

# Preliminary MRP-227- Rev. 1 RAI Response Strategies



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# Presentation Outline

- Background and Overview
- RAIs with Minimal Discussion
- RAIs with Additional Discussion
- Questions

# Background and Overview

- MRP-189, Revision 2 and MRP-231, Revision 3 prepared in 2014, MRP-191, Revision 1 and MRP-230, Revision 1 Supplement prepared in 2016
  - Technical basis for changes in MRP-227-Rev. 1
  - Available to NRC upon formal request
- MRP-227-Rev. 1 completed in October 2015, submitted to NRC Staff in December 2015
- NRC prepared RAIs, transmitted to industry May 15, 2017
- Industry preparing RAI responses
- Response strategies/approaches here are **DRAFT, PRELIMINARY,** and for discussion only

# Background and Overview

- Twenty-seven (27) RAIs received May 15, 2017
- Eleven (11) Babcock & Wilcox-design specific RAIs
  - 1, 2, 3, 4, 6, 11, 17, 18, 21, 22, 25
- Fourteen (14) Westinghouse-design or CE-design specific RAIs
  - 5, 7, 8, 9, 10, 12, 14, 15, 16, 19, 20, 23, 24, 26
- Two (2) Generic RAIs
  - 13 and 27

# Background and Overview

- Babcock and Wilcox-design specific RAIs
  - 2, 3, 6, 11, 17, 25 – discussion minimal herein (6)
  - 1, 4, 18, 21, 22 – additional discussion herein (5)

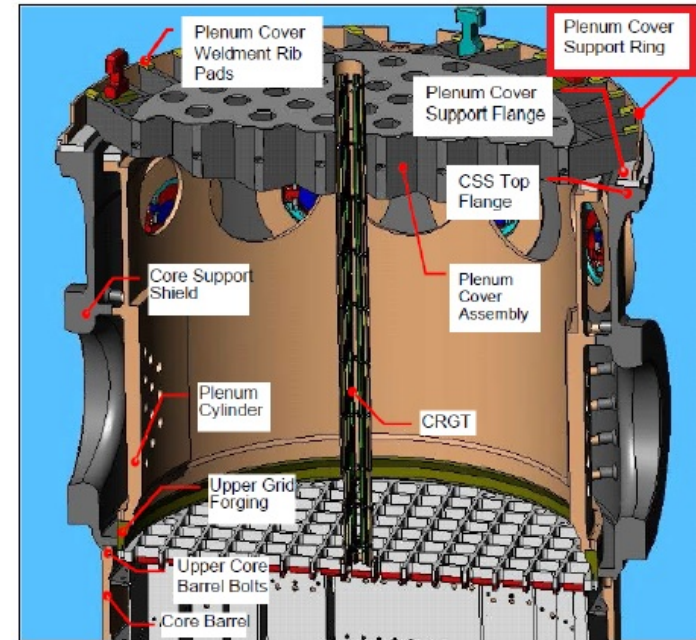
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# RAIs with Minimal Discussion

## ■ RAI 2

- **RAI Summary:** Why the change of the plenum cover support ring from “A” in MRP-227-A to “Primary” in MRP-227-Rev. 1.
- **Preliminary Industry Approach:** Plenum cover support ring machined to a common plane with the plenum cover weldment rib pads, making it part of the core clamping items.
- Core clamping measurements have been consistently performed at all Babcock and Wilcox-designed units, and included the plenum cover support ring
- Clarifying change only (no technical issues), core clamping measurements always considered the ring and the pads as they are designed to share the load

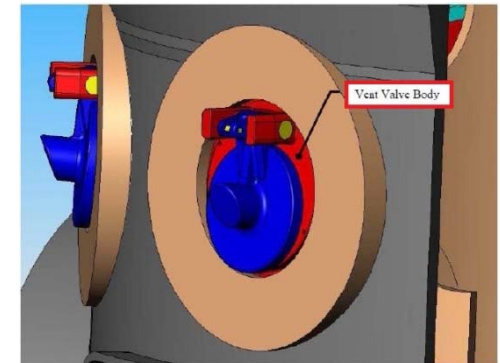


MRP-227-Rev. 1 Figure 4-1

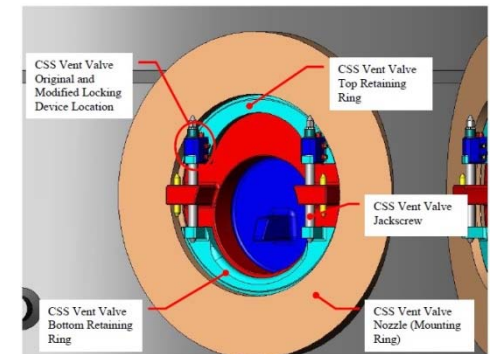
# RAIs with Minimal Discussion

## ■ RAI 3

- **RAI Summary:** Why the addition of the vent valve bodies as Expansion link to the CRGT spacer castings (previously they were no additional measures)?
- **Preliminary Industry Approach:** Previously the original vent valve bodies were able to be screened out, but data for replacement vent valve bodies have not been fully gathered, hence they are conservatively screened in unless they can be shown to be below the screening criteria (see Table 4-4 Note 4)
- This may consist of CMTR reviews and/or a statistical argument, PWROG-15032-NP



MRP-227-Rev. 1 Figure 4-9



MRP-227-Rev. 1 Figure 4-10



# RAIs with Minimal Discussion

## ▪ RAI 6

- **RAI Summary:** Is Note 8 in Table 4-1 regarding locking devices and locking device welds for core barrel bolting correct? Is the Expansion link correct?
- **Preliminary Industry Approach:** Both are correct. None of the locking device welds have irradiation-assisted stress corrosion cracking (IASCC) as an applicable aging degradation mechanism, but all bolt locking devices and locking device welds are linked by irradiation embrittlement (IE).

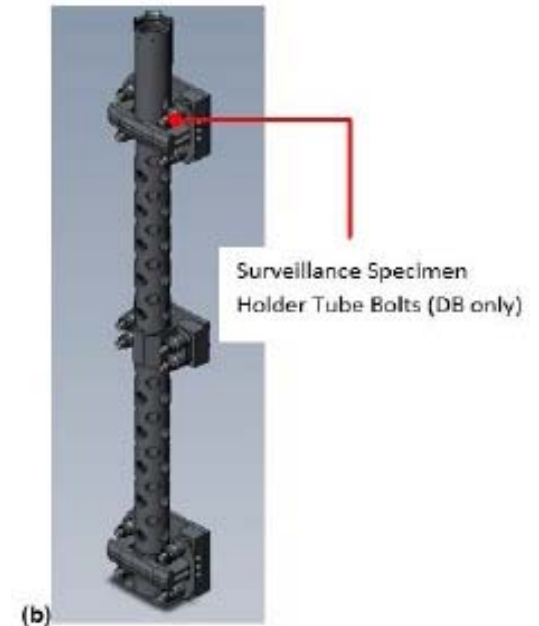
### **MRP-227-Rev. 1 Table 4-1 Note 8 for Locking Devices/Welds**

8. The aging degradation mechanism of IASCC is only applicable to the baffle-to-former bolt and internal baffle-to-baffle bolt locking devices, not the baffle-to-former bolt and internal baffle-to-baffle bolt locking device welds. There are no Expansion component items for the baffle-to-former bolt and internal baffle-to-baffle bolt locking device welds for IASCC.

# RAIs with Minimal Discussion

## ▪ RAI 11

- **RAI Summary:** Why do the SSHT bolts have IC/ISR/Fatigue/Wear applicable in MRP-227-Rev. 1? Were the compression collars left out of the screening and FMECA process as an oversight and are they the same as the locking cups and tie plate in MRP-227-A?
- **Preliminary Industry Approach:** After determining more accurate fluence values for the SSHT bolts, the fluence was determined to exceed the screening criteria for IC/ISR. When IC/ISR is screened in, so are fatigue and wear. A plant-specific records search was performed in 2010 for DB and determined the details of the SSHT bolt and locking mechanism for DB, and the use of a compression collar was discovered at that time. This component was unknown during the development of MRP-227-A. The locking cups and tie plates are in addition to the compression collar. This component only exists at DB.

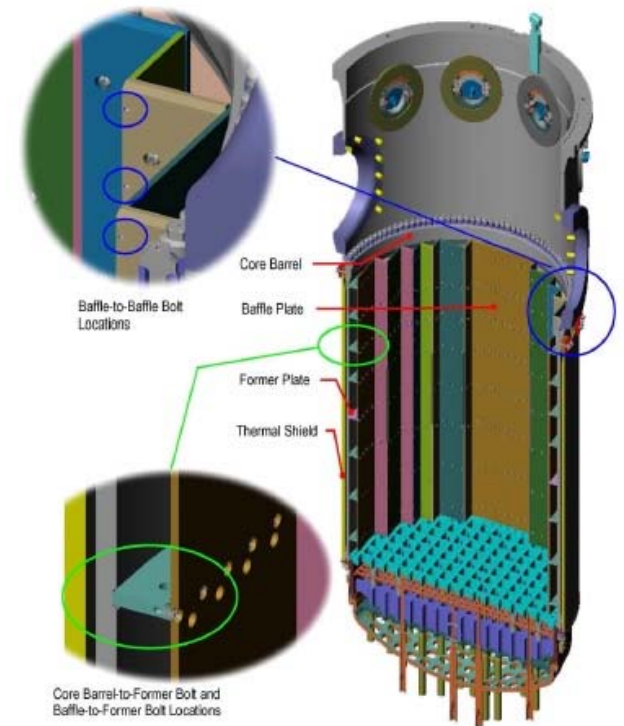


MRP-227-Rev. 1 Figure 4-8(b)

# RAIs with Minimal Discussion

## ▪ RAI 17

- **RAI Summary:** The primary link for the core barrel bolting locking devices/welds changed from “...locking devices, including locking welds, of baffle-to-former bolts or internal baffle-to-baffle bolts...” to “...locking devices, including locking welds, of baffle-to-former bolts and internal baffle-to-baffle bolts...” Does this mean you now need aging degradation in both types of locking devices/welds before Expansion?
- **Preliminary Industry Approach:** No, word change is editorial in nature only.

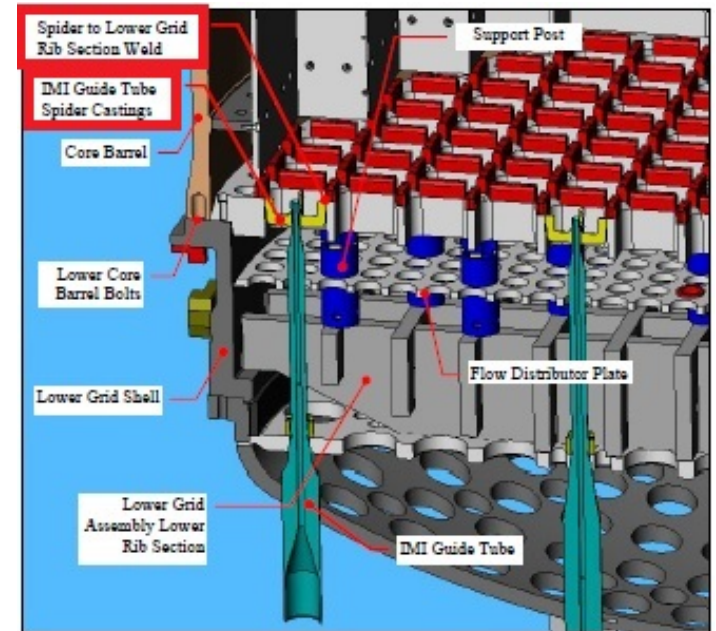


MRP-227-Rev. 1 Figure 4-2

# RAIs with Minimal Discussion

## ▪ RAI 25

- **RAI Summary:** Explain why the examination coverage for the IMI guide tube spiders changed from “100% of top surfaces of 52 spider castings and welds to the adjacent lower grid rib section” to “Spiders: 100% of the accessible top surfaces and 100% of the accessible spider surfaces adjacent to the spider casting welds” and “Spider welds: 100% of the accessible welds to the adjacent lower grid rib section.”
- **Preliminary Industry Approach:** This is a clarification of the examination coverage by separating the spiders from the welds and does not change the actual inspection coverage.



MRP-227-Rev. 1 Figure 4-3

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# RAIs with Additional Discussion

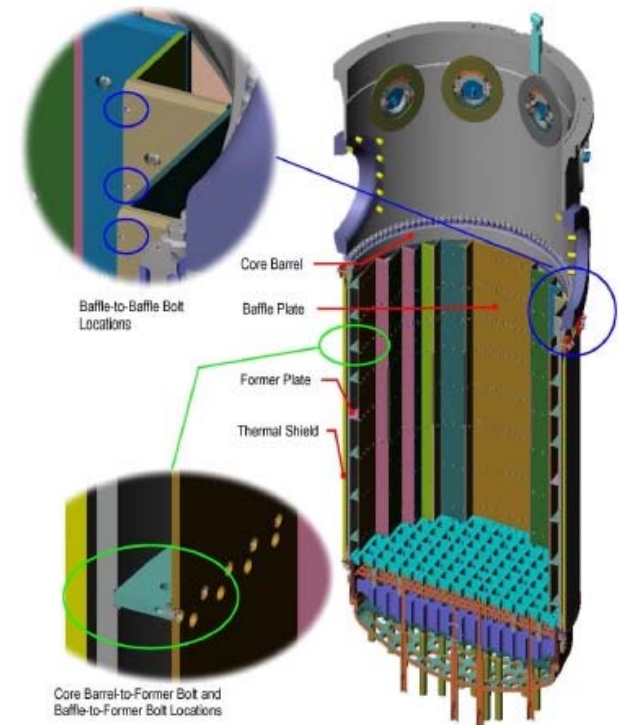
## ▪ RAI 1

- **RAI Summary:** Clarify what the change from “during the next 10-year ISI [inservice inspection]” to “during the next 10-year ISI interval” means, i.e., can these examinations be performed until up to 20 years from now? This RAI is applicable to the CRGT spacer castings, vent valve retaining rings (top and bottom), baffle plates, and locking devices, including locking welds, of the baffle-to-former bolts and internal baffle-to-baffle bolts.
- **Preliminary Industry Approach:** The updated wording does not allow initial examinations 20 years into the PEO. The term “10-year ISI interval” is intended to mean the plant’s existing schedule associated with removal of the core barrel, i.e., during the next scheduled 10-year ISI interval examination, consistent with wording in the ASME B&PV Code. Therefore, the intention of this wording is for examinations to be performed not more than 11 years apart, i.e., what is allowed by Section XI of the ASME B&PV Code, which is consistent with the stipulations stated in Section 4.2.6 of MRP-227-Rev. 1.

# RAIs with Additional Discussion

## ▪ RAI 4

- **RAI Summary:** Does the initial baseline UT examination schedule for the baffle-to-former bolts in MRP-227-Rev. 1 assume an examination of baffle-to-former bolts has been completed within two RFOs from the beginning of the period of extended operation? If not, justify changing the schedule for the baseline UT examinations of the baffle-to-former bolts
- **Preliminary Industry Approach:**
- Yes, the initial baseline UT examination schedule for the B-F bolts in MRP-227, Rev. 1 assumes an examination of B-F bolts has been completed within two refueling outages from the beginning of the period of extended operation for each B&W unit.

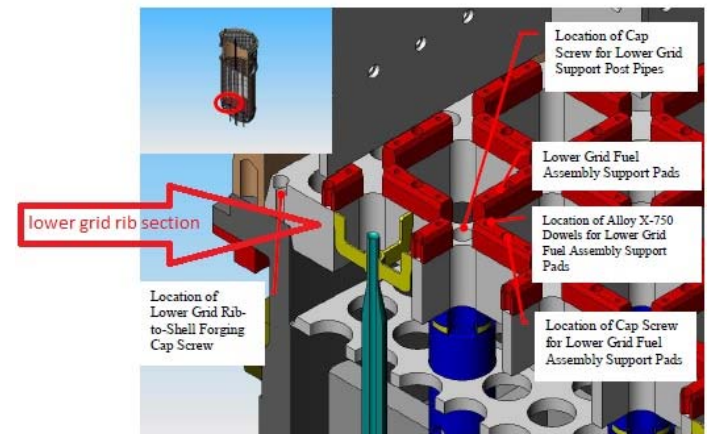


MRP-227-Rev. 1 Figure 4-2

# RAIs with Additional Discussion

## RAI 18

- RAI Summary:** Explain why the lower grid rib section has been recategorized from “No Additional Measures” to “Expansion.”
- Preliminary Industry Approach:** The table below shows the changes from MRP-189, Revision 1 to MRP-189, Revision 2. The screening results are the same but the change comes in the FMECA.



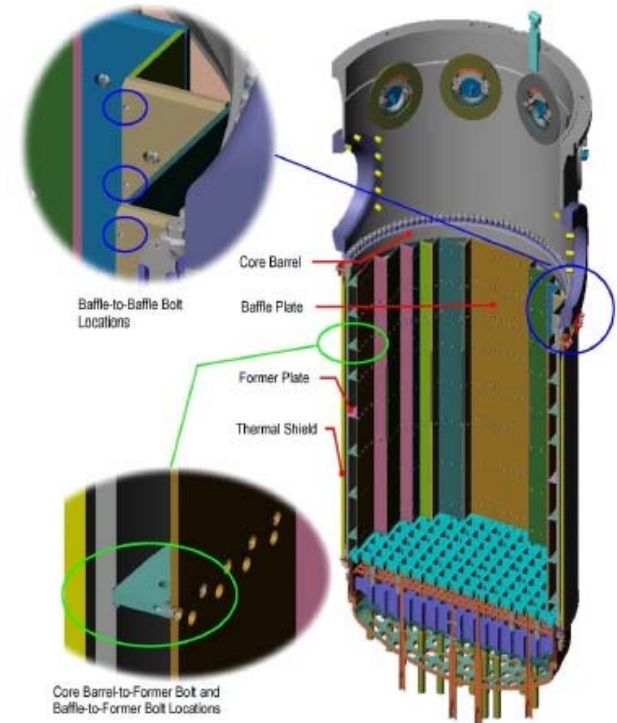
	MRP-189 Screening Result	MRP-189 FMECA Result	MRP-231 Aging Management Strategy Result
Lower Grid Rib Section in MRP-189, Revision 1	Category “Not A” for IE	Category “A” based on susceptibility of B and safety consequence of 1	Category “A” (not considered in MRP-231)
Lower Grid Rib Section in MRP-189, Revision 2	Category “Not A” for IE	Category “C” based on susceptibility of C and safety consequence of 2	Expansion (to Baffle Plates)



# RAIs with Additional Discussion

## ▪ RAI 21

- **RAI Summary:** Explain why the language regarding rows 3, 4, and 5 and 25% of the bolts on a single plate was removed from the Expansion criteria of the baffle-to-former bolts.
- **Preliminary Industry Approach:**
- Parts a and b – The Expansion criteria were updated to include only considerations for Expansion, i.e., determining that an active aging degradation mechanism in the baffle-to-former bolts is underway. Aging degradation drives the Expansion inspections.
- Note that clustering of failures of baffle-to-former bolts is not expected in the Babcock & Wilcox-designed units, per Customer Service Bulletin 16-02 (July 2016), which is also supported by operating experience to date in the Babcock & Wilcox-designed units.

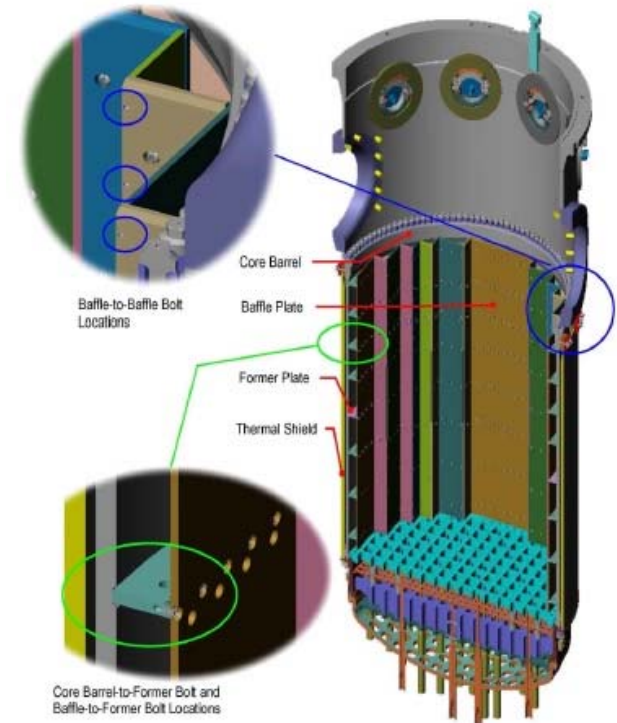


MRP-227-Rev. 1 Figure 4-2

# RAIs with Additional Discussion

## ▪ RAI 22

- **RAI Summary:** Provide technical justifications for the change in relevant condition and Expansion criteria text for the baffle plates. Clarify whether Expansion is only required if cracking links two or more openings or whether Expansion would be required if cracking is present within one inch of any opening.
- **Preliminary Industry Approach:**
- Part a – Due to the nature of irradiation embrittlement, this examination acceptance criteria is appropriate.
- Units have examined the baffle plates and thus far no relevant conditions have been identified
- Part b and c – The Expansion criteria entry currently listed in Table 5-1 of MRP-227-Rev. 1 for the baffle plates will be updated to be consistent with the relevant condition, as noted on the next page (updated text is bold-underlined).



MRP-227-Rev. 1 Figure 4-2

# RAIs with Additional Discussion

## ▪ RAI 22 (continued)

Primary Item	Applicability	Primary Item Examination Acceptance Criteria	Expansion Link(s)	Expansion Criteria	Expansion Item Examination Acceptance Criteria
<p><b>Core Barrel Assembly</b></p> <p><b>Baffle Plates</b></p>	All plants	<p>Visual (VT-3) examination</p> <p>The specific relevant condition is readily detectable cracking connecting openings in the baffle plates (i.e., each bolt hole and flow hole).</p>	<p>Former plates</p> <p>Core barrel cylinder (including vertical and circumferential seam welds)</p> <p>Lower grid rib section</p>	<p><b><u>Readily detectable cracking (if confirmed) connecting openings in the baffle plates (i.e., each bolt hole and flow hole) shall require:</u></b></p> <p>a) An evaluation of the former plates and the core barrel cylinder for the purpose of determining continued operation or repair/replacement by the completion of the next refueling outage. Alternatively, repair/replacement activities may be initiated based on results of a best effort former plate and core barrel cylinder examination.</p> <p>b) That the VT-3 examination be expanded by the completion of the next refueling outage to include 100% of the lower grid rib section heat-affected zones adjacent to the IMI guide tube spider-to-lower grid rib section welds.</p>	N/A

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