

September 6, 2005

Mr. Jeffery Archie  
Vice President, Nuclear Operations  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
Post Office Box 88  
Jenkinsville, South Carolina 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION — RELIEF REQUEST-III-02  
ASSOCIATED WITH THE RISK-INFORMED INSERVICE INSPECTION  
PROGRAM (TAC NO. MC4323)

Dear Mr. Archie:

By letter dated September 8, 2004, South Carolina Electric & Gas Company requested U.S. Nuclear Regulatory Commission (NRC) authorization to extend the risk-informed inservice inspection (RI-ISI) program plan for Virgil C. Summer Nuclear Station (VCSNS) to the third 10-year inservice inspection (ISI) interval. The VCSNS RI-ISI program was initially submitted to the NRC by letter dated September 16, 2002, and was approved by the NRC for use in the second 10-year ISI interval by letter dated May 12, 2003. The VCSNS RI-ISI program was developed in accordance with the methodology contained in the NRC approved Electric Power Research Institute (EPRI) Topical Report EPRI-TR-112657, Revision B-A. The proposed RI-ISI program is an acceptable alternative to the requirements of the American Society of Mechanical Engineers Code, Section XI, for inservice inspection of Code Class 1 piping, Categories B-F and B-J welds and Class 2 piping, Categories C-F-1 and C-F-2 welds.

The NRC staff authorizes the proposed alternatives in Relief Request-III-02, for the third 10-year inservice inspection interval of VCSNS, pursuant to Title 10, Code of Federal Regulations, Section 50.55a(a)(3)(i) on the basis that the alternatives provide an acceptable level of quality and safety.

Sincerely,

*/RA/*

Evangelos C. Marinos, Chief, Section 1  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-395

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME CODE REQUIREMENTS

FOR THIRD 10-YEAR INSERVICE INSPECTION PROGRAM

BASED ON RISK-INFORMED ALTERNATIVE APPROACH

VIRGIL C. SUMMER NUCLEAR STATION

SOUTH CAROLINA ELECTRIC AND GAS COMPANY

DOCKET NO. 50-395

1.0 INTRODUCTION

By letter dated September 8, 2004 (Reference 1), South Carolina Electric & Gas Company (SCE&G, the licensee) requested U.S. Nuclear Regulatory Commission (NRC) authorization to extend the risk-informed inservice inspection (RI-ISI) program plan for Virgil C. Summer Nuclear Station (VCSNS) to the third 10-year inservice inspection (ISI) interval. The VCSNS RI-ISI program was initially submitted to the NRC by letter dated September 16, 2002 (Reference 2), and supplemented in a letter dated January 29, 2003 (Reference 3). The VCSNS RI-ISI program was reviewed and approved by the NRC for use during the second 10-year ISI interval in a letter dated May 12, 2003 (Reference 4).

The licensee considered relevant information since the development of the original program and reviewed and updated the RI-ISI program. The licensee's current submittal proposes to extend the updated RI-ISI program to the third 10-year ISI interval.

2.0 REGULATORY EVALUATION

Title 10 of the Code of Federal Regulations (10 CFR), Section 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code (Code), Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). It states in 10 CFR 50.55a(a)(3) 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.

The licensee's RI-ISI program, as outlined in References 3 and 4, was developed in accordance with the methodology contained in the Electric Power Research Institute's (EPRI's)

Enclosure

Topical Report EPRI TR-112657, Rev. B-A (Reference 5), which was reviewed and approved by the NRC staff. The VCSNS RI-ISI program is an alternative pursuant to 10 CFR 50.55a(a)(3)(i). In Reference 1, the licensee requests NRC authorization to continue the implementation of an RI-ISI piping program for the third 10-year ISI interval at VCSNS. The scope of the RI-ISI program is limited to the inspection of ASME Code Class 1 and 2 piping (Categories B-F, B-J, C-F-1, and C-F-2 welds).

### 3.0 TECHNICAL EVALUATION

The licensee is requesting relief to use the proposed RI-ISI program plan in the third 10-year ISI interval instead of the ASME Section XI program for piping. An acceptable RI-ISI program plan is expected to meet the five key principles discussed in NRC Regulatory Guide 1.178 (Reference 6), Standard Review Plan 3.9.8 (Reference 7) and the EPRI TR-112657 (Reference 5), as stated below.

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.
2. The proposed change is consistent with the defense-in-depth philosophy.
3. The proposed change maintains sufficient safety margins.
4. When proposed changes result in an increase in Core Damage Frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
5. The impact of the proposed change should be monitored by using performance measurement strategies.

The first principle is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(3)(i) and, therefore, an exemption request is not required. The second and third principles require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected. The methodology used to develop the RI-ISI program for the third 10-year inspection interval is unchanged from the methodology approved for use in the second 10-year inspection interval and, therefore, the second and third principles are met.

As described in Reference 2 and approved by the NRC staff in Reference 4, the RI-ISI is a living program that requires periodic updating and that, as a minimum, risk ranking of piping segments will be reviewed on an ASME period basis. In Reference 1, the licensee described eight areas of review and the results of the review. The licensee stated that the only change in the RI-ISI program between the second 10-year inspection interval and the third 10-year inspection interval was an increase in the number of welds included in the risk-informed evaluation (i.e., the scope of the program). The licensee determined that no changes in the number and location of inspections were required in accordance with the approved methodology in Reference 5.

Relief was granted in Reference 4 from selected requirements in the ASME code, 1983 Edition through 1983 Addenda of Section XI, the licensee's code of record when relief was requested. The licensee reported that the code of record for the third ASME interval is the 1998 ASME Section XI through the 2000 addenda. The licensee reported that, as part of the ASME third interval update, ASME code classification was reviewed for all piping. The 1998 ASME Section XI through the 2000 addenda reduced the inspection exemption for emergency

feedwater lines from 4 inches to 1½ inches. The licensee also changed the basis for the original ASME classification for some pipe segments from design stress considerations to functional considerations. The change in the basis caused some piping that had been previously classified as Class 2 to become Class 1 and reduced the inspection exemptions accordingly. Taken together, the changes removed the ASME inspection exemptions from a total of 107 welds.

As described in Section 3.2.1 of the EPRI Topical Report, the RI-ISI program scope is determined by the ASME inspection program scope. The licensee reported that the 107 welds were added to the RI-ISI program scope and, therefore, were included in the risk ranking. All the new welds are located in low safety significant (LSS) segments. The EPRI methodology does not require inspections of any LSS welds but the risk increase associated with discontinuing the inspections of the LSS welds must be included in the change in risk estimates.

The licensee reported in Reference 1 that the change in CDF and large early release frequency (LERF) were re-calculated using the latest revision of the Probabilistic Risk Analysis (PRA). None of the 107 welds added to the RI-ISI program scope had been inspected under the previous ASME program and their addition to the RI-ISI program did not affect the risk estimates because no inspections were discontinued. Some ASME inspections might have been required in the 107 welds if a new ASME inspection program had been developed for the new code of record in the third 10-year inspection interval. Development of an acceptable RI-ISI program is primarily achieved through the risk-ranking and the inspection location selection processes. Estimates of the change in CDF and LERF is a final phase intended to provide additional assurance that aggregate changes in risk will be acceptable (Ref. 5). Although the ASME inspection program may change slightly when developed from the new code of record, the accuracy of the change in risk calculations does not warrant developing a new ASME program for the new code of record simply to be used as a new baseline and then discarded. Therefore, the NRC staff finds that the comparison of the risk estimate between the RI-ISI program proposed in the submittal and the ASME program based on the code of record from which relief was granted in Reference 4 is appropriate and acceptable. No deviation from the risk acceptance criteria were identified and the NRC staff finds that the process provides assurance that the fourth key principle is met.

Section 3.6.6.1 of EPRI TR-112657 states, in part, that the service history and susceptibility review and ongoing industry event reviews assure that the industry trends are being monitored to assure that if an unexpected or new mechanism is identified, or a new component is identified as susceptible to an existing degradation mechanism, the RI-ISI program will be updated to reflect that change. The program update will incorporate any additional inspections mandated by the NRC, as well as those inspections deemed appropriate by the industry groups addressing the specific issues.

Due to recent and ongoing issues related to degradation due to pressurized water stress corrosion cracking in components that contain alloy 600/82/182, the NRC staff requested that the licensee provide information related to welds containing alloy 82/182. The licensee participated in a teleconference to discuss the aforementioned issue. The licensee stated that it has taken the issue into account and is complying with industry guidance, and intends to continue to follow industry guidance in the future.

In addition to monitoring industry experience, the licensee stated that future updates to the PRA model and the RI-ISI program will be conducted in accordance with the Nuclear Energy Institute (NEI) document NEI-04-05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs for Nuclear Plant Piping Systems" (Reference 8). Therefore, the NRC staff concludes that the RI-ISI program continues to be a living program and that the fifth key principle is met.

Based on the above discussion, the NRC staff finds that the five key principles of risk-informed decision making are ensured by the licensee's proposed third 10-year RI-ISI interval program plan and, therefore, the proposed program for the third 10-year ISI inspection interval is acceptable.

### 3.0 CONCLUSIONS

Based on the information provided in the licensee's submittals, the NRC staff has determined that the proposed alternative provides an acceptable level of quality and safety, and, therefore, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year ISI interval at VCSNS.

### 4.0 REFERENCES

6. Letter from Jeffrey B. Archie, SCE&G, dated September 8, 2004, to NRC, *Request to Use Alternatives to ASME Code Requirements in VCSNS Third Inservice Inspection Interval (RR-III-01, RR-III-02)*.
7. Letter from Stephen A. Byrne, SCE&G, dated September 16, 2002, to NRC, *Request for Revision to ASME Boiler and Pressure Vessel Code, Section XI Relief Request RR-II-07*.
8. Letter from Stephen A. Byrne, SCE&G, dated January 29, 2003, to NRC, *Response to NRC Questions Regarding ASME Boiler and Pressure Vessel Code, Section XI, Relief Request RR-II-07*.
9. Letter from NRC, dated May 12, 2003, to Stephen A. Byrne, SCE&G, *Virgil C. Summer Nuclear Station - Relief Request II-07 Associated with the Risk-Informed Inservice Inspection (RI-ISI) Program (TAC No. MB6523)*.
10. EPRI TR-112657, Revision B-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Final Report, December 1999.
11. NRC RG 1.178, *An Approach for Plant-Specific Risk-Informed Decision Making: Inservice Inspection of Piping*, September 2003.
12. NRC NUREG-0800, Chapter 3.9.8, *Standard Review Plan for the Review of Risk-Informed Inservice Inspection of Piping*, September 2003.
13. NEI 04-05, *Living Program Guidance To Maintain Risk-Informed Inservice Inspection Programs For Nuclear Plant Piping Systems*, April 2004.

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Date: September 6, 2005

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