Southern Nuclear

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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Request for Alternative:
Requirements for Preservice Inspection
Acceptance of Volumetric Examinations (VEGP 3&4-PSI/ISI-ALT-14)

Ladies and Gentlemen:

Pursuant to 10 CFR 50.55a(z)(1), Southern Nuclear Operating Company (SNC) hereby requests NRC authorization to use an alternative to the requirements of Section XI, IWB-3112 and IWC-3112, of the ASME Boiler and Pressure Vessel (B&PV) Code, 2007 Edition through 2008 Addenda (code of record) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4. The proposed request for alternative is applicable to preservice inspection of Class 1 and Class 2 welds. The details of the 10 CFR 50.55a(z)(1) request are contained in the enclosure to this letter. Approval is requested by September 30, 2020, to support performance of preservice inspection activities prior to Unit 3 ITAAC completion.

The enclosure provides the Proposed Alternative VEGP 3&4-PSI/ISI-ALT-14 in Accordance with 10 CFR 50.55a(z)(1).

This letter contains no regulatory commitments. This letter has been reviewed and confirmed to contain no security-related information. Should you have questions regarding this submittal, please contact Mr. Steven Leighty at (706) 848-6790.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of June 2020.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Michael J. Yox
Regulatory Affairs Director
Vogtle 3 & 4

MJY/CAC/sfr

Enclosure: Proposed Alternative VEGP 3&4-PSI/ISI-ALT-14 in Accordance with 10 CFR 50.55a(z)(1) – Requirements for Preservice Inspection Acceptance of Volumetric Examinations

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Southern Nuclear Operating Company

ND-20-0590

Enclosure

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Proposed Alternative VEGP 3&4-PSI/ISI-ALT-14 in Accordance with 10 CFR 50.55a(z)(1) – Requirements for Preservice Inspection Acceptance of Volumetric Examinations

(Enclosure consists of 7 pages, not including this cover page.)

Proposed Alternative VEGP 3&4-PSI/ISI-ALT-14 in Accordance with 10 CFR 50.55a(z)(1) – Requirements for Preservice Inspection Acceptance of Volumetric Examinations

Plant Site-Unit:	Vogtle Electric Generating Plant (VEGP) – Units 3 and 4
Interval-Interval Dates:	Applies to (1) preservice inspection and (2) the first period of the first inservice inspection (ISI) interval for reexamination of vessel welds.
Requested Date for Approval:	Approval is requested by September 30, 2020, to support completion of preservice inspection activities prior to Unit 3 ITAAC completion.
ASME Code Components Affected:	ASME Class 1 and Class 2 welds being examined during PSI using volumetric examination methods. Class 1 applies to the reactor coolant system pressure boundary. Applicable welds are in Code Categories B-A, B-B, B-D, B-F, and B-J. Class 2 applies to components that limit the leakage of radioactive material from the containment following a design basis accident. Applicable welds are in Code Categories C-A, C-B, C-C, C-F-1, and C-F-2. The weld classes, weld categories, and non-destructive examination method for each weld are listed in the PSI program plan for each unit.
Applicable Code Editions and Addenda:	ASME Boiler & Pressure Vessel Code, Section III, 1998 Edition through 2000 Addenda ASME B&PV Code, Section XI, 2007 Edition with the 2008 Addenda
Applicable Code Requirements:	ASME Boiler & Pressure Vessel Code, Section III, 1998 Edition through 2000 Addenda NB-5280 Preservice Examination NB-5281 General Requirements (a) Examinations required by NCA-3252(c) shall be completed prior to completion of the N-5 Data Report. (b) All volumetric and surface examinations shall be documented with results and identified in a form consistent with those required in NCA-4134.17 for transfer to the Owner.

	NB-5282 Examination Requirements (a) Components shall be examined as specified in Section XI, Table IWB-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWB-2500-1. Only the volumetric and surface examinations are required to be performed. NB-5332 Preservice Examination (a) Components whose volumetric examination reveals flaws that meet the acceptance standards of Section XI, IWB-3000 shall be acceptable. The flaws will be dimensioned and recorded in accordance with Section V, Article 4 and this Subsection. (b) Components whose volumetric examination reveals flaws that exceed the standards of IWB-3000 are not acceptable for service and shall be repaired. ASME Boiler & Pressure Vessel Code, Section XI, 2007 Edition with the 2008 Addenda IWB-2200 Preservice Examination (a) Examinations required by this Article (with the exception of Examination Category B-P, and the visual VT-3 examination of the internal surfaces of Categories B-L-2 and B-M-2, of Table IWB-2500-1) shall be completed prior to initial plant startup. In addition, these preservice examinations shall be extended to include essentially 100% of the pressure retaining welds in all Class 1 components, except in those components exempted from examination by IWB-1220(a), (b), or (c). However, in the case of Examination Category B-O (Table IWB-2500-1), the examination shall be extended to include essentially 100% of the welds in the installed peripheral control rod drive housings only. (b) Shop and field examinations may serve in lieu of the on-site preservice examinations provided: (1) in the case of vessels only, the examination is performed after the hydrostatic test required by Section III has been completed; (2) such examinations are conducted under conditions and with equipment and techniques equivalent to those that are expected to be employed for subsequent inservice examinations; (3) the shop and field examination records are, or can be, documented and identified in a form consistent with those required in IWA-6000. (c) Steam generator tube examination shall be governed by the plant Technical Specification. IWB-2500 Examination and Pressure Test Requirements

	(a) Components shall be examined and tested as specified in Table IWB-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWB-2500-1 except where alternate examination methods are used that meet the requirements of IWA-2240. IWB-3100 Evaluation of Examination Results IWB-3110 Preservice Volumetric and Surface Examinations IWB-3111 General (a) The preservice volumetric and surface examinations required by IWB-2200 and performed in accordance with IWA-2200 shall be evaluated by comparing the examination results with the acceptance standards specified in Table IWB-3410-1, except where IWB-3112(b) is applicable. (b) Acceptance of components for service shall be in accordance with IWB-3112, IWB-3113, and IWB-3114. IWB-3112 Acceptance (a) A component whose volumetric or surface examination either confirms the absence of or detects flaws that do not exceed the standards of Table IWB-3410-1 shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA- 1400(h), IWA-2220(b), and IWA-6230 in terms of location, size, shape, orientation, and distribution within the component. (b) A component whose volumetric or surface examination (IWB-2200) detects flaws that meet the nondestructive examination standards of NB-2500 and NB-5300, as documented in Quality Assurance Records (NCA-4134.17), shall be acceptable. (c) A component whose volumetric or surface examination (IWB-2200) detects flaws, other than the flaws of IWB-3112(b), that exceed the standards of Table IWB-3410-1 is unacceptable for service, unless the component is corrected by a repair /replacement activity to the extent necessary to meet the acceptance standards prior to placement of the component in service. Additionally, IWC-3112 provides the commensurate requirements for Class 2 Components.

Reason for Request:	PSI Ultrasonic Testing (UT) examinations may potentially identify indications that were not found by the ASME Section III Radiographic Testing (RT) examinations or that do not meet the ASME Section XI PSI acceptance standards. Limited use of ASME Section XI flaw evaluation methodology in

	accordance with IWB-3600 and IWC-3600 will allow disposition of these indications without weld repairs that could be detrimental to the component. The currently identified need for this alternative is based on indications detected in three Core Make-up Tank (CMT) inlet and outlet nozzle-to-head welds. This request is also provided based on the possibility that remaining PSI examinations could identify additional locations where flaw evaluation is needed for Vogtle Units 3 and 4. As of May 27, 2020, the approximate number of Class 1 welds that are being examined using UT Preservice examination is 607. For Unit 3, approximately 432 of these examinations have been completed, with about 175 remaining. The approximate total number of Class 2 welds that are being examined using UT Preservice examination is 128. For Unit 3, approximately 49 of these examinations have been completed, with about 79 remaining. Progress of PSI for Unit 3 substantially leads progress on Unit 4.
Proposed Alternative and Basis for Use:	**Proposed Alternative:** As an alternative to the requirements of ASME Section XI, 2007 Edition with 2008 Addenda, the requirements of ASME Section XI 2017 Edition Acceptance Standards, IWB-3112 and IWC-3112, including Applicable Tables IWB- and IWC-3410-1 and referenced paragraphs, may be applied: IWB-3112 Acceptance *(a)* A component whose volumetric or surface examination in accordance with IWB-2200 meets (1), (2), or (3) below shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA-1400(i) and IWA-2220(b) in terms of location, size, shape, orientation, and distribution within the component. *(1)* The volumetric or surface examination confirms the absence of flaws or identifies only flaws that have already been shown to meet the nondestructive examination standards of NB-2500 or NB-5300, as documented in Quality Assurance Records (NCA-4134.17). *(2)* Volumetric examination detects flaws that are confirmed by surface or volumetric examination to be non-surface-connected and that do not exceed the standards of Table IWB-3410-1. *(3)* Volumetric examination detects flaws that are confirmed by surface or volumetric examination to be non-surface-connected and that are accepted by analytical evaluation in accordance with the provisions of IWB-3132.3 to the end of the service lifetime of the component and reexamined in accordance with the requirements of IWB-2420(b) and IWB-2420(d). *(b)* A component whose volumetric or surface examination detects flaws that do not meet the criteria established in (a) shall be unacceptable for service, unless the component is corrected by a repair/replacement activity in accordance with IWB-3113 to the extent necessary to meet the provisions of (a) prior to placement of the component in service.

	(c) A component whose volumetric or surface examination (IWB-2200) detects flaws, other than the flaws of (b), that exceed the standards of Table IWB-3410-1 is unacceptable for service, unless the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards prior to placement of the component in service. The following additional conditions shall be applied to welds accepted under ASME Section XI 2017 Edition IWB or IWC 3112(a)(3): • This Alternative can be applied to a maximum of twelve (12) Class 1 welds and seven (7) Class 2 welds. These limits are applicable to each unit. • This Alternative is not applicable to the Steam Generator to Reactor Coolant Pump (SG-to-RCP) welds. • The flaw evaluation shall demonstrate that the flaw is predicted to remain non-surface-connected for the entire service life of the component. • This Alternative can be applied to welds with initial individual flaw depths up to 65% of wall thickness. • Subsequent examination for each vessel weld that has been evaluated using this Alternative shall be conducted during the first inservice inspection (ISI) period. **Basis for Use:** The proposed alternative establishes that flaws, which are confirmed by surface or volumetric examination to be non-surface-connected and that are accepted by analytical evaluation in accordance with the provisions of IWB-3132.3 to the end of the service lifetime of the component, are acceptable. IWB-3132.3 establishes the requirements for acceptance of flaws by analytical evaluation, as described in IWB-3600. This requirement for analytical evaluation of flaws is consistent with the requirements for flaws identified during inservice inspection. Therefore, the use of analytical flaw evaluation is an acceptable method to demonstrate weld integrity consistent with the requirements for operating nuclear plants. Hence, this alternative will provide an acceptable level of quality and safety, in accordance with 10 CFR 50.55a(z)(1). There are additional conditions proposed for the use of this alternative. These additional conditions establish the applicability of the alternative and limits for its use. Specifically, the proposed alternative is applicable to a maximum of twelve (12) Class 1 welds and seven (7) Class 2 welds. Also, the alternative is not applicable to the SG-to-RCP welds, which are fabricated component-to-component welds. These additional requirements for the overall use of the alternative are proposed to establish limits for use of analytical flaw evaluation for PSI. Limiting the total number of welds to twelve Class 1 and seven Class 2 in each unit is intended as a conservative limitation on the use of this alternative. These limits are less than 2% of Class 1 and 6% of Class 2

	required welds being examined by UT for PSI. If additional application of analytical flaw evaluation is needed beyond these conservative limits, then it is intended that this restriction will assure that the process of accepting such evaluations is an iterative one, by requiring an additional request for alternative. A requirement to conduct reexamination, in excess of the ASME Section XI 2017 Edition requirement, is also proposed. These subsequent examinations of vessel welds, to be performed during the first inservice inspection period, ensure that flaw evaluations for these vessel welds have adequately accounted for potential growth during startup and initial plant operation. A limitation is proposed that the flaw evaluation shall demonstrate the flaw is predicted to remain non-surface-connected for the service life of the component. Also, the use of this alternative is limited to flaws with initial depths that do not exceed 65% of the wall thickness. IWB and IWC-3600 limit the depth of flaws to 75% for piping welds. For example, IWB-3644 states, "Flaws with depths greater than 75% of the wall thickness are unacceptable." The 75% depth limit identified in ASME Section XI has been previously accepted by the NRC for use in ISI as documented in 10 CFR 50.55a(a)(1)(ii). SNC's proposed initial flaw depth limit of 65% provides additional margin to the 75% limit and will be applied to any weld that is subject to flaw evaluation under this proposed alternative. This limit, combined with the flaw evaluation prediction for flaw growth and subsequent reexamination of the welds, is expected to preserve the NRC-accepted ASME Section XI code 75% limitation during the service life of the components evaluated under this alternative. The proposed additional limitations provide assurance that the use of this alternative will ensure that weld integrity is maintained and provide conservative limitations on the number of welds that can be subjected to flaw evaluation under IWB and IWC-3600. UT methods being used during PSI ensure reliable flaw detection and characterization, as demonstrated by the detection of indications during PSI UT examination that were not found during ASME III RT exams. The fracture mechanics methods, which have been developed for use under the flaw evaluation methods described in ASME Section XI, allow for very accurate assessment of the impact of such flaws on the integrity of the structure. Further, experience has shown that local repair of flaws can result in high residual stresses that can aggravate stress corrosion cracking. Studies have also shown that such weld repairs can reduce weld reliability, as compared to use of flaw evaluation techniques. This is highly relevant when considering repairs of embedded flaws in components welds, which often are larger thickness welds, as compared to piping system welds. In order to maintain the integrity of plant components, particularly fabricated vessels, the use of flaw evaluation with the conditions above, which includes the consideration of potential for flaw growth to become surface connected, and specific requirements for reexamination, establish the optimal conditions for maintaining weld integrity for the construction of Vogtle Units 3 and 4.

	Therefore, the use of this alternative will provide an acceptable level of quality and safety, in accordance with 10 CFR 50.55a(z)(1).
Duration of Proposed Alternative:	PSI through the first period of the first ISI interval for reexamination.
Reference:	None
Status:	Awaiting NRC authorization