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General Comments

Comments on Draft Regulatory Guide DG-1077, "Guidelines for Environmental Qualification of Microprocessor-Based Equipment Important to Safety in Nuclear Power Plants"

1. The guidance offered by this DG creates confusion and is not consistent with previous EQ guidance. We believe that the current regulatory approach offers a stable review and licensing process for digital systems. The DG should not be issued in its present form. The DG, if issued, should be revised based on a review which establishes consistency with existing regulations, guidance, and practices for digital systems and environmental qualification. There are other guidance documents that contain EQ guidance for digital systems and have been endorsed by the NRC. The EQ guidance contained in EPRI Report TR-107330 is one example. Environmental requirements are discussed in Section 4.3.6 of the EPRI Report. EMI/RFI, ESD, and seismic requirements are given in Sections 4.3.7, 4.3.8, and 4.3.9 respectively. Furthermore, the Standard Review Plan gives environmental qualification guidance for digital systems and references pertinent guides and standards. In addition to licensee specific efforts, the NRC has also issued SERs accepting the environmental qualification programs of several vendors (e.g., Framatome ANP) for plant specific applications. Our review of the draft regulatory guide suggests that existing practice and guidance documents were not adequately considered during development of the draft guide. If it is the intent that this draft RG becomes the de facto guidance document for EQ for digital systems, it should be so stated. The DG should only be issued when consistency is obtained and agreement is unilateral.

2. Using the manufacture's maximum temperature range to establish the qualification level for the system seems to be inappropriate and confusing. Furthermore, it is difficult to establish if this is based on the IC manufacturer's test range or the system manufacturer's test range. The manufacturer's stress test has no bearing on the qualification level for a PLC system or any other type of digital system.

3. The protection hierarchy levels have provided a much more complicated qualification program than is necessary. These levels impose a questionable EQ burden and one that seems more suited to be place in a "design" area. This regulatory position provides design recommendations that, while reflecting elements of good design practice, are not an environmental qualification. This position should be deleted from this or any EQ standard.

4. Item 8 of the Regulatory Position Section lists six tests that the IC manufacturer should include as a minimum for the IC test practices. There are no criteria listed with these tests. Are we to assume that the criteria given in the discussion section of the draft RG are to be used as the baseline? Again, this is

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1 E-RIDS = ADM-03
Cdd = A. Beranek (AFB)
C. ANTONESCU (CEA)

placing a burden on the vendor/licensee to now ensure that the IC component is stressed to a certain level before insertion in the system. The present practice of qualifying the PLC with the IC components mounted on the boards encompasses the need for proving acceptable qualification.

5. We do not believe that EMI/RFI should be categorized as a significant aging factor. EMI/RFI has the potential to create failures when equipment is not designed to operate in the correct environment. These failures do not cause the digital equipment to be more vulnerable to failure during accidents due to any aging degradation.

Likewise, we do not believe that deposits are an aging mechanism. For this to occur, there would have to be a smoke or fire incident. After which, in a realistic application, the equipment would not be placed back into service without an analysis to ensure safe operation, no damage from the incident. We doubt if this would occur a first time and highly doubt a continuing occurrence of this practice.

6. The differences noted in the DG between digital and analog systems do not appear to be so significant that a new digital EQ guide is required. There are significant design process differences such that new digital licensing criteria for safety systems needed to be established. The two differences noted are in radiation tolerance and the speed of development. IC technology is not unique to digital devices or systems. Existing qualification guidance discusses component exposure and recommends a qualification process through testing and analysis. The rapid development of digital technology is not a valid reason for suggesting that unique EQ guidance is necessary. The IC manufacturers and the system manufacturers have ensured that their quality procedures achieve the highest reliability and qualification levels necessary.

7. Regulatory Position 1 is not necessary as this information can be found in several other guidance documents including the SRP.

8. Regulatory Position 3 is inconsistent with 10CFR 50.49 based on the DG definition of Category A locations. Technical bases are not provided for the proposed Category A radiation, temperature, and humidity limits. The DG should be revised for this area to reflect positions taken in existing regulations and practice.

9. Regulatory Positions 4 and 5 are inconsistent with existing regulations and guidance based on the DG Category B and C criteria. Technical bases are not provided for the proposed Category B and C radiation, temperature, and humidity limits. Existing regulatory guidance refutes criteria assumed for B and C. The draft guide should be revised for this area to be consistent with existing regulatory practice.

10. The regulatory position on margin needs to be redeveloped and justified or deleted. Margin on aging parameters has not been identified nor required by RG

1.89 or IEEE Std 323. It is not quantifiable relative to accelerated aging parameters and, as a result, it should not be part of the DG. Regulatory Guide 1.89, which endorses IEEE 323, contains adequate margin guidance.

11. Regulatory Position 7 appears to be unnecessary and should be deleted. A qualified life is not required by RG 1.89 or IEEE Std 323 for equipment that is to be located in a mild environment which is the location for most digital systems. Component life is designed into the process using certain quality techniques. This along with required testing ensures that components will not exceed their operational life-span.

12. The environmental stress screening tests identified in Regulatory Position 8 are not part of environmental qualification. These stress-screening tests do not replicate any operational conditions but are intended to reveal failure modes and mechanisms under accelerated stress conditions. These tests are quality processes and are used to aid designers in the selection of the optimum components with proven reliability and capability. The process suggested in this position deviates from the processes used for analog components and both burdens and complicates the EQ process while adding no real value. This position should be deleted.

13. The guidance in Regulatory Position 10 is not part of environmental qualification. Digital system testing is covered in great detail in the SRP and other associated guidance documents. This position should be deleted.

15. In the Regulatory Analysis Section, we believe that the take no action approach is the best one at this time. The reasons reached for disregarding this approach seem to be incorrect. We do not believe that NRC review efforts will increase without new guidance and that the adoption of a new approach will increase consistency. We believe that the current review and approval process is well established and stable. Existing regulatory guidance, licensee submittals, and NRR review practices for the licensing of digital system proves that the overall process is adequate to insure environmental qualification of digital systems. The draft guide contains new guidance that we believe will complicate the approval process and cause new instabilities.

Jerry L. Mauck
P.O. Box 88
Dayton, MD 21036

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