

Inspection of Regulatory Treatment of Non-safety System Components

Regulatory treatment of non-safety system (RTNSS) is a method of classifying a subset of non-safety-related structures, systems, and components (SSCs) credited to meet Nuclear Regulatory Commission specifications for passive reactor design. RTNSS SSCs may be used in a variety of plant conditions to supplement safety-related systems or reduce overall plant risk. For example, operators could use RTNSS SSCs to supplement the mitigation function of passive safety-related SSCs by reducing the frequency of challenges to those systems.

The functionality of RTNSS SSCs can affect the risk profile of the plant. Specifically, some RTNSS SSCs are relied on during power operation or shutdown conditions to meet the Commission's safety goals of a core damage frequency of less than 1×10^{-4} each reactor year and a large release frequency of less than 1×10^{-6} each reactor year. For example, the non-Class 1E power supply for the diverse actuation system was identified as risk significant¹ during power operation.

Based on special treatment of RTNSS SSCs in licensing, there was some discussion among the staff about the proper treatment of RTNSS SSCs during inspections. However, the staff determined that SSCs of similar safety or risk significance should be treated similarly, and the special treatment of these systems in inspection would not be an appropriate risk-informed application. Therefore, no inspection resources or samples were directly allocated to inspection of RTNSS SSCs in baseline inspection procedures. As discussed in the previous sections, AP1000 inspection sample size was determined based on an assessment of the reduction in overall components and lower baseline risk.

RTNSS SSCs will be inspected consistent with how other non-safety-related SSCs are inspected in currently operating plants. In currently operating plants, inspectors can select inspection activities involving non-safety-related SSCs based on risk significance or on the potential for impact on steady-state plant operations in accordance with guidance contained in Inspection Procedure (IP) 71111, "Reactor Safety-Initiating Events, Mitigating Systems, Barrier Integrity." Since licensing documents specifically discuss RTNSS SSCs for AP1000 plants, the staff will update program guidance to clarify that RTNSS SSCs will be treated as any other non-safety-related SSCs.

The staff intends to revise IP 71111 and Inspection Manual Chapter 2515, "Light-Water Reactor Inspection Program—Operations Phase," to provide guidance on the appropriate selection of RTNSS SSCs as inspection samples. Consistent with risk-informed principles, inspectors are expected not to routinely focus inspection resources on RTNSS SSCs and other non-safety-related systems but rather examine these non-safety-related systems when site activities make them samples of value consistent with the risk-informed sample selection guidance.

Practical Examples of RTNSS SSCs and Non-safety-related System Inspection Sampling

As a practical example, inspectors at currently operating plants have selected non-safety-related alternate decay heat removal systems that have been placed into operation during reactor outage evolutions when safety-related residual heat removal systems were not available. The selection of the non-safety-related SSC for inspection was because the inspector recognized that the contribution to total plant risk was elevated for the duration the safety-

¹ WCAP-15985, "AP1000 Implementation of the Regulatory Treatment of Non-safety-Related Systems Process," Revision 2, issued August 2003.

related SSC was not available. For example, Grand Gulf Inspection Report 2016008 (ADAMS Accession No. ML17303B200) discusses a special inspection performed following the misalignment of the alternate decay heat removal system, which is a non-safety-related SSC, that resulted in an elevated risk condition for the plant configuration.

Similarly, the contribution to total plant risk for the RTNSS normal residual heat removal system is expected to be higher during outage periods. Using guidance from IP 71111 for risk-informed sample selection, it would be appropriate for inspectors to select the normal residual heat removal (RNS) system for sampling during periods of elevated RNS risk importance.