

# **Appendix C**

**Response to BWRVIP Applicant Action Items**

**Vermont Yankee Nuclear Power Station**

Of the BWRVIP documents credited for VYNPS license renewal, the following have (or are expected to have) NRC safety evaluation (SE) reports for license renewal.

BWRVIP-18	BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines
BWRVIP-25	BWR Core Plate Inspection and Flaw Evaluation Guidelines
BWRVIP-26	BWR Top Guide Inspection and Flaw Evaluation Guidelines
BWRVIP-27	BWR Standby Liquid Control System / Core Plate $\Delta P$ Inspection and Flaw Evaluation Guidelines
BWRVIP-38	BWR Shroud Support Inspection and Flaw Evaluation Guidelines
BWRVIP-41	BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines
BWRVIP-42	LPCI Coupling Inspection and Flaw Evaluation Guidelines
BWRVIP-47	BWR Lower Plenum Inspection and Flaw Evaluation Guidelines
BWRVIP-48	Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines
BWRVIP-49	Instrument Penetration Inspection and Flaw Evaluation Guidelines
BWRVIP-74	BWR Reactor Vessel Inspection and Flaw Evaluation Guidelines
BWRVIP-76	BWR Core Shroud Inspection and Flaw Evaluation Guidelines
BWRVIP-116	BWR Vessel and Internals Project Integrated Surveillance Program (ISP) Implementation for License Renewal

License renewal application action items identified in the corresponding SE report for each of the above reports are addressed in the following table. BWRVIP-76 and BWRVIP-116 are not included in the table because, although they are expected to have SE reports for license renewal, they have not yet been issued. BWRVIP documents without SE reports for license renewal have no applicant action items and are, therefore, not included in the table.

The SE reports contain three common applicant action items, which are addressed only once in the table. For SE reports that contain additional applicant action items, the response is provided separately following the responses to the three common action items.

Action Item Description	Response
<b>Common Action Items from BWRVIP-18, -25, -26, -27, -38, -41, -42, -47, -48, and -49</b>	
<p>BWRVIP-AII (1)</p> <p>The license renewal applicant is to verify that its plant is bounded by the report. Further, the renewal applicant is to commit to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operation. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the aging management programs within these BWRVIP reports described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the components or other information presented in the report, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).</p>	<p>The BWRVIP reports have been reviewed and VYNPS has been verified to be bounded by the reports. Additionally, VYNPS commits to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operation. Commitments are administratively controlled in accordance with the requirements of 10 CFR 50, Appendix B. Site procedures require that deviation from a BWRVIP report approved by the NRC be reported to the NRC within 45 days of receipt of NRC final approval of the guideline.</p>
<p>BWRVIP-AII (2)</p> <p>10 CFR 54.21(d) requires that an FSAR supplement for the facility contain a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs for the period of extended operation. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the programs and activities specified as necessary in the applicable BWRVIP reports are summarily described in the FSAR supplement.</p>	<p>The FSAR supplement is included as <a href="#">Appendix A</a> and includes a summary of the programs and activities specified as necessary for the BWRVIP program.</p>

Action Item Description	Response
<p>BWRVIP-AII (3)</p> <p>10 CFR 54.22 requires that each application for license renewal include any technical specification changes (and the justification for the changes) or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application. The applicable BWRVIP reports may state that there are no generic changes or additions to technical specifications associated with the report as a result of its aging management review and that the applicant will provide the justification for plant-specific changes or additions. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the inspection strategy described in the reports does not conflict with or result in any changes to their technical specifications. If technical specification changes or additions do result, then the applicant must ensure that those changes are included in its application for license renewal.</p>	<p>No technical specification changes have been identified for VYNPS based upon the BWRVIP reports.</p>
<p><b>Additional Action Items</b></p>	
<p><i>BWRVIP-18, Core Spray Internals Inspection and Flaw Evaluation Guidelines</i></p>	
<p>BWRVIP-18 (4)</p> <p>Applicants referencing the BWRVIP-18 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV internal components.</p>	<p>There were no TLAA issues identified for VYNPS for BWRVIP-18.</p>
<p><i>BWRVIP-25, Core Plate Inspection and Flaw Evaluation Guidelines</i></p>	
<p>BWRVIP-25 (4)</p> <p>Due to susceptibility of the rim hold-down bolts to stress relaxation, applicants referencing the BWRVIP-25 report for license renewal should identify and evaluate the projected stress relaxation as a potential TLAA issue.</p>	<p>The calculation of loss of preload on the core plate rim hold-down bolts is a TLAA. Evaluation of the 60-year projected stress relaxation of the rim hold-down bolts in BWRVIP-25, Appendix B showed that the VYNPS bolts would experience only 5 to 19 percent loss of preload.</p>

Action Item Description	Response
<p><b>BWRVIP-25 (5)</b>  Until such time as an expanded technical basis for not inspecting the rim hold-down bolts is approved by the staff, applicants referencing the BWRVIP-25 report for license renewal should continue to perform inspections of the rim hold-down bolts.</p>	<p>VYNPS follows BWRVIP-25 guidelines for rim hold-down bolt inspection under the BWR Vessel Internals Program with one exception.  VYNPS performs VT-3 inspection of 50% (15) of the top of the core plate rim hold-down bolts every other refueling outage. If access to the lower plenum becomes available, VYNPS plans to perform a VT-3 inspection of accessible rim hold-down bolt bottom locking engagement and accessible aligner pin assemblies. Thus, VYNPS does not meet the BWRVIP-25 requirement to perform enhanced VT-1 from below the core plate of 50% of the hold-down bolts every other refueling outage. A baseline VT-3 examination of the tops of all 30 bolted connections was performed in 1996. Follow-up VT-3 examinations of tops of 50% of the bolted connections were performed in 1999, 2000 and 2001. None of the exams found evidence of cracking or bolting disassembly. Since the lower bolted connections are similar to the top, and there were no failed connections in the sample that was inspected, it is unlikely that a significant number of failed connections could exist in the remainder of the population. Therefore, the VYNPS inspection plan is adequate for ensuring the structural integrity of the core plate configuration to resist sliding against shear loads.</p>
<p><i>BWRVIP-26, Top Guide Inspection and Flaw Evaluation Guidelines</i></p>	
<p><b>BWRVIP-26 (4)</b>  Due to IASCC susceptibility of the subject safety-related components, applicants referencing the BWRVIP-26 report for license renewal should identify and evaluate the projected accumulated neutron fluence as a potential TLAA issue.</p>	<p>Accumulated neutron fluence projected to 60 years for VYNPS exceeds the threshold for IASCC susceptibility for the top guide. Since VYNPS has implemented the inspection requirements of BWRVIP-26, the <a href="#">BWR Vessel Internals</a> Program will adequately manage the effects of aging on the top guide for the period of extended operation.</p>

Action Item Description	Response
<i>BWRVIP-27, Standby Liquid Control System/Core Plate ΔP Internals Inspection and Flaw Evaluation Guidelines</i>	
<p>BWRVIP-27 (4)  Due to the susceptibility of the subject components to fatigue, applicants referencing the BWRVIP-27 report for license renewal should identify and evaluate the projected fatigue cumulative usage factors as a potential TLAA issue.</p>	<p>BWRVIP-27 fatigue analysis of the standby liquid control system / core plate ΔP line was identified as a potential TLAA. However, VYNPS fatigue analyses do not provide a CUF for the standby liquid control / core plate ΔP nozzle. Therefore, VYNPS does not have a TLAA associated with this component.</p>
<i>BWRVIP-42, LPCI Coupling Inspection and Flaw Evaluation Guidelines</i>	
<p>BWRVIP-42 (4)  Applicants referencing the BWRVIP-42 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV internal components.</p>	<p>There were no TLAA issues identified for VYNPS for BWRVIP-42.</p>
<p>BWRVIP-42 (5)  The BWRVIP committed to address development of the technology to inspect inaccessible welds and to have the individual LR applicant notify the NRC of actions planned. Applicants referencing BWRVIP-42 report for license renewal should identify the action as open and to be addressed once the BWRVIP response to this issue has been reviewed and accepted by the staff.</p>	<p>Inspection of inaccessible welds is a BWRVIP generic open action. VYNPS will address this issue once the BWRVIP response has been reviewed and accepted by the NRC.</p>
<i>BWRVIP-47, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines</i>	
<p>BWRVIP-47 (4)  Due to fatigue of the subject safety-related components, applicants referencing the BWRVIP-47 report for LR should identify and evaluate the projected CUF as a potential TLAA issue.</p>	<p>Fatigue analyses of lower plenum pressure boundary components were identified as TLAA. Fatigue and CUFs are addressed in <a href="#">Section 4.3</a>.</p>

Action Item Description	Response
<i>BWRVIP-74, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines</i>	
<p>BWRVIP-74-A (4)</p> <p>The staff is concerned that leakage around the reactor vessel seal rings could accumulate in the VFLD lines, cause an increase in the concentration of contaminants and cause cracking in the VFLD line. The BWRVIP-74 report does not identify this component as within the scope of the report. However, since the VFLD line is attached to the RPV and provides a pressure boundary function, LR applicants should identify an AMP for the VFLD line.</p>	<p>The vessel flange leak detection (VFLD) line is in scope and has loss of material and cracking identified as aging effects requiring management. Aging of the vessel flange leak detection line is managed by the <a href="#">Water Chemistry Control – BWR</a> and <a href="#">One-Time Inspection</a> Programs.</p>
<p>BWRVIP-74-A (5)</p> <p>LR applicants shall describe how each plant-specific aging management program addresses the following elements: (1) scope of program, (2) preventative actions, (3) parameters monitored and inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.</p>	<p>Descriptions of plant-specific aging management programs (see <a href="#">Appendix B</a>) address the required ten elements.</p>
<p>BWRVIP-74-A (6)</p> <p>The staff believes inspection by itself is not sufficient to manage cracking. Cracking can be managed by a program that includes inspection and water chemistry. BWRVIP-29 describes a water chemistry program that contains monitoring and control guidelines for BWR water that is acceptable to the staff. BWRVIP-29 is not discussed in the BWRVIP-74 report. Therefore, in addition to the previously discussed BWRVIP reports, LR applicants shall contain water chemistry programs based on monitoring and control guidelines for reactor water chemistry that are contained in BWRVIP-29.</p>	<p>The <a href="#">Water Chemistry Control – BWR</a> Program monitors and controls reactor water chemistry in accordance with the guidelines of BWRVIP-130, which supersedes BWRVIP-29.</p>
<p>BWRVIP-74-A (7)</p> <p>LR applicants shall identify their vessel surveillance program, which is either an ISP or plant-specific-invessel surveillance program, applicable to the LR term.</p>	<p>The <a href="#">Reactor Vessel Surveillance</a> Program is an ISP program.</p>

Action Item Description	Response
<p>BWRVIP-74-A (8)            LR applicants should verify that the number of cycles assumed in the original fatigue design is conservative to assure that the estimated fatigue usage for 60 years of plant operation is not underestimated. The use of alternative actions for cases where the estimated fatigue usage is projected to exceed 1.0 will require case-by case staff review and approval. Further, a LR applicant must address environmental fatigue for the components listed in the BWRVIP-74 report for the LR period.</p>	<p>Thermal fatigue (including discussion of cycles, projected cumulative usage factors, environmental fatigue, etc.) is evaluated as a TLAA in <a href="#">Section 4.3</a>.</p>
<p>BWRVIP-74-A (9)            Appendix A to the BWRVIP-74 report indicates that a set of P-T curves should be developed for the heat-up and cool-down operating conditions in the plant at a given EFPY in the LR period.</p>	<p>Development of pressure-temperature limits for the period of extended operation is described as a TLAA in <a href="#">Section 4.2.2</a>.</p>
<p>BWRVIP-74-A (10)            To demonstrate that the beltline materials meet the Charpy USE criteria specified in Appendix B of the report, the applicant shall demonstrate that the percent reduction in Charpy USE for their beltline materials are less than those specified for the limiting BWR/3-6 plates and the non-Linde 80 submerged arc welds and that the percent reduction in Charpy USE for their surveillance weld and plate are less than or equal to the values projected using the methodology in RG 1.99, Revision 2.</p>	<p>Discussion of Charpy upper-shelf energy for the period of extended operation is described as a TLAA in <a href="#">Section 4.2.3</a>.</p>



Action Item Description	Response
<p><b>BWRVIP-74-A (11)</b></p> <p>To obtain relief from the in-service inspection of the circumferential welds during the LR period, the BWRVIP report indicates each licensee will have to demonstrate that (1) at the end of the renewal period, the circumferential welds will satisfy the limiting conditional failure frequency for circumferential welds in the Appendix E for the staff's July 28, 1998, SER, and (2) that they have implemented operator training and established procedures that limit the frequency of cold overpressure events to the amount specified in the staff's FSER.</p>	<p>Discussion of relief from in-service inspection of the circumferential welds for the period of extended operation is included in <a href="#">Section 4.2.5</a>.</p>
<p><b>BWRVIP-74-A (12)</b></p> <p>As indicated in the staff's March 7, 2000, letter to Carl Terry, a LR applicant shall monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RTNDT of the limiting axial beltline weld at the end of the period of extended operation is less than the values specified in Table 1 of this FSER.</p>	<p>Discussion of axial weld failure probability during the period of extended operation is included in <a href="#">Section 4.2.6</a>.</p>
<p><b>BWRVIP-74-A (13)</b></p> <p>The Charpy USE, P-T limit, circumferential weld and axial weld RPV integrity evaluations are all dependent upon the neutron fluence. The applicant may perform neutron fluence calculations using staff approved methodology or may submit the methodology for staff review. If the applicant performs the neutron fluence calculation using a methodology previously approved by the staff, the applicant should identify the NRC letter that approved the methodology.</p>	<p>The method used for the neutron flux calculation is documented in GE's Licensing Topical Report NEDC-32983P-A, which was approved by the US NRC for licensing applications in USNRC letter S. A. Richards to J. F. Klapproth, Safety Evaluation for NEDC-32983P, General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluation (TAC No. MA9891), MFN 01-050, September 14, 2001.</p>
<p><b>BWRVIP-74-A (14)</b></p> <p>Components that have indications that have been previously analytically evaluated in accordance with subsection IWB-3600 of Section XI to the ASME Code until the end of the 40-year service period shall be reevaluated for the 60-year service period corresponding to the LR term.</p>	<p>No flaw evaluations were identified.</p>