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Clarification on Endorsement of Nuclear Energy Institute Guidance in Designing Digital Upgrades in Instrumentation and Control Systems

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Clarification on Endorsement of Nuclear Energy Institute Guidance in Designing Digital Upgrades in Instrumentation and Control Systems

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General Comment

This document is inconsistent with the intent of the 50.59, as expressed in NRC communications to the public. The 1999 change to the 50.59 rule was meant as a relaxation to the rule in effect at that time (see 64 FR 53582). Prior to the change the 50.59 rule stated:

"A proposed change, test, or experiment shall be deemed to involve an unreviewed safety question (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or (ii) if a possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created; or (iii) if the margin of safety as defined in the basis for any technical specification is reduced."

In effect, the old (i) became the new (i)-(iv) and the old (ii) became the new (v) & (vi). The new rule states:

"(i) Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final safety analysis report (as updated);

(ii) Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final safety analysis report (as updated);

...

(v) Create a possibility for an accident of a different type than any previously evaluated in the final safety analysis report (as updated);

(vi) Create a possibility for a malfunction of an SSC important to safety with a different result than any

previously evaluated in the final safety analysis report (as updated);"

One point to derive from the above is that Questions (i)-(iv) were intended to evaluate the impact of a change on accidents and malfunctions that were previously evaluated in the UFSAR. Furthermore, Questions (v) and (vi) were intended to evaluate any new or different accidents and malfunctions that were created as a result of the change.

The primary concern of the Supplement to RIS 2002-22 is to provide guidance on how to address digital CCF. This first step must be to determine whether the digital CCF is just a new initiator for an existing accident or malfunction, or a new accident or malfunction. Then the most applicable 50.59 evaluation questions must be identified. Finally the criteria of the applicable questions must be identified and applied (e.g., frequency or likelihood of occurrence, consequences, types of design basis accidents and AOOs, or malfunction results). Obviously, more than one question can be applicable to any change (and all questions must be answered for each change), but each accident or malfunction would either be addressed by Questions (i)-(iv) or (v) & (vi).

Generally, if an existing digital system (or component) is replaced with a new one of the same scope, capability, and connections, then digital CCF should be addressed by Questions (i)-(iv); however, if an existing analog system (or component) is replaced by a digital one, and particularly if the new one is NOT of the same scope, capability, and connections as the old one, then Questions (v) & (vi) may be needed to address digital CCF. Obviously, the most applicable evaluation question is determined by the specific changes and the resultant changes in accidents or malfunctions.

Generally, digital CCF is not a concern for impacting the likelihood of accidents or malfunction that were previously evaluated in the UFSAR; that is, new digital equipment is generally more reliable than the equipment it is replacing. The "sufficiently low" criteria is not needed to address these (i.e., not needed for Questions (i) and (ii)). Please remove the new guidance for "sufficiently low" from being applicable to Questions (i) and (ii).

Generally, digital CCF can create (by introducing newly shared resources, and coupling or combining previously distinct SSCs): (1) the possibility for new types of accidents, and/or (2) malfunctions with different results; to meet the "sufficiently low" criteria for these accidents and malfunctions, design attributes must be used. The RIS must state this clearly. Subsequently, in another document, the NRC must ensure guidance is published and/or endorsed that identifies acceptable design attributes for eliminating digital CCF from further consideration (e.g., updated BTP 7-19 Section 1.9).

To publish guidance that something can be done, but not at least one acceptable way to do it, creates regulatory uncertainty. Furthermore, the lack of specific guidance on at least one acceptable approach makes it very difficult for an inspector to write a violation (or a licensee to ensure they will not get a violation).