

# Dominion Energy and AXPO Power Employ Innovative Phased Array UT Solution for Rapid, Cost-Efficient Nuclear Inspections



Dominion Energy and AXPO Power partnered with EPRI and vendors in EPRI’s Nondestructive Evaluation Program (NDE) to qualify and implement a new non-encoded phased array ultrasonic testing procedure (PAUT) for reactor vessel welds. This initiative replaced older ultrasonic testing methods that relied on large search units with limited coverage and reduced sensitivity to small fabrication flaws—issues that often led to costly follow-up analyses and repeat examinations. By adopting the newly qualified PAUT procedure, the utilities significantly reduced examination time and costs while improving the reliability and safety of identifying and characterizing indications in pressure vessel welds.

## Benefits

Dominion completed five welds in a single shift instead of five days, reducing flaw evaluation work and saving days of engineering time, including approximately \$250,000 USD in avoided evaluation costs. AXPO also benefited from expanded inspection coverage enabled by the smaller, more efficient search unit design, as well as higher ultrasonic resolution and a more intuitive display. These improvements are driving broader adoption of the new procedure across its fleet and more efficient, reliable weld assessments.

## Application

Using innovative techniques developed by EPRI, Dominion and AXPO qualified and implemented a first-of-its-kind manual PAUT procedure for reactor vessel welds. The new technique provides real-time characterization of indications and enhanced coverage of examination volume, resolving long-standing limitations of earlier UT methods.

EPRI developed and qualified the new PAUT method in collaboration with the international nuclear community, with industry vetting through the Performance Demonstration Focus Group. EPRI also supplied search units (transducers) for emergent issues. By enabling real-time evaluation of weld conditions, the technique makes inspections faster, safer, and more cost-effective for nuclear plants – saving hundreds of thousands of dollars and reducing the impact of NDE examinations on the overall outage schedule. Dominion and AXPO’s early adoption provided critical operating experience that accelerated industry acceptance and led to broader global use of the technique, delivering significant efficiency and cost benefits to multiple utilities.

The related industry standard is qualified in accordance with ASME Section XI, Appendix VIII, and available via the EPRIQ website (<https://pdi.epriq.com/>):

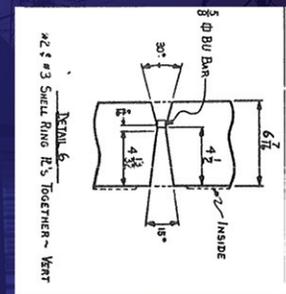
- PDI-UT-14, PDI Generic Procedure for Manual Phased Array Ultrasonic Examination of Reactor Pressure Vessel Welds



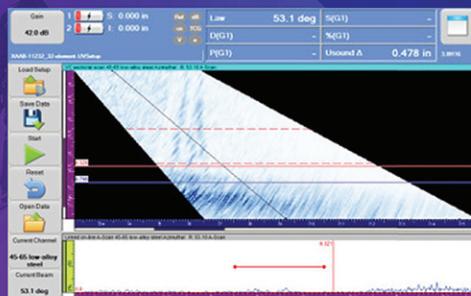
**Figure 1**  
Illustrates how the PDI-UT-14 technique was developed using vintage, canceled reactor components to define the required weld sensitivity from the original construction period.



**Figure 2**  
Shows a pressurizer head from a vintage cancelled reactor.



**Figure 3**  
Depicts the typical reactor vessel shell weld design.



**Figure 4**  
Shows the PDI-UT-14 sector scan display and the technique’s sensitivity, including its ability to image weld geometry.