

NRCREP Resource

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Sent: Friday, July 11, 2008 5:41 PM
To: NRCREP Resource
Cc: Horin, William A.; pmhstar@ieee.org
Subject: NUGEQ Comments on DG-1175
Attachments: NUGEQ Comments on DG-1175.pdf

The Nuclear Utility Group on Equipment Qualification is submitting comments on DG-1175, "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants."

The NUGEQ transmittal letter and comments are provided in the attached file - NUGEQ Comments on DG-1175.pdf

Please confirm receipt by return e-mail.

William A. Horin
Counsel to the Nuclear Utility
Group on Equipment Qualification

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July 11, 2008

Chief, Rules, Directives and Editing Branch
Office of Administration
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SUBJ: Comments on Draft Regulatory Guide DG-1175, "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants." (73 Fed. Reg. 30,422 (May 27, 2008))

Ladies and Gentlemen:

In the referenced *Federal Register* Notice, the U.S. Nuclear Regulatory Commission ("NRC") Staff requested comments concerning proposed revisions to its regulatory guidance on Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment. The comments provided herein are submitted on behalf of the Nuclear Utility Group on Equipment Qualification ("NUGEQ" or the "Group").¹

The enclosed comments and recommended DG-1175 changes are intended to help clarify the NRC guidance and make it consistent with accepted industry practice and related NRC information, including the provisions of the March 2007 revision of the Standard Review Plan, particularly SRP Section 3.9.6 "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints." The NUGEQ has focused most of these comments and recommendations on those portions of DG-1175 that address functional qualification. The NUGEQ is particularly concerned with the proposed expansion of Regulatory Guide 1.100 from strictly a seismic and dynamic qualification document to one that includes functional qualification of mechanical equipment. The NUGEQ also questions the proposed provisions that would dictate conformance with all the nonmandatory sections of QME-1 and direct seismic OBE/SSE testing in lieu of experience data or analysis for the seismic

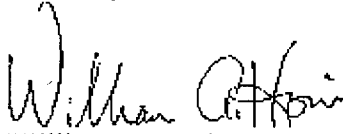
¹ The NUGEQ is comprised of member electric utilities in the United States and Canada, including NRC licensees authorized to operate over 80 nuclear power reactors in the United States. The NUGEQ was formed in 1981 to address and monitor topics and issues related to equipment qualification, particularly with respect to the environmental qualification of electrical equipment pursuant to 10 C.F.R. § 50.49.

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qualification of all active mechanical equipment exposed to harsh environments, aging, and earthquakes.

We appreciate the opportunity to comment on DG-1175. Please feel free to contact the NUGEQ if the NRC Staff would like further information on clarification on any of these comments.

Sincerely,

A handwritten signature in black ink, appearing to read "William A. Horin". The signature is fluid and cursive, with the first name "William" being the most prominent.

William A. Horin
Counsel to the Nuclear Utility Group
On Equipment Qualification

Enclosure: DG-1175 – NUGEQ Comments

1. Do Not Impose OBE/SSE Testing for Equipment Also Exposed to Harsh Environments

(Note: Applicable DG-1175 text in Times Roman font precedes NUGEQ Comment and NUGEQ Recommendation)

B.1. Seismic Qualification of Electric and Active Mechanical Equipment (page 5):

“The NRC staff has a concern regarding electric and active mechanical equipment exposed to harsh environments, aging, and earthquakes. In such cases, the NRC staff does not find it acceptable to use experience data (earthquake or test experience data) for seismic qualification of equipment. The test sample shall be subjected to simulated operating-basis earthquake (OBE) and SSE seismic vibrations in accordance with IEEE Std 344-2004.”

1.2.1 General NRC Staff Positions – i (page 13):

“For active mechanical equipment exposed to harsh environments, aging, and earthquakes, the staff does not find it acceptable to use experience data (earthquake or test experience data) for seismic qualification of equipment. The test sample shall be subjected to simulated OBE and SSE seismic vibrations in accordance with IEEE Std 344-2004.”

NUGEQ Comment: The NRC fails to articulate the technical basis for its “concern” regarding the use of seismic experience data for equipment also exposed to harsh environments and aging. Importantly, the design basis for US plants does not postulate concurrent or sequential seismic and LOCA or HELB events. Consequently, the design basis of these plants does not require that equipment function after an SSE and then a LOCA (or visa versa). The NRC concurred with this fact in prior Regulatory Guide 1.89 comment resolutions but indicated a preference for using the same test sample for both seismic and environmental qualification as a conservative practice. The IEEE acknowledged this fact and reaffirmed the NRC perspectives in IEEE 323-2003 which states: *“NOTE—A seismic event is not assumed to occur in conjunction with a loss-of-coolant accident. Rather, the sequence described previously has been developed as the basis of a conservative qualification, not one indicative of a sequence of expected plant events.” (IEEE 323-2003 page 10)*

DG-1175 takes a stated NRC preference for electrical equipment qualification and transforms it into an expectation for mechanical equipment without providing any supportable technical basis. The NRC should provide a coherent basis for its “concern” that warrants establishing this “required” regulatory position.

The NUGEQ notes that not all mechanical equipment will be qualified using either experience or OBE/SSE testing. A significant amount of mechanical equipment will be seismically qualified using stress analysis combined with limited but supporting stress tests. The DG-1175 position is silent on the use of such analysis but implies that such analysis is not acceptable since it would direct qualification based on subjecting a test sample to simulated OBE and SSE seismic vibrations in accordance with IEEE 344-2004.

Finally, the staff is unclear regarding the significance of “aging” to this position. Virtually all installed active equipment experience some form of in-service aging. Only significant aging mechanisms need to be considered as part of qualification. If the aging is not significant does the stated position permit the use of experience data for equipment whose design basis includes seismic events and harsh environment accidents?

NUGEQ Recommendation: Delete the Background and Regulatory Position text which dictates the use of seismic testing to establish seismic qualification for all active mechanical equipment exposed to harsh environments, aging, and earthquakes. Alternatively, the NRC may indicate its preference for the use of OBE and SSE testing for this equipment in lieu of experience data. If the NRC states such a preference then it should also make clear that analysis remains a valid method to seismically qualify such equipment.

2. Regulatory Guide 1.100 Scope - Limit to Seismic/Dynamic Qualification

B Discussion Background (page 1):

“The NRC developed this regulatory guide (i.e., Revision 3) to endorse, with exceptions and clarifications, the IEEE Std 344-2004 and the ASME QME-1-2007. (This is the first time the NRC is endorsing ASME QME-1). . . . Sections B.2 and C.2 of this regulatory guide endorse, with exceptions and clarifications, Section QR and the remaining sections of ASME QME-1-2007 (except Nonmandatory Appendix QR-A) for the functional qualification of active mechanical equipment.”

NUGEQ Comment: The scope of this proposed revision to Regulatory Guide 1.100 should be consistent with prior versions and should be limited to seismic qualification of mechanical and electrical equipment. The functional qualification provisions of QME-1 should be addressed in separate regulatory guidance, either the Standard Review Plan or a separate regulatory guide, or both. A revision to SRP 3.9.6 “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints” and Regulatory Guide 1.48 “Functional Specification for Active Valve Assemblies in Systems Important to Safety in Nuclear Power Plants” may be the most appropriate methods of addressing the functional qualification provisions of QME-1.

NUGEQ Recommendation: Limit the scope of RG 1.100 to IEEE 344-2004 and the seismic and dynamic provisions of QME-1 and delete DG-1175 Sections B.2 and C.2. Issue guidance on the functional qualification of active mechanical equipment in separate guidance documents, possibly in SRP 3.9.6 and Regulatory Guide 1.48.

3. Regulatory Analysis Fails to Evaluate Differences in DG-1175 and SRP 3.9.6

Regulatory Analysis 3. Alternatives Approaches: (page 19)

“The NRC staff considered the following alternative approaches:

- Do not revise Regulatory Guide 1.100.
- Update Regulatory Guide 1.100.”

NUGEQ Comment: The NRC has failed to consider the significant differences between the functional qualification provisions of QME-1 as modified by DG-1175 and the recently issued NRC guidance in the March 2007 revision of SRP 3.9.6 “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints.” These differences suggest significant additional licensee burdens regarding the methods and procedures used to establish functional qualification and the documents used to demonstrate such functional qualification. The March 2007 revision of SRP 3.9.6, without reference to any QME-1 functional qualification provisions and guidance, states:

“Conformance with the specific guidance in Subsection II of this SRP section will provide reasonable assurance that the functional design and qualification of pumps, valves, and dynamic restraints within the scope of this SRP section and their associated IST programs satisfy the applicable requirements of 10 CFR 50.55a, particularly the IST program requirements of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code); General Design Criteria (GDC) 1, 2, 4, 14, 15, 37, 40, 43, 46, and 54 in Appendix A to 10 CFR Part 50; Appendix B to 10 CFR Part 50; 10 CFR 52.47(b)(1) and 10 CFR 52.80(a).”

The NRC Regulatory Analysis does not evaluate or justify the apparent significant differences and licensee burdens when QME-1 is used in lieu of the existing SRP guidance on functional qualification of mechanical equipment. The NRC determined last year that this SRP guidance meets all applicable regulatory requirements. This burden is exacerbated by the DG-1175 provision, without further analysis or justification, requiring compliance with all the nonmandatory sections of QME-1.

NUGEQ Recommendation: The NRC should provide a detailed evaluation and justification for using the more prescriptive provisions of QME-1 in lieu of the existing mechanical equipment functional qualification guidance in SRP 3.9.6 and its referenced documents/standards. This evaluation should include the technical basis for requiring compliance with each of the nonmandatory sections of QME-1. Alternatively, and as suggested in Comment 2 the NRC should limit this revision of Regulatory Guide 1.100 to seismic and dynamic qualification and issued separate guidance on functional qualification of active mechanical equipment.

4. NRC Should Not Dictate Compliance with Nonmandatory Appendices

1.2.1 General NRC Staff Positions - a: (page 13):

"In endorsing the use of ASME QME-1-2007, the staff noticed that several appendices are designated as either nonmandatory or mandatory (e.g., Nonmandatory Appendix QR-A; Nonmandatory Appendix QR-B; Nonmandatory Appendices QDR-A, QDR-B, and QDR-C; Nonmandatory Appendices QP-A, QP-B, QP-C, QP-D, and QP-E; and Mandatory Appendix QV-1). The staff position is that, once the user commits to the use of ASME QME-1- 2007 for its qualification of active mechanical equipment in NPPs, the criteria and procedures delineated in those appendices then become the requirements for its qualification program, unless the deviations are justified."

NUGEQ Comment: The NUGEQ disagrees with requiring the use of the nonmandatory appendices and believes this may be counterproductive and limit licensee commitments to the use of ASME QME-1. QME-1 makes clear that mandatory appendices contain provisions that must be followed and nonmandatory appendices provide information or guidance that is not imposed.

The QME-1 committee has issued several revisions to QME-1 and has clearly determined that the nonmandatory appendices provide information/guidance and do not constitute required elements of the standard. Industry experience with interpreting and implementing QME-1 is needed to refine both the mandatory and nonmandatory portions of QME-1. This lack of experience and recognition that acceptable alternative methods may be available were likely considerations that prompted the QME-1 committee to specify certain appendices as nonmandatory.

The NRC states that this is the first time that the NRC is endorsing QME-1. The NRC and many in the industry have little experience interpreting or implementing the provisions of QME-1. This is exemplified by the limited number of QME-1 code cases attached to the 2007 revision.

The NUGEQ is concerned that unilaterally dictating implementation of all the nonmandatory appendices represents a significant departure from current accepted industry practices that have been endorsed by the NRC. See for example our subsequent comment regarding Nonmandatory Appendix QR-B, "Guide for Qualification of Nonmetallic Parts."

If the NRC believes it has sufficient experience interpreting the nonmandatory appendices then it may be appropriate for the staff to indicate that the NRC has determined that these appendices represent acceptable methods of complying with QME-1. The NRC needs to be clear that they remain guidance and that other methods may be approved on a case-by-case basis.

NUGEQ Recommendation: Delete those portions of DG-1175 that dictate compliance with the nonmandatory portions of QME-1 for licensees that commit to the use of ASME QME-1- 2007. If the NRC accepts the guidance in these appendices then the

NRC should delete the existing language beginning with “The staff position is that, once the user commits to the use of ASME QME-1- 2007” and replace it with the following: “The staff has determined that the contents of these nonmandatory appendices are acceptable for meeting applicable QME-1 provisions for the qualification of active mechanical equipment. Other appropriately justified methods not addressed in these QME-1 appendices may also be accepted on a case-by-case basis.”

5. Nonmandatory Appendix QR-B Not Appropriate for All Equipment

1.2.1 General NRC Staff Positions - a: (page 13):

“In endorsing the use of ASME QME-1-2007, the staff noticed that several appendices are designated as either nonmandatory or mandatory (e.g., Nonmandatory Appendix QR-A; Nonmandatory Appendix QR-B; Nonmandatory Appendices QDR-A, QDR-B, and QDR-C; Nonmandatory Appendices QP-A, QP-B, QP-C, QP-D, and QP-E; and Mandatory Appendix QV-1). The staff position is that, once the user commits to the use of ASME QME-1- 2007 for its qualification of active mechanical equipment in NPPs, the criteria and procedures delineated in those appendices then become the requirements for its qualification program, unless the deviations are justified.”

NUGEQ Comment: The NUGEQ is concerned that requiring compliance with Nonmandatory Appendix QR-B, “Guide for Qualification of Nonmetallic Parts” for all active mechanical equipment will result in excessive and unnecessary procedures, methods, and documentation burdens on licensees for some equipment, including all such equipment located in mild environments. Rigid application of the appendix to all equipment regardless of its plant location or potential for exposure to harsh environmental conditions is inconsistent with existing regulatory guidance.

The most recent regulatory guidance regarding environmental qualification of such nonmetallic parts is contained in the March 2007 revision of SRP 3.11, “Environmental Qualification of Mechanical and Electrical Equipment.” SRP 3.11 states in part (page 3.11-2):

“For mechanical equipment located in a harsh environment, compliance with the environmental design provisions of GDC 4 are generally achieved by demonstrating that the non-metallic parts/components are suitable for the postulated design basis environmental conditions.”

“For electrical and mechanical devices located in mild environments, compliance with the environmental design provisions of GDC 4 are generally achieved and demonstrated by proper incorporation of all relevant environmental conditions into the design process, including the equipment specification.”

SRP 3.11 also states that while environmental design requirements apply to all equipment important to safety (i.e., both mild and harsh environments) that environmental qualification is verification of design, limited to demonstrating that

electrical or mechanical or I&C equipment are capable of performing their safety function under significant environmental stresses (i.e., harsh environments) resulting from design basis events in order to avoid common-cause failure.

Regarding mechanical equipment SRP 3.11 makes important distinctions between the methodologies and documentation expectations for harsh and mild mechanical equipment. In both cases the SRP 3.11 establishes flexible guidance and does not dictate the more restrictive methods and documentation provisions contained in Appendix QR-B. SRP 3.11 indicates that for mechanical equipment, the staff concentrates its review on materials that are sensitive to environmental effects (e.g., seals, gaskets, lubricants, fluids for hydraulic systems, and diaphragms) and verifies that the licensee has identified the equipment's location, service parameters, and nonmetallic material capabilities, and has evaluated the environmental effects. For mechanical equipment located in mild environments SRP 3.11 indicates that acceptable environmental design can be demonstrated by the "design/purchase" specifications containing a description of the functional requirements for a specific environmental zone during normal environmental conditions and anticipated operational occurrences.

In contrast, it appears that Appendix QR-B would dictate that the equipment qualification report for all affected equipment regardless of location (i.e., harsh or mild) contain detailed information on the equipment's nonmetallics, including their function, formulation identification, activation energy, service conditions, failure modes and aging significance evaluations, qualification basis, qualified life, and maintenance/replacement requirements. While such information is similar to that developed to achieve compliance with 10 CFR 50.49 for electrical equipment located in a harsh environment, it is not required by any NRC guidance documents or the IEEE standards for electrical equipment located in a mild environment.

In summary the rigid application of Appendix QR-B to all active mechanical equipment is inconsistent with, and would be an unwarranted expansion of, existing regulatory guidance for the environmental design of such equipment. Its application would likely require the expenditure of significant additional licensee resources to address the more restrictive methods and documentation provisions of this nonmandatory Appendix.

NUGEQ Recommendation: As suggested in Comment 2 the NRC should limit this revision of Regulatory Guide 1.100 to seismic and dynamic qualification and issued separate guidance on functional qualification of active mechanical equipment. Any regulatory positions that establish NRC expectations for complying with QME-1 Appendix QR-B should be deleted.