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April 30, 2019

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

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Docket No.: 50-395
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SOUTH CAROLINA ELECTRIC & GAS COMPANY
VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
ALTERNATIVE REQUEST RR-4-23 TO UTILIZE CODE CASE N-513-4
"EVALUATION CRITERIA FOR TEMPORARY ACCEPTANCE OF FLAWS IN MODERATE ENERGY CLASS 2 OR 3 PIPING SECTION XI, DIVISION 1"

In accordance with 10 CFR 50.55a(z)(2), South Carolina Electric & Gas Company (SCE&G) acting for itself and as an agent for South Carolina Public Service Authority (Santee Cooper) is requesting a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Specifically, SCE&G is requesting to apply the evaluation methods of ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1," to Class 2 and 3 moderate energy piping. This would include elbows, bent pipe, reducers, expanders, and branch tees without performing a repair/replacement activity, not exceeding the time to the next scheduled refueling outage.

SCE&G requests your review and approval of this request by August 30, 2019. Should you have any questions, please call Michael Moore at 803-345-4752.

Sincerely,

Mark Sartain
Vice President of Nuclear Engineering & Fleet Support

Commitments contained in this letter: None

Attachment: Alternative Request RR-4-23, Proposed Alternative to Utilize Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1"

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ATTACHMENT

Alternative Request RR-4-23
Proposed Alternative to Utilize Code Case N-513-4
"Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1"

Virgil C. Summer Nuclear Station Unit 1 (VCSNS)

South Carolina Electric & Gas Co. (SCE&G)

Alternative Request RR-4-23
Proposed Alternative to Utilize Code Case N-513-4
"Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1"

In Accordance with 10 CFR 50.55a(z)(2)
--Hardship without a compensating increase in quality and safety–

1. ASME Code Component(s) Affected

All American Society of Mechanical Engineers (ASME), Section XI, Class 2 and 3 components that meet the operational and configuration limitations of Code Case N-513-4, paragraphs 1(a), 1(b), 1(c), and 1(d).

2. Applicable ASME Section XI Code Edition and Addenda:

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2007 Edition through 2008 Addenda. VCSNS is in its 4th 10-year interval effective from January 1, 2014, through and including December 31, 2023.

3. Applicable Code Requirement

ASME Code, Section XI, IWC-3120 and IWC-3130 require that flaws exceeding the defined acceptance criteria be corrected by repair/replacement activities or evaluated and accepted by analytical evaluation. ASME Code, Section XI, IWD-3120(b) requires that components exceeding the acceptance standards of IWD-3400 be subject to supplemental examination, or to a repair/replacement activity.

4. Reason for Request

In accordance with 10 CFR 50.55a(z)(2), SCE&G is requesting a proposed alternative from the requirement to perform repair/replacement activities for degraded Class 2 and 3 piping whose maximum operating temperature does not exceed 200°F, and whose maximum operating pressure does not exceed 275 psig. Moderately degraded piping could require a plant shutdown within the required Technical Specification Action Statement timeframes to repair or replace the degraded piping. Plant shutdown activities result in additional dose and plant risk that would be inappropriate when degraded piping is demonstrated to retain adequate margin to complete the piping's function. The use of an acceptable alternative analysis method in lieu of immediate action for such degraded conditions will allow SCE&G to perform additional extent-of-condition examinations on the affected piping while allowing time for safe and orderly long-term repair or replacement actions if necessary. Actions to remove degraded piping from service could have an overall detrimental risk impact by requiring a plant shutdown, thus requiring use of a system that is in standby during normal operation. Accordingly, compliance with the current ASME Code requirements results in a hardship without a compensating increase in the level of quality and safety.

ASME Code Case N-513-3 does not allow evaluation of flaws located away from circumferential piping welds attaching elbows, bent pipe, reducers, expanders, and branch

tees to straight pipe. ASME Code Case N-513-3 also does not allow evaluation of flaws located in heat exchanger external tubing or piping. ASME Code Case N-513-4 provides Evaluation Criteria for the temporary acceptance of flaws in these locations.

5. Proposed Alternative and Basis for Use

SCE&G is requesting approval to apply the evaluation methods of ASME Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1," to Class 2 and 3 components that meet the operational and configuration limitations of Code Case N-513-4, paragraphs 1(a), 1(b), 1(c), and 1(d). This will avoid accruing additional personnel radiation exposure and increased plant risk associated with a plant shutdown to comply with the cited Code requirements.

The NRC issued Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping (Generic Letter 90-05)," (Reference 1) to address the acceptability of limited degradation in moderate energy piping. The generic letter defines conditions that would be acceptable to utilize temporary non-code repairs with NRC approval. The ASME recognized that relatively small flaws could remain in service without risk to the structural integrity of a piping system and therefore developed Code Case N-513.

NRC approval of Code Case N-513 versions in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," allows acceptance of partial through-wall or through-wall leaks in ASME Code Class 2 and 3 piping for an operating cycle provided all conditions of the Code Case and NRC conditions are met. The Code Case also requires the Owner to demonstrate system operability due to leakage.

The ASME recognized that the limitations in Code Case N-513-3 were preventing use in piping components such as elbows, bent pipe, reducers, expanders, and branch tees and external tubing or piping attached to heat exchangers. Code Case N-513-4 (Reference 2) was approved by the ASME to expand use of evaluation methods for acceptance of flaws at these locations and to revise several other areas of the Code Case.

The following provides a high level overview of the Code Case N-513-4 changes as compared to Code Case N-513-3:

1. Revised the maximum allowed time of use from no longer than 26 months to the next scheduled refueling outage.

2. Added applicability to piping elbows, bent pipe, reducers, expanders, and branch tees where the flaw is located more than $(R_0 \times t)^{1/2}$ from the centerline of the attaching circumferential piping weld.

3. Expanded use to external tubing or piping attached to heat exchangers in specific instances.

4. Revised to limit the use to liquid systems.

5. Revised to clarify treatment of Service Level load combinations.

6. Revised to address treatment of flaws in austenitic pipe flux welds.

7. Revised to require minimum wall thickness acceptance criteria to consider longitudinal stress in addition to hoop stress.

8. Other minor editorial changes to improve the clarity of the Code Case.

Detailed discussion of significant changes in Code Case N-513-4 when compared to NRC approved Code Case N-513-3 is provided in Reference 3.

The design basis is considered for each flaw and evaluated using the Operability Recommendation Process. The evaluation process for a through-wall flaw must consider requirements or commitments established for the system, continued degradation and potential consequences, operating experience, and engineering judgment. The evaluation process also considers, but is not limited to, system make-up capacity, flow margin, effects on adjacent equipment, and the potential for room flooding.

Leakage rate is not typically a good indicator of overall structural stability in moderate energy systems, where the allowable through-wall flaw sizes are often on the order of inches. This is evidenced in Safety Evaluation Reports for previously approved relief requests (References 4-6). The periodic inspection interval defined using paragraph 2(e) of Code Case N-513-4 provides evidence that a leaking flaw continues to meet the flaw acceptance criteria and that the flaw growth rate is such that the flaw will not grow to an unacceptable size.

The effects of leakage may impact the operability determination or the plant flooding analyses specified in paragraph 1(f) of Code Case N-513-4. For a leaking flaw, the allowable leakage rate will be determined by dividing the critical leakage rate by a safety factor of four (4). The critical leakage rate is determined as the most limiting leakage rate that can be tolerated with respect to loss of inventory, room flooding, and other effects of leakage on system operability. The safety factor of four (4) on leakage is based upon Code Case N-705 (Reference 7), which is accepted without condition in Regulatory Guide 1.147, Revision 18. Paragraph 2.2(e) of Code Case N-705 requires a safety factor of two (2) on flaw size when estimating the flaw size from the leakage rate. This corresponds to a safety factor of four (4) on leakage for nonplanar flaws. Although the use of a safety factor for determination of an unknown flaw is considered conservative when the actual flaw size is known, this approach is deemed acceptable based upon the precedent of Code Case N-705. Note that this alternative does not propose to use any portion of Code Case N-705, and that citation of N-705 is intended only to provide a reasonable technical basis for the safety factor on leakage. This approach is similar to an approach which was previously approved by the NRC as documented in Safety Evaluation Report ML16230A237.

During the temporary acceptance period, leaking flaws will be monitored daily as required by paragraph 2(f) of Code Case N-513-4 to confirm the analysis conditions used in the evaluation remain valid. Significant change in the leakage rate is reason to question that the analysis conditions remain valid and would require re-inspection per paragraph 2(f) of the Code Case. Any re-inspection must be performed in accordance with paragraph 2(a) of the Code Case.

The leakage limit provides quantitative measurable limits which ensure the operability of the system and early identification of issues that could erode defense-in-depth and lead to adverse consequences.

In summary, SCE&G will apply ASME Code Case N-513-4 to evaluation of Class 2 and 3 components that are within the scope of the Code Case. Code Case N-513-4 utilizes technical evaluation approaches that are based on principals that are accepted in other Code documents previously accepted for use by the NRC. The application of this Code Case, in concert with safety factors on leakage limits, will maintain acceptable structural and leakage integrity while minimizing plant risk and personnel exposure by minimizing the number of plant transients that could be incurred if degradation is required to be repaired based on ASME Section XI acceptance criteria only.

6. Duration of Proposed Alternative:

The proposed alternative is for use of Code Case N-513-4 for Class 2 and Class 3 components within the scope of the Code Case. An ASME Section XI compliant repair/replacement will be completed prior to exceeding the next scheduled refueling outage or allowable flaw size, whichever comes first. This relief request will be applied for the duration of the inservice inspection interval defined in Section 2 of this relief request or such time as the NRC approves Code Case N-513-4 in Regulatory Guide 1.147 or by other means. If a flaw is evaluated near the end of the interval for VCSNS and the next refueling outage is in the subsequent interval the flaw may remain in service under this relief request until the next refueling outage.

7. Precedents:

A Similar Relief Request to apply the evaluation provisions of Code Case N-513-4 has been approved by the NRC as listed below.

1. NRC Safety Evaluation for Exelon Generation Company, dated September 06, 2016, TAC NOs. MF7301-MF7322, [Accession Number ML 16230A237].

8. References:

1. NRC Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping."

2. Code Case N-513-4, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1" approved by ASME on May 7, 2014.

3. "Technical Basis for Proposed Fourth Revision to ASME Code Case N-513," Proceedings of the ASME 2014 Pressure Vessels & Piping Conference, 2014-28355.

4. NRC Safety Evaluation for Pilgrim Nuclear Power Plant, dated September 09, 2014, TAC NO. MF3558, [Accession Number ML14240A603]

5. NRC Safety Evaluation for Fort Calhoun Station – Unit 1, dated November 19, 2014, TAC NO. MF4643, [Accession Number ML14316A167].

6. NRC Safety Evaluation for Arkansas Nuclear One – Unit 2, dated March 16, 2015, TAC NO. MF5107, [Accession Number ML15070A428].

7. Code Case N-705, "Evaluation Criteria for Temporary Acceptance of Degradation in Moderate Energy Class 2 or 3 Vessels and Tanks, Section XI, Division 1" approved by ASME on October 12, 2006.

8. ASME Code Section XI, Division 1, 2007 Edition through 2008 Addenda.