Staff Responses to Public Comments on Draft Regulatory Guide DG-1175
(Proposed Revision 3 of Regulatory Guide 1.100)
(Public comments have been edited for clarity)

IEEE Power Engineering Society Nuclear Power Engineering Committee (ML082000783)	Nuclear Utility Group on Equipment Qualification (ML082000784)	Nuclear Energy Institute 1776 I Street NW, Suite 400 Washington, DC 2006-3708 (ML082540405)
Westinghouse Electric Company P. O. Box 355 Pittsburgh, PA 15230-0355 (ML082000782)	Duke Energy Carolinas, LLC EC07H / P.O. Box 1006 Charlotte, NC 28201-1006 (ML082000785)	Dominion One James Rive Plaza Richmond, VA 23219 (ML082200057)
	ASME Nuclear Codes and Standards (ML082660608)	

Comments			NRC Comment Resolution
Originator	DG-1175 Section	Specific Comment	NRC Staff Response
IEEE-1	B.1	In paragraph (5), we disagree with the NRC comment about the seismic vulnerability of solid state components. Test results experienced by members have shown high capacities for solid state relays. The specific nature of the NRC data showing issues for these types of components should be examined. Recommend deleting these sentences	The staff has reviewed and considered the comment. The statement is revised to "*Some solid-state relays and microprocessor-based components may be sensitive to earthquake excitations.*" A test would be needed to confirm if particular equipment is not sensitive to high-frequency ground motion.
IEEE-2	B.1	In paragraph (5), the term "equipment capacity factor" is not defined. Recommend defining this term.	The staff reviewed the comment and revised the statement in the final version of DG-1175.

IEEE-3	B.1	In paragraph (5), the statement "Third, since no new NPPs were built after the early 1980s, a number of manufacturers for electric or active mechanical equipment are no longer in business, and the appropriateness of using the test experience of old equipment made by manufacturers no longer in business for the seismic qualification of modern equipment designs made by different manufacturers is highly questionable," is misleading and should be corrected or deleted. Many NPPs have been built since the early 1980s. Kashiwazaki-Kariwa Nuclear Power Plants has five BWR units, which entered commercial operation in 1985 and 1994 and two ABWRs which entered commercial operation between 1996 and 1997. There are at least 29 NPPs worldwide that have been built since early 1980s that have utilized IEEE 344 standard for qualification. We also disagree with the suggestion that seismic fragilities are manufacturer-specific. The construction of the equipment and the observed failure modes which are addressed by the similarity requirements in the Standard, are of significantly greater importance. U.S. NRC concern about use of experience data for older equipment is not warranted since such equipment would not be similar to more current components. IEEE Std 344-2004 Section 10.4.2 (a) excludes the use of data for components that have changed in time (such as microprocessor systems). Recommend deleting this entire discussion.	The statement is rewritten as "*Furthermore, since no new NPPs were built in the USA after the early 1980s, a number of manufacturers for electric or active mechanical equipment are no longer in business…"* While the staff agrees that many NPPs have been built outside the USA, not all seismic and test experience database were available to the staff.
IEEE-4	B.1	In paragraph (6) the U.S. NRC concern about using experience data for equipment exposed to harsh environment is not valid. Aging and other environmental requirements are governed by IEEE 323 standard. In addition, EPRI has conducted substantial research (NP3326) to identify those components that do not have a seismic aging correlation.	The staff reviewed the comments and deleted the paragraph in the final version of DG-1175.

		Recommend removing the beginning "The NRC staff - IEEE Std 344-2004."	
IEEE-5	B.1	In paragraph (7) the statement "Ball joints and kinematics linkages of the shake tables generated these inadvertent high frequencies, which the NRC staff considers to be noise signals that may not have the proper frequency content with sufficient energy to be compatible with the amplified region of the RRS at high frequencies" is misleading and should be corrected or deleted. Since the high-frequency range has been characterized as (20 hertz (Hz) and above), RRS used in seismic testing envelope plant equipment location requirements almost always exceed 20 Hz and often contain higher than 33 Hz content purposely input into the seismic test table, there is no basis to state with certainty that "Ball joints and kinematics linkages of the shake tables generated these inadvertent high frequencies". Recommend removing this discussion.	The staff has reviewed and considered the comment. Even though IEEE Std 344-2004 may have safeguards to ensure that the input is generated and in compliance with the frequency range of interest, the statement is needed to prevent potential misuse of the previous test data. The statement is revised to "*Therefore, any attempt to use such past test experience data for the seismic qualification of high-frequency-sensitive equipment or fragile components in such plant is not appropriate unless frequency content of the power spectral density (PSD) of the test waveform has been evaluated in accordance with Annex B of IEEE 344-2004*".
IEEE-6	B.1	In paragraph (7) the statement "However, the vast majority of existing seismic qualification tests used input frequencies up to only 33 Hz, although the TRS may have shown a zero period acceleration (ZPA) up to 100 Hz" is misleading and should be corrected or deleted. The statement intertwines two seismic qualification elements and generates a misunderstanding. The seismic test frequency range is the amplified range, which is defined by the RRS. The ZPA is by definition the acceleration level of the high-frequency, non-amplified portion of the response spectrum. Recommend removing this discussion.	The staff has revised the statement for clarification as "*although the TRS may have shown a zero period acceleration (non amplified frequency range) up to 100 Hz*".

IEEE-7	B.1	In paragraph (7) per U.S. NRC concurrence, new plants are not being qualified for high frequency ground-motions rather they are being screened for high frequency sensitivity. Such high-frequency motions are not part of the certified design basis. Refer to COL/DC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated with High Frequency Ground Motion in Design Certification and Combined License Applications" Recommend removing the discussion beginning "When new - motion concerned."	All equipment in new nuclear plants must satisfy the regulations for seismic qualification delineated in Appendix A of 10 CFR Part 100 and Appendix S of 10 CFR Part 50. The staff acknowledges that there is no inconsistency between COL/DC-ISG-1 and DG1175. The ISG provided guidance on the methodology to determine whether the equipment is sensitive to the effects of high frequency ground motion. DG-1175 described methods that the staff considered acceptable for use in seismic qualification of electric and active mechanical equipment. IEEE Std 344 is mentioned in the ISG-1 twice. In Section 4.1.1 of COL/DC-ISG-1, "*If existing test data are used to demonstrate functionality, the use of such data should be evaluated over the required frequency range of interest in accordance with IEEE Standard 344 to demonstrate that the proper frequency content with sufficient amplitude was used as input to the component that has been previously tested*". For the screening procedure and justification of high frequency sensitive equipment, requirements in IEEE Std 344 should be used to demonstrate that the proper frequency range and sufficient amplitude was used. Section 4.3.1 in COL/DC-ISG-1 indicated that "*The test procedure is to be consistent with the requirements of IEEE-344 as supplemented by NRC RG 1.100*". For seismic qualification of screened-in equipment/components, any test procedure should be consistent with IEEE Std 344.

IEEE-8	B.1	In paragraph (7) U.S. NRC defines high-frequency range as 20 Hz and above. It is understandable that a bound was not defined because it is dependent on the frequency range of interest of the hard rock site. Recommend adding a statement in this section to define the upper limit to the high frequency range.	The staff agrees that the bound of the high-frequency range depends on the frequency range of floor response spectrum of the hard rock site. Defining an upper limit would not be appropriate in the guidance document. Thus, no change is necessary in the final version of DG-1175.
IEEE-9	B.1	In paragraph (7) it appears that the NRC position in this section is that previous seismic test programs which did not require HF content cannot be used for qualification of equipment at HF sites. Is it the NRC position that only seismic test programs that required HF content (i.e., hydrodynamic loadings associated with BWR) are acceptable? All seismic tests should be acceptable provided there is sufficient energy content over the frequency range of interest. Recommend this section be revised to be consistent with COL/DC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated with High Frequency Ground Motion in Design Certification and Combined License Applications."	See responses to IEEE-5 and IEEE-7
IEEE-10	B.2	In paragraph (1) the major change from ASME QME-1-2002 to ASME QME-1-2007 in terms of the functional qualification of mechanical equipment is a complete rewrite of Section QV and the new Mandatory Appendix QV-1. This entire section seems out of place in a seismic qualification document. This material addresses functional qualification and may be a better fit in Regulatory Guide (RG) 1.148, "Functional Specification for Active Valve Assemblies in Systems Important to safety in nuclear Power plants." RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. Although the ANSI standard by itself does not provided complete assurance of operability, there is an overlap between DG1175 and RG 1.148 for functional qualification of	The NRC staff plans to withdraw Regulatory Guide (RG) 1.148 after this revision to RG 1.100 is finalized. RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. In the Foreword of ASME QME-1-2007, it was explained that the ANSI N45 Committee's valve task force (N278) was reassigned to the ASME QME in 1982 and designated the Subcommittee on Qualification of Valve Assemblies. In addition, ANSI N278.1 has not been updated since 1975 and the staff believes that there is no need to revise RG1.148. Endorsing the ASME QME-1-2007, which incorporated all the lesson-learned and

		active valves. Recommend that functional qualification of active mechanical components (which have no direct bearing on seismic qualification) should be discussed in a revision to RG 1.148 and the RG 1.100 should only provide guidance for seismic qualification of electric and mechanical equipment. Therefore, Section 2. (Functional Qualification of Active Mechanical Equipment) should be move to RG 1.148 and the title for this document reverted back to "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants	operating experience of active mechanical equipment, for functional qualification is appropriate and prudent.
IEEE-11	C.1.1.1b	In subsection (1) of C.1.1.1b the word "credibility" is used. This word may imply a negative bias and is not suggested for use in a regulatory position document. The following change is recommended: 1) The wordings "the credibility and" be removed. The remaining wording is sufficient. or 2) Change to the following: (1) seismic experience data for its completeness and the information that would be generated in the process of establishing evidence of qualification.	The staff disagrees with the comment. Not all test and earthquake experience data have equal technical quality. The credibility, or the quality of the data, should be justified.
IEEE-12	C.1.1.1c	This sub-section states "The NRC staff does not generally find it acceptable to use experience data (earthquake or test experience data) for ..." and goes on to provide three categories of equipment which are very extensive and encompass the majority of safety-related electrical and electromechanical equipment provided to Nuclear Power Plants (NPPs). It is unclear why the NRC find experience based qualification to be an unacceptable method. As written the DG-1175 position suggests that test-based experience performed in accordance with IEEE Std 344-2004 requirements (per Section 10.3) does not adequately qualify chatter sensitive equipment. This is unclear since sub-clause	The staff does not disallow the use of experience-based methods. As delineated in C.1.1.1b, the use of experience-based method for seismic qualification of electric equipment will be subject to the review and approval by the NRC staff. Even though IEEE Std 344-2004 identified limitation of earthquake or test experience – based qualification, the staff believes that the list in IEEE Std 344-2004 sub-clause 10.4.2(b) should be supplemented by the additional items listed in C.1.1.1c. However,

		10.4.2 (b) of IEEE Std 344-2004 provided exclusion to such things as relays, contactors, switches and breakers. Experience based method as defined in IEEE Std 344-2004 provides sufficient evidence of seismic qualification. Further clarification is recommended to understand the DG-1175 position.	C.1.1.1c should not be considered as a complete list.
IEEE-13	C.1.1.1c	Please clarify what are fragile electronic components, such as solid-state relays and microprocessors-based components This paragraph provides an inappropriate conclusion that safety-related solid-state relays and microprocessor-based components are fragile. Test results experienced by IEEE Std 344-2004 Working Group (WG) have shown high capacities for equipment like solid-state relays. Safety-related solid-state relays and microprocessor-based components have been seismically qualified to IEEE Std 344-2004 by testing and have recently experienced actual earthquakes, such as the Niigataken Chuetsu-Oki earthquake at the Kashiwazaki-Kariwa Nuclear Power Plant in which safety-related digital I&C operated properly during and after the earthquake. Seismic qualification test programs and earthquake experience demonstrated that safety-related solid-state relays and microprocessors-based components are not fragile. Therefore, the characterization "fragile electronic components" must mean "non-safety-related" solid-state relays and microprocessor-based components. Recommend DG-1175 data identifying “fragile electronic components" be provided for review and the statement further clarified or deleted since as written it is misleading.	The staff has reviewed and considered the comment. The statement is revised in the final version of DG-1175
IEEE-14	C.1.1.1c	Item (3) identifies a concern with the using of experience data for subcomponents that are defined in Items (1) and (2). This exclusion is presently addressed in IEEE Std 344-2004 in the Introduction and the exclusion defined in sub-clause 10.4.2 (b). Therefore,	The staff has reviewed and considered the comment. The statement is revised in the final version of DG-1175

		since this item is addressed in. IEEE Std 344-2004, no restriction is required. Recommend this exclusion be removed since it is presently addressed in IEEE Std 344-2004.	
IEEE-15	C.1.1.1d	This sub-section as written seems to impose new requirements on the common practice of seismic testing selected items to qualify a family of similar items in accordance with Claus 8 (Testing) of IEEE Std 344-2004. If so, this is a change from traditional seismic qualification methods used in the past. Recommended this statement be further clarified to better define the intent of the section and the relationship to similarity method defined in sub-clause 9.3 (Extrapolation for similar equipment) of IEEE Std 344-2004 or be deleted. This section should allow the industry to qualify similar equipment without having to obtain NRC approval.	C.1.1.1d is applicable only to applicant or licensee who is proposing to use test-experience data (in IEEE St 344-2004 Clause 10.3) to perform seismic qualification. C.1.1.1d is not applicable to the provision in Clause 8 (Testing) and Clause 9 (Combined analysis and testing).
IEEE-16	C.1.1.1f	Seismic qualification of equipment should be performed over the frequency range of interest. DG-1175 wording does not allow a limit lower than 33 Hz to be performed but mandates a higher cutoff is required by the RRS of a specific plant. There may be instances where a lower cut-off would be allowed by a site specific RRS and therefore should be allowed. IEEE 344 standard uses the following wordings throughout the standard to address this item. "...over the frequency range of interest (typically, 1 Hz to 33 Hz)" or "up to the cutoff frequency." Where the cutoff frequency is defined as "The frequency in the response spectrum where the ZPA asymptote begins..." The IEEE Std 344-2004 wording above is appropriate. The wording has not changed from the IEEE Std 344-1987 version. Recommend removing this discussion.	The staff agrees the wording in IEEE Std 344-2004 concerning the frequency range has not changed from the IEEE Std 344-1987 version. However, recent studies identified that the response spectrum for certain sites in the Central and Eastern United States may have amplified region in the beyond 33 Hz. The staff agrees that defining an upper limit would not be appropriate in the guidance document. The upper bound of the frequency range should be depends on the frequency range of the RRS of the specific plant equipment. The statement is revised to "*The NRC staff does not generally find it acceptable to restrict the frequency range of testing up to 33 Hz. The frequency range should be consistent with the RRS of specific plant equipment*." Due to other changes in the draft guide, this is

			now Section 1.1.1 e. A statement has also been added to address 1/6 octave testing.
IEEE-17	C1.1.1g	This section excludes the use of previous testing to address high frequency concerns because the high frequency motions were not intentionally input to the test. An assessment of the test input waveform should be conducted to verify the test specimen was adequately tested over the frequency range of interest. If the test data demonstrate sufficient frequency content in the high-frequency range throughout the time history then the data should be acceptable. This approach is consistent with Section C.1.1 1.h. IEEE Std 344-2004 has sufficient safeguards to ensure that the input is generated and in compliance with the frequency range of interest. The DG-1175 position is not necessary since the present requirements in IEEE Std 344-2004 are adequate to verify the test data has sufficient content over the frequency range of interest throughout the input time history. This requirement is addressed in the stationary requirements in the strong motion portion of the test inputs through time segment analysis as defined in IEEE Std 344-2004 Annex B. If there is sufficient content in each of the time segments then the test input is acceptable and the origins of the energy input to the test (ball joints and kinematic linkages) are immaterial. The test specimen experienced the required environment regardless of source. Recommended this section be revised to require high frequency motions evaluated in accordance with IEEE	The staff has reviewed and considered the comment. Even though IEEE Std 344-2004 may have safeguards to ensure that the input is generated and in compliance with the frequency range of interest, the statement is needed to prevent potential misuse of the previous test data. The statement is rewritten as "*The vast majority of existing seismic qualification tests used input frequencies up to only 33 Hz. The use of these prior testing results should be justified by demonstrating that the frequency content of the power spectral density (PSD) of the test waveform is sufficient in accordance with Annex B of IEEE 344-2004".*

		Std 344-2004 Annex: B (Frequency Content and Stationarity).	
IEEE-18	C.1.1.1i	The statement "Electric equipment should be qualified with five one-half SSE events followed by one full SSE event (SECY-93-087) even if the OBE of a plant is defined to be one-third of SSE or less," should be deleted since the statement as-is creates a situation where current acceptable testing may be rendered unacceptable. The DG-1175 position does not recognize that some plants are licensed with an OBE that is greater or less than one-half the SSE. The plant licensing basis should define whether the OBE is one-third or one-half of the SSE, or has no relationship to the SSE. The SECY-93-087 document specifically addressed issues affecting Advanced Light-Water Reactors (ALWRS), for which the OBE was eliminated as a design case by making it one-third of SSE or less. The five one-half SSEs provision in SECY-93-087 is intended for ALWR applications. It is also noted that the DG-1175 phrase ",..even if the OBE of a plant is defined to be one-third of SSE or less" is not in SECY-93-087. The OBE tests in IEEE 344 standard are intended to simulate vibratory aging effects for conditions where plant operation is expected to proceed without requiring shutdown. Recommend this section be revised to reflect that the OBE amplitude should be based on the applicable plant licensing requirements.	The statement is revised for clarification. *"For NPPs that were licensed with the elimination of the OBE, electric equipment should be qualified with five one-half SSE events followed by one full SSE event or, alternatively, a number of fractional peak cycles equivalent to the maximum peak cycles for five one-half SSE events in accordance with Annex D of IEEE 344-2004 when followed by one full SSE (SECY-93-087) even if the OBE of a plant is defined to be one-third of SSE or less. For other reactors, the staff will review the seismic qualification based the OBE level in accordance with the licensing basis".*

IEEE-19	C.1.1.1j	This section states "The IEEE Std 344-2004 recommended no damping values." This is not correct as written. IEEE Std 344-2004, Clause 6 (Damping) provides specific details regarding the application of damping. Sub-clause 6.3.1 (Application of damping in analysis) identifies "Appropriate values of damping may be obtained from tests or other Justifiable sources" Further clarifications are provided in subclauses 6.3.2 (Application of damping in testing) and 8.6.1.3 (Damping selection) to provide additional guidance on the damping to be used for testing. It should be noted that U.S. Regulatory Guide 1.61, which provides acceptable damping values for seismic analysis and design, also allows for higher damping values if test data is available to support. Recommended this statement be reworded to say IEEE Std 344-2004 recommends appropriate values of damping for analysis may be obtained from tests or other justifiable sources" or deleted since it incorrectly states that IEEE Std 344-2004 does not recommend damping values."	The statement is revised for clarification. "*The damping values used in analysis should be in accordance with the damping values listed in Table 6 of NRC Regulatory Guide 1.61, Revision 1, "Damping Values for Seismic Design of Nuclear Power Plants," (Ref. 31) issued in March 2007, or as approved in the plant licensing basis.. Damping values other than those provided in the plant licensing/design basis or RG 1.61 may be used, subjected to staff review and approval, if documented test data supports the higher values."*
IEEE-20	C.1.1.2a	This section addresses the susceptibility of safety-related equipment to low cycle fatigue. Low cycle fatigue is the result of materials experiencing structural damage when subjected to cyclic loading. Low cycle fatigue is related to structural integrity which can indirectly affect functionality. Low cycle fatigue susceptibility is a material property that can be screened out. Functionality is a separate issue and IEEE Std 344-2004 requires a separate evaluation for it. Since earthquakes impose repeated cyclic loadings on SSCs, the possibility of fatigue has been identified as a potential failure mechanism. The potential for such failure mechanisms is relatively small because	The staff disagrees. The section addresses not only the low cycle fatigue but also all the possible failure modes that will affect the functionality of the equipment under OBE excitation. The guidance of using five OBE and one SSE, or the equivalent, has been a consistence staff position for seismic qualification of electric and mechanical components to meet the regulations in Appendix A of 10 CFR Part 100 and Appendix S of 10 CFR Part 50.

		earthquakes create only a few cycles of strong motion and most materials are not susceptible to low-cycle fatigue (typically only brittle materials are susceptible to low-cycle fatigue). IEEE Std 344-2004 recognizes this situation in sub-clause 7.6 (OBE and SSE Analysis) where it limits the scope of what is necessary for analysis to only low-cycle fatigue-sensitive equipment: *"The number of OBEs and the fatigue-inducing potential per OBE is important only for low-cycle fatigue-sensitive equipment."* However, DG-1175 does not take exception to the underlying premise for performing repeated OBE tests or analyses. Instead five OBEs are arbitrarily imposed, even though there are other ways to address this issue. One other method for addressing the potential for low-cycle fatigue is to exclude use of experience data for low-cycle fatigue-sensitive equipment as required in IEEE Std 344-2004 subclauses 10.2.3.1 and 10.3.3.1. Recommend this section be revised to remove discussion on low cycle fatigue.	
IEEE-21	C.1.1.2c	The capacity derived from earthquake experience data is an average capacity from many samples. It is appropriate to compare it to an "average" demand such as median-centered. It would also be overly conservative to require the RRS be developed using normally conservative analytical approaches in RG 1.122 and also implement the conservative assumption of the ground motion for the experience data earthquakes to represent the capacity for th e class. In a manner similar to modern code development there should be relative consistency in margin between all approaches. Therefore, the use of conservatively calculated demand (e.g., RG 1.122) is inappropriate. Recommend this section be deleted.	The staff reviewed the comment and revised the statement to "*In-structure response spectra used as the RRS for the qualification of candidate equipment should be in accordance with the licensing/design basis or the Standard Review Plan, (Ref 33), Section 3.7.2, as applicable. The use of RRS other than those described in the licensing/design basis should be submitted for NRC staff review and approval.*" *The proposition to use median centered in-structure response spectra within the context of equipment qualification license amendment would require the development of detailed technical justification.*

IEEE-22	C.1.1.2d	This staff position on the first paragraph of sub-clause 10.3.2 imposes the requirement to divide the Test Experience Spectrum (TES) by a factor of 1.4 and cites References 32 and 33 as the basis, The proposed equipment capacity factor of 1.4 is not applied as a capacity reduction factor. Rather, it is applied as a demand increase factor; i.e., one increases the seismic demand by 1.4 and compares to the capacity determined by test or test experience to demonstrate adequate margin in order to meet a stated performance goal. The IEEE 344 standard is intended for equipment qualification in a deterministic evaluation for meeting a design requirement rather than in an evaluation for meeting a probability-based performance goal. IEEE 344 standard has never specified a numerical value of test margin. Instead it simply states that the qualification specification should state what margin is required and refers to IEEE 323 standard, which currently has the suggested margin of 1.1. The RRS, including any required margin, is part of the qualification specification and any margin is controlled by documents external from IEEE 344 standard. In fact, in IEEE Std 344-2004 sub clause 10.3 (Test experience data) is consistent with clause 8 (testing) in that both require seismic demand (Required Response spectrum) to be based on conservative design response spectra rather than realistic median spectra as for Section 10.2 (earthquake experience data). This difference recognizes the relative levels of confidence for qualification by test or test experience and qualification by earthquake experience that was the intent in References 32 and 33. The staff position relative to the second paragraph of sub-clause 10.3.2 does not recognize this section	The staff reviewed the comments and revised the statements. A factor of 1.4 will not be imposed in the final version of DG-1175. The statement is revised to "*The TES shall be the frequency-by-frequency mean of the response spectra from successful tests without malfunction. When using test experience data, both the mean and the standard deviation of the data leading to the TES curve should be provided for review and approval. .*" The staff did not take any exception in Clause 8 (Testing) for this issue. The specific staff position C.1.1.2.d.ii is necessary because new reactors are licensed with the elimination of OBE when the OBE is 1/3 or less of the SSE, not ½ the SSE as indicated in subclause 10.3.2

		requires the items in the reference equipment class must be tested with five OBE and one SSE, as per current staff guidance. This sub-clause was intended to define the requirement for when the development of an OBE test experience spectra TES is required. Recommend this DG-1175 discussion be deleted and that References 32 and 33 not be cited.	
IEEE-23	C.1.1.2e	This section provides a restriction for test experience data that the tested equipment be so similar to each other (1/6 octave) that it becomes a one to one similarity qualification process. The basis of the requirement of 1/6 octave range for class definition natural frequency is very restrictive and not understood. If the plant's licensing basis (especially older operating plants) would allow data analyzed at 1/3 octaves then such criteria should also be acceptable for test experience data. Recommend deleting this discussion.	The use of 1/3 octave will miss the identification of the natural frequency of the equipment and devices especially in the high-frequency range. Thus, the final version of DG-1175 was changed both here and Sections 1.1.1 e and 1.2.1.f to clarify the concern is in the high frequency range. This is considered to be a consistent position with COL/DC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated with High Frequency Ground Motion in Design Certification and Combined License Applications"
IEEE-24	C.1.1.2g	This section states that median-centered horizontal in-structure response spectrum as the RRS for the candidate equipment is not acceptable. The median-centered RRS are not used with Test Experience Data and not referenced in sub-clause 10.3.4 of IEEE Std 344-2004. Recommend deleting this discussion.	The staff has reviewed the comment and agreed that subclause 10.3.4 does not identify the method of developing the in-structure response spectrum to be used with Test Experience Data. The staff has deleted this guidance in the final version of DG1175.
IEEE-25	C.1.1.2k	1.0 SUMMARY OF ISSUE The NRC in DG-1175 has recommended changes to the Coherence and Correlation limits on shake table testing performance that are contained in IEEE Std 344-1987 and IEEE Std 344-2004 versions. The following sections address our technical issue with the position in DG-1175	The staff reviewed the written comments and input from the public meeting. The staff has deleted this guidance.

		and provide the rational for why the values should not be changed. NRC comments on the following points are requested, as well as technical justification for the basis under which the NRC would recommend such reductions. 2.0 The current Coherence and Correlation limits have been used for over 20 years. This issue involves the performance of seismic shake tables with multiple degrees-of-freedom (DOF). In a biaxial table, for example the motion may be in the horizontal (X) direction and independently in the vertical (Z) direction. For reasons discussed below it is desired that the motion in these two directions not be too similar. That is they must have limited Correlation or Coherence. TECHNICAL BACKGROUND ON COHERENCE AND CORRELATION The Coherence function is a frequency dependent function describing the similarity of two signals on a frequency by frequency basis. By mathematical definition the Coherence function is real valued between 0.0 and 1.0. If two time histories, X and Y, have a Coherence Function of 1.0 for all frequencies of interest they are essentially identical and are totally "coherent". They are very similar. If they have a Coherence function of 0.0 for all frequencies of interest then they are very different and independent from each other (they are not coherent at all). If, for example, they have Coherence in a particular frequency range around 0.5 then they are somewhat similar to each other in this frequency range (somewhat coherent). For reasons discussed below IEEE-344 standard has held that the perpendicular motions on a shake table should have Coherence equal or less than 0.5 at all frequencies of seismic interest. (This typically means between 1 Hz and 33 Hz.) The Correlation Factor of two signals is related to the	

		Coherence Function mathematically but is a single real valued number between -1.0 and +1.0. Generally the absolute value of the Correlation Factor is used and it runs between 0.0 and 1.0. Again signals with a Correlation factor of 0.0 are very different and those with a Correlation factor of 1.0 are essentially identical. For reasons discussed below IEEE Std 344-2004 holds that the Correlation Factor between perpendicular motions on a shake table must be equal to or less than 0.3. IEEE Std 344-2004 specifies that either of these two above criteria must be met for the shake table test to be valid. That is: either the Coherence must be less than or equal to 0.5 at all frequencies of interest or the Correlation Factor need be less than 0.3. Both criteria need not be passed, just one or the other. This test must be done between all pairs of perpendicular motions on the shake table. For a biaxial table this refers to the X and Z directions. For a triaxial table this refers to the X and Z, X and Y (where Y is the other horizontal direction), and Y and Z directions. 3.0 TECHNICAL BACKGROUND ON EARTHQUAKE SUGGESTED LIMITS These requirements on Coherence and Correlation came from ASME Paper 83,PVP-22, "Suitability of Synthesized Waveforms for Seismic Qualifications" and others in the IEEE 344 WG. The concern leading to this work and suggested limits was that some early shake tables had certain inadequacies that could potentially lead to un-conservative testing. At the most extreme would be the attempt to present a Vector Biaxial table as a true Independent biaxial table. A Vector Biaxial table runs in a single direction (single axis, single DOF) but this axis is tilted with respects to the X and Z axes, for example. Hence such a table can produce both X and Z motion, but these two motions would be nearly	

		identical except for a scaling factor depending on the angle of tilt. In this case the XZ Coherence and Correlation would be nearly 1.0. Hence, the IEEE 344 standard limits would clearly invalidate calling such a table an independent triaxial table. (Note that IEEE 344 standard does allow the use of Vector Biaxial tables, but under limited conditions and with test level penalties that do not apply to Independent Biaxial tables.) A second and more subtle concern was that the dynamic stiffness or control system of an independent biaxial (or triaxial) table was insufficient and allowed either table resonances or test item resonance feedback to significantly distort the test motions. This could also occur if the artificial time histories generated to drive the table were inadequately prepared. If this was the case then it was possible that, in a certain frequency range, the X and Y motions could be independent but in the region near the resonances they would be dependent (similar). One can postulate certain cases for certain structures, where such similarity could cause an under test. That is the Test Response Spectra (TRS) measured on the table would, in both directions meet or exceed the Required Response Spectra (RRS), but that certain modes of test object vibration would not be sufficiently excited. Hence, the IEEE-344 WG felt that there must be some limitation on the amount of similarity allowed in a valid test. To answer what kind of limitation the ASME Paper 83-PVP-22 studied the actual correlation between several measured earthquake ground motions. It evaluated the Coherence Function and correlation Factor as these actual earthquakes, and concluded that actual earthquakes do in fact have some non zero values of these factors. The ASME Paper 83-PVP-22 then argued, and the committee and technical community at large eventually accepted, that the	

		restrictions placed on shake tables should be similar to the values found in these actual earthquakes. Review of the actual earthquake data suggested that the value of 0.5 for Coherence and 0.3 for Correlation were reasonable. Hence these factors are based on study of actual earthquake ground motion properties. The values of 0.5/0.3 are slightly rounded up averages of the actual earthquake motions in ASME Paper 83-PVP-22. These numbers and concepts are presented in Annex E of IEEE Std 344-2004 and earlier version. The recent NRC recommendations suggest that these limits should be reduced from 0.30 for Correlation Factor. In addition the NRC recommends a Coherence function between 0.0 and 0.3 with an average of 0.2. This reduced from the current IEEE Std 344-2004 requirement of 0.5. 4.0 FIRST REASON FOR NOR REDUCING THESE LIMITS As these limits reflect actual earthquake behavior, reducing the shake table limits further appears unfounded. Reducing these limits would, in a sense, make the shake table tests less "earthquake-like" not more. No reason has been presented why further reduction of the limits is needed, or why this would lead to a more conservative test. It is unlikely that this reduction would provide any significant increase in conservatism or quality of test. 5.0 IN-STRUCTURE SPECTRA - THE SECOND REASON FOR NOT REDUCING LIMITS The ASME Paper 83-PVP.22 study used actual ground motion data. Most equipment is tested to RRS computed in structures. The intervening structure often has resonances that significantly increase the energy content in a selected frequency bands. Further they often do so in all directions. Hence we are often faced	

		with RRS that have strong energy peaks at the same narrow frequency bands in both X and Y directions. These concentrated energy peaks correspond to time signals that are not quite sinusoidal and not fully random. Two sinusoidal or nearly sinusoidal signals at the same or nearly the same frequency are highly correlated. The signals required to match such RRS are, by their fundamental mathematical nature, more highly correlated than the more random ground motions. This phenomenon was recognized in ASME Paper 83-PVP-22. Hence, it becomes difficult, and in some cases, mathematically impossible to simultaneously match such peak RRS and also satisfy low Coherence/Correlation criteria. This is not the result of poor shake table performance. It is the mathematical result of how we process and generate RRS in the nuclear power industry. This issue has plagued IEEE 344 standard shake table testing for years and often made test validation very difficult if not impossible. A further and arbitrary (in our opinion) reduction in Coherence/Correlation limits would only exacerbate this issue to the point of rendering shake table testing impossible. This would be an unfortunate move as in fact the motions found in higher levels of a structure are, in real earthquake, more, not less correlated. Regulation should direct us to use more realistic earthquake motions, not less realistic or mathematically impossible ones. 6.0 ROTATED MOTIONS - THE THIRD REASON FOR NOT REDUCING LIMITS Consider a shake table in which the X and Y perpendicular motions have in fact, somehow, have been generated to have 0.0 Coherence and Correlation. Now consider the motion on this same table at the same	

		time in a set of coordinate's rotated 45 degrees to the X and Y axes. That is, consider two new motions A and B: A = (X + Y) / SQRT(2) B = (X - Y) / SQRT (2) What are the Correlations and Coherence of A and B, which are perpendicular to each other? Assuming X and Y (and hence A and B) are of approximately the same energy level as is typically the case, then the Correlation factor of A and B will be approximately 0.5. Hence when we contemplate trying to reduce the Correlation of shake table motions to near zero in the traditional X and Y axes, we need to remember that even if this task is achievable, the Correlation in a rotated set of axes on the same table will be significantly correlated. Since equipment placement, structural orientation, and direction of earthquakes are somewhat random, there is nothing sacred about the transitional X and Y axes. So in reality, for both real earthquakes and real shake table tests, the motions imparted into the test structure in fact will have and must be somewhat Correlated under some set of axes. This is true even if under a different set of axes the motion is highly uncorrelated. Therefore, we believe it is unreasonable to focus on extreme correlation limits in any one, arbitrary, set of axes. 7.0 PRACTICAL ISSUES - THE FOURTH REASON FOR NOT REDUCING LIMITS Hence real earthquakes are correlated and in-structure earthquakes are even more correlated than we are requiring of our shake tables.	

		Shake table construction and control has been evolving over the years. There are shake tables today that could, with some difficulty, provide lower correlated motions, as long as the limit of mathematical possibility is not crossed. However, there are a number of older shake tables that may not be able to provide lower correlation limits. It would be unfortunate to exclude these tables from performing valuable seismic testing for the nuclear industry based on an unsubstantiated limit reduction. 8.0 ADDITIONAL SUMMARY POINTS AND REFERENCES RELATED TO THESE LIMITS The NRC staff seeks to imposes, in DG-1175, more stringent limits in IEEE Std 344- 2004 Annex E. This suggested limitation and modification of the consensus standard is not consistent with the following sound technical bases identified by the IEEE 344 WG that developed IEEE 344-2004. a. The coherence function and the cross correlation coefficient were originally developed in ASME Paper 83-PVP-22 based on his review of several actual earthquakes. Some of actual earthquakes had factors higher than 0.5/0.3. The recommendation (0.5/0.3) is slightly higher than the average of the actual earthquake results and represents real data. b. The earthquakes in ASME Paper 83-PVP-22 were for free field ground motions. They were not for motions in buildings. ASME Paper 83-PVP-22 noted that ground motions after entering buildings were likely to be more (not less) correlated, due to the multi-directional contribution of many structural modes of vibration. Therefore, it is reasonable to expect that motions on upper floors of a structure will be more, not less, correlated than 0.5/0.3. c. It is unrealistic and nearly impossible to have two real	

		narrow band floor spectra to be less correlated than 0.5/0.3. Requiring motions to have less correlation is unrealistic and mathematically approaching unrealizable d. We have not identified any studies that suggest that a correlation less than 0.5/0.3 results in a significantly more severe test. With current seismic shake tables it will be very difficult, if not impossible, to achieve significantly less than 0.5/0.3. This is caused by a combination of table design/control limitations and the difficulties mathematically in achieving the task. Lowering the 0.5/0.3 criteria would reduce the current seismic test capacity and not achieve any better results. e. The commenter cites regulatory Guide 1.92 revision 1 as providing the NRC staff's position related to the unacceptable nature of using a coherence function of less than 0.5 and cross correlation coefficient of 0.3." Regulatory Guide 1.92, Revision 1 "Combining Modal responses and Spatial Components in Seismic Response Analysis" states In footnote 2 that when using the Time-History Analysis Method, "the earthquake motions specified in the three different directions should be statistically independent. For a discussion of statistical independence, see Reference 6." The reference referred to is a paper in the February 1975 edition of the Journal of the Structural Division, ASCE titled "Definition of Statistically Independent Time Histories." Regulator Guide 1.92 Revision 1 itself does not establish a limiting value for coherence or cross correlation. ASCE standard 4-98 on seismic analysis of safety-related nuclear structures has the following requirement in Section 2.3 on time history input to structures: *“When responses from three components of motion are calculated simultaneously on a time history basis, the input motions in the three orthogonal directions shall be*	

		statistically independent and the time histories shall be different. Shifting the starting time of a single time history shall not constitute the establishment of a different time history. Two time histories shall be considered statistician independent if the absolute value of the correlation coefficients does not exceed 0.3." ASCE standard is an industry consensus standard for seismic analysis of safety- related nuclear structures and is in agreement with the intent of information provided in IEEE Std 344-2004 Annex E.	
IEEE-26	C.1.2.1d	In subsection (1) of C.1.2.1d the word "credibility" is used. This word may imply a negative bias and is not suggested for use in a regulatory position document. The following is recommended: 1) The wording "the credibility and" be removed. The remaining wording is sufficient. Or 2) Change to the following: (1) seismic experience data for its completeness and the information that would be generated in the process of establishing evidence of qualification.	See IEEE-11
IEEE-27	C.1.2.1e	This subsection as written seems to impose new requirements practice of seismic testing selected items to qualify a family of similar items in accordance with QR-A7200 (Qualification by Testing, note that ASME QME has a typographical error and QR-A7200 is mislabeling Qualification by Analysis) of ASME QME-1-2007.If so, this is a change from traditional seismic qualification methods on the common used in the past. It is recommended that the statement be further clarified to better define the intent of this subsection and the relationship to similarity method defined in QR-A7300 (Qualification by Similarity) of ASME QME-1-2007 or be deleted. This section should continue to allow the	See IEEE-15

		industry to qualify similar equipment without requiring prior NRC approval.	
IEEE-28	C.1.2.1f	Seismic qualification of equipment should be deformed over the frequency range of interest. DG-1175 wording does not allow a limit lower than 33 Hz to be performed but mandates a higher cutoff is required by the RRS of a specific plant. There may be instances where a lower cut-off would be allowed by a site specific RRS and therefore should be allowed. That is why the ASME QME standard uses the following wordings "...over the frequency range of interest (typically, 1 Hz to 33 Hz)." The ASME QME-1-2007 wording is appropriate. It is recommended that this statement be reworded or deleted.	See IEEE-16
IEEE-29	C.1.2.1g	This section excludes the use of previous testing to address high frequency concerns because the high frequency motions were not intentionally input to the test. An assessment of the sufficiency of the input waveform should be conducted on the basis of a measurement as defined in ASME QME-1-2007 QR-A7232 or IEEE 344- 2004 Annex B. That will determine whether the component has adequately challenged in all frequency ranges. The origins of the energy input to the test (ball joints and kinematic linkages) are immaterial. DG-1175 does not consider the unintentional vibration due to test table mechanical characteristics to be adequate to meet this requirement even if the ASME QME-1-2007 QR-A7232 or IEEE 344-2004 Annex B frequency content and stationarity requirements are met. The current requirements to demonstrate frequency content and stationarity over the amplified portion of the RRS are adequate, regardless of whether	See IEEE-17.

		the test table vibrations are intentional, unintentional, or a combination of the two. Recommend this section be revised to require the high frequency motions to be evaluated in accordance with ASME QME-1-2007 QR-A7232 or IEEE Std 344-2004 Annex B.	
IEEE-30	C.1.2.1j	The statement "Active mechanical equipment should be qualified with five one-half SSE events followed by one full SSE event (SECY-93-087) even if the OBE of a plant is defined to be one-third of SSE or less," should be deleted since the statement as-is creates a situation where currently acceptable testing may be rendered unacceptable. The DG-1175 position does not recognize that some plants are licensed with an OBE that is greater or less than one-half the SSE. The plant licensing basis should define whether the OBE is one-third or one-half of the SSE, or has no relationship to the SSE. The SECY-93-087 document specifically addressed Light-Water Reactors (ALWRS), for which the OBE was eliminated as a design case by making it one-third of SSE or less. The five one-half SSEs provision in SECY-93087 is intended for ALWR applications. It is also noted that the DG-1175 phrase "...even if the OBE of a plant is defined to be one-third of SSE or less" is not in SECY-93-087. The OBE tests in IEEE 344 standard are intended to simulate vibratory aging effects for conditions where plant operation is expected to proceed without requiring shutdown. Recommend this section be revised to reflect that the OBE amplitude should be based on the applicable plant licensing requirements.	The statement is revised for clarification. *"For NPPs that were licensed with the elimination of the OBE, active mechanical equipment should be qualified with five one-half SSE events followed by one full SSE event or, alternatively, a number of fractional peak cycles equivalent to the maximum peak cycles for five one-half SSE events in accordance with Annex D of IEEE 344-2004 when followed by one full SSE (SECY-93-087) even if the OBE of a plant is defined to be one-third of SSE or less. For other reactors, the staff will review the seismic qualification based on the OBE level in accordance with the licensing basis."*

IEEE-31	C.1.2.2a	The specified damping values in a plant licensing basis may be higher or lower than those specified in table QR-A6210-1 or Regulatory Guide 1.61, Revision 1. This subsection should be revised to note that the specified damping values should be in accordance with the plant licensing basis or otherwise determined from testing.	The statement is revised for clarification. "*The damping values used in analysis should be in accordance with the damping values listed in Table 6 of NRC Regulatory Guide 1.61, Revision 1, "Damping Values for Seismic Design of Nuclear Power Plants," (Ref. 31) issued in March 2007, or as approved in the plant licensing basis. Damping values other than those provided in the plant licensing/design basis or RG 1.61 may be used, subjected to staff review and approval, if documented test data supports the higher values."*
IEEE-32	C.1.2.2b	Since the Earthquake Experience Spectrum (EES) is based on free field ground motions, and ignores in-structure and in-line amplification at the earthquake site, it is reasonable and conservative to use the demand spectra at the distribution system support location. Further complications of accounting for in-line amplification of the earthquake site facility and the nuclear facility add unnecessary complexity to the qualification. In addition, the nature of the in-line mechanical equipment being discussed is that these equipment classes have adequate variety within the class (supports, frequencies, configurations, etc.) to establish that the in-line amplification is already accounted for within the class. This criterion is adequately addressed in ASME QME-1-2007, and no additional restrictions are required. Therefore, this subsection should be deleted.	The staff disagrees. For piping design, the piping system could be relatively flexible to account for thermal expansion. Due to the flexibility, the amplification of the seismic motion at the equipment location could be very significant depending on the location of the active equipment.

IEEE-33	C.1.2.2d	ASME QME Section QR-A7421 already requires items susceptible to low cycle fatigue failures be evaluated in accordance with QR-A6800, Fatigue and Aging Considerations. The OBE evaluation is performed to consider aging, and it is not required to demonstrate functionality during the OBE. This criterion is adequately addressed in ASME QME-1-2007, and no additional restrictions are required. Therefore, this subsection should be deleted.	See IEEE-20.
IEEE-34	C.1.2.2h	The capacity derived from earthquake experience many samples. It is appropriate to compare it to an “average” demand such as median-centered. It would also be overly consecutive to require the RRS be developed using normally conservative analytical approaches in RG 1.122 and also implement the conservative assumption of the ground motion for the experience data earthquakes to represent the capacity for the class. In a manner similar to modern code development there should be relative consistency in margin between all approaches. Therefore, the use of conservatively calculated demand (e.g., RG.1.122) is inappropriate. This criterion is appropriately addressed in ASME QME-1-2007 and no additional restrictions are required. Therefore, this subsection should be deleted.	See IEEE-21
IEEE-35	C.2	This entire section seems out of place in a seismic qualification document. This material addresses functional qualification and may be a better fit in Regulator Guide (RG) 1.148, "Functional Specification for Active Valve Assemblies in Systems Important to safety in Nuclear Power Plants." RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. Although the ANSI standard by itself does not provided complete	See IEEE-10

		assurance of operability, there is an overlap between DG-1175 and RG 1.148 for functional qualification of active valves. Recommend that functional qualification of active mechanical components (which have no direct bearing on seismic qualification) should be discussed in a revision to RG 1.148 and the RG 1.100 should only provide guidance for seismic qualification of electric and mechanical equipment. Therefore, Section 2. (Functional Qualification of Active Mechanical Equipment) and the title for this document should revert back to "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear power Plants."	
NEI-1	General	The draft RG title and scope have been changed to include functional qualification of active mechanical equipment, as compared to the two previous revisions of RG 1.100 which only discussed seismic qualification of electrical and mechanical equipment. This change is because the RG now endorses ASME QME-1-1994, which covers functional qualification of active mechanical equipment. The main discussion on pages 5 through 8 of the DG is for active, motor-operated valves. It is noted that RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. Although the ANSI standard by itself does not provided complete assurance of operability, there is an overlap between DG-1175 and RG 1.148 for functional qualification of active valves. It is recommended that functional qualification of active mechanical components (which have no direct bearing on seismic qualification) should be discussed in a revision to RG 1.148. RG 1.100 should focus solely on guidance for seismic qualification of electric and mechanical equipment. Remove functional qualification of active mechanical equipment from this DG (address in RG 1.148) such	See IEEE-10

		that RG 1.100 focuses solely on guidance for seismic qualification of electric and mechanical equipment. If this is not done, reconcile the overlap between DG-1175 and RG 1.148 in another manner.	
NEI-2	Page 4, (4th para from top–"Large…") C.1.1.1 b C.1.1.2b,c	In the SERs that NRC sent to the USI A-46 plants in the past, it was stated that older vintage plants could use the experience-based SQUG-GIP method for seismic verification of new and replacement equipment provided they revised their licensing bases. Many older plants are currently using the SQUG-GIP method. The DG is silent on this. Add a sentence at the end of this paragraph to this effect: "However, older vintage plants can, with a few exceptions, use the experience-based SQUG-GIP method for seismic verification of new and replacement equipment provided they revise their licensing bases via safety evaluations." Alternatively, reconcile the fact in the DG that NRC has previously accepted earthquake experience-based qualification of new/replacement equipment in older plants.	The staff has reviewed the comment. The statement in B.1 indicated that the use of experience data was feasible for the purpose of verifying equipment seismic adequacy for the older vintage USI A-46 plants. For clarification, the staff added "*The staff does not accept the use of SQUG guidelines for seismic qualification of equipment in non USI A-46 plants licensed under 10 CFR Part 50 or in plants licensed under 10 CFR Part 52.*"
NEI-3	B.1	The middle of the 5th paragraph in Section B.1 says "Some solid-state relays and microprocessor-based components are quite fragile in terms of withstanding earthquake excitations." This is specifically counter to testing experience and counter to the experience of the April 8 IEEE SC2 meeting attendees who were not aware of any experience showing solid-state relays and microprocessor-based components to be particularly vulnerable to earthquake motions. This sentence should be deleted as well as the following sentence based on this conclusion.	See IEEE-13

NEI-4	B.1	The end of the 5th paragraph in Section B.1 says “Third, since no new NPPs were built after the early 1980s, a number of manufacturers for electric or active mechanical equipment are no longer in business, and the appropriateness of using the test experience of old equipment made by manufacturers no longer in business for the seismic qualification of modern equipment designs made by different manufacturers is highly questionable.” This specific concern is addressed in IEEE 344 Section 10.3.4h and ASME QR-A7432(a); therefore, this concern is not valid for items qualified in accordance with the two standards. This sentence should be deleted.	See IEEE-3.
NEI-5	B.1 C.1.1.1g C.1.2.1g	The high frequency content, which exists in most existing tests, whether inadvertent or deliberate, will still be imparted to an item on equipment on the shake table. Therefore, high frequency vibratory motions generated on a shake table in an inadvertent manner can be of significance. The DG should clarify that such inadvertent motions can be credited provided they are shown to meet stationarity requirements per Appendix B of IEEE Std 344-1987 or 2004 (when one of these versions of the IEEE Standard is the plant’s commitment). However, in IEEE Std 344-1975, there was no requirement for stationarity check. For example, previous seismic shake tests for BWR Mark II and III plants (committed to the 1975 version of the standard) were frequently utilized to qualify equipment for the combined seismic and hydrodynamic loads with high frequency content up to 100 Hz and were accepted by the NRC staff in SQRT audits. Revise to require the high frequency motions to be evaluated in accordance with QR-A7232 or IEEE 344 Annex B, Frequency Content and Stationarity.	See IEEE-5 and IEEE -17

NEI-6	B.1 C.1.1.1i C.1.2.1j	In the last sentence of this paragraph, it says that the test sample shall be subjected to simulated OBE and SSE vibrations. per IEEE Std. 344-2004. In section C.1.1.1i (p. 10) two alternatives for the number of tests/cyclic considerations are provided. However, another alternative when OBE is defined as 1/3 or less of SSE is to use two SSE events (with 10 maximum stress cycles per event) in accordance with SRP 3.7.3 (p. 4), March 2007. The SRP considers this alternative to be equivalent to the cyclic load basis of one SSE and five OBEs. This alternative can save testing duration and should also be listed. Revise these sections to include an option that 2 SSE tests, as an alternative to 5 OBE and 1 SSE are also acceptable when the OBE is designated as 1/3 or less of the SSE.	See IEEE-18 and IEEE-30
NEI-7	C.1.1.1c	This paragraph repeats the inappropriate conclusion that solid-state relays and microprocessor-based components are fragile and suggests that test-based experience performed in accordance with IEEE 344 requirements (per Section 10.3) does not adequately qualify chatter sensitive equipment. Both of these comments are incorrect. These sentences should be deleted	See IEEE-13
NEI-8	C.1.1.1d	This paragraph as written seems to impose new requirements on the common practice of testing selected items to qualify a family of similar items in accordance with IEEE 344 Section 8. This section should be deleted or rewritten.	See IEEE-15

NEI-9	C.1.1.1f, C.1.2.1f	This section states: “The NRC staff does not generally find it acceptable to restrict the frequency range of testing up to 33 Hz. The frequency range should be continued beyond 33 Hz, in accordance with the RRS of a specific plant.” This last sentence could be reworded to provide more clarity. Reword second sentence to read as follows: “For RRS with ZPA frequency in excess of 33 Hz, the frequency range of testing should be accordingly extended to match the RRS.”	See IEEE-16
NEI-10	C.1.1.1i	This section requires that the OBE amplitude be set to 1/2 the SSE, even if the plant license OBE is 1/3 of the SSE. The OBE qualification level should be based on the plant license.	See IEEE-18
NEI-11	C.1.1.1j	The IEEE Std. 344-2004 has a section on damping. While the damping values in RG 1.61 can be used when qualification is by analysis, there should be no specific requirement on damping values to be used for shake-testing, only that the equipment damping at which the RRS is developed should be the same or lower than the TRS damping value. This is not mentioned. Clarify the statement in this section that for qualification by shake-table testing, RRS with any reasonable damping value (such as 5% of critical damping) can be used provided that the TRS is also plotted at the same damping value or a higher damping value.	See IEEE-19
NEI-12	C.1.1.2a	IEEE 344 Sections 10.2.3.1 and 10.3.3.1 provide specific criteria for addressing low-cycle loads. Five OBE tests, or actual earthquakes at the same site, are not the only permitted methods to evaluating low-cycle loads. The standard as written properly imposes those requirements on the qualification.	See IEEE-20

		The section should be deleted.	
NEI-13	C.1.1.2c	The capacity spectra are based on a weighted average of the ground motions, neglecting the in-structure amplification from the experience sites. Therefore, the use of median centered demand spectra results in a conservative capacity/demand comparison. The section should be deleted.	See IEEE-21
NEI-14	C.1.1.2d	Application of the concepts in References 32 and 33 would dramatically revise current qualification practices. For example, the 1.4 factor would have to be applied to every test qualification performed in accordance with IEEE 344 Section 8. The mixing and mismatching of these criteria between the goals of IEEE 344 and References 32 and 33 would need careful consideration and would need to be consistently applied throughout the qualification standard. The criteria in References 32 and 33 need to be deleted from this Section or applied consistently throughout IEEE 344. Without substantial further study, it is recommended that the concepts in references 32 and 33 not be incorporated.	See IEEE-22
NEI-15	C.1.1.2g	This section says that you can not use median centered demand spectra for comparison with the TES. IEEE 344 10.3.4b already requires the use of computed in-structure spectra for the demand as opposed to 10.2.4b which specifies median-centered spectra for comparison with the EES). The section should be deleted.	See IEEE-24

NEI-16	C.1.1.2k	This section requires changing the coherence criteria to lower values. This was discussed in the IEEE 344 Working Group and rejected on sound technical bases as follows: The Working Group believes the criteria established in Annex E are acceptable. Our reasons for objecting to the suggested change are noted below: 1. The coherence function and cross correlation coefficient were originally developed by Kana based on his review of several actual earthquakes. Some of the actual earthquakes had factors higher than 0.5/0.3. The recommendation (0.5/0.3) is slightly higher than the average of the actual earthquake results and represents real data. 2. The earthquakes that Kana used were for free-field ground motions. They were not for motions in buildings. Kana noted that ground motions after entering buildings were likely to be more (not less) correlated, due to the multi-directional contribution of many structural modes of vibration. Therefore, it is reasonable to expect that motions on upper floors of a structure will be more, not less, correlated than 0.5/0.3. 3. It is unrealistic and nearly impossible to have two real narrow band floor spectra to be less correlated than 0.5/0.3. Requiring motions to have less correlation is unrealistic and mathematically approaching unrealizable. 4. We have not identified any studies that suggest that a correlation less than 0.5/0.3 results in a significantly more severe test. With current seismic shake tables it will be very difficult, if not impossible, to achieve significantly less than 0.5/0.3. This is caused by a combination of table design/control limitations and the difficulties mathematically in achieving the task.	See IEEE-25

		Lowering the 0.5/0.3 criteria would reduce the current seismic test capacity and not achieve any better results. 5. The commenter cites Regulatory Guide 1.92 Revision 1 as providing the NRC staff's position related to the unacceptable nature of using a "coherence function of less than 0.5 and cross correlation coefficient of 0.3." Regulatory Guide 1.92, Revision 1 "Combining Modal Responses and Spatial Components in Seismic Response Analysis" states in footnote 2 that when using the Time-History Analysis Method, "the earthquake motions specified in the three different directions should be statistically independent." For a discussion of statistical independence, see Reference 6. The reference referred to is a paper in the February 1975 edition of the Journal of the Structural Division, ASCE, titled "Definition of Statistically Independent Time Histories." Regulatory Guide 1.92 Revision 1 itself does not establish a limiting value for coherence or cross correlation. ASCE standard 4-98 on seismic analysis of safety-related nuclear structures has the following requirement in Section 2.3 on time history input to structures: "*When responses from three components of motion are calculated simultaneously on a time history basis, the input motions in the three orthogonal directions shall be statistically independent and the time histories shall be different. Shifting the starting time of a single time history shall not constitute the establishment of a different time history. Two time histories shall be considered statistically independent if the absolute value of the correlation coefficient does not exceed 0.3*." The ASCE standard is an industry consensus standard for seismic analysis of safety-related nuclear structures and is in agreement with the intent of information provided in IEEE 344 Annex E. 6. The commenter goes on to state that the NRC staff's	

		position on the numerical values for the cross correlation coefficient and the coherence function for defining statistically independent motions are also reflected in Section N-1213.1 of Appendix N of the ASME Section III Code. N-1213.1 states that: "The peak acceleration of the three orthogonal synthetic time histories generally need not occur at the same time. In order to simulate natural earthquake occurrences, the correlation of the synthesized time histories may be evaluated by calculating the cross correlation coefficients and the coherence functions. The artificially generated time histories are acceptable if both their cross correlation coefficients and their coherence functions are approximately equal to the respective functions for past earthquake records. An absolute value of the correlation coefficient less than 0.16 is acceptable. For the coherence function the numerical values ranging between 0.0 and 0.3 with an average of approximately 0.2 are acceptable." Note that this section of the appendix does not prohibit use of coefficients higher than 0.16 or 0.3 and focuses on the goal to have synthetic time histories that are representative of past earthquakes. The current version of IEEE 344 (to which the NRC did not object in Regulatory Guide 1.100) was based on the study of actual earthquakes.	
NEI-17	C.1.2.1d	This section discusses "similarity" between the excitation documented in the experience database and the required seismic excitation. The term "similarity" is too strong as the only spectrum comparison requirement should be that the RRS be enveloped by the test spectrum used in the experience database. Suggest deleting the last part of the last sentence that starts with "as well as similarity between…." Add a sentence to read as follows: "Additionally, the test response spectrum documented in the experience database shall exceed the RRS."	The staff reviewed the comments and acknowledged IEEE 344-2004 provided guidance on this issue. The discussion has been deleted in the final version of DG1175.

NEI-18	C.1.2.1e	This paragraph as written seems to impose new requirements on the common practice of testing selected items to qualify a family of similar items (e.g. valve actuators) in accordance with ASME QME QR-A7200. This section should deleted or rewritten.	See IEEE-15
NEI-19	C.1.2.1j	This section requires that the OBE amplitude be set to 1/2 the SSE, even if the plant license OBE is 1/3 of the SSE. The OBE qualification level should be based on the plant license.	See IEEE-18
NEI-20	C.1.2.2b	Since the EES is based on free field ground motions, and ignores in-structure and in-line amplification at the earthquake site, it is reasonable and conservative to use the demand spectra at the distribution system support location. Further complications of accounting for in-line amplification of the earthquake site facility and the nuclear facility add unnecessary complexity to the qualification. This section should be deleted.	See IEEE-32
NEI-21	C.1.2.2d	QME Section QR-A7421 already requires items susceptible to low cycle fatigue failures be evaluated in accordance with QR-A6800, Fatigue and Aging Considerations. This section should be deleted.	See IEEE-33
NEI-22	C.1.2.2h	The capacity spectra are based on a weighted average of the ground motions, neglecting the in-structure amplification from the experience sites. Therefore, the use of median centered demand spectra results in a conservative capacity/demand. This section should be deleted.	See IEEE-21

NUGEQ-1	B.1, C.1.2.1i	<u>Do Not Impose OBE/SSE Testing for Equipment Also Exposed to Harsh Environments</u> *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."* <u>NUGEQ Comment:</u> 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:	For section B.1 paragraph 6, the statement "*The NRC staff has two other concerns as well…… in accordance with IEEE Std 344-2004"* has been deleted in the final version of DG-1175. For C.1.2.1i, The staff reviewed the comments and agreed that the use of experience-based methods for equipment exposed to harsh environment, or aging are limited as indicated in Limitations of IEEE Std 344-2004 Clause 10.4.2 (f) and ASME QME-1-2007 Section QR-A7432 (e). This guidance has been deleted in the final version of DG-1175.

		"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? <u>NUGEQ Recommendation:</u> 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.	
NUGEQ-2	B	<u>Regulatory Guide 1.100 Scope - Limit to Seismic/Dynamic Qualification</u> *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."* <u>NUGEQ Comment:</u> 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.	The NRC staff plans to withdraw Regulatory Guide (RG) 1.148 after this revision to RG 1.100 is finalized. RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. In the Foreword of ASME QME-1-2007, it was explained that the ANSI N45 Committee's valve task force (N278) was reassigned to the ASME QME in 1982 and designated the Subcommittee on Qualification of Valve Assemblies. In addition, ANSI N278.1 has not been updated since 1975 and the staff believes that there is no need to revise RG1.148. Endorsing the ASME QME-1-2007, which incorporated all the lesson-learned and operating experience of active mechanical equipment, for functional qualification is appropriate and prudent.

		<u>NUGEQ Recommendation:</u> 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.	
NUGEQ-3	General	<u>Regulatory Analysis Fails to Evaluate Differences in DG-1175 and SRP 3.9.6</u> *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."* <u>NUGEQ Comment:</u> 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	Contrary to the NUGEQ comment, there are no significant differences between the functional qualification provisions of ASME Standard QME-1-2007 and the March 2007 revision of Standard Review Plan (SRP) Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints." Both QME-1 and SRP Section 3.9.6 were revised in response to lessons learned from valve performance experience at current operating nuclear power plants, and through NRC and industry research programs. Section B.2 in Draft Guide DG-1175 discusses the valve performance experience that resulted in the preparation of QME-1-2007 and the revision to SRP Section 3.9.6. SRP Section 3.9.6 Acceptance Criterion II.1.B on page 3.9.6-8 states that functional design and qualification of each safety-related pump and valve should be accomplished such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under all conditions ranging from normal conditions to design-basis accident conditions. The SRP Section 3.9.6 acceptance criteria are consistent with the provisions in QME-1-2007 to demonstrate that pumps and valves are capable of performing

		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.	their design-basis functions. The ASME Standard QME-1-2007 represents one acceptable method to satisfy the acceptance criteria in SRP Section 3.9.6 for the functional design and qualification of pumps, valves, and dynamic restraints, consistent with DG-1175. The NRC staff will evaluate Design Certification applications and COL applications based on the SRP Section 3.9.6 acceptance criteria for the functional design and qualification of pumps, valves, and dynamic restraints. The ASME Standard QME-1-2007, as addressed in DG-1175, provides an efficient and effective approach for satisfying the SRP Section 3.9.6 acceptance criteria. Compliance to the provisions and guidance is optional. The NRC staff will also consider other approaches for the functional design and qualification of pumps, valves, and dynamic restraints proposed by Design Certification and COL Applicants in meeting the SRP Section 3.9.6 acceptance criteria.
NUGEQ-4	C2.1.1a	NRC Should Not Dictate Compliance with Nonmandatory Appendices *2.1.1 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-*	The staff agreed that Mandatory Appendices contained provisions must be followed. Compliance of Nonmandatory Appendices, which provided information or guidance, is voluntary. The statement is revised to clarify. *“The staff position is that, if a licensee commits to the use of non-mandatory appendices in ASME*

		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." <u>NUGEQ Comment:</u> 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	*QME-1-2007 for its qualification of active mechanical equipment in NPPs, then the criteria and procedures delineated in those non-mandatory appendices become part of the requirements for its qualification program, unless specific deviations are requested and justified."*

		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 DG-1175 – NUGEQ Comments 5 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."	
NUGEQ-5	C.2.1.1a	Nonmandatory Appendix QR-B Not Appropriate for All Equipment *2.1.1 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-*	The staff agreed that Mandatory Appendices contained provisions that must be followed. Compliance of Nonmandatory Appendices, which provided information or guidance, is voluntary. However, if a user commits to use QR-B for its qualification of active mechanical equipment in NPPs, all the criteria and

		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.” <u>NUGEQ Comment</u>: 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,	procedures that delineated in both the Mandatory Appendices and QR-B then become the requirements for its qualification program. Justification must be provided for any deviations, which will be subjected to NRC staff review and approval.

		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 DG-1175 – NUGEQ Comments 6 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. <u>NUGEQ Recommendation:</u> 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.	
WEC-1	B.1	*"Specifically, Sections B. 1 and C. 1 of this regulatory guide endorse, with exceptions and clarifications, the entire IEEE Std 344-2004 and Section QR "General Requirements," and Nonmandatory Appendix QR-A, "Seismic Qualification of Active Mechanical Equipment," of ASME QME-1 -2007 for the seismic qualification of electrical and active mechanical equipment, respectively."* <u>Comment (Editorial)</u> The word "respectively" should be deleted since there are more than two documents and all of the documents	The staff revised the statement for clarification.

		can be used in the seismic qualification of active mechanical equipment. <u>Recommended Change</u> Delete the word "respectively."	
WEC-2	B.1	*"Some solid-state relays and microprocessor-based components are quite fragile in terms of withstanding earthquake excitations."* <u>Comment</u> The following statement in our opinion has not been the case. "Some solid-state relays and microprocessor-based components are quite fragile in terms of withstanding earthquake excitations." We are not aware of any seismic issues that involve solid state relays. There are no solid-state relays and microprocessor-based components which we would consider fragile. The concern with microprocessors may be related to the connections to the buses and interfaces. <u>Recommended Change</u> The statement on solid state relays and microprocessors being sensitive should be deleted.	See IEEE-13
WEC-3	B.1	*"Recent studies related to the early site permit applications at certain hard-rock based plants along the east coast of the United States indicated that the site-specific spectra may exceed the certified design spectra of those new plants in the high-frequency range (20 hertz (Hz) and above)."* <u>Comment</u> DG-1175 defines high-frequency range as 20 Hz and above. It is understandable that an upper bound was not defined because it is dependent on the cutoff frequency of the hard rock site. The NRC should add a statement in this section to clarify. <u>Recommended Change</u> Further clarification should be added on how the upper limit to the high-frequency range should be defined.	See IEEE-8

WEC-4	B.1	*"Therefore, any attempt to use such past test experience data for the seismic qualification of high-frequency-sensitive equipment or fragile components in such plants clearly is not appropriate."* Comment This section excludes the use of previous seismic testing to address qualification of for high frequency sensitive equipment or fragile components because the high frequency motions were not intentionally input to the test. DG-1175 Section C. 1.1.1 .h specifies how new seismic qualification tests planned for equipment in plants with the high-frequency ground motion concern should be addressed. The criteria specified are already in IEEE Std 344-2004. Therefore, seismic test programs in compliance with IEEE Std 344-2004 (including seismic test motion) which have sufficient frequency content in the high-frequency range demonstrated through power spectral density (PSD) analysis should be acceptable. It is unclear why does DG-1 175 call out "fragile components" and what is the definition? Recommended Change Update section to allow pass seismic test data to permitted for addressing high frequency conditions as provided the data is in compliance with IEEE Std 344-2004 and demonstrates sufficient frequency content in the high-frequency range. Provide addition information as to the definition and usage of the term "fragile components."	See IEEE-5
WEC-5	B.2	Comment DG-1175 Section B.2 provides information associated with functional qualification of active mechanical equipment. Regulatory Guide (RG) 1.148 also provides information on functional specification of active valves and primarily endorses ANSI N278.1-1975. Functional qualification of active mechanical equipment discuss in DG-1 175 may be better suited for RG 1.148 since it presently exists. Recommended Change	See IEEE-10

		Recommend that functional qualification of active mechanical components not related to seismic qualification be discussed in a revision to RG 1.148. RG 1.100 should only provide guidance in the area of seismic qualification of electric and mechanical equipment. DG-1 175 Section B.2 (Functional Qualification of Active Mechanical Equipment) should be removed and the title of DG-1 175 should revert back to "Seismic Qualification of Electrical and Mechanical Equipment for Nuclear Power Plants."	
WEC-6	C.1.1.1c	*"(2) fragile electronic components, such as solid-state relays and microprocessors-based components;..."* Comment The phrase "fragile electronic components" in our opinion has not been observed in the seismic qualification of solid-state relays and microprocessor-based components. There are no solid-state relays and microprocessor-based components which we would consider fragile. The concern with microprocessors may be related to the connections to the buses and interfaces. Recommended Change The condition "(2) fragile electronic components, such as solid-state relays and microprocessors-based components: should be deleted.	See IEEE-13
WEC-7	C.1.1.1g	*"Furthermore, credit should not be taken for the inadvertent high frequencies present in some of the IEEE-344-type seismic qualification tests of equipment in the past, which may have shown the ZPA of the TRS to be up to 100 Hz."* Comment Request further clarification as to why this position is taken in DG-1 175. As written the statement would exclude the use of previous testing to address high frequency concerns since the test motion did not intentionally require input in the high frequency range. If an evaluation of the test input is performed and the data	See IEEE-17

		demonstrate sufficient frequency content in the high-frequency range throughout the time history through PSD analysis then the data should be acceptable. This approach is consistent with regulatory guidance in Section C. 1.1.1 h (also Section C.1.2.1h). We believe IEEE Std 344-2004 provides sufficient guidance to ensure that the input is generated and in compliance with the frequency range of interest. IEEE Std 344-2004 Annex B defines how to verify the test data has sufficient content over the frequency range of interest throughout the input time history. Recommended Change Clarify that the subject test data is not acceptable unless further evaluation is performed and data generated to demonstrate there is sufficient frequency content over the frequency range of interest.	
WEC-8	C.1.1.1i	*"Electric equipment should be qualified with five one-half SSE events followed by one full SSE event (SECY-93-087) (Ref. 28) even if the OBE of a plant is defined to be one-third of SSE or less. Alternatively, a number of fractional peak cycles equivalent to the maximum peak cycle for five one-half SSE events may be used in accordance with Annex D, "Test Duration and Number of Cycles," to IEEE Std 344-2004, when followed by one full SSE."* Comment The DG-1175 position does not recognize that some plants are licensed with an OBE that is greater or less than one-half SSE. The document SECY-93-087 addressed issues affecting Advanced Light-Water Reactors (ALWRs), for which the OBE eliminated from design certification when the OBE is established at less than or equal to one-third the SSE. It also states the following: *"With the elimination of the OBE, two alternatives exist that will essentially maintain the requirements provided in IEEE Standard 344-1987 to qualify equipment with the equivalent of five OBE events followed by one SSE*	See IEEE-18

		event (with 10 maximum stress cycles per event). Of these alternatives, the staff concludes that equipment should be qualified with five one-half SSE events followed by one full SSE event. Alternatively, a number of fractional peak cycles equivalent to the maximum peak cycles for five one-half SSE events may be used in accordance with Appendix D of IEEE Standard 344-1987 when followed by one full SSE." <u>Recommended Change</u> This section should be updated to identify the present wording is associated with qualification of equipment for new plant designs. Wording should also be added to identify for other applications the OBE requirement is based on plant specific licensing requirements. [For Section C.1.2.1j, Page 14 the recommended change is applicable to active mechanical equipment.]	
WEC-9	C1.1.1j	*"The IEEE Std 344-2004 recommended no damping values. The damping values listed in Table 6 of NRC Regulatory Guide 1.61, Revision 1, "Damping Values for Seismic Design of Nuclear Power Plants," (Ref. 29) issued in March 2007, are recommended. These damping values are the updated values currently acceptable to the NRC staff."* <u>Comment</u> DG-1175 is recommending use of NRC Regulatory Guide 1.61, Revision 1 damping values. This is not appropriate since older plants as well as AP1000 uses damping values consistent with Regulatory Guide 1.61, Rev. 0. In addition, IEEE Std 344-2004 sub-clause 6.3.1 (Application of damping in analysis) identifies "Appropriate values of damping may be obtained from tests or other justifiable sources." IEEE Std 344-2004 sub-clause 6.3.2 (Application of damping in testing) and 8.6.1.3 (Damping selection) identify for testing "The RRS are usually specified at several levels of damping. When available, the RRS with a damping of 5% is the recommended choice for use in testing." <u>Recommended Change</u>	See IEEE-19

		This section should be reworded to indicate the version of Regulatory Guide 1.61 as included in the plant licensing basis. This sentence dealing with damping in IEEE Std 344-2004 should also be deleted.	
WEC-10	C.1.1.2k	"A coherence function of less than 0.5 and an absolute value of the correlation coefficient function of less than 0.3 are not acceptable. The NRC positions on the numerical values for the coherence function and the correlation coefficient function for defining statistically independent motions are the same as in Reference 34, particularly the following: **i.** For the coherence function, numerical values ranging from 0.0 to a maximum of 0.3 and an average of approximately 0.2 are acceptable. ii. An absolute value of less than 0.16 for the correlation coefficient function is acceptable." Comment The coherence function and correlation coefficient limits appear to be restrictive. IEEE Std 344-2004 and IEEE Std 344-1987 specifies that either coherence function and correlation coefficient limits criteria must be met for the shake table test to be valid. That is: either the coherence function must be less than or equal to 0.5 at all frequencies of interest or the correlation coefficient need be less than 0.3. Both criteria need not be passed, just one or the other. The coherence function and cross correlation coefficient were originally developed in ASME Paper 83-PVP-22 based on his review of several actual earthquakes and used in the development of requirements initially in IEEE Std 344-1987. We are not aware of any new industry data which would change this position. In addition, Reference 34 (ASME Boiler and Pressure Vessel Code, Section III Division 1, Article N-1213.1 of Nonmandatory Appendix N) of DG-1175 is addressing the development of time history input for analysis where you are developing inputs associated	See IEEE-25

		with a specific in-structure required response spectrum. Where as, for seismic testing, the inputs are normal generic in nature (multiple plant sites/locations) and the RRS will be most likely the same in both horizontal axes as a minimum. Recommended Change This section should be updated to concur with the present criteria in IEEE Std 344-2004 for test input generation associated with coherence function and correlation coefficient limits and its usage.	
WEC-11	C.1.2.1a	*"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, QPB, 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."* Comment RG 1.148 may be a more correct place for the Operability portion of QME-1. Including the operability portions of ASME QME-1-2007 into DG-1175 may create a potential conflict with RG 1.148. DG-1175 indicates that '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." ASME QME-1-2007 includes Nonmandatory Appendix QV-A "Functional Specification for Active Valves for Nuclear Power Plants." This nonmandatory appendix	See IEEE-10

		represents a potential for conflict with RG 1.148. RG 1.148 Value/Impact Statement, Section Value (page 5) states, "It is anticipated that the most important contributions from ANSI N278.1-1975 will be realized when subsequent standards, which are currently being developed to address such topics as valve assembly functional qualification and production, are in place to provide a set of requirements covering various aspects of valve assembly operability." ASME QME-1-2007 represents the latest development in valve assembly functional qualification and production indicated. While it is not specifically noted that RG 1.148 will be revised to endorse these requirements it seems logical that all requirements regards functional qualification should be gathered into a single regulatory position. Because RG 1.148 already addresses some portion of functional qualification it would be the logical place for all functional qualification to be gathered. RG 1.100 has previously only addressed seismic qualification which is only of functional qualification. Recommended Change Recommend regulations dealing with ASME QME-1-2007 in the area functional qualification be moved to RG 1.148.	
WEC-12	C.1.2.1g	"*For certain hard-rock-based plants, the site-specific spectra may exceed the certified design spectra in the high-frequency range. This guide refers to this phenomenon as the high-frequency ground motion concern. As a result of the high-frequency ground motion, the seismic input to SSCs may also contain high frequency excitations. For operating BWR plants, the seismic qualification of some safety-related active mechanical equipment were performed using IEEE-344-type tests with intentional high-frequency contents to account for concurrent BWR hydrodynamic loads. However, the vast majority of existing seismic qualification tests used input frequencies up to only 33 Hz. These past test experience data are therefore not*	See IEEE-17

		acceptable for the seismic qualification of high frequency- sensitive equipment or fragile components. Furthermore, credit should not be taken for the inadvertent high frequencies present in some of the IEEE-344-type seismic qualification tests of equipment in the past, which may have shown the ZPA of the TRS to be up to 100 Hz. Ball joints and kinematics linkages of the shake tables could have generated these inadvertent high frequencies, and the NRC staff considers them to be noise signals that may not have the proper frequency content with sufficient energy to be compatible with the amplified region of the RRS at high frequencies." Comment Request further clarification as to why DG-1175 (Regulatory Positions on ASME QME-1) discusses high frequency response. The DG-1175 should limit discussions and positions to high frequency sensitive equipment. We believe that mechanical equipment is not sensitive to high frequency. DG-1175 position on high frequency sensitive equipment should only be applied to sensitive electrical component which may be attached to the mechanical equipment. As written the statement would exclude the use of previous testing to address high frequency concerns since the test motion did not intentionally require input in the high frequency range. If an evaluation of the test input is performed and the data demonstrate sufficient frequency content in the high-frequency range throughout the time history then the data should be acceptable. This approach is consistent with regulatory guidance in Section C. 1.1.1.h. We believe IEEE Std 344-2004 provides sufficient guidance to ensure that the input is generated and in compliance with the frequency range of interest. IEEE Std 344-2004 Annex B defines how to verify the test data has sufficient content over the frequency range of interest throughout the input time history. Therefore,	

		seismic test programs in compliance with IEEE Std 344-2004 (including seismic test motion) which have sufficient frequency content in the high-frequency range demonstrated through PSD analysis should be acceptable. <u>Recommended Change</u> Update section to clarify that electrical component which may be attached to the mechanical equipment may be high frequency sensitive and are address by this section. Allow pass seismic test data to permitted for addressing high frequency conditions as provided the data is in compliance with IEEE Std 344-2004 and demonstrates sufficient frequency content in the high-frequency range.	
WEC-13	C.2.1	"*In general, the NRC staff finds ASME QME-1-2007 acceptable for the functional qualification of **(1)** active mechanical equipment in new NPPs; and (2) new addition or replacement of active mechanical equipment in operating NPPs, subject to the following provisions:*" <u>Comment</u> Section C.2 of DG-1175 provides information associated with functional qualification of active mechanical equipment. Regulatory Guide (RG) 1.148 also provides information on functional specification of active valves and primarily endorses ANSI N278.1-1975. Functional qualification of active mechanical equipment discuss in DG-1175 may be better suited for RG 1.148 since it presently exists. <u>Recommended Change</u> Recommend that functional qualification of active mechanical components not related to seismic qualification be discussed in a revision to RG 1.148. RG 1.100 should only provide guidance in the area of seismic qualification of electric and mechanical equipment. DG-1 175 Section B.2 (Functional Qualification of Active Mechanical Equipment) should be removed and the title of DG-1 175 should revert back to "Seismic Qualification of Electrical and Mechanical	See IEEE-10

		Equipment for Nuclear Power Plants."	
Dom-1	General	The draft RG title and scope have been changed to include functional qualification of active mechanical equipment, as compared to the two previous revisions of RG 1.100 which only discussed seismic qualification of electrical and mechanical equipment. This change is because the RG now endorses ASME QME-1-1994, which covers functional qualification of active mechanical equipment. The main discussion on pages 5 through 8 of the DG is for active, motor-operated valves. It is noted that RG 1.148 also discusses functional specification of active valves and primarily endorses ANSI N278.1-1975. Although the ANSI standard by itself does not provided complete assurance of operability, there is an overlap between DG-1175 and RG 1.148 for functional qualification of active valves. It is recommended that functional qualification of active mechanical components (which have no direct bearing on seismic qualification) should be discussed in a revision to RG 1.148. RG 1.100 should provide guidance just for seismic qualification of electric and mechanical equipment. Either remove functional qualification of active mechanical equipment from this DG or reconcile the overlap between DG-1175 and RG 1.148 in another manner.	See IEEE-10
Dom-2	B.1 C.1.1.1b C.1.1.2b,c	In the SERs that NRC sent to the USI A-46 plants in the past, it was stated that older vintage plants could use the experience-based SQUG-GIP method for seismic verification of new and replacement equipment provided they revised their licensing bases. Many older plants are currently using the SQUG-GIP method. The DG is silent on this. Add a sentence at the end of this paragraph to this	See NEI - 2

		effect: "However, older vintage plants can, with a few exceptions, use the experience-based SQUG-GIP method for seismic verification of new and replacement equipment provided they revise their licensing bases via safety evaluations". Alternatively, reconcile the fact in the DG that NRC has previously accepted earthquake experience-based qualification of new/replacement equipment in older plants.	
Dom-3	B.1 C.1.1.1g C.1.2.1g	The high frequency content, which exists in most existing tests, whether inadvertent or deliberate, will still be imparted to an item on equipment on the shake table. Therefore, high frequency vibratory motions generated on a shake table in an inadvertent manner may not be inconsequential. The DG should clarify that such inadvertent motions can be credited provided they are shown to meet stationarity requirements per Appendix B of IEEE Std 344-1987 or 2004 (when one of these versions of the IEEE Standard is the plant's commitment). However, in IEEE Std 344-1975, there was no requirement for stationarity check. For example, previous seismic shake tests for BWR Mark II and III plants (committed to the 1975 version of the standard) were frequently utilized to qualify equipment for the combined seismic and hydrodynamic loads with high frequency content up to 100 Hz and were accepted by the NRC staff in SQRT audits. Revise this section appropriately, such as adding a sentence to this effect: "When the existing seismic tests contain inadvertent high frequency motions due to ball joints and kinematics linkages, such tests shall be shown to meet the stationarity requirements discussed in Appendix B of IEEE Std. 344-2004."	See IEEE-5 and IEEE-17
Dom-4	B.1 C.1.1.1.i C.1.2.1.j	In the last sentence of this paragraph, it says that the test sample shall be subjected to simulated OBE and SSE vibrations per IEEE Std. 344-2004. In section	See IEEE-18

		C.1.1.1i (p. 10) two alternatives for the number of tests/cyclic considerations are provided. However, another alternative when OBE is defined as 1/3 or less of SSE is to use two SSE events with 10 maximum stress cycles per event in accordance with SRP 3.7.3 (p. 4), March 2007. This alternative should also be listed. Revise these sections to include an option that 2 SSE tests, as an alternative to 5 OBE and 1 SSE are also acceptable when the OBE is designated as 1/3 or less of the SSE.	
Dom-5	C.1.1.1.j	The IEEE Std. 344-2004 has a section on damping. While the damping values in RG 1.61 can be used when qualification is by analysis, there should be no specific requirement on damping values to be used for shake-testing, only that the equipment damping at which the RRS is developed should be the same or lower than the TRS damping value. Clarify the statement in this section that for qualification by shake-table testing, RRS with any reasonable damping value (such as 5% of critical damping) can be used provided that the TRS is also plotted at the same damping value or a higher damping value.	See IEEE-19
Dom-6	General	There is no discussion of required margins for seismic testing, except in Section C1.1.2d re. test experience spectra. A 10% margin is recommended in IEEE Std 323. Also, SRM on SECY-93-087 states that the Commission approved the use of a 1.67 margin over SSE for a margin type assessment. The intent of these margins should be clarified, particularly for seismic testing. The required margins and/or the intent of margins in TRS vs. RRS over the applicable frequency range should be discussed in the RG so that there is no	See IEEE-22

		confusion by the practitioners.	
ASME-1	General	The mechanical equipment functional qualifications included in DG-1175 are an expansion of RG-1.100 and overlaps with several older NRC documents (Regulatory Guides and Standard Review Plan). There needs to be a discussion to foster a better understanding of the regulatory position with regard to mechanical equipment functional qualification and QME-1-2007 requirements.	Also see NUGEQ -2 and NUGEQ-3.
ASME-2	General	The restrictions on the use of experience-based seismic qualification to USI A-46 power plants results in this method of seismic qualification being disallowed by the DG for new plants. The experience-based seismic methods have been in developed and used by the nuclear industry for quite some time. These methods were approved by the consensus committee process based on sound and accepted engineering judgment, information, and practices, and ASME requests that use of experience-based methods be allowed and accepted.	As delineated in C.1.1.1b, the use of experience-based method for seismic qualification of electric equipment will be subject to the review and approval by the NRC staff. Even though IEEE Std 344-2004 and ASME QME-1-2007 indicated limitation of earthquake or test experience-based qualification, the staff found that there are difficulties to justify the demonstration of similarity in seismic excitation, physical , functional, and dynamic characteristics between electric equipment in the experience database and those in the NPP to be seismically qualified. The staff does not accept the use of SQUG guidelines for seismic qualification of equipment in non-USI A-46 plants licensed under 10CFR50 or in plants licensed to 10CFR52.
ASME-3	General	ASME and IEEE need to work together in order to better define scope and responsibility of each of our respective organizations. For example, we should cross-reference requirements between each of our standards rather than to duplicate them. Redundant standards documents cause confusion and may make it very difficult for NRC to provide regulatory endorsement and appropriate guidance on their application.	The NRC staff will continue to work with IEEE and ASME in developing standards documents.

ASME-4	General	The NRC has made the QME Nonmandatory Appendices mandatory. The intent of the QME standard is to provide an acceptable method to meet a particular qualification requirement while providing some flexibility for a user. If the Nonmandatory Appendix is committed to by a user, all aspects of that Nonmandatory Appendix become mandatory. There needs to be a better understanding of what the minimum requirements are and when it is appropriate to have non-mandatory approaches for equipment qualification.	The staff agreed that Mandatory Appendices contained provisions must be followed. Compliance of Nonmandatory Appendices, which provided information or guidance, is voluntary. However, if a user commits to use any Nonmandatory Appendices for its qualification of active mechanical equipment in NPPs, all the criteria and procedures that delineated in both the Mandatory Appendices and those committed Nonmandatory Appendices then become the requirements for its qualification program. Justification must be provided for any deviations, which will be subjected to NRC staff review and approval.
Duke Energy-1	General	Duke supports and adopts the comments submitted by the Institute of Electrical and Electronics Engineer (IEEE) Nuclear Power Engineering Committee and the Nuclear Energy Institute by letters dated July 10, 2008 and July 11, 2008, respectively	The staff has reviewed and provided responses to the comments from IEEE NPEC committee and Nuclear Energy Institute.