Response to Public Comments for Draft Regulatory Guide DG-1149, "Qualification of Safety-Related Motor Control Centers for Nuclear Power Plants" Proposed New Regulatory Guide 1.213

A notice that Draft Regulatory Guide DG-1149 (proposed new Regulatory Guide 1.213) was available for public comment was published in the *Federal Register* (73 FR 42627) on Tuesday, July 22, 2008. The public comment period ended on September 19, 2008. The following table contains the comments and NRC staff disposition.

Comments were received from:

Westinghouse Electric Company J. A. Gresham, Manager Regulatory Compliance and Plant Licensing Nuclear Services P.O. Box 355 Pittsburgh, PA 15230 (ADAMS Accession No. ML082480107)	Nuclear Utility Group on Equipment Qualification (NUGEQ) submitted by: William A. Horin, Partner Winston & Strawn LLP 1700 K Street N.W. Washington, DC 20006-3817 (ADAMS Accession No. ML082700226)	IEEE Power Engineering Society Nuclear Power Engineering Committee J. Scott Malcom, Chair AECL 2251 Speakman Drive Mississauga, Ontario, L5K 1B2 Canada (ADAMS Accession No. ML082700225)

Comment from	Comment	NRC Staff Disposition
Westinghouse Comment 1	**Page 2. 3rd Paragraph**: The third paragraph of Section B provides the NRC Staff position regarding high frequency concerns related to motor control centers (MCCs) for new nuclear power plant designs located on hard rock sites in the central and eastern United States. The [paragraph] excludes the use of previous seismic testing of MCCs to address high frequency concerns because it may not have high frequency input. Before rejecting valuable test data, a review of the test data should be performed to determine if past seismic test motions used for qualification had adequate content over the frequency range of interest. Sub-clause 9.5.1.1 of IEEE Std 649-2006 specifies that the test input motion shall be in accordance with IEEE Std 344-2004 (IEEE Recommended Practice for Seismic Qualification of Class 1 E Equipment for Nuclear Power Generating Stations). Annex B of IEEE Std 344-	This is a cautionary note. COL/DC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated with High Frequency Ground Motion in Design Certification and Combined License Applications" may be used in evaluating whether high frequency ground motion has an impact on potential high frequency sensitive equipment. Previous seismic testing is acceptable for high frequency nuclear plant sites when an evaluation of the seismic test inputs

Comment from	Comment	NRC Staff Disposition
	2004 defines the guidelines to verify that the seismic test data has sufficient content over the frequency range of interest. It is also recommended that COL/DC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated with High Frequency Ground Motion in Design Certification and Combined License Applications" be referenced to in DG-1149 for NRC staff guidance on the subject of evaluating the impact of postulated high frequency ground motion on potentially high frequency sensitive equipment. Provide further wording that clarifies past seismic testing may be used to demonstrate seismic qualification for nuclear power plant sites with postulated high frequency ground motion when it can be demonstrated that the past seismic test data had sufficient content over the frequency range of interest in accordance with Annex B (Frequency Content and Stationarity) of IEEE Std 344-2004	demonstrated that there is sufficient content over the appropriate frequency range.
Westinghouse **Comment 2.**	**Page 3. Section C.1** The first position statement of Section C requires operational aging of control and distribution transformers located in motor control centers when located in a harsh environment. Control and distribution transformers are passive components (no moving parts) and are design rated based on industrial/commercial standards for electrical performance characteristics. For control and distribution transformers, high temperature environments and self-heating may affect the performance and life of the wiring and insulating materials. Environmental temperature and self-heating are addressed during the thermal aging phase of an environmental qualification program performed per IEEE Std 649-2006. Therefore operational aging parameter associated with control and distribution transformers is not necessary since this equipment has no moving parts and environmental temperature and self-heating are presently being addressed in IEEE Std 649-2006. **Recommendation**: Please clarify what operational aging is being required for control and	The staff agrees. Regulatory Position 1 was deleted.

Comment from	Comment	NRC Staff Disposition
	distribution transformers or delete Regulatory Position Number I of Section C of DG-1149.	
NUGEQ **Comment 3.**	**Page 2, Section B** The entire paragraph beginning "Clause 9.5 of IEEE Standard 649-2006 references IEEE Standard 344-2004..." and Footnote 1. Regulatory Guide 1.100 Should be cited for Seismic Qualification Guidance **NUGEQ Comment**: The NRC has recently sought comments on Draft Regulatory Guide DG-1175 (Proposed Revision 3 of Regulatory Guide 1.100), "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants." Regulatory Guide (RG) 1.100 is the appropriate location for staff guidance on seismic qualification of electrical equipment and the information contained in [the identified paragraph] is redundant to the information provided in the proposed revision of RG 1.100 (see DG-1175 page 5). The DG-1149 discussion text should point the reader to RG 1.100 for staff seismic qualification guidance and then supplement the RG 1.100 guidance to the extent that additional seismic qualification guidance specific to MCCs and associated components is needed. However, our review of DG-1149 suggests that no supplemental seismic guidance unique to MCCs and associate components is provided. **NUGEQ Recommendation**: Delete the referenced paragraph and Footnote 1 and replaced with the following: "Regulatory Guide 1.100 Revision 3 describes methods that the NRC staff considers acceptable for use in seismic qualification of electric and mechanical equipment. Regulatory Guide 1.100 Section 1.1 'Regulatory Positions on IEEE Std 344-2004' contains specific staff guidance that applies to the use of IEEE Std 344-2004 for the qualification of electrical equipment, including MCCs."	This is a cautionary note. Guidance provided in Regulatory Guide 1.100, Revision 3 (when issued) can be used for seismic testing.
NUGEQ	**Section C Regulatory Position 1 (page 3):**	Regulatory Position 1 was deleted.

Comment from	Comment	NRC Staff Disposition
Comment 4.	Testing transformers for operational aging..... **NUGEQ Comment**: Operational aging (i.e., cycle aging) is not a concern for transformers because transformers do not contain moving parts or separable connections. Further, IEEE Std 649 indicates that operational aging is principally a concern for seismic functionality and not for during "harsh environments." IEEE Std 649 considers and provides guidance on thermal aging, radiation aging, and operational aging. Operational aging occurs when devices are mechanically cycled and within the context of IEEE 649 the terms operational aging and aging cycles are synonymous. MCCs components potentially affected by cycle aging are either electromechanical or contain separable electrical connections (e.g., stab-on connections). IEEE 649 Table 1, "Typical operational aging parameters" specifies aging cycles for pushbuttons, switches, relays, contactors, circuit breakers, and stab-on connections. Table 1 does not require cycle aging for devices that are not electromechanical or contain separable electrical connections including resistors, indicating lights, and transformers. The effects associated with operational aging are principally related to device functionality during or after seismic events and not for MCCs potentially exposed to "harsh environments." This focus on seismic functionality for operational aging is confirmed by IEEE 649 Clause 9.4.1.2.3 Operational Aging Analysis which states, in part, that, "*operational aging effects on seismic fragility cannot be accurately forecasted without actual test data*" but that cycle aging analysis can be used if it demonstrates that "*...the component or device does not exhibit any deterioration due to aging that effects the ability of the device to function during or after a seismic event*." (emphasis added) **NUGEQ Recommendation:** Delete Regulatory Position 1.	
NUGEQ	**Page 3, Regulatory Position 2**:	The staff agrees.

Comment from	Comment	NRC Staff Disposition
Comment 5	Additional testing for motor control centers... **<u>NUGEQ Comment</u>**: IEEE 649 provides, in part, the following guidance regarding acceptance criteria: * "*Acceptance criteria shall be defined so that all failures to perform the specified safety function(s) in the service conditions for which the equipment is being qualified can be identified*." (See IEEE 649, page 10, i) Acceptance criteria) * "*Care should be taken to ensure that the acceptance criteria selected are not overly restrictive or based on measurements not related to the specified safety functions*." (See IEEE 649, page 10, i) Acceptance criteria) * "*the specifier must determine which criteria are to be demonstrated during and after a harsh environment test.*" (See IEEE 649, page 12) It is inappropriate for the regulatory guide to specify criteria for all components since, per IEEE 649, the criteria must be related to specified safety functions should not be overly restrictive and the specifier must determine which criteria are to be demonstrated. The NUGEQ agrees that "the alternative criteria" or other criteria need to be specified for all devices whose failure would affect safety functions. The NUGEQ disagrees that the alternative criteria would apply to all devices "*...that do not have a specific functional test during and after a harsh environment test*." **<u>NUGEQ Recommendation:</u>** Revise Regulatory Position 2 to read as follows: 2. In addition to the typical functional tests specified in Table 2 of IEEE Standard 649-2006, the alternative criteria a, b, and c should be <u>used for testing any</u> motor control center <u>components whose failure could adversely affect specified safety functions and</u> that do not have a <u>specified</u> functional test during or after a harsh environment test.	Regulatory Position 2 was revised to read: In addition to the typical functional tests specified in Table 2 of IEEE Standard 649-2006, the alternative criteria a, b, and c should be performed on all motor control center components, that support or impact the intended safety function of the motor control center and that do not have a specific functional test during and. after a harsh environment test.
NUGEQ **Comment 6**	**<u>Page 3, Regulatory Position 3</u>** Typical functional tests for "timing devices"	The staff agrees. Regulatory Position 3 was revised as suggested.

Comment from	Comment	NRC Staff Disposition
	NUGEQ Comment: IEEE 649 states that: "The operational tests given in Table 2 reflect *typical requirements for a generic qualification program*. Where specific applications require different values, the values shall be specified," (See IEEE 649, page 10, i) Acceptance criteria), (emphasis added). Consequently the drop out voltage in Table 2 is one of several generic values in Table 2 that should be consistent with plant-specific analyses. **NUGEQ Recommendation:** Revise Regulatory Position 3 to read as follows: 3. The functional tests specified in Table 2 of IEEE Standard 649-2006, represent typical requirements for a generic qualification program. The tests and criteria should bound plant-specific requirements. For example, although Table 2 states that "*Devices shall not drop out at or above 70% rated coil voltage*," this test should be consistent with the plant-specific voltage analysis.	
IEEE **Comment 7**	**Section B – Discussion** The third paragraph of Section B. provides the NRC staff position regarding high frequency concerns related to motor control centers (MCCs) for new nuclear power plant designs located on hard rock sites in the central and eastern United States. The draft guide excludes the use of previous seismic testing of MCCs to address high frequency concerns because it may not have high frequency: input. We believe an assessment of previous seismic test inputs should be conducted to verify the equipment had adequate content over the frequency range of interest before discounting any seismic test data. Seismic qualification testing of safety-related MCCs per IEEE Std 649-2006 is performed in compliance with IEEE Std 344-2004 requirements. Annex B of IEEE Std 344-2004 defines guidance for verifying the test data has sufficient content over the frequency range of interest.	See Staff Disposition to Comment 1 (page 1).

Comment from	Comment	NRC Staff Disposition
	DG-1149 should 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" for NRC staff guidance in evaluating whether high frequency ground motion has an impact on potential high frequency sensitive equipment. **We recommend the following updates to Section B**: Clarify that previous seismic testing is acceptable for high frequency nuclear plant sites when an evaluation of the seismic test inputs demonstrated there is sufficient content over the frequency range of interest in accordance with Annex B (Frequency, Content and Stationarity) of IEEE Std 344-2004. Reference should be made to COIUDC-ISG-1, "Interim Staff Guidance on Seismic Issues Associated With High Frequency Ground Motion in Design Certification and Combined License Applications" for the NRC Staff guidance in the evaluation of potential high frequency sensitive equipment at new nuclear power plants.	
IEEE **Comment 8**	**Section C.1.** The first item of Section C provides the NRC staff position on the operational aging of control and distribution transformers located in motor control centers. The DG-1149 guidance requires operational aging to be considered for control and distribution transformers when located in a "harsh environment." Table 1 of IEEE Std 649-2006 is intended to provide users of the standard with typical operational aging parameters. The standard does not preclude incorporation of additional parameters if the end user or qualifying entity determines significant aging parameters are present in the installation. However, in the case of Control and Distribution transformers, they do not have mechanically active components in their construction. Therefore, there are no mechanical stressors contained in the devices. The transformers are typically rated to other industrial standards for electrical characteristics. The end user	Regulatory Position 1 was deleted.

Comment from	Comment	NRC Staff Disposition
	should consider these ratings in selecting transformers for the application. Both control power and distribution transformers will typically see changes in the supplied load from a minimum value up to a maximum load, depending upon the state of the control circuit or the connected distribution loads. These changes in load produce a very limited magnetic stressor on the transformer windings in changes from minimum load to full rated load condition. The primary degradation mechanism relative to transformers is heat and the effect of heat on the magnet wire and insulating materials used in the manufacturing process. The 'internal' heat rise and other temperature effects on the winding insulation will be addressed by the thermal aging program. These determinations will include the effects of maximum load, or other specified load/time profiles on the transformer self temperature rise as required by IEEE Std 649-2006, Section 9.4.1.d) however, this is not considered part of the operational aging parameters in IEEE Std 649-2006. If NRC has information that conflicts with this consensus IEEE will be pleased to evaluate this information. **We recommend that this item of DG-1149 be deleted.**	
IEEE **Comment 9**	**Section C.2** The second item of Section C provides the NRC Staff Position on the typical functional testing to be performed on motor control centers components during and after a harsh environment test. The DG requires the mandatory compliance with additional functional parameters without regard to whether the requirements support the intended safety related function of the motor control center. The purpose of the qualification program is to demonstrate that the motor control center is capable of Performing its intended safety related function as required before during and/or after a design basis event. There are applications where individual components do not support the safety related function of the motor	See Staff Disposition of comment 5 (page 5).

Comment from	Comment	NRC Staff Disposition
	control center. Examples could include items such as auxiliary contacts that provide power to local indicating lights and blown bulbs in local indicating lights. The inability of these items to function does not affect the safety related function of the motor control center. The intent of the standard is that the specifier identifies the specific characteristics that support the safety related function of the motor control center as stated in paragraph Section 8.1(i) of the standard. Therefore, establishing acceptance criteria for MCC components for applications which do not support the safety-related function of the equipment is not appropriate. **We recommend that this item of DG-1 149 be deleted or revised to read:** "In addition to the typical functional tests specified in Table 2 of IEEE Standard 649-2006, the alternative criteria a, b, and c should be performed on all motor control center components, that support or impact the intended safety related function of the motor control center and that do not have a specific functional test during and after a harsh environment test."	
IEEE	**Section C.3** The third item of Section C provides the NRC staff position on the typical functional testing for timing devices in motor control centers during and after a harsh environment test. The DG indicates that the minimum drop-out voltage should be consistent with the plant specific voltage analysis. The SC-2 Working Group 2.14 on Motor Control Centers agrees supply voltages and frequencies for all of the motor control center components is an important consideration in developing the service conditions for the equipment. This requirement is already addressed in Section 8.1(i) of IEEE Std 649-2006. Therefore this section of DG-1 149 is considered redundant with guidance established within the Standard. **We recommend that this item of the DG be deleted**.	Regulatory Position 3 was deleted.