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Disposition of Information Related to the Time Period that Safety-Related Structures, Systems, and Components are Installed

Comment On: NRC-2016-0098-0001

Disposition of Information Related to the Time Period that Safety-Related Structures, Systems, or Components are Installed; Draft Regulatory Issue Summary

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General Comment

See attached comments

Attachments

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Comments:

1. Page 1, "INTENT" section states: "This RIS addresses instances where a licensee becomes aware of credible information pertaining to the time period that a safety-related SSC is installed that may impact its ability to perform its safety-related function(s)." This statement implies that the licensee needs to take action only if they become aware of credible information pertaining to the time period that a safety-related SSC is installed that may impact its ability to perform its safety-related function(s). Vendors or manufactures of equipment used in nuclear power plants typically do not provide these type of information other than Part 21 or warranty issues. This statement should be corrected because the current NRC regulations (such as 10 CFR 50.55a, 10 CFR 50.34, plant Technical Specifications, GDCs, and 10 CFR 50.54) require licensees to maintain design basis¹ documentation (analyses and tests data indicating equipment qualification under operating environment (mild)) to show that safety-related equipment can perform their intended design functions for the entire period of operation (i.e. 40 or 60, or 80).

2. In addition to the above, this RIS "INTENT section should be revised to clarify that the obligation of nuclear power plant licensee is also to update the design bases documentation (analyses and tests data) required to demonstrate that safety-related equipment can perform their intended design functions for the entire period of operation in accordance with current licensing bases requirements.

3. Although RIS discusses the design bases requirements in the "Background Information," it does not discuss the design bases requirements such as analyses required to maintain the "design life" and "service life" of safety-related equipment. It is important to maintain the design bases of SSCs consistent with its licensing basis. Licensees must reevaluate the design life and service life of equipment originally analyzed via initial licensing in order to verify the capability of equipment to perform safety function in accordance with NRC requirements (GDC 4 or equivalent principal design criteria in FSAR, 10 CFR 50.54, and 10 CFR 50.55a). Components designed originally and installed may not perform reliably the intended design functions because of the degradation of age sensitive parts used in the equipment. For these components, the degradation cannot be revealed through routine maintenance or testing programs especially for standby systems used in accident mitigation unless they are replaced by the end of its design or service life. For example, typically capacitors are replaced every 6 -10 years or Class 1E batteries prior to 20 years. This is required to ensure that the facility can be operated safely consistent with the design requirements (GDCs or principle design criteria specified in the FSAR) specified in its current licensing basis for the duration of plant operation. The following current requirements have to be met by licensees in demonstrating the design life and service life of equipment.

¹ Design bases is defined in 10 CFR 50.2, "Definitions," to mean, "that information which identifies the specific functions to be performed by a structure, system, or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (2) requirements derived from analysis (based on calculation and/or experiments) of the effects of a postulated accident for which a structure, system, or component must meet its functional goals."

10 CFR 50.54 (jj) requires that " Structures, systems, and components subject to the codes and standards in 10 CFR 50.55a must be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed.

The regulation at 10 CFR 50.55a (h)(2), "Protection systems," states, "For nuclear power plants with construction permits issued after January 1, 1971, but before May 13, 1999, protection systems must meet the requirements stated in either IEEE Standard 279,"Criteria for Protection Systems for Nuclear Power Generating Stations," or in IEEE Standard 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. For nuclear power plants with construction permits issued before January 1, 1971, protection systems must be consistent with their licensing basis or may meet the requirements of IEEE Standard 603-1991 and the correction sheet dated January 30, 1995."

Industry Standards such as IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," Section 4.4, "Equipment Qualification," states that Type test data or reasonable engineering extrapolation based on test data shall be available to verify that protection system equipment shall meet, on a continuing basis, the performance requirements determined to be necessary for achieving the system requirements.

Also, IEEE 603 -1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," Section 5.4 "Equipment Qualification" states: "Safety system equipment shall be qualified by type test, previous operating experience, or analysis, or any combination of these three methods, to substantiate that it will be capable of meeting, on a continuing basis, the performance requirements as specified in the design basis. Qualification of Class 1E equipment shall be in accordance with the requirements of IEEE Std 323-1983 and IEEE Std 627-1980."

In addition to the above, IEEE- 323-2003, "IEEE Standard-for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," defines design life as "the time period during which satisfactory performance can be expected for a specific set of service conditions," and service life as "the time period from initial operation to removal from service." IEEE 323-2003, Section 7.1, "Mild environment documentation" states that "the documents required to demonstrate the qualification of Class 1E equipment located in a mild environment are the design/purchase specifications, seismic test reports (if applicable), and an evaluation and/or certificate of conformance. In addition, the design/purchase specifications shall contain a description of the functional requirements for a specific environmental zone during normal environmental conditions and anticipated operational occurrences."

Discussion:

The primary role of equipment qualification for mild environment is to provide reasonable assurance that equipment can perform their specified safety functions and that no failure mechanisms exist that can lead to a common-cause failure under the postulated service conditions. System design life parameters are established early on during the system design phase and include key assumptions involving safety limits and material life. Safety limits and the

properties of material aging are critical to defining system life. Systems that age through use require periodic inspection to ascertain the degree of aging and fatigue. The results of inspections (beyond the current range of surveillance tests) determine the need for actions to extend the product life. Reliability upgrades, component replacement or rebuilding of the system are needed to prevent unanticipated loss of safety function. The goal is typically to return the system to its original condition consistent with the design and licensing bases requirements. These actions are required by a licensee in order to preserve the plant's defense in depth and safety margins. Otherwise, licensee in violations with the current NRC requirements.

Typically, manufacturers provide technical data for equipment's anticipated service life or design life. For example, electrical components such as cables, containment electrical penetrations, switchgear components, motor operated valves, terminal blocks, diesel or hydro-electric generators, batteries, motors, transformers, relays, electronic components, capacitors, and internal wiring, have expected design life that vendors provide based on reliability data and aging of certain materials based on operating experience and service conditions to ensure that these components will perform reliably when they are required to operate. Therefore, if licensees are operating the equipment beyond its design life or service life without replacing or refurbishing or extending the component's design life the licensees should establish technical and regulatory bases via analyses and testing to demonstrate that, it would not reduce the reliability of safety functions and would not create common cause failures.

In summary, it is licensee's responsibility that safety-related SSC's service life or design life has not been exceeded and the SSCs can reliably perform their safety functions consistent with the design bases requirements specified in its current licensing basis. Any non-conformances must be addressed in accordance with the licensee's NRC-approved QA program and design control processes, the licensee's operability/functionality determination process, and the licensee's corrective action program.