



NUCLEAR ENERGY INSTITUTE

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April 18, 2001

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Director, Division of Engineering  
Office of Nuclear Reactor Regulation  
Mail Stop O9-E3  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT:** SEQUAL Topical Report, *Basis for Adoption of the Experience-Based Seismic Equipment Qualification (EBSEQ) Methodology by Non-A46 Nuclear Power Plants, Revision 0* (dated 4/17/2001)

**PROJECT NUMBER: 689**

Dear Mr. Strosnider:

The industry, in close coordination with NRC, successfully developed an experience-based methodology for verifying the seismic adequacy of nuclear power plant equipment required for safe shutdown. The methodology developed by the Seismic Qualification Utility Group (SQUG) uses equipment performance data from actual earthquakes supplemented by test data and analysis to demonstrate the seismic adequacy of equipment. It has been used by well over half of the nuclear plants in the U. S. to address Unresolved Safety Issue A-46, *Seismic Qualification of Equipment in Operating Nuclear Power Plants*. The method has been implemented by the U. S. Department of Energy and has been used in several foreign countries. NRC approval of the SQUG Generic Implementation Procedure (GIP) provides for seismic evaluation of commercial grade equipment such as heat exchangers, pumps, valves, electrical cable trays, and other electrical and mechanical equipment. The application of actual earthquake performance data has clearly been demonstrated as an efficient and cost effective approach for evaluating the seismic adequacy of electrical and mechanical equipment.

The Seismic Experience-based Qualification Owners Group has developed a methodology and supporting basis for adoption of an experience-based seismic equipment qualification (EBSEQ) method by non-A46 plants. A copy of the topical report is enclosed for your review and approval.

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The report provides the technical and regulatory basis for NRC acceptance of the EBSEQ methodology as an alternative seismic equipment qualification method for those operating plants not included in the scope of USI A-46 (*i.e.*, non-A46 plants), some of which are committed to NRC regulatory requirements found in 10 C.F.R. Part 50, Appendix A, General Design Criterion (GDC) 2, and Appendix A of 10 CFR Part 100.

The EBSEQ method is based on documented performance of equipment in dozens of strong motion earthquakes in hundreds of power plants and industrial facilities, and is supplemented by results of shake table tests and analyses. An important finding of the research, which is the basis for the EBSEQ methodology, is that the conventional electrical and mechanical equipment included in the scope of the EBSEQ is inherently rugged for earthquake levels significantly higher than the design basis earthquakes for eastern U. S. nuclear plants provided the criteria outlined in the EBSEQ procedure are met. The guidelines provide a systematic, controlled and well-documented performance-based method to evaluate (*i.e.*, screen out) those types of conventional equipment shown to be insensitive to earthquake motions and to focus on actual equipment and installation vulnerabilities identified in strong motion earthquakes and prior qualification tests. The EBSEQ process makes use of this equipment performance data to define the procedure for seismic qualification of new and replacement equipment in operating nuclear plants. This process has been demonstrated to be cost-effective in identifying risk-significant seismic issues without reduction of seismic design margins.

The topical report has broad applicability and will result in considerable cost savings and/or critical procurement lead time over traditional seismic analysis and testing. The subject addressed by the topical report is of importance to over 40 domestic operating reactors.

The NRC staff review of the report is considered to be relevant to the NRC performance goals as identified below.

## **1. Maintain Safety**

Safety is maintained through the application and use of a process that clearly defines the method for seismic qualification of commercial grade equipment, new and replacement. The method provides a practical and effective procedure for screening out seismically rugged conventional equipment, thereby allowing licensee staff to focus important resources on more sensitive or vulnerable items.

In the safety evaluation report approving use of the GIP methodology for A46 plants, the NRC determined that implementation of the GIP approach “satisfy[ies] the pertinent equipment seismic requirements of GDC 2 and the purpose of the NRC regulations relevant to equipment seismic adequacy

including 10 CFR Part 100.” The NRC concluded that the GIP methodology provides the required reasonable assurance of adequate protection of the public health and safety for more than half of the operating nuclear plants in the U. S. It is this accepted methodology upon which the EBSEQ is based.

**2. Maintain Public Confidence**

Public confidence will be maintained through the development, review and subsequent use of a more scrutable process that utilizes an experience-based approach. Experience-based methods have been used in more than half of the U.S. operating plants for a period of almost 20 years. Results of numerous strong motion earthquakes worldwide since approval of the GIP have validated the adequacy of its criteria.

**3. Make NRC Activities and Decisions More Effective, Efficient and Realistic**

Efficiency and effectiveness of regulation will be improved through the establishment of approaches acceptable to the NRC for seismic equipment qualification.

Utilities operating A46 plants have demonstrated cost savings ranging from several thousand dollars to several hundred thousand dollars per equipment item procured using the experience-based seismic qualification method. Equipment availability is also greatly enhanced, particularly as vendors increasingly decide to no longer supply IEEE 344 qualified equipment for nuclear applications. Precluding the use of an experience-based seismic qualification method for the non-A46 operating plants, some of which share the same site, procedures, and personnel as A46 plants, creates technical and economic inequities that are no longer justified. Additionally, requiring a dual standard for procurement of otherwise identical equipment results in more complex and costly procurement and material control processes, and complicates facility modifications, without a commensurate increase in the overall safety and seismic adequacy of the plants.

**4. Reduce Unnecessary Regulatory Burden**

The development and approval of the topical report will reduce unnecessary regulatory burden. The NRC acceptance of an experience-based seismic equipment qualification method as an alternative approach will enable licensees to more easily incorporate these methods into their licensing basis. Regulatory burden will be reduced for both licensees and NRC inspection staff at sites containing both A46 and non-A46 plants.

We believe that the NRC staff review of the enclosed topical should be exempt from the fee recovery provision contained in 10 CFR Part 170. This submittal

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provides information that might be helpful to NRC staff when reviewing licensee activities associated with adoption and incorporation of an alternative method for seismic qualification of equipment. Such reviews are exempted under §170.21, Schedule of Facility Fees. Footnote 4 to the Special Projects provision of §170.21 states, "Fees will not be assessed for requests/reports submitted to the NRC...[a]s means of exchanging information between industry organizations and the NRC for the purpose of supporting generic regulatory improvements or efforts."

We are prepared to meet with you and your staff to discuss further details for the review and approval of the topical report.

At your earliest convenience, please contact John Butler at 202-739-8108, [jcb@nei.org](mailto:jcb@nei.org), or me, to discuss how best to proceed forward with the review.

Sincerely,



Alexander Marion

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Enclosure

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