NRC License Renewal RAIs on BWRVIP-25, Rev. 1

Core Plate Inspection and Evaluation Guideline

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Outline – License Renewal RAIs

- General Discussion Topics
  - BWRVIP Report License Renewal Appendices
  - Plant-specific use of analyses containing fluence-based criteria
- MVIB License Renewal Related RAIs on BWRVIP-25, Rev. 1

License Renewal Appendices

Background

- License renewal appendices have been developed for a significant number of BWRVIP reports, including most I&E Guidelines
- Initially developed for the purpose of demonstrating that the report provided the information needed to meets the technical information requirements of 10 CFR 54
- Concept originated and most LR appendices developed before availability of the GALL Report
- Provided an option for plants to incorporate BWRVIP reports by reference into plant-specific integrated plant assessments (IPAs), thereby simplifying application content and NRC review
- LR Appendices were developed for most BWRVIP I&E Guidelines, exceptions are:
  - BWRVIP-75-A, "Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules" (not a typical I&E guideline)
  - BWRVIP-205, "Bottom Head Drain Line Inspection and Evaluation Guidelines" (baseline exam requirements only, additional inspections to be addressed by FAC Program)
- By the time of initial GALL Report issue, majority of LR Appendices were already prepared and approved by NRC

I&E Guideline LR Appendix Submittals and Approvals

Document	Component	Submittal	Approval
BWRVIP-49	RPV Instrument Penetrations	Mar 1998	Sep 1999
BWRVIP-27	Standby Liquid Control	Apr 1997	Dec 1999
BWRVIP-18	Core Spray	Dec 1996	Jan 2001
BWRVIP-25	Core Plate	July 1997	Jan 2001
BWRVIP-26	Top Guide	July 1997	Jan 2001
BWRVIP-41	Jet Pump	Oct 1997	Jun 2001
BWRVIP-42	LPCI Coupling	Dec 1997	Jan 2001
BWRVIP-47	Lower Plenum	Dec 1997	Jan 2001
BWRVIP-48	RPV ID Attachment Welds	Feb 1998	Jan 2001
BWRVIP-38	Shroud Support	Sep 1997	Mar 2001
BWRVIP-74	RPV License Renewal Guide	Sep 1999	Oct 2001
BWRVIP-76	Core Shroud	Nov 1999	Nov 2009
BWRVIP-139	Steam Dryer	Feb 2014	Jan 2017
BWRVIP-180	Access Hole Cover	Jul 2009	N/A (info only)
BWRVIP-183	Top Guide Grid Beams	Jul 2009	N/A (withdrawn)

- Relevant NUREG-1801 Dates:
  - Jul 2001 (Initial)
  - Sep 2005 (Rev. 1)
  - Dec 2010 (Rev. 2)
- BWR “Pre-GALL” LRA submittals:
  - Mar 2000 (Hatch)
  - July 2001 (Peach Bottom)
- Other LR Appendices:
  - BWRVIP-108 / 241 (Nozzle ISI Relief)

BWRVIP Perspective on LR Appendices

- Availability of the GALL Report effectively eliminates the need for LR Appendices
  - GALL Report recommends use of BWRVIP guidelines to manage BWR reactor vessels and reactor internals
  - Cited by applicants within plant-specific LRAs, evaluations based on consistency with GALL
  - Same approach taken regardless of LR Appendix submittal / approval status
  - Similar appendices not needed for other industry AMPs (e.g., SGMP, MRP)
- Additional considerations:
  - Implementation of the NEI 03-08 materials initiative provides confidence in the quality of new guidance and guidance revisions
  - Most LR appendices are based on 1990s state of knowledge and are known to have areas of inconsistency with current guidance
  - At the time of development, the positions were considered appropriate and accepted by NRC as evidenced by the SEs existing for most appendices

BWRVIP Position on LR Appendices

- Significant resources would be required to update and maintain the appendices and associated NRC SEs, without a significant change in the overall level of safety provided
- Current BWRVIP practice is to make LR Appendices historical whenever the corresponding I&E guideline is revised
  - LR Appendix content and associated NRC SE retained for informational purposes only
  - “Time-dependent” limitations specifically affecting use of the guidance clearly documented

Relevance to BWRVIP-25, Rev. 1

- Intent was to make the LR Appendix historical in BWRVIP-25, Rev. 1
- Error identified in LR Appendix cover page where the content implies the LR Appendix was updated for Rev. 1
- Proposed revision to correct:

  "*…As such, content provided on page B-2 and following has not been updated to address revisions to BWRVIP-25 occurring since BWRVIP-25 (TR-107284) and should be considered historical.*"
- BWRVIP responses to RAIs focused on the LR appendix will be placed in the context of the intended historical status

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Plant-Specific Use of Analyses Containing Fluence-Based Criteria

Limitations on Use of BWRVIP-25, Rev. 1 Appendix I to Justify Elimination of Core Plate Hold-down Bolt Exams

- Limitations based on plant-design and operational parameters
  - Core plate loads and ΔP
  - Neutron fluence
- Appendix I analyses based on assumption of a conservative 60-yr end-of-life estimate of neutron fluence
- BWRVIP position is that the Appendix I analysis does not include a calendar-based limitation on use
  - Plants must confirm that core plate bolt fluence remains less than the value assumed in Appendix I through the end of the time period for which the analysis is credited
- Review of available calculations for a number of plants indicates that most plants will have 80-yr fluence well below the fluence used in the generic analysis

BWRVIP Position on Use of Analyses Containing Fluence-Based Limitations

- Regardless of the decision-making associated with the inputs to the analysis, use of the analysis by plants on a plant-specific basis may continue so long as the plant verifies that its fluence remains less than that used as a basis for the analysis
- Content describing input selection bases as being associated with any licensed operating period (e.g., 60 years, 80 years) is informational in nature
- BWRVIP role is to ensure limitations are clearly documented
- Licensees / applicants are responsible to ensure that limitations are considered in AMP implementation

Relevant SLR-related BWRVIP Activities

- Developing technical bases documents addressing the adequacy of current guidance for operation beyond 60 years
  - RPV – New report consistent with BWRVIP-74
  - Reactor internals – New report addressing internals
- Guidance modifications to clarify applicability of guidance to operation beyond 60 years provided in these reports
- As activities are undertaken to revise guidance for other reasons, content of existing guidance will be updated / clarified

License Renewal Related RAIs on BWRVIP-25, Rev. 1

MVIB License Renewal RAI-1

- Request Synopsis:
  - Clarify the scope of core plate components to be included in an LRA or SLRA

- BWRVIP Position:
  - LR or SLR applicants are responsible for identifying the systems and components (SCs) included within the scope of license renewal
  - Generic consideration of components by BWRVIP I&E guidance does not relieve licensees of the responsibility to identify the SCs within the scope of license renewal

MVIB License Renewal RAI-2 (1 of 2)

- Request Synopsis:
  - Justify why the methodology in BWRVIP-25, Rev. 1 Appendix B limits SCs subject to AMR to only those having applicable aging effects
- BWRVIP Position:
  - Conclusions presented in Appendix B are considered historical
  - The language in Section B.3 (c) was intended to describe cracking as the primary aging effect requiring management and was not intended to limit the SCs subject to AMR

MVIB License Renewal RAI-2 (2 of 2)

- Request Synopsis:
  - Justify why BWRVIP-25, Rev. 1 does not identify loss of preload due to stress relaxation / irradiation creep as an aging effect requiring management (AERM)
  - Explain why BWRVIP-25, Rev. 1 does not identify cumulative fatigue damage as an AERM
- BWRVIP Position:
  - At the time of development, these aging effects were not identified as AERMs
  - The LR Appendix is intended to be historical. As such, it does not reflect the current requirements in BWRVIP-25, Rev. 1
  - Loss of preload is an AERM
  - Cumulative fatigue usage is a potential TLAA associated with a plant's design basis and dispositioned on a plant-specific basis. It is not an aging effect requiring management requiring inspection under BWRVIP-25, Rev. 1.

MVIB License Renewal RAI-3

- Request Synopsis:
  - Justify the basis for omitting a structural analysis report appendix for core plates restrained by wedges, including the upper bound limits for stresses, loads, or stress intensities associated with wedge design
  - Clarify if there are any aging effects requiring management (AERMs) associated with wedges
  - Justify why verification of wedge structural analyses has not been identified as an applicant action item
- BWRVIP Position:
  - Wedge structural analyses are plant-specific and not addressed by BWRVIP guidance
  - There are no AERM associated with wedges – these components are not welded, nor are they subject to significant stresses during normal operation
  - Wedge analyses are not TLAAs and as such do not need to be identified as a calculation subject to evaluation for LR or SLR

MVIB License Renewal RAI-4 (1 of 2)

- Request Synopsis:
  - Clarify if use of the BWRVIP-25, Rev. 1 Appendix I analysis is predicated on favorable OE and provide inspection data supporting this conclusion
  - Justify why it is acceptable to apply the Appendix I analysis if there is no supporting inspection data
- BWRVIP Position:
  - The technical basis supporting the BWRVIP position that IGSCC is unlikely to occur in Core Plate Hold-down bolts is provided in Section 4 of Appendix I
  - MVIB Operating Plant RAI-3 and RAI-5 address this question

MVIB License Renewal RAI-4 (2 of 2)

- Request Synopsis:
  - Explain why Section B.3 does not address analysis as an alternative to inspection
- BWRVIP Position:
  - The BWRVIP agrees that in any current evaluation, analysis should be indicated as an alternative to inspection. However, the intent was to make the LR Appendix documented in BWRVIP-25, Rev. 1 Appendix B historical. As such, there would be no change.

MVIB License Renewal RAIs 5 and 6

- Request Synopsis:
  - Clarify the criteria and justifications that must be addressed by an applicant in its BWRVIP AMP or in an LRA / SLRA for use of the methodology described in BWRVIP-25, Rev. 1 Appendix I

- BWRVIP Position:
  - Appendix I Table 8-3 and Figure 9-9 provide the criteria for plant use of the analysis to justify elimination of core plate hold-down bolt examinations

MVIB License Renewal RAI-7 (1 of 2)

- Request Synopsis:
  - Justify why Appendix I does not define the bounding time frame used for the neutron fluence assessment included in the stress relaxation analysis
- BWRVIP Position:
  - The fluence used as an input to the analysis was selected based on a desire to ensure a successful analysis result that could be applied by most U.S. BWRs, not any specific plant bounding value or licensed operating period
  - Accumulated fluence projections based on licensed operating period vary significantly between plant designs. Selection of a conservative bounding value likely would unnecessarily limit application by plants.
  - Plants are required to ensure fluence limitations are met in order to use BWRVIP-25, Rev. 1 Appendix I

MVIB License Renewal RAI-7 (2 of 2)

- Request Synopsis:
  - Clarify whether an applicant crediting the BWRVIP-25, Rev. 1 Appendix A analysis must identify the analysis as a TLAA for its SLRA
- BWRVIP Position:
  - Use of the Appendix I analysis to justify elimination of core plate hold-down bolts through the end of a licensed operating period generally meets the definition of a TLAA
  - However, SLR applicants, not the BWRVIP, are responsible for determining which calculations meet the definition of a TLAA
  - Scenarios may exist where the TLAA is dispositioned by 10CFR54.21(c)(1)(iii), specifically where current end-of-life fluence is predicted to exceed the limitation in Appendix I and the AMP includes controls to ensure accumulated fluence is monitored and appropriate actions taken prior to exceeding the limit

MVIB License Renewal RAI-8

- Request Synopsis:
  - Identify core plate assembly components that are subject to ASME Section III cumulative usage factor (CUF) analyses
  - Justify why the LR Appendix does not identify that fatigue analyses may need to be identified as TLAAs for LRAs or SLRAs
- BWRVIP Position:
  - ASME Code classification is specific to the design basis of each plant. Differences in design basis affect the scope of components subject to detailed fatigue usage calculations.
  - BWRVIP reports must only identify TLAAs / limitations directly relevant to the aging management evaluation contained in the report. Consideration of fatigue-related TLAAs for reactor internals does not directly affect the aging management approach provided in BWRVIP-25, Rev. 1. Additionally, applicants are made aware of this potential TLAA by GALL / GALL-SLR item IV.B1.R-53.