



Stephen A. Byrne  
Senior Vice President, Nuclear Operations  
803.345.4622

October 23, 2003  
RC-03-0223

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Sir/Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)  
DOCKET NO. 50/395  
OPERATING LICENSE NO. NPF-12  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION  
REGARDING REQUEST TO USE ALTERNATIVES TO ASME BOILER  
AND PRESSURE VESSEL CODE, SECTION XI, RELIEF REQUEST  
RR-II-15, RR-II-17, RR-II-18 (0-C-03-0262)

Reference: 1. SCE&G Letter to NRC (Document Control Desk), RC-03-0196, dated September 16, 2003, Resubmittal of Request To Use Alternatives To ASME Boiler and Pressure Vessel Code, Section XI, (C-03-0262), RR-II-15, RR-II-16, RR-II-17, and, RR-II-19  
2. SCE&G Letter to NRC (Document Control Desk), RC-03-0142, dated July 14, 2003, Request To Use Alternatives To ASME Boiler and Pressure Vessel Code, Section XI, RR-II-15, RR-II-16, RR-II-17, RR-II-18, RR-II-19, RR-II-20, RR-II-21  
3. NRC (K. R. Cotton) Letter to VCSNS October 2, 2003, Request for Additional Information ISI Relief Request RR-II-15, 17, and 18 (TAC NO. MC0108)

South Carolina Electric & Gas Company (SCE&G) hereby submits the attached response to the referenced request for additional information (RAI) regarding relief requests RR-II-15, RR-II-17 resubmitted by Reference 1 on September 16, 2003, and RR-II-18 submitted by Reference 2 on October 30, 2002.

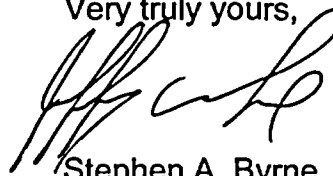
Based on Question 2.3 for relief request RR-II-17 and the accompanying response, SCE&G requests withdrawal of RR-II-17. Code Case N-648-1 was not yet accepted when Relief was applied for. As Code Case N-648-1 has been endorsed by Regulatory Guide 1.147, Revision 13, with conditions, RR-II-17 is no longer needed by VCSNS.

A047

Document Control Desk  
0-C-03-0262  
RC-03-0223  
Page 2 of 2

Should you have any questions, please call Mr. Ron Clary at (803) 345-4757.

Very truly yours,

  
PER DIRECTION  
OF SA3 10/23/03  
Stephen A. Byrne

JT/SAB/dr  
Attachments (3)

c: N. O. Lorick  
N. S. Carns  
T. G. Eppink (w/o Attachments)  
R. J. White  
L. A. Reyes  
K. R. Cotton  
K. M. Sutton  
General Managers  
NRC Resident Inspector  
T. A. McAlister  
A. R. Caban  
NSRC  
RTS (0-C-03-0262)  
File (810.19-2)  
DMS (RC-0223)

**South Carolina Electric & Gas Company (SCE&G)  
Virgil C. Summer Nuclear Station (VCSNS)  
Response to NRC Request for Additional Information (RAI)  
Regarding Inservice Inspection Relief Request  
RR-II-15**

TAC MB6647 - submittal dated October 30, 2002 as supplemented September 16, 2003 (RC-03-0197) and TAC MC0108 - submittal dated July 11, 2003 as supplemented September 16, 2003 (RC-03-0196).

**1.0 RR-II-15, September 17, 2003 (RC-03-0196) submittal: As an example see Salem Unit 2 submittal dated February 11, 2002 and the staff's safety evaluation dated March 21, 2003.**

**1.1 The "Alternate Test" section is vague. The request for relief is reviewed based on the statements in this section. This section should have a concise statement of the alternative. For example, the alternative should state that the examination will be performed with personnel and procedures qualified to a specific edition/addenda of the ASME Code, Section XI, Appendix VIII, Supplements 4 and 6.**

**Response 1.1:**

In accordance with 10CFR50.55a(a)(3)(i), SCE&G proposes to use a qualified performance based procedure for the Ultrasonic examination of the Reactor Vessel flange to upper shell weld. The ASME Section XI, Appendix VIII qualified procedure, PDI-ISI-254 Rev 5, has been demonstrated to perform detection, length sizing and through-wall sizing of Reactor Vessel shell welds including those of similar thickness and material composition as the flange to upper shell weld. This procedure and the personnel performing examinations per the procedure have been qualified in accordance with ASME Section XI, Division 1, 1995 Edition, 1996 Addenda, Appendix VIII, Supplements 4 and 6. (See pages 4 through 6 of this response for Table, Comparison of Reactor Pressure Vessel Shell Weld Examination Techniques.)

**1.2 From the submittal, the coverage requirements are not clear. The figure provided shows less than essentially 100% for an Appendix VIII (10 CFR 50.55a(b)(2)(xv)(G) or Section V, Article 4, T-441 examination. Identify the coverage criteria that will be used for the examination. If the coverage is less than essentially 100%, state the coverage alternative, discuss possible coverage increases that can be achieved with other transducers, and discuss changes in coverage associated with UT performed from the flanged surface.**

**Did VCSNS receive relief from the coverage requirements of this weld for the first ISI 10-year interval? What was the coverage? If the coverage from the first interval is greater than the coverage expected from this examination (second interval), discuss the reasons for the differences.**

**Response 1.2:**

As is shown in the coverage calculation drawing previously submitted, according to the Appendix VIII procedure, each transducer type has a specific depth range, so coverage is calculated for each depth range and the ranges are then added together. The dual element focused 45° examines from the clad-base-metal interface to a depth of 2.5". The single element L wave 45° examines from 2.5" to .6T. The 45°shear wave transducer examines from .6T through T.

For coverage, the volume of each of these areas for both the weld and the Code required additional 1/2T is calculated from the AutoCAD technique drawing, which is a scaled representation of the examination volume. The volume of each of these areas is then weighted with respect to the entire examination volume. The coverage of 100% weld and 79% volume averages to 89.5% for the ID surface examination using the Appendix VIII technique. When these results are combined with manual examinations performed from the flange seal surface, the expected coverage is 95% minimum. It is not anticipated that greater coverage could be obtained scanning along the ID surface by using additional transducers and beam angles due to the fact that the flange taper geometry will partially obstruct the path of all transducers.

No specific limitations were reported in the first 10-year ISI examination of this weld. The reports associated with the first 10-year ISI had general statements relative "scan limitations due to configuration".

- 1.3 In the submittal, the bases for relief section does not address the qualification of personnel performing the examinations. Provide a discussion of the personnel qualifications.**

**Response 1.3:**

The personnel performing examinations per the procedure (ultrasonic examiners) have been qualified in accordance with ASME Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Supplements 4 and 6. Additionally, Ultrasonic examiners establishing sensitivity, verifying essential operating parameters, approving scan plans and performing data analysis per this procedure shall be qualified and certified to Level II or Level III in accordance with WESDYNE International Procedure WDP-9.2, latest revision. They shall also possess certification attachments (PDQS) documenting successful qualification in accordance with the PDI implementation of Appendix VIII, Supplements 4 and 6.

- 1.4 In the submittal, the bases for relief section states that the examination will be performed according to Code as amended by the 10 CFR 50.55a October 2000 and WesDyne International. The 10 CFR is issued in its entirety annually with periodical updates issued in the *Federal Register*. Explain the reference "October 2000."**

WesDyne does not have the authority to amend the Code. However, alternatives to the Code may be proposed based on the WesDyne process or any other process, such as, the Performance Demonstration Initiative (PDI) program. Provide, in the appropriate sections of the submittal, any differences that may exist between the VCSNS examination as implemented by WesDyne and ASME Code as amended by the 10 CFR 50.55a(b). Include any clarifying discussions as needed.

Identify the revision for procedure PDI-ISI-254 that will be used for this examination.

**Response 1.4:**

October 2000 is an incorrect reference. It is not the intent of the relief request to imply that WESDYNE is amending the Code, but simply that the Code requirements as amended by the final rule will be complied with by using the WESDYNE procedure. The revision for procedure PDI-ISI-254 is Revision 5.

South Carolina Electric & Gas Co.  
V.C. Summer Nuclear Station  
ISI Relief Request RR-II-15

Comparison Of Reactor Pressure Vessel Shell Examination Techniques

Description (Code Reference)	ASME Section V, Article 4, 1989 ASME Section XI, 1989 NRC Regulatory Guide 1.150, Revision 1	Westinghouse Examination Procedure PDI-ISI-254
Examination Angle	Section V, Article 4, T-441 requires the volume of weld and adjacent base material to be scanned by straight and angle beam techniques. Two angle beams, having nominal angles of 45 and 60 degrees with respect to a perpendicular to the examination surface, shall generally be used. Other pairs of angle beams are permitted provided the measured difference between the angles is at least 10 degrees.	Examinations are conducted with three transducer types applied four directionally. Each transducer type has responsibility for interrogation of a specific depth range. The base material directly underneath the cladding to a depth of 2.5 inches is examined by the 45 degree dual element transducer at 4 MHz. From 2.5 inches deep to a depth of 60% of the component thickness, the qualified transducer is the 45 degree L wave, single element at 4 MHz. For examination of vessel shell material from 60% thickness to the OD surface, a 45 degree single element transducer at 2 MHz is used.  These examination angles/ transducer types were successfully qualified under PDI protocol using the PDI program test blocks.
Instrument Calibrations	Section V, Article 4, T-431 requires that instrument screen height and amplitude linearity be evaluated at least every three months.  Section XI, IWA-2232 requires that these screen height and linearity checks be performed at the beginning and end of the weld examination performed on a vessel during one outage.	Instrument screen height and amplitude linearity are checked prior to and following completion of the examinations of the V.C. Summer reactor vessel.
System Calibrations	Section V, Article 4, Article 4, T-432 requires that the original system calibration be performed on the Code basic calibration block.	Calibrations are established on a clad calibration block made from reactor vessel material. The block has side drilled hole reflectors at depths throughout the examination volume which are used for range adjustment and calibration sensitivity.

South Carolina Electric & Gas Co.  
V.C. Summer Nuclear Station  
ISI Relief Request RR-II-15

Comparison Of Reactor Pressure Vessel Shell Examination Techniques

Description (Code Reference)	ASME Section V, Article 4, 1989 ASME Section XI, 1989 NRC Regulatory Guide 1.150, Revision 1	Westinghouse Examination Procedure PDI-ISI-254
	T-432 allows the use of different types of reference blocks and electronic simulators to perform system calibration verifications.	
Scanning Sensitivity	Section V, Article 4, T-424 permits scanning to be performed at the reference level when electronic distance-amplitude correction (DAC) is used with automated recording.	Scanning is performed at the reference level.
Recording Level	Section V, Article 4, T-441 requires recording and evaluation of reflectors that produce a response equal to or greater than 20% DAC.  Regulatory Guide 1.150 requires recording and evaluation at 20% DAC for the inner 25% of material thickness	Per PDI-ISI-254, any indication suspicious of being a flaw, regardless of amplitude, shall be measured for through-wall and length and assessed in accordance with the acceptance criteria set forth in Section XI, IWB-3000. The procedure sensitivity level compares to an ASME Code level of 5-10% DAC.
Scan Index and Pulse Repetition Rate	Section V, Article 4, T-424 requires each pass of the search unit overlap a minimum of 10% of the transducer piezoelectric element dimension perpendicular to the direction of the scan.  Section XI, IWA-2232 requires each pass of the search unit overlap at least 50% of the transducer piezoelectric element dimension perpendicular to the direction of the scan.  NRC Regulatory Guide 1.150 requires a 25% maximum overlap for detection and 0.25-inch maximum increments for sizing.	A scan index of 0.50* is used for flaw detection and measurement.  This index size was satisfactorily demonstrated in the Westinghouse Appendix VIII procedure demonstration.

**South Carolina Electric & Gas Co.  
V.C. Summer Nuclear Station  
ISI Relief Request RR-II-15**

**Comparison Of Reactor Pressure Vessel Shell Examination Techniques**

Description (Code Reference)	ASME Section V, Article 4, 1989 ASME Section XI, 1989 NRC Regulatory Guide 1.150, Revision 1	Westinghouse Examination Procedure PDI-ISI-254
Flaw Sizing and Evaluation	Section V, article 4, T-441 requires amplitude based sizing at 20% DAC. Section V, Article 4, T-453 permits evaluation to alternative standards.	The through-wall size of flaws is determined by the recognition and measurement of diffracted signals from the upper and lower extremes of the flaw. The length is determined by adding the number of scan sweeps exhibiting similar features. This measurement technique was successfully demonstrated in accordance with the rules of Section XI, Appendix VIII, Supplements 4 and 6 as modified by the Final Rule.
Procedure qualification and data analyst	N/A	<p>The remote examinations will be performed using the Westinghouse SUPREEM Robot and the Paragon UT data acquisition system in accordance with a PDI qualified procedure. The Westinghouse procedure PDI-ISI-254, "Remote Inservice Examination of Reactor Vessel Shell Welds", in accordance with ASME Section XI, Appendix VIII, Supplements 4 and 6, was demonstrated at the PDI qualification session in 2001 (Performance Demonstration Qualification Sheet (PDQS) No. 407). The procedure complies with ASME Section XI, Appendix VIII, 1995 edition, 1996 Addenda as modified by the final rule.</p> <p>According to procedure, the person performing these tasks must possess individual PDI certification attachments indicating qualification to requirements of Appendix VIII, Supplements 4 and 6 for detection, length, and depth sizing. Examiners are allowed to work only within the scope of their qualifications.</p>



**South Carolina Electric & Gas Company (SCE&G)  
Virgil C. Summer Nuclear Station (VCSNS)  
Response to NRC Request for Additional Information (RAI)  
Regarding Inservice Inspection Relief Request  
RR-II-17**

TAC MB6647 - submittal dated October 30, 2002 as supplemented September 16, 2003 (RC-03-0197) and TAC MC0108 - submittal dated July 11, 2003 as supplemented September 16, 2003 (RC-03-0196).

**2.0 RR-II-17, September 17, 2003 (RC-03-0196) submittal:**

**2.1 In the submittal, the code requirement section states the applicable examination as Item B3.20 for an Inspection Program A while proposed alternative section references an Item B3.100 for an Inspection Program B. Which Inspection Program and examination Item applies to this request for relief?**

**Response 2.1:**

The correct reference for both the Code Requirement and Alternative is Item No. B3.100 (Inspection Program B).

**2.2 In the submittal, the alternate test section has a paragraph on reduced examination volume to ½ inch from each side of the weld. Is this relevant to examinations performed on the inner nozzle radius? If so, discuss the relevance.**

**Response 2.2:**

This Paragraph should not be included since the reduced volume applies to nozzle to shell welds not reactor vessel inner radii.

**2.3 In the submittal, the statement is made that the request for relief is the same as Code Case N-619 which is endorsed in Regulatory Guide 1.147, Revision 13 with conditions. If the code case with conditions is the same as this request for relief, discuss why the relief is still needed? If the relief is still needed, explain the differences between the relief request and the code case.**

Document Control Desk  
Attachment II  
0-C-03-0262  
RC-03-0223  
Page 2 of 2

**Response 2.3:**

The Relief Request should reference Conditionally Acceptable Code Case N-648-1 "alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles, Section XI Division 1. Code Case N-648-1 was not yet accepted when Relief was applied for. As Code Case N-648-1 has been approved by Regulatory Guide 1.147, Revision 13 with conditions, SCE&G requests withdrawal of RR-II-17.

**South Carolina Electric & Gas Company (SCE&G)  
Virgil C. Summer Nuclear Station (VCSNS)  
Response to NRC Request for Additional Information (RAI)  
Regarding Inservice Inspection Relief Request  
RR-II-18**

TAC MB6647 - submittal dated October 30, 2002 as supplemented September 16, 2003 (RC-03-0197) and TAC MC0108 - submittal dated July 11, 2003 as supplemented September 16, 2003 (RC-03-0196).

**SCE&G Discussion Point:**

RR-II-18 was accepted as submitted in a meeting between the V.C. Summer Nuclear Station NRR Project Manager, the NRC technical reviewer, and SCE&G held on August 8, 2003, at the NRR offices, however the following information should resolve any concerns the reviewers may have relative to this Relief Request:

**3.0 RR-II-18, July 11, 2003 submittal:**

**3.1 In the submittal, the alternate test section has the phrases "to the extent practical" and "anticipated to be 88 percent." The proposed alternative should have an accountable value, such as, to the extent practical but not less than 88 percent coverage. Discuss what is meant by "to the extent practical." Is the anticipated 88% coverage a minimum?**

**Response 3.1**

The coverage calculated before the examination can only be estimated since a small mislocation of the any of the bottom mounted instrumentation (BMI) tubes with respect to the available drawings will have an effect on the final coverage (either positive or negative). Experience with examinations of numerous other Westinghouse 3-loop reactor vessels with similar BMI locations has shown that 88% minimum coverage is reasonable. Every attempt will be made by the exam team to achieve a coverage value higher than 88%.

"To the extent practical" simply means that in cases where there is an obstruction to the scan path, specifically around a BMI tube, scanning boundaries are established on a case-by case basis by manually guiding a specially adapted robotic arm and transducer sled up to the minimum safe distance next to and around the penetrations.

The examiner and robot operator work together in this task and these boundaries are established on site for all partially obstructed areas.

These limited scan segments typically reduce the total coverage of the weld. Additional coverage is not believed to be possible with different transducers or beam angles because the limitation is due to penetrations and the need to establish a safe scanning boundary around them.

**3.2 In the submittal, the basis for relief section states that the examination coverage will be to the maximum extent practical. Is the procedure that will be used to examine the reactor vessel head circumferential weld the same as the procedure that will be used to examine circumferential vessel welds? Discuss the extra effort that VCSNS will contribute to the examination that is beyond the criteria in the procedure. Discuss VCSNS's evaluation of other transducers and UT techniques that were considered for improving the coverage.**

**Response 3.2**

The procedure to examine the bottom head to vessel barrel weld is the same as to be used for the automated examinations of the circumferential vessel welds. This procedure is PDI-ISI-254 Revision 5. The location of the bottom mounted instrumentation tubes (BMI) is the interference, which precludes full coverage of the required examination area. In order to maximize the coverage a modified attachment to the robotic arm will be employed. This allows location of the transducers to be as close as possible to the BMI tubes. Two extra transducers (additions to the standard transducer sled package) are used to examine the required volume to the maximum extent practical when the transducer sled is next to a BMI tube.

**3.3 What was the coverage achieved for this weld in the first 10-year ISI interval?**

**Response 3.3**

No specific limitations were identified in the first 10-year ISI examination of this weld. The examination reports indicate " no specific limitations due to core support lugs and/or BMI's."