EPRI Streamlined RI-ISI Approach (ASME Code Case N-716)

Offers RI-ISI Benefits At Reduced Cost

Traditional RI-ISI

Risk-Informed In-service Inspection (RI-ISI) allows the use of risk assessment plus an understanding of component-specific degradation mechanisms to establish a cost-effective inspection program as an alternative to current ASME Code Section XI requirements. The EPRI RI-ISI methodology consists of several steps:

- Consequence Evaluation
- Failure Potential (Degradation Mechanism) Evaluation
- Risk Ranking using the Risk Matrix
- Element Selection
- Risk Impact Analysis

RISK MATRIX

Consequence Evaluation → / Failure Potential Assessment (Degradation Mechanism) ↓		CONSEQUENCE CATEGORY CCDP and CLERP Potential			
		NONE	LOW	MEDIUM	HIGH
DEGRADATION CATEGORY Pipe Rupture Potential	HIGH	LOW (Cat. 7)	MEDIUM (Cat. 5)	HIGH (Cat. 8)	HIGH (Cat. 1)
	MEDIUM	LOW (Cat. 7)	LOW (Cat. 6)	MEDIUM (Cat. 5)	HIGH (Cat. 2)
	LOW	LOW (Cat. 7)	LOW (Cat. 7)	LOW (Cat. 6)	MEDIUM (Cat. 4)

This methodology has been approved by the NRC and proven on numerous plant applications (e.g. greater than 70 percent of the US fleet). Structural Integrity played a key role in the development of the EPRI RI-ISI methodology and ASME Code Cases N-560 and N-578. SI has performed Code Case N-560 and N-578 evaluations for twenty-seven PWR units and ten BWR units. In all cases, the EPRI methodology has been proven to significantly reduce the number of piping inspections with negligible impact on plant risk.

The Streamlined Approach

EPRI's Streamlined RI-ISI approach, which has been codified as ASME Code Case N-716 (risk-informed safety-based, or RIS_B), pre-defines high safety significant (HSS) piping components (Class 1, Break Exclusion Region (BER), and some additional Class 2 piping welds) based upon industry exhaustive experience with RI-ISI applications. As such, the detailed consequence evaluation of the traditional approach (see above) does not need to be performed; instead, only a failure potential evaluation of the HSS components is required.

The results of this evaluation, along with insights from the plant internal flooding study, are used to determine the appropriate sampling of the weld population that will constitute the RIS_B program (approximately 10 percent of the HSS population). The RIS_B technology results in reduced inspections over a standard Section XI ISI program with no increase in plant risk. It also provides the additional cost savings over traditional RI-ISI of not having to perform a consequence evaluation of the in-scope piping. This allows for cost savings both in the initial application as well as in performing the required periodic RI-ISI program updates.

Structural Integrity supported the application of the streamlined RI-ISI approach to both of EPRI's pilot plant studies (one BWR and one 2-unit PWR site). Plant-specific SERs for both pilot plants were received from the NRC in late 2007. In addition, SI has supported three follow-on ASME Code Case N-716 plant applications to-date. The advantages of using the EPRI streamlined RI-ISI approach vary depending on the plant's current status:

- For plants currently using Code Case N-577, the existing failure potential evaluation may provide insights during a conversion to the EPRI Streamlined RI-ISI approach; and once the conversion has been performed, the living program requirements of N-716 are much less burdensome.
- For plants that currently have a Class 1 N-560 or N-578 (EPRI) RI-ISI program, the EPRI Streamlined RI-ISI approach offers the advantages of covering additional Class 2 and BER program scope under the risk-informed program, in addition to the reduced living program requirements.
- For plants that have not yet adopted any RI-ISI methodology, Streamlined RI-ISI offers the most cost-effective approach, covering the most critical piping weld scope, of any RI-ISI methodology developed to-date.

Clients who choose to have Structural Integrity develop their RI-ISI program can be secure in the knowledge that they have access to a breadth and depth of RI-ISI knowledge and experience unmatched in the industry.

For more information on how RI-ISI or Code Case N-716 can help your plant, please use the contact information below:

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