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Implementation of Risk-Informed Categorization and Alternative Treatment of Structures, Systems, and Components for Nuclear Plants

In 2017 and 2018, EPRI conducted the Accelerating Implementation of Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Plants (10 CFR 50.69) Supplemental to support the categorization process and training needed for consistent implementation of a 50.69 program. EPRI is extending the project to aid in categorization, issue resolution, program implementation, and application development of appropriate alternative treatments for SSCs that have been re-categorized and can be removed from some regulatory programs. This will allow nuclear plant owners to focus on SSCs with greater risk and safety significance, while offering enhanced operational flexibility for lower-risk SSCs.

Background, Objectives, and New Learnings

The U.S. Nuclear Regulatory Commission's (NRC's) 10 CFR 50.69 process allows a plant to categorize the safety significance of its systems, structures, and components (SSC) using information from risk assessments. SSCs are divided into categories based on their deterministic "safety related" or "non-safety related" classification, as well as considerations of the SSCs' quantitative safety significance in the plant's risk models. Based on these and other considerations, SSCs are placed in one of the following four risk-informed safety classes (RISCs):

- RISC-1 – Safety-related SSCs that perform safety-significant functions
- RISC-2 – Non-safety-related SSCs that perform safety-significant functions
- RISC-3 – Safety-related SSCs that perform low safety-significant functions
- RISC-4 – Non-safety-related SSCs that perform low safety-significant functions

The risk-informed categorization process helps focus attention on SSCs that are the most important to plant safety — those identified as RISC-1 or RISC-2 components — while allowing increased operational flexibility for RISC-3 and RISC-4 components. Based on pilot plant application of 10 CFR 50.69, as much as 75% of safety-related SSCs could be categorized as RISC 3.

SSCs that have been re-categorized as RISC-3 can be removed from the scope of some regulatory programs such as:

- Quality assurance (Appendix B)
- Reporting (10 CFR Part 21)
- Maintenance rule (10 CFR 50.65)
- Testing requirements (portions of Appendix J)
- Seismic qualification (10 CFR 100, Appendix A)

Efficiently defining and consistently applying alternative treatments based on industry standards to these SSCs could allow greater flexibility and reduced costs related to design, procurement, installation, testing, and maintenance. In addition, these insights and guidance could inform operational decisions at non-U.S. plants that are able to incorporate risk-informed methodologies.

Benefits

This project will build on the advisory structure and industry working groups already in place for 50.69 to develop

enhanced categorization tools and an efficient and consistent approach for applying alternative treatments for SSCs categorized as RISC-3. In collaboration with the Industry Working Group and Joint Owners Group on 50.69, this project will develop guidelines and templates describing appropriate candidate alternative treatments for the highest priority SSCs using a process that can be consistently applied across the industry. Support for training and categorization guidance in that phase of a 50.69 implementation program will continue to be provided as needed by EPRI.

Project Summary

Through collaborative R&D, this project will provide enhanced categorization guidance, streamlined categorization processes, and alternative treatment evaluation templates for high-priority RISC-3 SSCs – such as motors, pumps, transmitters, valves – based on their extent of use in operating nuclear plants, their operating and maintenance costs, and their expected operating lives.

The guidance will be tested through a series of workshops and pilot applications at an operating nuclear site, resulting in final published EPRI Technical Reports.

EPRI will support technology transfer and training to achieve efficient and effective application of enhanced categorization and alternative treatment guidance.

Deliverables

- Alternative Treatment Program Guidance: This is an overarching guidance document describing the steps required for establishing a process and program for applying alternative treatments to RISC 3 SSCs.
- Alternative Treatment Templates: These documents will provide the specific requirements for the application of alternative treatments of select SSCs as RISC 3 components.
- Enhanced Categorization Guidance: This document will provide updated categorization methodologies and technical basis for alternatives to existing processes such as ASME Code Case N660, passive categorization, piping and component support boundaries as well as more efficient treatment of defense-in-depth requirements.

Price of Project

The cost to participate in this supplemental project is $10,000 per year per unit, up to a maximum of $25,000 per participant.

Project Status and Schedule

EPRI expects to develop up to 10 templates in 2019 and 2020 through this project, although the exact number will depend on the extent of participation in this supplemental.

Key milestones include:

Initial Session – Alternative Treatment Training Module	January 2019
Issue Update of 10CFR50.69 Special Treatments Guidelines, TR 1015099	January 2019
Example Standard Design Package for simple components	February 2019
Example Standard Design Package for complex components	April 2019
Categorization Workshop	June 2019
Publish Revised 10CFR50.69 Special Treatments Guidelines, TR 1015099	June 2019
Publish EPRI Report with Standard Design Package Examples	September 2019
Categorization Workshop	December 2019
Enhanced Categorization Technical Update	December 2019
Publish EPRI Report with Reasonable Confidence Evaluations	December 2019
Categorization Workshop	December 2020
Final Enhanced Categorization Technical Update	December 2020

Who Should Join

All U.S. utilities planning to implement 10 CFR 50.69, as well as other utilities interested in applying risk-informed characterization and treatment to plant SSCs to increase safety and reduce costs.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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