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PR-Misc Notice
Reg Guide

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Secretary of the Commission
Docketing and Service Section
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Enclosed are our comments on Regulatory Guide 1.89, Proposed Revision 1, Proposed Rule, "Environmental Qualification of Electrical Equipment in Nuclear Power Plants."

We appreciate having been given the opportunity to comment.

Yours very truly,

J. S. Loomis, Head
Nuclear Safeguards &
Licensing Division

JSL:DMS:dyd
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Comments on Proposed Revision 1 to
Regulatory Guide 1.89

1. B.3

The requirement that "...dose rate, spectrum and particle type should be simulated..." during testing is an unnecessary burden on the industry which has no empirical or theoretical basis. It is energy deposited which is of concern, and it is exactly this which is given by "dose." The very reason for the concept of "dose", is to provide a measure of damage, taking the effects of particle type and spectrum into account; thus allowing the comparison of effects from different particle types or spectra. Dose is determined on the basis of particle type and spectrum, but once it (the energy deposition) is known, there is no further need to be concerned with such information.

While dose rate can be an important consideration in special circumstances, it is not a concern for equipment qualification. Dose rate is known to have an effect on biological systems where reparative mechanisms exist. In non-biological systems dose rate can also have an effect at levels which are high enough to cause heating and heat dissipation problems. Even the worst post-LOCA dose rates, though, are below the level at which this effect is significant. Therefore, dose rate is of no known concern in equipment qualification.

The staff should take the same posture on the potential (i.e. never observed and no theoretical reason to suppose their existence) effects of dose rate, particle type and spectrum as it has taken on the subject of synergism (see C.4.c.7.a); "Where synergistic effects have been identified... then should be accounted for in the qualification program." In a similar fashion we recommend that it be stated that, "where particle type, spectrum or dose rate effects have been identified, they should be accounted for in the qualification program."

2. C.1

It is assumed that the reference to associated circuits, implies qualification of the equipment utilized in these circuits, please confirm. Qualification of this equipment would not be required if it is demonstrated thru a failure analysis that the associated circuit would not adversely effect any safety related operations.

3. C.3 The Regulatory Position rules out the possibility of implementing analysis as a means for qualification. This position should apply only to equipment located in analysis results from the ability to adequately demonstrate operability during a Design Basis Event (DBE). In non-harsh areas, a seismic disturbance is the only DBE concern. When an analysis demonstrates retention of pertinent properties over a qualified life, it can be concluded with this retention that seismic withstand capability is not a function of time. As a result, operability can be demonstrated by seismic testing new equipment, and environmental qualification established through an analysis.
4. C.4.c.1 The distinction between C.4.c.1.a and C.4.c.1.b is vital to determining the proper method of analysis, and requires clarification. An explanation of the staff's meaning of a primary system which "cannot be restored" as opposed to those which "can" is needed. (Our interpretation would be to apply C.4.c.1.a to BWR's and C.4.c.1.b to PWR's). If this is the staff's intent, please say so.
- C.4.c.1.b requires an "instantaneous" release "(after an initial time delay)" of 30 minutes. Can it be assumed that this allowance also applies to the "instantaneous" release of C.4.c.1.a? We believe that it should.
5. C.4.c.3 Special equipment qualification sources for some instrumentation channels should be removed and placed into Regulatory Guide 1.97.
6. C.4.c.8 Since gamma rays are indirectly ionizing and interact with matter by imparting energy to electrons, and beta radiation is nothing more than energetic electrons there is no need to require a justification for the use of gamma radiation only (C.4.c.8.a).
- See also comment #1 above.
7. C.4.c.11 Here as in many other places in the document the 40-year normal operating dose is ignored.
8. C.4.c.13 See comments #1 and #6 above.
9. C.4.d.5.h This acceptance of Co-60 and Cs-137 should be carried over to the earlier sections which discuss radiation testing methods. See comments #1, #6 and #8.

10. C.5

The position states that a Certificate of Compliance (COC) based on test data and analysis will be acceptable for mild environment qualification. A definition of what is to be contained in the COC should be outlined in this position. This definition should also describe the type of test data and analysis required. We are assuming that the test data and analysis required are standard production type tests (e.g. phase balance, megger for a motor), and not environmental qualification type test data and analysis, otherwise this would contradict item 1(d) of the draft value impact statement.

11. C.5.g

It is not necessary to apply the extremes of voltage and frequency during testing, provided the anticipated extremes are within the design limits of voltage and frequency for the equipment. Electrical devices are designed to operate within a range of applied voltage and frequency based on industry standards. Thus demonstration of qualification for a device, implicitly demonstrates qualification to voltage and frequency variations.

12. C.5.b

The requirement to demonstrate qualification for one hour beyond that assumed in the accident analysis is unrealistic. These devices should be shown to be functional thru qualification testing for the time frame assumed in the accident analysis plus 10% margin on time. There is no basis for assuming that an additional hour added to the time frame for devices whose functional requirements are for less than ten hours provides more confidence than the 10% margin assumed for all other devices. A combination of testing/analysis should follow the qualification of these devices for a time frame deemed necessary to demonstrate that the device will not fail or misoperate in a detrimental fashion.

13. C.7.d

We interpret the requirement to justify and define the aging acceleration rate and activation energies to mean that it must be demonstrated that for multi-material devices, the lowest activation energy is used. As this is not clear, elaborate on what is required.

14. C.7.f Testing for the effects of humidity should not be restricted to accelerated aging. It may in some instances be desirable to perform humidity tests separately to study their effects or be included thru DBA testing which may be more severe.
15. D Fans should not appear as a separate item under Part 1. Qualification would be required for the fan motor which is covered by item 1(d).
16. App. C.4 For a semi-infinite cloud to be valid, the dose point need not be on "walls or large internal structures," any piece of equipment which has dimensions greater than two times the range of beta particles (a few millimeters) can be assumed to be exposed to a semi-infinite cloud.
17. Table C-1 The units of Table C-1 are wrong. Dose is not measured in "R" (Roentgen). Further, the unit "Roentgen" is not to be applied to gamma rays with energies in excess of 3 MeV. Doses should be stated in terms of Rads-Carbon.
18. Table C-2 It is inappropriate to use tissue as a beta dose medium. We recommend the use of polystyrene, since it is more representative of coatings and cable jacketings which are the main items of concern for beta radiation.