

Constellation Achieves NRC Approval to Eliminate Costly BWR Reactor Vessel Circumferential Weld Inspections



Under U.S. Nuclear Regulatory Commission (NRC) regulation 10 CFR 50.55a, U.S. nuclear power plants must follow the in-service inspection requirements of ASME Boiler and Pressure Vessel Code Section XI—including inspections of Boiling Water Reactor (BWR) reactor pressure vessel (RPV) circumferential welds. In practice, these welds are very difficult to access, and full inspection is not practicable due to internal RPV structures.

EPRI's earlier research in BWRVIP-05 supported eliminating these inspections, but the technical basis had limitations. BWRVIP-329-A, published in December 2021, offers an updated and much stronger technical foundation, using modern analysis methods and replacing the previous reports. Constellation Energy was the first utility to apply the updated technical basis into practice and secure NRC approval - achieving significant cost savings.

Benefits

BWRVIP-329-A allows BWR plants to continue deferring circumferential weld inspections during extended operation while still meeting safety goals. Although exact savings are difficult to quantify without a practical way to inspect welds fully, estimates show Constellation saved several million dollars per unit per 10-year interval by avoiding associated mobilization and inspection work.

Constellation also received inspection relief through the end of its operating licenses. Unlike earlier technical bases, the new analysis in BWRVIP-329-A has no time-based limitations and remains valid for any operating period as long as key technical parameters are met. NRC approval further reinforces this basis. The approach also eliminates the significant time and logistical challenges of trying to inspect welds that would otherwise require impractical disassembly of major internal components.

Application

Constellation's use of BWRVIP-329-A marks the first application of the updated technical basis in the industry. Using the report's implementation template, Constellation submitted relief requests for Limerick Units 1 and 2 (Pennsylvania), LaSalle Units 1 and 2 (Illinois), and Nine Mile Point Unit 2 (New York). EPRI supported the effort by reviewing the draft request and confirming that the technical parameters in the template were correctly completed for each plant. The NRC approved the submittal in January 2025.

Other utilities planning to adopt BWRVIP-329-A can reference Constellation's publicly available NRC submittal as a reference when preparing their own requests.

Key EPRI products and resources used to support this effort include:

- BWRVIP-329-A: BWR Vessel and Internals Program, Updated Probabilistic Fracture Mechanics Analyses for BWR RPV Welds to Address Extended Operations, 3002022650
- BWRVIP-05: BWR Reactor Pressure Vessel Shell Weld Inspection Recommendation, 105697
- BWRVIP-74-A: BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines for License Renewal, 1008872

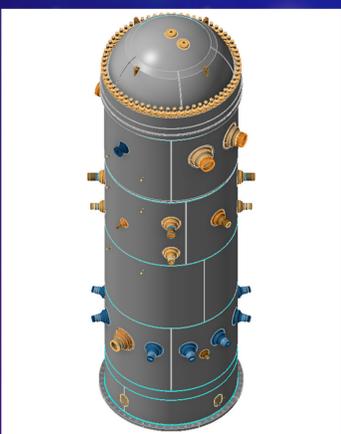


Figure 1
BWR RPV with highlighted circumferential welds (from BWRVIP information database)

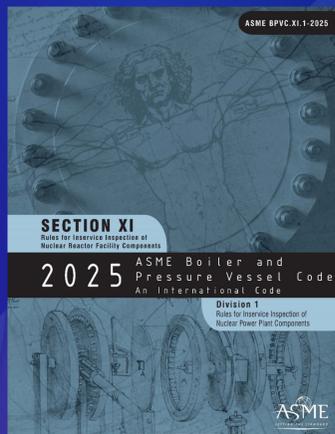


Figure 2
ASME Section XI cover page



Figure 4
LaSalle Clean Energy Center



Figure 3
Limerick Clean Energy Center



Figure 4
Nine Mile Point Clean Energy Center