMBER 50-395

1.0 INTRODUCTION

The Technical Specifications for Virgil C. Summer Nuclear Station state that the inservice inspection 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 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 difficulties 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) 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 the Virgil C. Summer Nuclear Station second 10-year inservice inspection (ISI) interval is the 1989 Edition. 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

ENCLOSURE

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.

In a letter dated March 28, 1996, and supplemented by a letter dated April 23, 1996, South Carolina Electric and Gas Company (SCE&G), proposed an alternative examination to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI. SCE&G requested approval for the implementation of the alternative rules of ASME Section Code Case N-522, dated December 9, 1993, "Pressure Testing of Containment Penetration Piping, Section XI, Division I" pursuant to 10 CFR 50.55a(a)(3) for system pressure testing on certain Class 2 piping systems that penetrate containment.

## 2.0 DISCUSSION AND EVALUATION

### 2.1 Licensee's Request

Relief is requested from performing the Code required System Pressure Leakage Tests in ASME Section XI, Table IWC-2500-1, Category C-H.

### 2.2 Licensee's Component Identification

This relief request is for the piping listed in the licensee's March 28, 1996 submittal, that penetrate the containment vessel, when the piping and isolation valves that are part of the containment system are Class 2, but the balance of the piping system is outside the scope of ASME Section XI (non-ASME Code Class piping).

### 2.3 ASME Code, Section XI, Requirements

IWA-5211 requires the pressure retaining components within each system boundary shall be subject to system pressure tests under which conditions visual examination VT-2 is performed in accordance with IWA-5240 to detect leakages.

IWC-5210(a) requires the pressure retaining components within each system boundary shall be subjected to a system pressure test conducted during a system functional test, a system pressure test conducted during a system inservice test, or a hydrostatic test, and visually examined by the method specified in Table IWC-2500-1, Examination Category C-H.

Table IWC-2500-1, Examination Category C-H, specifies a frequency of examination of once per inspection period for inservice or functional testing and once per inspection interval for hydrostatic testing.

## 2.4 Licensee's Proposed Alternative Testing

Pursuant to Code Case N-522, SCE&G proposes to test in accordance with 10 CFR Part 50, Appendix J all Class 2 piping and isolation valves that are part of the containment system, but for which the balance of the piping system is outside the scope of ASME XI.

## 2.5 Licensee's Basis for Relief (as stated)

"The proposed alternative will reduce the level of redundant testing. Imposition of the IWC-2500-1 test requirements would result in additional testing as follows:

1. Water systems would be flooded and pressurized through the associated penetration test tap and a VT-2 visual examination performed during the pressurization period.
2. Air and gas system would be tested in an identical fashion to 10 CFR 50, Appendix J test method and a VT-2 visual examination would be performed during the pressurization period."

"For the penetrations listed, 10 CFR 50, Appendix J testing is performed by draining the test volume, if required, venting downstream of the test volume and pressurizing the test volume to 53.5 to 57 psig. The rate of makeup flow is determined and compared to acceptance criteria based on allowable containment leak rate."

"Leakage from water systems would be indicated during the 10 CFR 50, Appendix J test more readily than the IWC-2500-1 test due to the lower density of the air test medium. Based on this fact, the use of the Appendix J test program is conservative when compared to the ASME Section XI program."

"Leakage from air and other gas systems would be indicated by 10 CFR 50, Appendix J testing in a similar manner to an IWC-2500-1 test. Based on this fact, the two programs are essentially equivalent."

"The specified frequency of testing for the 10 CFR 50, Appendix J test program is once per refueling cycle, which is approximately 18 months. The IWC-2500-1 specified test frequency is once per inspection period which is approximately 3-1/3 years. A comparison of the specified test frequencies indicates the 10 CFR 50, Appendix J test program is conservative when compared to the ASME Section XI test program."

## 2.6 Evaluation

The system pressure leakage test required in Table IWC-2500-1, Category C-H provides periodic verification of the leak-tight integrity of Class 2 piping systems or segments once every 18 months for Summer. The pipe segment from a non-code class system that penetrates containment is designed and examined as Class 2 pipe in order to protect the integrity of containment. Appendix J pressure testing provides periodic verification of the leak-tight integrity of the primary reactor containment and systems and components that penetrate containment. The frequency of Appendix J testing provides assurances that the containment pressure boundary is being maintained at an acceptable level while

monitoring for deterioration of seals, valves, and piping. Appendix J requires that three Type A tests be performed at approximately equal intervals during the 10-year ISI interval with the third test done while shutdown for the 10-year plant ISI. Appendix J also requires Type B and C tests be performed during each refueling outage, but in no case at intervals greater than 2 years.

The Class 2 containment isolation valves (CIVs) and connecting pipe segment must withstand the peak calculated containment internal pressure related to the maximum design containment pressure. The containment penetration piping is classified as Class 2 because of its function as part of the containment pressure boundary, and because containment integrity is the only safety-related function performed by this penetration piping. Therefore, it is logical to test the penetration piping portion of the associated system to the Appendix J criteria. The staff finds that the pressure retaining integrity of the CIVs and connecting piping and their associated safety functions may be verified with an Appendix J, Type C test if conducted at the calculated peak containment pressure. The seal between the connecting pipe segment and containment may be verified using an Appendix J, Type B test. Therefore, when the connecting pipe segment is subjected to either a Type B or C test, its safety function is verified and Code Case N-522 may be used. For Class 2 pipe segments between the CIVs that are not subjected to either a Type B or C test, the safety function is not verified and Code Case N-522 may not be used.

Section XI, IWC-5210(b) requires that where air or gas is used as a testing medium, the test procedure shall include methods for detection and location of through-wall leakages in components of the system tested. Because an Appendix J, Type C test most likely uses air as a testing medium, SCE&G's test procedure should meet the above requirement for the CIVs and pipe segments between the CIVs.

### 3.0 CONCLUSIONS

Based on the above analysis and information submitted, the staff concludes that compliance with Appendix J for those penetrations identified in the licensee's March 28, 1996 and April 23, 1996 submittals, would provide an acceptable level of quality and safety in lieu of the Code-required system pressure leakage test of Class 2 piping that penetrates containment, where the balance of the piping system is non-code class. The April 23, 1996 supplemental letter revised the March 28, 1996 submittal by reducing the number of penetrations for which Code Case N-522 relief is requested. Pursuant to 10 CFR 50.55a(a)(3)(i), the use of Code Case N-522 is acceptable provided that the test is conducted at the calculated peak containment pressure and that the test procedure includes methods for detection and location of through-wall leakages in CIVs and pipe segments between the CIVs.

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