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Embedded Digital Devices in Safety-Related Systems

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Embedded Digital Devices in Safety-Related Systems

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General Comment

Comment 1 - Page 1, Intent Section, 2nd Paragraph. Discussion narrows scope to safety-related equipment and then broadens underlying concern to non-safety equipment. Consequently, message is made ambiguous. Remaining discussion does not answer the question on how NRC expects the industry needs to treat requirements for non-safety equipment that contain embedded digital components. NRC should clarify the scope regarding non-safety components with embedded digital devices. The discussion of non-safety equipment should be deleted, since it is not governed by any specific regulation.

Comment 2 - Page 2, Intent Section, 5th and 6th Paragraphs.
Discussion of postulated software CCFs in non-diverse embedded digital devices coupled with discussion about inadequate diversity assessments implies diversity is the necessary mitigation strategy to use embedded digital devices. NRC should clarify how other options to address digital CCF for components with simple embedded devices can be applied to support obsolescence management strategies or new plant design and procurement strategies.

Comment 3 - Page 2, Intent Section, 5th and 6th Paragraphs.
There are no bounds on postulated software CCFs and there is no mention of other design approaches to reasonably minimize the potential for software CCFs as an alternative to component diversity. RIS should reflect discussion between the industry and NRC regarding plans to update NEI 01-01.

Comment 4 – Page 2, Intent Section, 5th and 6th Paragraphs. Implications can be understood to extend to needing diversity in nonsafety equipment when considered in conjunction with scope comment above.

Comment 5 - Page 3, Background Information Section, 4th Paragraph.
Discussion reinforces an expectation that diversity is a required mitigation strategy for embedded digital devices, since even 'simple' devices are not excluded from a diversity analysis. NRC should clarify how other options to address digital CCF for components with simple embedded devices can be applied to support obsolescence management strategies or new plant design and procurement strategies.

Comment 6 - Page 5, Bullet List in Item 1 in Summary of Issue Section. RG 1.53 R2 is missing from list. RG endorses IEEE 379-2000, which has relevant guidance for the treatment of CCFs. NRC should add RG 1.53 R2 to list of applicable regulatory guidance.

Comment 7 - Pages 6 and 7, Summary of Issue Section, 2nd Paragraph in Item 2.
Reference to BTP 7-19 for treatment of potential CCFs reinforces expectation that diversity is a necessary mitigation strategy for embedded digital devices. BTP 7-19 describes "two design attributes, either of which is sufficient to eliminate consideration of software based or software logic based CCF: Diversity or Testability." The Testability approach, as defined in BTP 7-19, is not a practical option for the types of equipment addressed in the RIS. NRC should clarify how other options to address digital CCF for components with simple embedded devices can be applied to support obsolescence management strategies or new plant design and procurement strategies

Comment 8 - Pages 6 and 7, Summary of Issue Section, 3rd Paragraph in Item 2
Discussion broadens underlying concern to non-safety equipment. Consequently, message is made ambiguous. Overall discussion does not answer questions on how NRC expects industry to treat requirements for non-safety embedded digital components. NRC should clarify scope regarding non-safety components with embedded digital devices. Discussion of non-safety equipment should be deleted, since it is not governed by any specific regulation.

Comment 9 - Pages 6 and 7, Summary of Issue Section, 4th Paragraph in Item 2
Discussion of BTP 7-19 is limited to equipment performing safety-related system execute features. However, guidance in BTP 7-19 is also relevant equipment performing safety-related monitoring and display functions.
NRC should clarify expectations for the application of BTP 7-19 to monitoring and display functions that contain embedded digital devices.