

December 8, 2016

Mr. Ronald A. Jones, Vice-President
South Carolina Electric & Gas Company
New Nuclear Deployment
P.O. Box 88
Jenkinsville, SC 29065

SUBJECT: NRC RESPONSE TO SOUTH CAROLINA ELECTRIC AND GAS COMPANY'S
REQUEST FOR RISK-INFORMED SAFETY-BASED INSERVICE INSPECTION
ALTERNATIVE FOR CLASS 1 AND 2 PIPING FOR THE VIRGIL C. SUMMER
NUCLEAR STATION, UNITS 2 AND 3 (CAC NO. RQ0470)

Dear Mr. Jones:

By letter dated August 16, 2016, the South Carolina Electric & Gas Company (SCE&G), acting on behalf of itself and the South Carolina Public Service Authority, submitted a request for U.S. Nuclear Regulatory Commission (NRC) authorization to use a certain alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code for the Virgil C. Summer Nuclear Station, Units 2 and 3. Specifically the alternative, if approved, would allow the use of a risk-informed in-service inspection program for ASME Class 1 and 2 piping.

The NRC staff has developed the enclosed response to document staff concerns regarding the subject request. The SCE&G response should include a proposed date for a public meeting where the staff's concerns may be discussed. Please note that the NRC staff review will be deferred until the aforementioned public meeting with SCE&G is held.

Sincerely,

/RA/

William (Billy) Gleaves, Lead Project Manager
Licensing Branch 4
Division of New Reactor Licensing
Office of New Reactors

Docket Nos.: 52-00027
52-00028

Enclosure:
As stated

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(Revised 10/03/2016)

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**NRC Response to
Risk-Informed In-service Inspection Pilot Program**

Virgil C. Summer Nuclear Station, Unit 2 and 3

The NRC staff has completed its review of the Virgil C. Summer Nuclear Station (VCSNS), Units 2 and 3, proposed alternative to implement a Pilot Risk-Informed Inservice Inspection (RI-ISI) Program, dated August 12, 2016, located in NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML16229A131. Based on this review, the staff concludes that the staff cannot sustain its review unless supplemented to address all the issues described below. Additional information on addressing the challenges associated with developing RI-ISI programs for new plants, and in particular for designs with no operating experience, is provided in Regulatory Issue Summary 2012-008, Revision 1, "Developing Inservice Testing and Inservice Inspection Under 10 CFR Part 52," dated July 17, 2013.

1. Insufficient Justification of Similar Characteristics

Most of the licensee's proposal is based on the premise that generic operating experience/data is applicable to VCSNS Units 2 and 3. However, the licensee has not provided the information needed for the staff to determine that VCSNS Units 2 and 3 are sufficiently similar to the current operating fleet. The staff expects that a new-build licensee using generic operating experience/data must substantiate the applicability of that experience/data to their plant design. This can be done, for example, by evaluating in detail how the characteristics of the plant design in question are sufficiently similar to those of the current operating fleet from which the experience/data originated. This evaluation should include, at a minimum, the following (evaluated together and not independently):

- The similarity of the piping materials of construction and construction techniques for new reactors to those in the currently operating fleet.
- Piping design, including similar piping sizes in similar as-built piping configurations, stresses, loadings and piping design Design Acceptance Criteria.
- Operating conditions, including similar environment (i.e., stagnant water), stresses, and loadings

The staff recognizes that in contrast to the current operating fleet, the AP1000 design uses passive systems that have no prior operating experience. Therefore, it is imperative that the information provided by the licensee is of sufficient detail to allow the staff to determine that the generic experience/data is applicable. With this in mind, it is necessary to describe the similarity of materials, piping design, and operating conditions on a system-by-system basis.

2. Insufficient Details Available to Determine the Validity of Degradation Mechanism Assessment

The staff is unable to evaluate the appropriateness of the proposed degradation mechanisms provided in Table 3.2 of the applicant's proposal because the licensee has not provided any details on the design (i.e., as-built configurations, stresses, loadings, etc.) of the piping systems in question.

3. Insufficient Details Provided on the Location of Welds included in the Risk Informed Inspection Plan

The licensee provided a count of welds that would be included in its risk informed program, but did not provide any details on the location of the welds in question as they relate to materials, design/configuration, and operating stresses and loads. Without this information, the staff cannot evaluate the scope of the proposed alternative examinations. In addition to the location, the licensee should describe the type of weld (e.g., dissimilar metal, etc.), type of welding process (Gas Tungsten Arc Welding, Shielded Metal Arc Welding), and joint design (Narrow V Groove, etc.). The staff is also interested in the access provided to inspect the welds in question as well as the nature of the nondestructive examination (NDE) to be performed. Therefore, in addition to the above, details should be provided on which welds can and cannot be 100 percent inspected per the ASME Code. This information is also needed for the staff to determine whether the inspection scope would provide assurance of maintaining the integrity of the welds.

4. Proposed Alternative indicates Potential for More Accessibility Issues

Design for inspectability issues have been identified for VCSNS Units 2 and 3. Section 3.3.4 of the applicant's proposal indicates that there will be additional cases where the required examination coverage cannot be obtained. Given that the licensee's proposed risk informed inspection program would not be implemented until the first inspection interval, the staff is also concerned about potential inspectability issues with Class 2 welds selected for RI-ISI that are not currently part of the population of Class 2 welds subject to preservice inspection.

The staff acknowledges that the current "design for inspectability" issue is yet to be resolved. However, once the issue is resolved, the staff expects that any proposed RI-ISI program be reconciled to, and consistent with, the resolution of the issue. In addition, the staff also expects that a RI-ISI program does not preclude the licensee's responsibility to meet the current regulatory requirements.

In addition to the above issues, the staff would like to inform the licensee of other potential issues identified during its review that could be resolved through the NRC review process (e.g., requests for additional information (RAIs)), although it would be prudent for the licensee to resolve them prior to re-submittal of the proposed alternative. Specifically, the staff identified some potential issues regarding the lack of detail on the scope and technical adequacy of the Probabilistic Risk Assessment (PRA) used in support of the RI-ISI program and the basis for the estimated conditional core damage probability values, conditional large early release probability values, delta core damage frequency, and delta large early release frequency provided in Section 3.4, "Risk Impact Assessment." Regulatory Guide 1.178, "An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping," Section 4.1 provides guidance on the information that should be included in the application to implement a RI-ISI

program. The application should include the description of the PRA in terms of the process to ensure quality, scope, and level of detail, and how limitations are compensated in the integrated decision making process supporting the RI-ISI submittal.