Southern Nuclear

Southern Nuclear
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Docket Nos.: 52-025
52-026

ND-19-0007
10 CFR 50.55a

U.S. Nuclear Regulatory Commission
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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Supplement to Request for Alternative:
Preservice and Inservice Inspection Requirements for
Specific Valve-to-Pipe Welds (VEGP 3&4-PSI/ISI-ALT-06S1)

Ladies and Gentlemen:

By letter dated October 19, 2018, Southern Nuclear Operating Company (SNC) submitted a request for an alternative to the requirements of Section XI, IWB-2500, 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 in accordance with 10 CFR 50.55a [ML18292A789]. The proposed request for alternative is applicable to preservice and inservice inspection (PSI/ISI) of specific valve-to-pipe welds listed in Section XI Table IWB-2500-1 Examination Category B-J and Table IWC-2500-1 Examination Category C-F-1, and ASME Class 3 valve-to-pipe welds treated as Class 2 due to leak-before-break (LBB) criteria. On December 13, 2018, the Nuclear Regulatory Commission (NRC) staff issued a request for additional information (RAI) [ML18347B589].

The responses to the RAI questions are included in the Enclosure 5. This supplement does not impact the original scope of the Code alternative.

Additionally, per this letter, the duration of the proposed Alternative is revised to include the Second Inservice Inspection Interval. The revised duration of the request includes ASME Section XI Preservice Examinations and the First and Second Inservice Inspection Intervals.

This letter, including enclosures, has been reviewed and confirmed to not contain security-related information. This letter contains no regulatory commitments. Should you have any questions, please contact Mr. Corey Thomas at (205) 992-5221.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of January 2019.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Amy G. Aughtman
Licensing Manager
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Enclosures 1 - 4: (previously submitted with the original code alternative, VEGP 3&4-PSI-ALT-06, in SNC letter ND-18-1185)

Enclosure 5: Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Response to Request for Additional Information Regarding Preservice and Inservice Inspection Requirements for Specific Valve-to-Pipe Welds (VEGP 3&4-PSI-ALT-06S1)

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Southern Nuclear Operating Company

ND-19-0007

Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Response to Request for Additional Information Regarding Preservice and Inservice Inspection Requirements for Specific Valve-to-Pipe Welds

(VEGP 3&4-PSI-ALT-06S1)

(Enclosure consists of 4 pages, including this cover page.)

The following are questions provided by the NRC Staff on December 13, 2018 (ADAMS Accession Number ML18347B589) regarding the review of Southern Nuclear Operating Company (SNC) Proposed Alternative VEGP 3&4-PSI-ALT-06 in accordance with 10 CFR 50.55a(z)(1) - Preservice and Inservice Inspection Requirements for Specific Valve-to-Pipe Welds (ADAMS Accession Number ML18292A789) submitted on October 19, 2018. Responses are provided below for each RAI question.

RAI Question ALT-06-1-1:

By letter dated October 19, 2018, Southern Nuclear Operating Company, Inc. (SNC), submitted Request for Alternative No. VEGP 3&4-PSI/ISI-ALT-06 to the U.S. Nuclear Regulatory Commission (NRC) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (ADAMS Accession No. ML18292A787) in accordance with 10 CFR 50.55a(z)(1) which permits the approval of alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Code based on the licensee demonstrating that the proposed alternative would provide an acceptable level of quality and safety. 10 CFR 50.55a(g)(3)(i) and (ii) states that components classified as ASME Code Class 1, 2, and 3 must be designed and be provided with access to satisfy the preservice examination requirements set forth in ASME Section III and Section XI. The Vogtle Units 3 and 4 UFSAR (Section 5.2.4.2) states that components and welds requiring inservice inspection (and by default preservice inspection) are designed to allow for the application of the required inservice inspection methods (and preservice inspection methods). Therefore, the welds and adjacent base material are required to be inspected in accordance with ASME Code Section III and Section XI. The alternative requests NRC approval to use an alternative to the requirements of IWB-2500 to Section XI of the ASME Code, 2007 Edition through 2008 Addenda to eliminate the requirement for a volumetric examination of the valve material in specific valve-to-pipe welds during preservice and inservice inspection.

Staff of the Materials and Chemical Engineering Branch in the Office of New Reactors reviewed and evaluated the information provided by the licensee, and has determined that the following information is needed to ensure the integrity of the valve-to-pipe welds based on inspection and operational experience.:

The request states that the 2008 Addenda of Section XI of the ASME BP&V Code removed the volumetric examination requirement for the welds in valve bodies. There is no information provided concerning the operating experience of these types of valve-to-pipe welds. The staff cannot approve this alternative to not inspect the valve material without operating experience. Discuss how the basis for removing the volumetric examination for the welds in the valve bodies applies to the piping welds in this alternative which are thinner (less margin) and may have different stresses. This should include the operating experience of similar types of valve-to-pipe welds in the discussion.

SNC Response to RAI Question ALT-06-1-1:

The proposed code alternative seeks to remove the volumetric examination of the valve base material. However, essentially 100% of the weld material and piping base metal will be examined as required by ASME Section XI, including ASME Section XI Appendix VIII.

First, a review was performed and operating experience was documented in the NRC issued Grimes letter [ML003717179] for valve body cracks operating experience. The review included the Sequence Coding and Search System (SCSS), the Nuclear Plant Reliability Data System (NPRDS) database, and foreign event files for thermal fatigue. The SCSS search covered the years from 1979 to 1999, and the NPRDS search covered 1987 to 1996. Ten valve body indications were identified over this time period. Of that 10, 5 failures were associated with stainless steel valve bodies. The 5 events were attributed to wall thinning, transgranular stress corrosion cracking, thermal stratification, indeterminate, and preferential corrosion at a weld repair. It should be noted that none of the events resulted in catastrophic failure of the valve, rather through-wall leaks were identified per leak detecting sensors. This review provides assurance that the operating experience associated with stainless steel valve bodies was exemplary for the time period from 1979 to 1999.

Second, a review for the time period of January 1, 2000 to January 7, 2019 was conducted to identify operating experience for indications in valve-to-pipe welds. A search was performed of Licensee Event Reports (LERs) that contain the following sets of keywords: 1) valve, weld, body, indication; and 2) valve, weld, body, crack. Additional industry searches using all of the following keywords: weld, crack, leak, and “valve body”. The search resulted in 70 instances of operating experience, with 23 deemed to be relevant to valve-to-pipe welds. In summary, two failures were a result of a valve body defect but neither were associated with a valve to pipe weld interface, one failure was deemed attributable to valve thinning, one failure was due to outer diameter stress corrosion cracking due to chloride contamination at a valve-to-pipe weld, and all others were located in small bore locations that are not required to be ultrasonically examined by ASME Section XI. One instance of operating experience was identified for valve to piping welds that are in the scope of ASME Section XI to be ultrasonically examined, but this failure originated from the outer diameter, while Section XI ultrasonic examinations are performed on the inner diameter. No operating experience was identified for valve to piping welds that are in the scope of ASME Section XI to be ultrasonically examined.

The reviews documented encompass operating experience of valve body failures at valve-to-pipe weld interfaces for 2400 reactor-years of operating U.S. PWRs and 1300 reactor-years for operating U.S. BWRs. Per this review, there has been only one identified valve-to-piping weld failure subject to volumetric examination per ASME Section XI and this was due to a failure mode that was initiated from the outer diameter of the material which is not the location for which ASME Section XI volumetric exams are conducted for valve-to-pipe welds. This review provides high assurance that there are no adverse trends related to valve-to-piping weld failures on the valve body side that would suggest that volumetric examination of the valve body volume currently required to be inspected per ASME Section XI is warranted. This review also provides high assurance that the operational experience for large bore valve to piping welds (i.e., valve-to-piping welds that require volumetric examination in accordance with ASME Section XI) is excellent.

Additionally, the flaw analyses conducted in the Grimes letter [ML003717179] and in Attachment 3 of the Alternative Request demonstrated acceptable flaw tolerance margins based on fracture mechanics evaluation for postulated flaw sizes. The Grimes letter demonstrated a very conservative 1.35 in. long through-wall crack is necessary before catastrophic failure would occur. This analysis, which was based on the "R6" Failure Assessment Diagram (FAD) used conservative lower bound fracture toughness in the evaluation to demonstrate high flaw-tolerance of severely aged valve materials. The flaw tolerance in Attachment 3 of the Alternative Request also evaluated flaw stability for stainless steel valves under design normal / upset / emergency / test / faulted conditions in accordance with ASME Section XI. The fatigue crack growth evaluation demonstrated insignificant amounts of crack growth under normal operating conditions, which aligns with operating experience for stainless steel components in general. Thus, the flaw tolerance evaluations are conservative and limiting; furthermore, when coupled with operating experience, these analyses agree well with the fact that there has been a very limited number of operating concerns for valves.

RAI Question ALT-06-1-2:

The request states that this alternative is not recommending any additional visual examinations. Please clarify this statement by confirming that the visual examinations required by Table IWB-2500-1, Category B-M-2 in Section XI of the ASME BP&V Code will still be performed as part of the ISI program. If these visual examinations are not performed, provide the basis for removing the internal visual inspection which provides continued assurance of the structural integrity of the valve.

SNC Response to RAI ALT-06-1-2:

The visual examinations required by Table IWB-2500-1, Category B-M-2 in Section XI of the ASME B&PV Code will still be performed as part of the ISI program. The proposed alternative does not seek to make any changes to these examinations.