

Risk-informed Technical Specifications for the Boiling Water Reactor Plants

Background

For the past 15 years, the nuclear industry and the U.S. Nuclear Regulatory Commission (NRC) have been working together to develop Risk-informed Technical Specifications (RITS) to enhance plant safety and improve plant operations. Following analysis and methodology development by the industry and subsequent approval by the U.S. NRC, the initiatives set forth by this partnership are now essentially complete and are available for plant implementation. The implementation of the initiatives is facilitated by the Technical Specification Task Force travelers (TSTFs).

The U.S. NRC-approved initiatives and the associated TSTFs for the boiling water reactor (BWR) plants are listed below:

- RITS-1: Improve Technical Specifications (TS) Required Action End States (TSTF-423, Revision 1)
- RITS-2: Revise Requirement for Missed Surveillances, Surveillance Requirement (SR) 3.0.3 (TSTF-358, Revision 6)
- RITS-3: Increase Flexibility in Mode Restraints, Limiting Condition for Operation (LCO) 3.0.4 (TSTF-359, Revision 9)
- RITS-4a: Extend Primary Containment Isolation Valve (PCIV) Completion Times (TSTF-454, Revision 2)
- RITS-4b: Risk Informed Completion Times With Configuration Risk Management Program or Maintenance Rule Backstop (TSTF-505, Revision 1)
- RITS-5b: Relocate Surveillance Frequencies to Licensee Control (TSTF-425, Revision 3)
- RITS-6: No submittal
- RITS-7a-1: Addition of LCO 3.0.8, Inoperability of Snubbers (TSTF-372, Revision 4)
- RITS-7a-2: Allowance for Non-Technical Specification Barrier Degradation on Supported System Operability (TSTF-427, Revision 2)
- RITS-8: No submittal

Westinghouse is very familiar with each of these initiatives due to our essential role in developing the approach, providing the probabilistic and deterministic analysis, supporting U.S. NRC review, supporting pilot plant applications, and developing implementation guidance for these initiatives for the pressurized water reactor (PWR) plants. Implementation of the currently available initiatives varies from plant to plant. Most BWR plants have already implemented the RITS Initiatives 1, 2 and 3. Many BWR plants intend to implement Initiative 4b and most intend to implement Initiative 5b. These two initiatives provide significant plant operational improvements. RITS-4b allows utilities to determine completion times following a risk-informed approach for their plants. This provides the plant with the ability to obtain longer times to repair inoperable equipment while at power than is currently allowed by the Technical Specifications. The allowable extension depends on a risk assessment and can potentially extend up to a maximum of 30 days. RITS-5b enables utilities to relocate surveillance frequencies to licensee control, thus allowing utilities to change these frequencies by using an approved risk-informed approach that does not require U.S. NRC review or approval.

Description

Westinghouse can provide the necessary probabilistic risk assessment (PRA), deterministic assessment and licensing resources to support utilities in implementing the above RITS initiatives. We have been a leader in the development and application of these initiatives since their inception. A number of recognized industry experts with experience in RITS initiatives applicable for both PWR and BWR plants are part of Westinghouse's PRA staff. This group of experts has made major contributions to the development of the applications and methods, and to industry implementation documents. Westinghouse also has a team of recognized industry experts to support the licensing aspects of these initiatives.

We can provide complete projects or work as part of the utility team in implementation of these initiatives. Westinghouse has experience in modification of current plant procedures as well as developing new plant procedures for the initiatives, where required. Westinghouse also can make the required PRA model modifications and complete the PRA quantifications, address the deterministic aspect of the assessment, and support documentation for the initiatives, as well as develop License Amendment Requests (LARs). The Westinghouse staff has vast risk analysis experience and employs the standard software packages used in the industry.

Benefits

The benefits of implementing these changes include enhanced safety, improved operational flexibility and a more effective and efficient use of the utility's resources. These initiatives can prevent plant shutdowns by permitting longer times to complete maintenance activities while at power, and can provide a quicker return to power after required plant shutdowns or start-ups following refueling. The RITS initiatives reduce surveillance testing requirements and costs, and lead to fewer component actuations and reduced component wear out, and reduced personnel exposure and reduced plant shutdown time. In addition, several of the initiatives provide improved plant flexibility in responding to equipment operability issues, and can also lead to fewer requests for Notice of Enforcement Discretion (NOED). RITS-4b provides the potential to eliminate NOED requests with regard to equipment operability.

Experience

Westinghouse has built a number of operating BWR plants in Europe and our parent company, Toshiba Corporation, has built many BWR plants in Japan, as a result of which Westinghouse has significant expertise in the area of BWR plant design and operation.

Westinghouse's staff has a high level of experience in developing and implementing RITS initiatives. Westinghouse has worked with the utility Owners Groups in developing numerous applications, and with a number of utilities in their implementation, starting in the mid-1980s and continuing today. This work has included developing the methods and risk models, completing the risk analysis, addressing deterministic requirements, supporting U.S. NRC review and approval, developing implementation guidance, and assisting utilities in LAR development and the associated U.S. NRC review. As a benefit of our extensive experience, Westinghouse can help provide consistency among plants with regard to the probabilistic and deterministic evaluations and results and implementation.

Westinghouse has developed specialized guidance to assist utilities in implementing a number of these initiatives. We also have worked extensively with the U.S. NRC in obtaining approval for a number of these initiatives on both generic and plant-specific bases.