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Svetlana Lawrence
Risk-Informed Systems Analysis Pathway Lead

Safety and Risk-Informed Methods for Classification of SSCs

NRIC-NEI-EPRI Nuclear Quality Assurance Challenges Workshop

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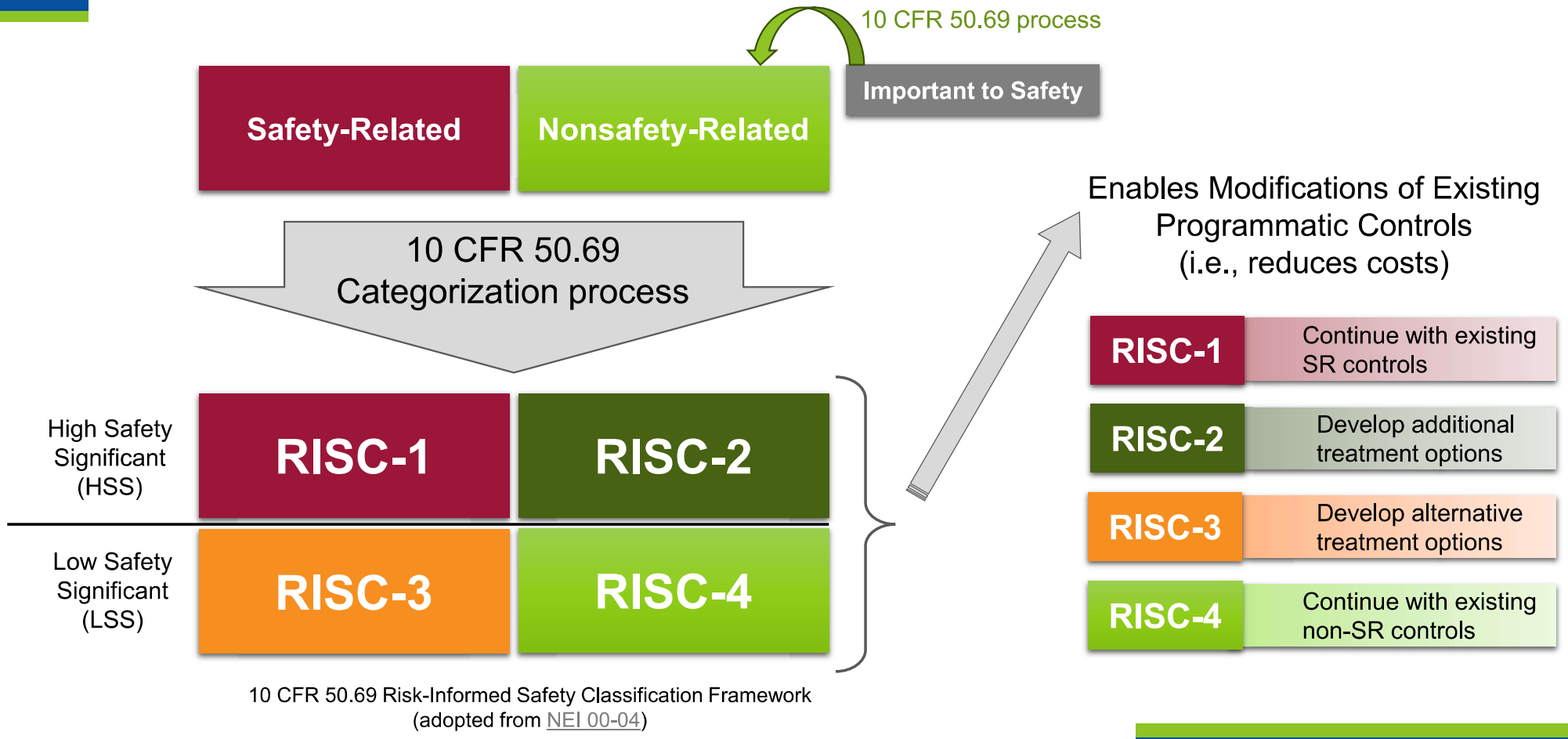
Idaho National Laboratory

10 CFR 50.69 SSC Categorization Guideline



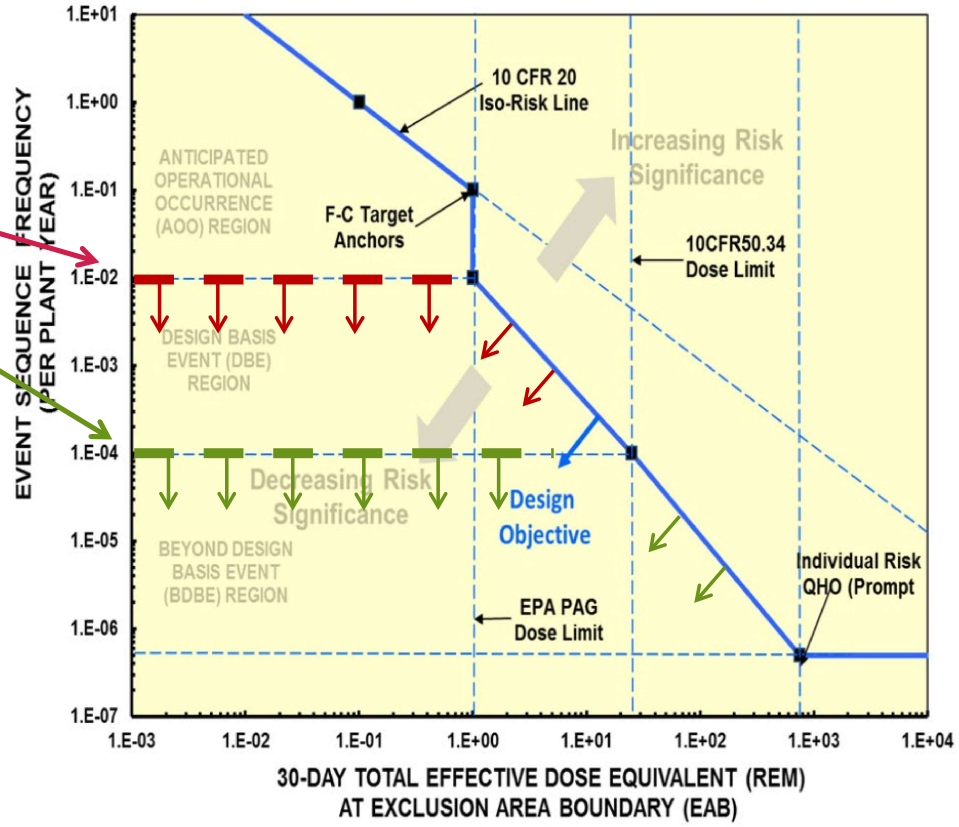
10 CFR 50.69 Risk-Informed Safety Classification Framework
(adopted from NEI 00-04)

RISC: Risk-Informed Safety Classification

NEI 18-04 Licensing Modernization project (LMP) Categorization Guideline

Safety classification categories

- Safety-related (SR)
  - SSCs performing RSFs to mitigate consequences of DBEs and DBAs to stay within F-C targets
  - SSCs performing RSFs to keep BDBEs within F-C targets
- Non-SR with Special Treatment (NSRST)
  - Non-SR SSCs performing functions that keep LBEs within F-C targets OR if they are significant contributors to total cumulative risk
  - Non-SR SSCs supporting DID adequacy
- Non-Safety-Related with No Special Treatment (NST)
  - All other SSCs

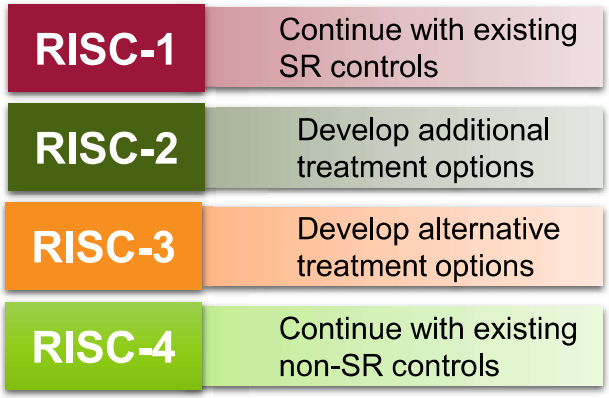


SSCs – structures, systems, and components
RSF – Required Safety Function
F-C – frequency-consequence
DID – Defense-In-Depth

DBA – Design Basis Accident
DBE – Design Basis Event
BDBE – Beyond Design Basis Event

10 CFR 50.69 vs LMP

Part 50 (Part 52) + 10 CFR 50.69



- RG 1.29

functions in previous designs. The pertinent quality assurance requirements of Appendix B to 10 CFR Part 50 shall apply to all activities affecting the safety-related functions of seismic Category I SSCs. The following SSCs of a nuclear power plant, including their foundations and supports, should be designated as seismic Category I:

a. the reactor coolant pressure boundary as defined in 10 CFR 50.2;

b. the reactor core and reactor vessel internals;

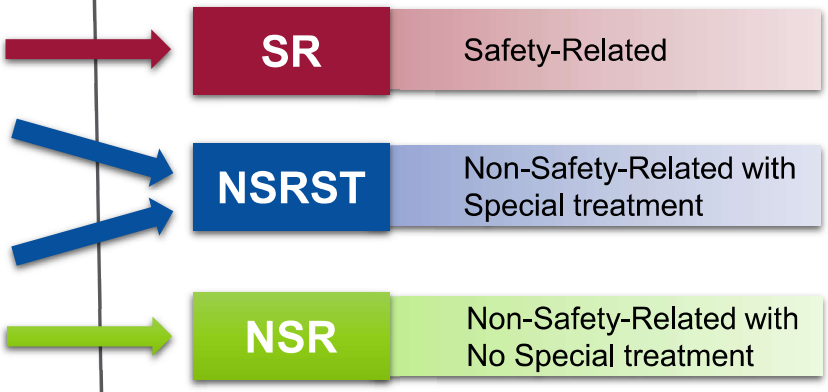
c. systems[1] or portions thereof that are needed for (1) emergency core cooling, (2) post-accident containment heat removal, or (3) post-accident containment atmosphere cleanup (e.g., hydrogen removal system);

d. systems or portions thereof (including but not limited to systems such as residual heat removal and auxiliary feedwater) that are needed to (1) shutdown the reactor and maintain it in a safe shutdown condition, (2) remove residual heat (including heat stored within the spent fuel pool), (3) control the release of radioactive material, or (4) mitigate the consequences of an accident;

Several key examples of systems included in items 1.c and 1.d are provided below for reference, but do not represent the complete scope of these items. Determining the complete scope of these items is the applicant's or licensee's responsibility.

- The primary and secondary reactor containment.

Part 50 (Part 52) + LMP



- NEI 21-07

6.1.3. Summary of DBHL-Related Requirements for Non-Safety-Related SSCs

Chapter 6 also identifies DBHL-related design requirements for non-safety-related SSCs. These design requirements are to support the special safety functions that are applied to the non-safety-related SSCs to prevent adverse impacts on the ability of the SR SSCs to perform the RSFs. An example is the requirement for anchorage to prevent a non-safety-related SSC from failing in such a manner that it would impact an SR SSC and cause it to fail to perform its RSF.

It is important to note that the non-safety-related SSCs covered in these requirements are not for the SSC functions that they normally perform but for the special function of preventing any adverse impact on the capability of any SR SSC in the performance of the RSF. The DBHL includes external hazards such as seismic events as well as internal plant hazards such as internal fires and floods, turbine missiles, and high energy line breaks. When a non-safety-related SSC is required to protect the SR SSCs in their ability to perform their RSFs, such non-safety-related SSCs are not necessarily NSRST. The NSRST classifications are based on the PRA Safety Functions these SSCs perform to prevent or mitigate event sequences and not functions that are focused on protecting the SR SSCs.

DBHL – Design Basis Hazard Level

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