



November 13, 2000  
RC-00-0344

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

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION  
DOCKET NO. 50/395  
OPERATING LICENSE NO. NPF-12  
REQUEST FOR RELIEF TO USE ULTRASONIC EXAMINATION  
IN LIEU OF RADIOGRAPHIC EXAMINATION OF CLASS I  
PIPING REPAIR  
NRR 00-0252

Stephen A. Byrne  
Vice President  
Nuclear Operations  
803.345.4622

South Carolina Electric & Gas Company (SCE&G) submits the attached request for an alternative to the requirements of the ASME Code regarding specific non-destructive examinations to be performed at VCSNS on the reactor coolant system (RCS).

South Carolina Electric & Gas Co.  
Virgil C. Summer Nuclear Station  
P. O. Box 88  
Jenkinsville, South Carolina  
29065

803.345.5209  
803.635.1461

Preparation activities are currently underway at VCSNS to address the replacement of the "A" loop hot leg nozzle weld. This request provides an alternative to the radiographic examination requirements of the ASME Code, Section III, for welds performed in the course of the repair/replacement. The proposed alternative provides for ultrasonic examinations to be used in lieu of the ASME Section III radiographic examinations. SCE&G has determined that the alternative provides an acceptable level of quality and safety.

The NRC has approved the use of a similar request at Oconee Nuclear Station, Unit 3, TAC NO. M99018.

The description of this alternative, including justification, is included as an attachment to this letter. SCE&G requests timely NRC staff review and approval of this request so that VCSNS can complete the weld repair of the "A" hot leg weld and return the RCS to operable status. VCSNS is currently shutdown for its 12<sup>th</sup> refueling outage and will not restart the plant until the RCS code compliance is restored.

**NUCLEAR EXCELLENCE - A SUMMER TRADITION!**

A047

Document Control Desk  
NRR 00-0252  
RC-00-0344  
Page 2 of 2

SCE&G is submitting the attached relief request in accordance with 10CFR50.55a(a)(3)(i).

Should you have any questions, please call Mr. Barry Mather at (803) 345-4601 or Mr. Phil Rose at (803) 345-4052.

Very truly yours,



Stephen A. Byrne

PAR/SAB/dr  
Attachment

c: N. O. Lorick  
N. S. Cams  
T. G. Eppink (w/o Attachment)  
R. J. White  
L. A. Reyes  
K. R. Cotton  
NRC Resident Inspector  
J. B. Knotts, Jr.  
B. E. Mather  
RTS (NRR 00-0252)  
File (810.19-2, 810.58)  
DMS (RC-00-0344)

**South Carolina Electric & Gas Co. (SCE&G)  
Virgil C. Summer Nuclear Station (VCSNS)  
Relief Request**

**Subject:**

Corrective action for the "A" loop hot leg nozzle to safe-end weld involves removal of the subject weld (along with a small portion of pipe) and replacement with a spool piece and its associated welds. This request provides for the alternative use of ultrasonic examination in lieu of the requirement for radiographic examination, specifically to be applied to the below listed Class I butt-welded joints.

**Components:**

ASME Class-1 weld joints associated with the repair of the "A" loop hot leg nozzle-to-safe-end weld where the radiation level of the in-situ pipe/components is too high to permit effective radiography. Specifically:

- 1) "A" Loop Hot Leg Nozzle to Safe-End Weld
- 2) "A" Loop Hot Leg Pipe-to Pipe Weld

**Current Code Requirement:**

ASME Code, Section III (all years and addenda) require that various Class 1 weld joints be examined via radiographic methods to satisfy non-destructive examination (NDE) requirements as part of final weld acceptance during construction. For example, ASME Code, Section III NB 5222 1992 Edition requires:

- "(a) Butt-welded joints shall be examined by the radiographic and either the liquid penetrant or magnetic particle method. "

**Alternative Requirement:**

The alternative involves ultrasonic and surface examinations of Class 1 repair/replacement welds. The ultrasonic examinations will be in accordance with the NDE programs at VCSNS. The alternative examinations will be made to satisfy the construction code requirement for radiographic examination where the radiation level of the in-situ pipe/components is too high to permit effective radiography. Prior to the use of the alternative examination on a specific weld, the effectiveness of the ultrasonic techniques will be demonstrated on a mock-up weld containing representative flaws. In addition, liquid penetrant examinations will be performed on the root and hot pass and

at various stages through the welding process. This process has been endorsed by both ASME and the NRC and is included in the 1998 edition of ASME Section XI Boiler and Pressure Vessel Code paragraph IWA-4520.c. This paragraph states:

*"Alternative examination methods, a combination of methods, or newly developed techniques may be substituted for the methods specified in the construction code or in this division, provided the Inspector is satisfied that the results are demonstrated to be equivalent or superior to those of the specified method."*

### **Basis for Request:**

#### **Assessment of the Use of Radiography**

Based on the review of the anticipated joint configuration of the planned welds it has been determined that radiographic examination that meets code acceptance criteria is not achievable. The dose rate on contact is estimated to be 500mR/hour. After reviewing the film specifications it has been determined that the amount of background radiation present would over-expose film during the planned exposure. Further, based on the variations in dose rates around the pipe welds it has been determined that it would be improbable that compensations could be made to the shot that would overcome the effects of the background radiation and obtain a code acceptable radiograph. Note that access to the piping inside diameter is not available for performing single wall radiography. The supporting details for this determination are listed below:

Pipe / Nozzle Thickness	2.5"
Pipe / Nozzle OD	36.0"
Wall Exposure	Double
Wall Viewing	Single
Source to Film Distance	36.0"
Total Exposure Thickness	5.0"
Type Penetrameter	Film Side
Penetrameter	Number 30 with 2T Hole Sensitivity
Source Requirement / Strength	Cobalt 60 Minimum 50 Curies
Required Film	Kodak AA or Equivalent
Film Density / Exposure Time	2.5 H & D / 46.5 Minutes Required per Shot
Code Minimum Density / Exposure Time	2.0 H & D / 34 Minutes Required per Shot
Number of Exposures	8-10 Depending on Overlap

### **Acceptability of Ultrasonic Examination**

Ultrasonic examination is capable of detecting the same type of flaws in welds that radiography can detect, i.e., cracks, lack of fusion, incomplete penetration and porosity. While the radiographic acceptance standards in the ASME Section III, NB5000 are based on interpretation and measurement of visible images on film, the ultrasonic acceptance standards are based on the amplitude of a signal on a cathode ray tube. The length of the flaw is determined by moving the search unit left and right, parallel to the flaw until the signal amplitude drops below 100% of the calibrated reference level. Because the ultrasonic beam has a finite width, measurement of the flaw length is usually conservative in that the width of the ultrasonic beam is included in the flaw length measurement. Interpretation of the ultrasonic signals requires plotting of the flaw location on a cross sectional sketch of the weld along with a trained examiner to discriminate between the types of flaws commonly associated with butt welds. In conclusion, given their intended use as described in this relief request, ultrasonic methods are an acceptable substitute for radiography, and therefore, quality and safety are not adversely affected.

In accordance with 10 CFR 50.55a(a)(3)(i), NRC staff approval is requested based on the proposed alternative examination providing an acceptable level of quality and safety.

### **Implementation Schedule:**

This relief will be implemented during the second inspection interval, specifically during the post weld examinations scheduled to occur prior to startup from the current refueling outage. The expected date for completion of the weld repair is December 15, 2000.