



Framatome Responses to NRC WCAP-17096, Revision 3 RAIs

ANP-3104, Rev. 3,
Q1, Revision 0

Technical Report

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Nature of Changes

Item	Section(s) or Page(s)	Description and Justification
000	All	Original Release

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Nomenclature

Acronym	Definition
ASME	American Society of Mechanical Engineers
B&PV	Boiler & Pressure Vessel
B&W	Babcock and Wilcox
BB	Baffle-to-Baffle (Bolt)
BFB	Baffle-to-Former Bolt
CF	Core Barrel-to-Former (Bolt)
CFR	Code of Federal Regulations
IASCC	Irradiation-Assisted Stress Corrosion Cracking
LEFM	Linear Elastic Fracture Mechanics
MRP	Materials Reliability Program
NDE	Non-Destructive Examination
NP	Non-Proprietary
NRC	Nuclear Regulatory Commission
PWR	Pressurized Water Reactor
PWROG	Pressurized Water Reactor Owners Group
RAI	Request for Additional Information
RVI ¹	Reactor Vessel Internals
SE	Safety Evaluation
SSC	Systems, Structures, and Components
TR	Topical Report
VT-3	Visual Testing
WEC	Westinghouse Electric Company

¹ Used in quotations from the US NRC.

ABSTRACT

By letter dated July 31, 2019, the Pressurized Water Reactor (PWR) Owners Group (PWROG) submitted for U.S. Nuclear Regulatory Commission (US NRC) staff review WCAP-17096-NP, Revision 3, "Reactor Internals Acceptance Criteria Methodology and Data Requirements." The US NRC has issued Requests for Additional Information (RAIs) on this submittal. This report provides the Framatome Inc. responses for RAIs 02, 03, 09, 12 and 13(b).

1.0 INTRODUCTION AND SUMMARY

By letter dated July 31, 2019, the Pressurized Water Reactor (PWR) Owners Group (PWROG) submitted for U.S. Nuclear Regulatory Commission (US NRC) staff review WCAP-17096-NP, Revision 3, "Reactor Internals Acceptance Criteria Methodology and Data Requirements" (References 1 and 2). The US NRC has issued Requests for Additional Information (RAIs) on this submittal (Reference 3) and this report provides the responses to those RAIs assigned to Framatome Inc.

Upon receipt of the RAIs, the PWROG and Framatome Inc. reviewed the RAIs and determined who would respond to each RAI. The responses for RAIs 02, 03, 09, and 12 were assigned fully to Framatome Inc. The responses for RAIs 01, 04, and 13(b) were assigned to be shared between Framatome Inc. and Westinghouse. The remaining RAIs (05, 06, 07, 08, 10, 11, 13(a), 13(c), 13(d), 13(e), 13(f), 13(g), and 14) were assigned fully to Westinghouse. This document contains responses to RAIs 02, 03, 09, 12 and 13(b) only. The responses to RAIs 02, 03 and 12 propose changes to the WCAP-17096-NP, Revision 3 text.

2.0 REQUESTS FOR ADDITIONAL INFORMATION

NRC RAIs 02, 03, 09, 12 and 13(b) are addressed in Section 2.1 through Section 2.5.

2.1 RAI 02

2.1.1 Statement of RAI 02

Applicable TR Sections, Appendices, Tables, Figures, or Pages:

TR Section 2.2 (TR Page 2-5) and TR Appendix A, Babcock & Wilcox (B&W)-Inside Diameter (ID²) Items A.2.5 through A.2.9.

Background and Issue:

TR Section 2.2 and TR Appendix A, B&W-ID Items A.2.5 through A.2.9 include the following statement for resolving the NRC staff's Condition 1³ for Group 1 B&W components.

“The licensee shall submit the plant-specific analysis for this component within one year after the inspection of the linked Primary item when the results trigger the expansion criteria in MRP-227.”

The TR applies this statement to the following Condition 1, Group 1 B&W “Expansion” category components:

- a) core barrel cylinder and welds,
- b) former plates,
- c) core barrel-to-former (CF) bolts,

² This is assumed to be an erroneous acronym identification. A more appropriate acronym identification for “ID” in this case would be “identification”.

³ Note – Conditions and associating component Groupings are as specified in Section 4.0 in the NRC staff's Final SE (Reference 4) for Rev. 2 of WCAP-17096-NP.

- d) internal and external baffle-to-baffle (BB) bolts, and
- e) locking devices for CF bolts and external BB bolts.

The staff notes that the above quoted TR statement for resolving Condition 1 for Group 1 B&W expansion items is not consistent with the guidance in Table 4-4 of MRP-227, Rev. 1-A since it does not include component replacement as an option. For these items (i.e., Item Nos. B9.1, B9.2, B10.1, B10.2, and B11.1 of Table 4-4 in MRP-227, Rev. 1-A), MRP-227, Rev. 1-A states: “*No examination requirements. Justify by evaluation or by replacement.*” (Emphasis Added)

NRC Request:

Clarify the noted inconsistency in the above quoted TR statement for resolving Condition 1 for the five Group 1 B&W expansion components, which does not address the potential for component replacement as an alternative to plant-specific analytical evaluation, consistent with the guidance in Table 4-4 of MRP-227, Rev. 1-A.

2.1.2 Response to RAI 02

This wording was inadvertently not included in Section 2.2 and Appendix Sections A.2.5 through A.2.9 of the topical report (TR) (Reference 2). The updates to the text in these particular sections are addressed in Section 2.1.2.1 and Section 2.1.2.2.

2.1.2.1 Resolution for TR Section 2.2

In Section 2.2 of the TR where the resolution to Condition 1 is addressed, the following text additions will be made, where text additions are noted in **bold font**:

Group 1 RVI component items are addressed in WCAP-17096, Rev. 3 by the addition of the following statement in Appendix A, Sections A.2.5, A.2.6, A.2.7, A.2.8, and A.2.9: “The licensee shall submit the plant-specific analysis, **replacement schedule, or justification for some other alternative process** for this component item within one year after the inspection of the linked Primary item when the results trigger the expansion criteria in MRP-227.”

2.1.2.2 Resolution for TR Appendix A, Sections A.2.5-A.2.9

In Appendix A, Sections A.2.5 through A.2.9 of the TR under the 'Methodology and Data Requirements' heading, the following text additions will be made, where text additions are noted in **bold font**:

The licensee shall submit the plant-specific analysis, **replacement schedule, or justification for some other alternative process** for this component item within one year after the inspection of the linked Primary item when the results trigger the expansion criteria in MRP-227.

2.2 RAI 03

2.2.1 Statement of RAI 03

Applicable TR Sections, Appendices, Tables, Figures, or Pages:

TR Section 2.2 (TR Page 2-5) and TR Appendix A, B&W-ID Item A.1.9.

Background and Issue:

Pages 13 and 45 of the staff's Final SE (Ref. 4⁴) for Rev. 2 of WCAP-17096-NP address the expansion of Condition 1 for Group 1 B&W Components to include the B&W baffle plates. B&W baffle plates are "Primary" category components addressed in Item B10 in Table 4-1 of MRP-227, Rev. 1-A and in TR Appendix A, B&W-ID Item A.1.9. The expansion of Condition 1 for Group 1 specifies that a linear elastic fracture mechanics (LEFM) analysis of the plant's baffle plates be submitted to the NRC staff within one year of their inspection if the inspection results indicate aging not meeting the acceptance criteria in Table 5-1 of MRP-227, Rev. 1-A. However, the TR's proposed resolution of Condition 1 for Group 1 B&W Components in TR Section 2.2 (TR Page 2-5) and TR Appendix A, B&W-ID Item A.1.9 does not address the expansion of this Condition to include the LEFM submittal needs for B&W baffle plates.

NRC Request:

Provide a justification for excluding the submittal of the baffle plate LEFM analysis to the NRC staff, consistent with the expansion of Condition 1 for Group 1 components in the Final SE for Rev. 2 of WCAP-17096-NP under the proposed resolution of Condition 1 for Group 1 B&W components in TR Section 2.2 (TR Page 2-5) and TR Appendix A, B&W-ID Item A.1.9.

⁴ "Reference 4" is a direct quotation from the NRC RAI letter (Reference 3). The same reference herein is Reference 4.

2.2.2 Response to RAI 03

This wording was inadvertently not included in Section 2.2 and Appendix Section A.1.9 of the TR (Reference 2). The updates to the text in these particular sections are addressed in Section 2.2.2.1 and Section 2.2.2.2.

2.2.2.1 Resolution for TR Section 2.2

In Section 2.2 of the TR where the resolution to Condition 1 is addressed, the following text additions will be made following the proposed text for Group 1 (see Section 2.1.2.1), where text additions are noted in **bold font**:

Group 1 RVI component items are also addressed in WCAP-17096, Rev. 3 by the addition of the following statement in Appendix A, Section A.1.9: “The licensee is required to submit the LEFM analysis for the baffle plates under normal/upset condition loads, considering IASCC, within one year of the inspection of the Primary component item for NRC to determine whether review and approval are needed if the inspection results indicate aging not meeting the acceptance criteria in Table 5-1 of MRP-227.”

2.2.2.2 Resolution for TR Appendix A, Section A.1.9

In Appendix A, Section A.1.9 of the TR under the ‘Methodology and Data Requirements’ heading, the following text additions will be made, where text additions are noted in **bold font**:

The licensee is required to submit the LEFM analysis for the baffle plates under normal/upset condition loads, considering IASCC, within one year of the inspection of the Primary component item for NRC to determine whether review and approval are needed if the inspection results indicate aging not meeting the acceptance criteria in Table 5-1 of MRP-227.

2.3 RAI 09

2.3.1 Statement of RAI 09

Applicable TR Sections, Appendices, Tables, Figures, or Pages:

TR Appendix A, B&W-ID Items A.1.10, A.1.12, A.2.1, A.2.10, and A.2.12

Background and Issue:

TR Appendix A includes following statement for the above B&W items:

“A technical justification for removal [of the applicable components associated with the B&W-ID items listed above] may be necessary.”

It is not clear whether these statements are addressing a physical removal of the component through licensee performance of a justifiable SSC design modification or the removal of the component from either the “Primary” or “Expansion” inspection category in MRP-277⁵, Rev. 1-A and recategorization as “No Additional Measures”.

NRC Request:

Clarify whether the referenced statements are being made in reference to a potential design modification of the affected plant SSCs or a recategorization of the components, as defined in MRP-227, Rev. 1-A.

2.3.2 Response to RAI 09

The statement quoted above from Appendix A, Sections A.1.10, A.1.12, A.2.1, A.2.10, and A.2.12 is being made in reference to physical removal of the component item and/or weld (i.e., a design modification) in each case.

⁵ This is believed to be a typographical error in the NRC quotation, which should be MRP-227.

2.4 RAI 12

2.4.1 Statement of RAI 12

Applicable TR Sections, Appendices, Tables, Figures, or Pages:

TR Appendix A, B&W-ID Items A.1.1, A.1.2, A.1.3, A.1.6, A.1.7, A.1.9, A.1.10, A.1.11, A.1.12, A.1.13, A.1.14, A.2.1, A.2.3, A.2.4, A.2.10, A.2.12, A.2.13

Background and Issue:

The B&W TR items listed above will receive either “Primary” VT-3 visual inspections or potential “Expansion” VT-3 visual inspections. The TR states that the general methodology to be used for the acceptance criteria for these components will be development of a non-destruction examination (NDE) inspection standard that contains examples of acceptable and unacceptable visual indications in the components. These statements do not address specific visual acceptance criteria that may be used to evaluate surface indications that are detected for these components.

NRC Request:

Provide the basis for the suitability of the VT-3 exam acceptance method without any information on specific acceptance standards for detected indications for these B&W components, or supplement these TR sections to include this information.

2.4.2 Response to RAI 12

The VT-3 exam acceptance criteria for TR Appendix A, B&W-ID Item A.1.1, is stated as follows:

“The general methodology to be used for VT-3 (a general condition monitoring visual examination) acceptance criteria for these component items will be development of an NDE inspection standard that contains explanations of acceptable and unacceptable visual indications. Input information needed includes:

- *Identification of the most likely signs and locations of wear that can be inspected*

- *Identification of what visual examination wear indications are considered rejectable and would require additional dimensional examination and evaluation*
- *Identification of any additional examination results that are anticipated*
 - *Identify general acceptance criteria for the additional items expected to be in the VT-3 examination field of vision*

Analytical efforts may be performed on a unit-specific basis due to the different initial interference. The NDE inspection standard could be developed generically.”

Similar statements are made in the TR for the VT-3 exam acceptance criteria for TR Appendix A, B&W-ID Items A.1.2, A.1.3, A.1.6, A.1.7, A.1.9, A.1.10, A.1.11, A.1.12, A.1.13, A.1.14, A.2.1, A.2.3, A.2.4, A.2.10, A.2.12, A.2.13.

It is understood that these statements from the TR do not fully define the acceptance criteria. Therefore, these statements shall be replaced with the following:

“The VT-3 exam acceptance criteria are “no relevant conditions.” Relevant conditions for the B&W Items of interest are defined in Section 5 of MRP-227-1A. These relevant conditions constitute discontinuities or imperfections (e.g., loose or missing parts, distortion, corrosion, wear, etc.), which are readily detectable with the VT-3 technique. Note that the VT-3 exam method meets the requirements of ASME B&PV Code Section XI, as specified and conditioned by 10 CFR 50.55a, and the MRP-228 Inspection Standard.”

2.5 RAI 13(b)

2.5.1 Statement of RAI 13(b)

Applicable TR Sections, Appendices, Tables, Figures, or Pages:

TR Appendix E, W-ID Item 6, WEC Baffle-Former Bolts

Issue:

If other vendors use probabilistic methods for BFB that are different from those described in the September 2019 WEC presentation, the staff needs to assess whether the other methods are suitable for use in assessing BFB reinspection intervals.

NRC Request:

Provide a list of the vendors that perform probabilistic evaluations for BFBs as part of W-ID Item 6. If any of these methods differ from those described in September 2019 WEC presentation, please make information available (via docketed response, audit, or other means) for the staff to assess the suitability of these methods.

2.5.2 Response to RAI 13(b)

In a meeting with the NRC Staff (Reference 5), Framatome provided a presentation of the methodology described in TR Section A.1.8 and how it is applied by Framatome to W-ID Item 6.

3.0 REFERENCES

1. Letter OG-19-164, "PWR Owners Group 'Transmittal of WCAP-17096-NP, Revision 3, "Reactor Internals Acceptance Criteria Methodology and Data Requirements," PA-MS-1567," July 31, 2019, NRC Accession Number ML19218A178.
2. WCAP-17096-NP, Revision 3, "Reactor Internals Acceptance Criteria Methodology and Data Requirements," July 2019, NRC Accession Number ML19218A179.
3. U.S Nuclear Regulatory Commission Letter, "U.S. NRC Request for Additional Information for Pressurized Water Reactor Owner's Group Topical Report, WCAP-17096-NP, Revision 3, 'Reactor Internals Acceptance Criteria Methodology and Data Requirements'," September 21, 2020, NRC Accession Number ML20268B123.
4. WCAP-17096-NP-A, Revision 2, "Reactor Internals Acceptance Criteria Methodology and Data Requirements," August 2016, NRC Accession Number ML16279A320.
5. NRC Closed Meeting with the Pressurized Water Reactor Owners Group (PWROG) on the Review of Topical Report WCAP-17096 Revision 3, "Reactor Internals Acceptance Criteria Methodology and Data Requirements," October 13, 2021, NRC Accession Number ML21274A079.