

ENCLOSURE 1

M240010

Presentation Slides for Pre-Application Meeting for GE Hitachi Nuclear
Energy BWRX-300 Proposed Break Exclusion Zone Design
Requirements

Non-Proprietary Information

Non-Proprietary Information



BWRX-300 Break Exclusion Zone (BEZ)

January 24, 2024

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Objective



- Provide a high level overview of the BWRX-300 containment penetration area configuration
- Seek NRC feedback on the approach to the Break Exclusion Zone (BEZ) for the BWRX-300

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Postulation of Pipe Ruptures



- ❑ The postulation of pipe ruptures is specified in NRC regulation and guidance:
 - 10CFR50, Appendix A, General Design Criterion 4, “*Environmental and dynamic effects design bases*”
 - NRC Standard Review Plan (SRP, NUREG-0800):
 - Sections 3.6.1 and 3.6.2 , Rev.3
 - 3.6.3 , Rev.1
 - BTP 3-3, Rev.3
 - BTP 3-4 , Rev.3

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Break Exclusion Zone (BEZ)



BTP 3-4 Rev.3 section B.1.(ii)

Fluid System Piping in Containment Penetration Areas.

“Breaks and cracks need not be postulated in those portions of piping from containment wall to and including the inboard or outboard isolation valves, provided they meet the design criteria of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Subarticle NE-1120, and the following additional design criteria: ...”

- (1) Reduced stress and fatigue limits.
- (2) Avoidance of welded attachments, or detailed stress analysis or tests.
- (3) Minimized number of circumferential or longitudinal welds.
- (4) Lengths of these portions of piping reduced to the minimum practical.
- (5) Pipe anchors, restrains, attachments to penetrations and whip restrains not welded directly to the pipe except where 100% volumetrically examinable and detailed stress analyzed.
- (6) Requirements on guard pipes.
- (7) A 100 percent volumetric inservice examination of all pipe welds should be conducted during each inspection interval as defined in ASME Code, Section XI, IWA-2400.

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Break Exclusion Zone (BEZ)

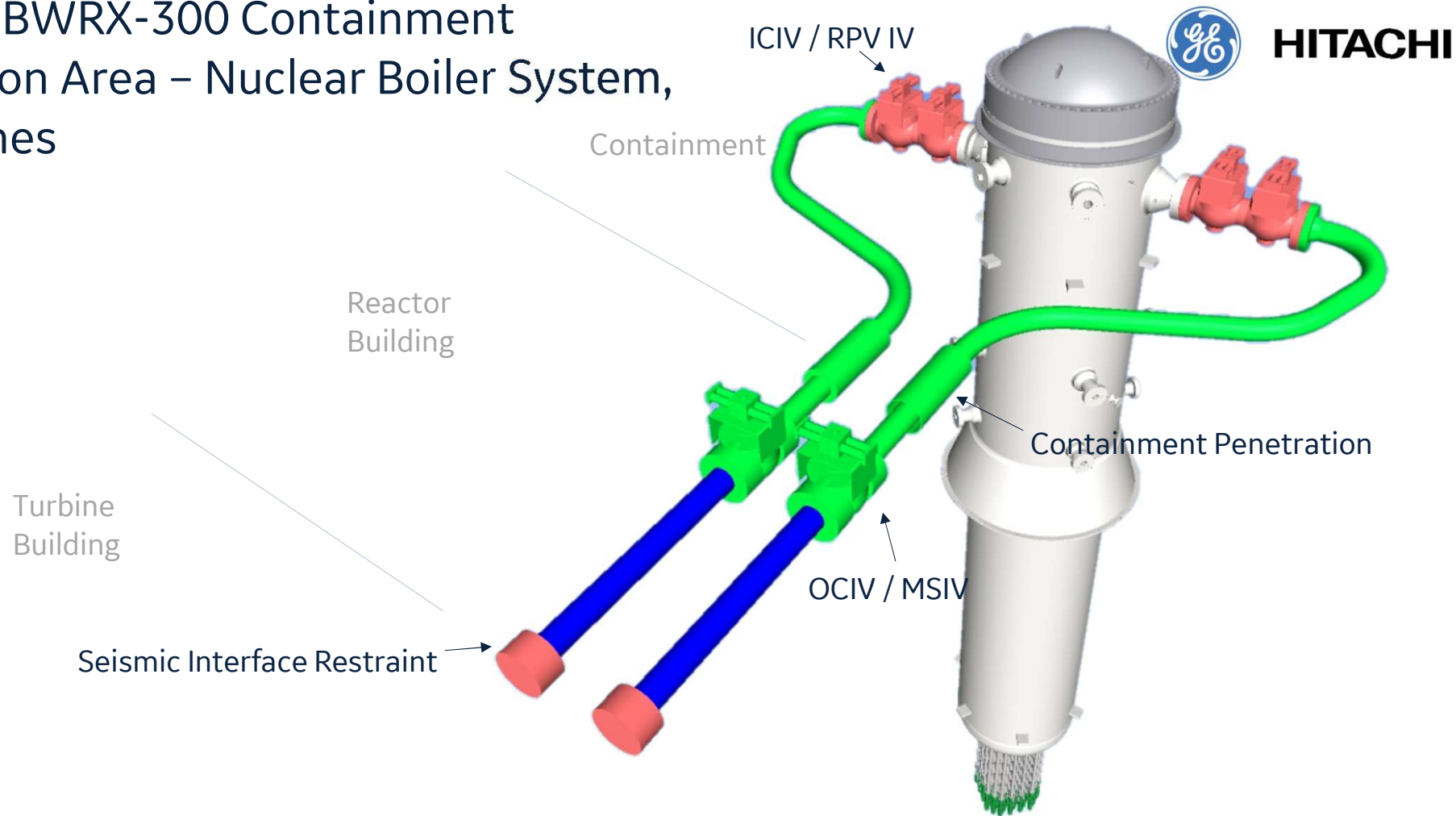


Consistent with current industry practice, the BWRX-300 applies BEZ from the inboard containment isolation valve to the nearest anchor beyond the outboard isolation valve:

1. The BWRX-300 RPV Isolation Valves (which also serve as containment inboard isolation valves) are located integral to the RPV in order to restore the reactor coolant boundary integrity. This ensures fuel cooling in the case of a loss of coolant accident as opposed to solely relying on the containment boundary in the event of a loss of coolant.
2. The functional boundaries of the BEZ, according to the BTP 3-4, are from inboard (inside containment) isolation valve to outboard (outside containment) isolation valve.
3. Additionally, the structural boundaries of the BEZ are the anchors that extend beyond the outboard isolation valves up to Seismic Interface Restraint (SIR) anchors. These anchors protect the containment isolation valve function from high energy line breaks and seismic effects beyond the SIRs.
4. Accordingly, the piping between the OCIV and the SIR maintains the enhanced piping classification and requirements of the functional boundaries of the BEZ.
5. Pipe length is minimized and associated routing is optimized to achieve sufficient flexibility and minimize stresses given thermal expansion and anchor motions.

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Example: BWRX-300 Containment Penetration Area – Nuclear Boiler System, Steam Lines



Break Exclusion Zone

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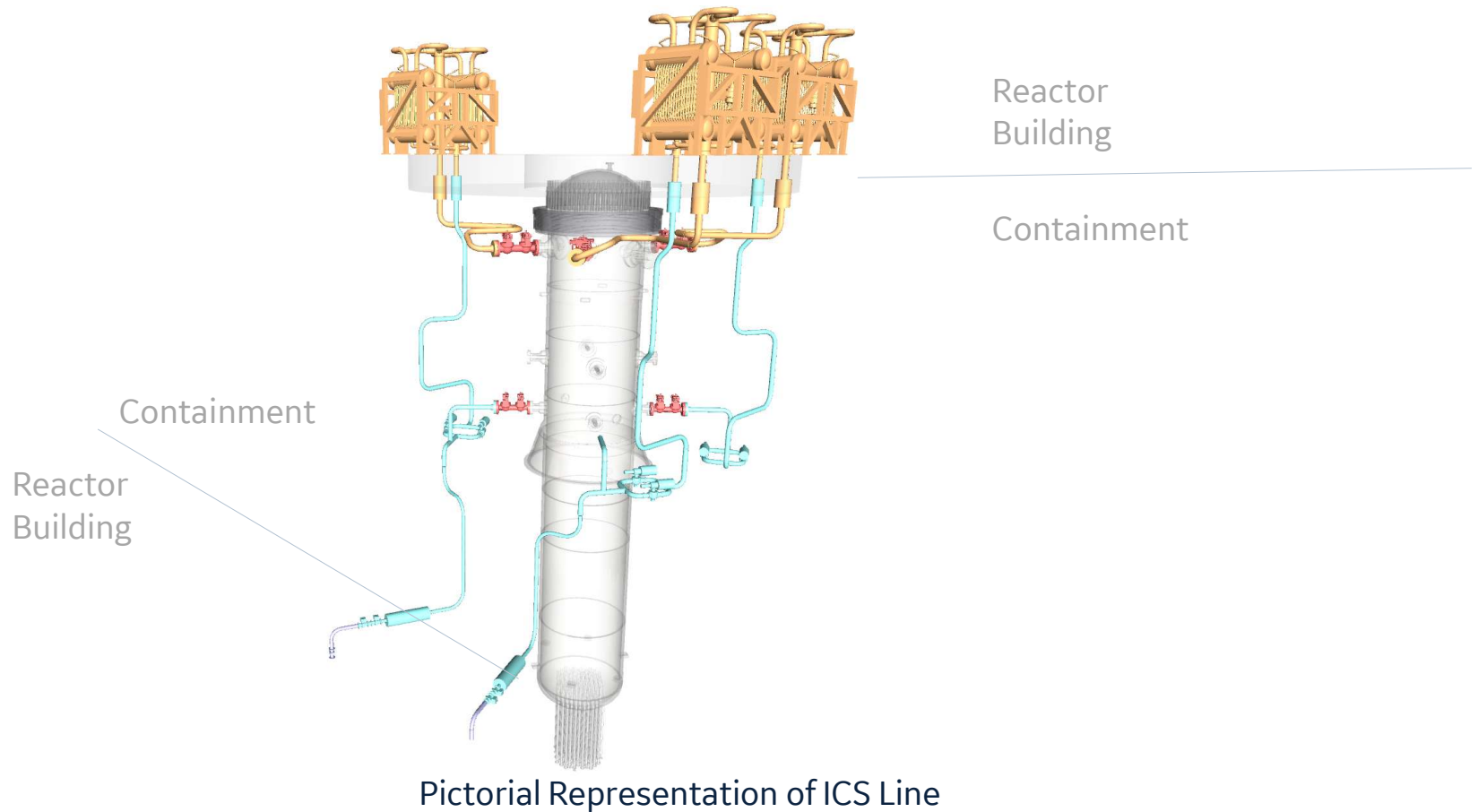
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BWRX-300 Isolation Condenser System - BEZ



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Break Exclusion Zone

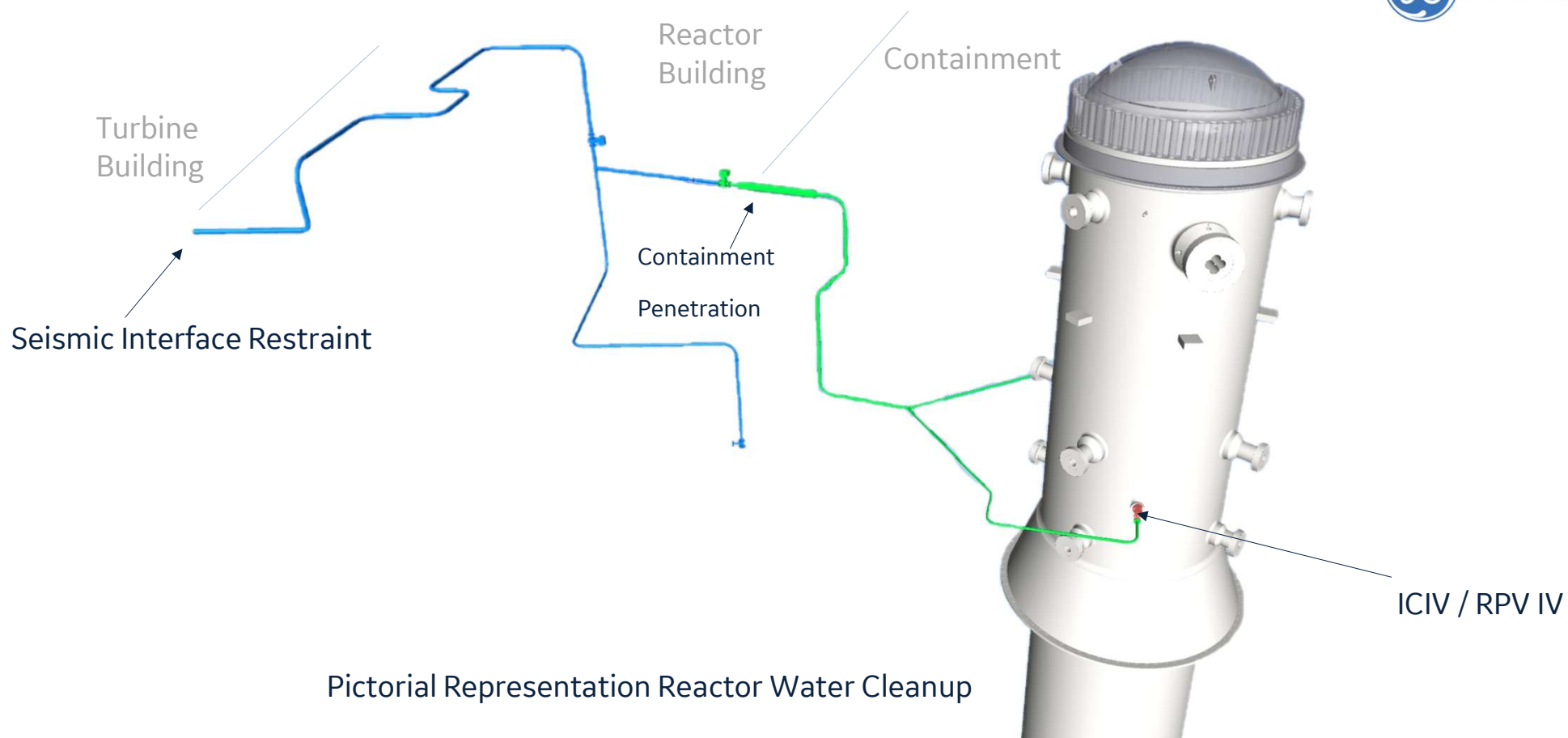
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BWRX-300 Reactor Water Cleanup - BEZ



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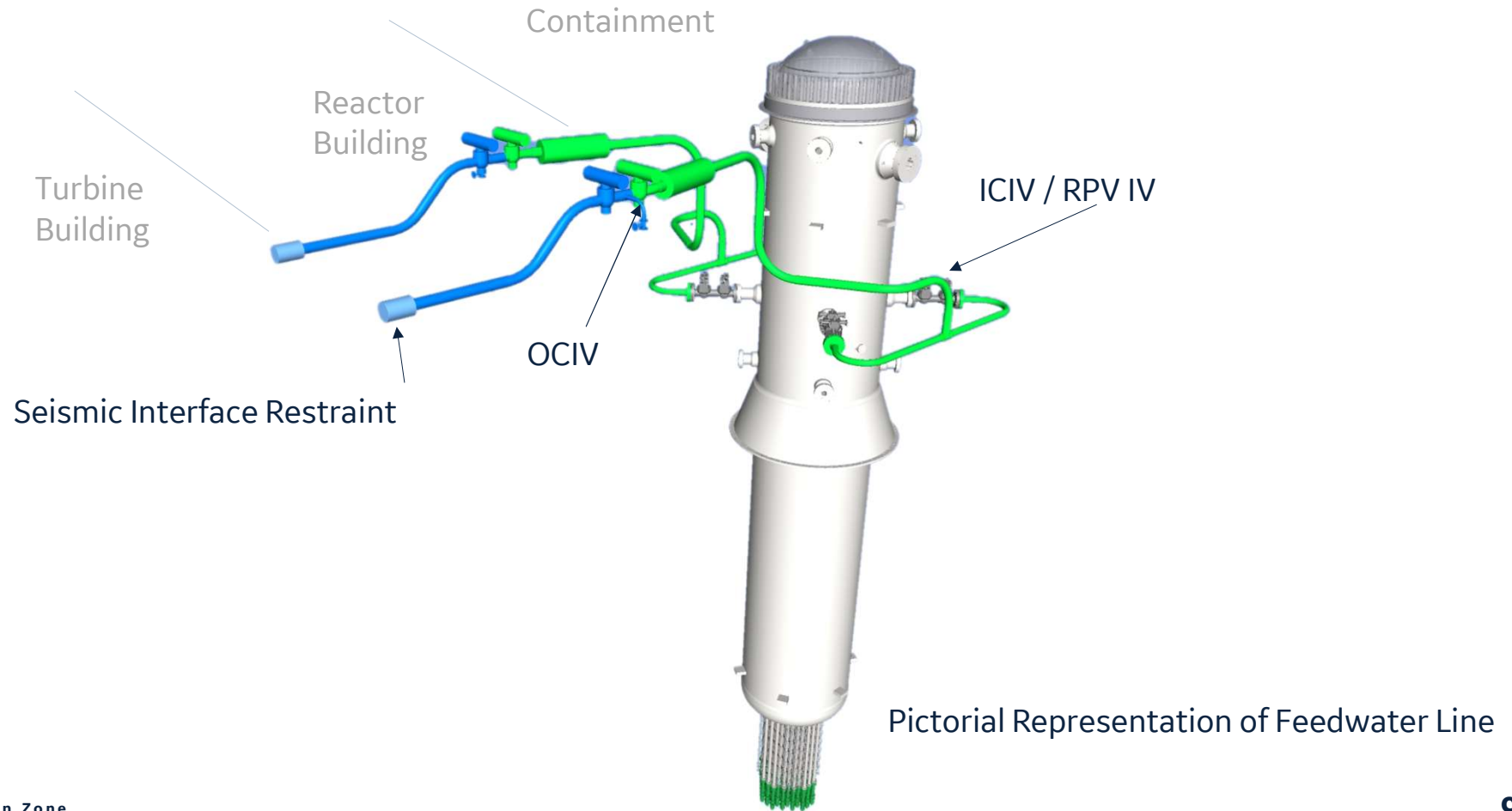


Break Exclusion Zone

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BWRX-300 Feedwater Lines - BEZ



Break Exclusion Zone

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