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U.S. Nuclear Regulatory Commission
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Subject: **Response to Portion of Request for Additional Information Letter No. 384 Related to ESBWR Design Certification Application – DCD Tier 2 Section 3.11 – Environmental Qualification of Mechanical and Electrical Equipment; RAI Number 3.11-41**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) letter number 384 sent by NRC letter dated October 27, 2009 (Reference 1). RAI 3.11-41 is addressed in Enclosure 1. DCD Markups are in Enclosure 2.

GEH has also determined that the applicability statement for RG 1.165 in DCD Tier 2 Table 1.9-21 should indicate a COL activity rather than something that applies to the design certification process. The attached markups include a correction to this unrelated item.

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

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Vice President, ESBWR Licensing

Reference:

1. MFN 09-685 Letter from U.S. Nuclear Regulatory Commission to J. G. Head, GEH, *Request For Additional Information Letter No. 384 Related to ESBWR Design Certification Application* dated October 27, 2009

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 384 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.11 – Environmental Qualification of Mechanical and Electrical Equipment; RAI 3.11-41

2. Response to Portion of NRC RAI Letter No. 384 Related to ESBWR Design Certification Application - DCD Tier 2 Section 3.11 – Environmental Qualification of Mechanical and Electrical Equipment; DCD Markups for RAI Number 3.11-41

cc:	AE Cubbage	USNRC (with enclosures)
	JG Head	GEH/Wilmington (with enclosures)
	DH Hinds	GEH/Wilmington (with enclosures)
	PM Yandow	GEH/ Wilmington (with enclosures)
	eDRF Section	0000-0109-7339 (RAI 3.11-41)

Enclosure 1

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Response to Portion of NRC Request for

Additional Information Letter No. 384

Related to ESBWR Design Certification Application

DCD Tier 2 Section 3.11

Environmental Qualification of Mechanical and Electrical Equipment

RAI Number 3.11-41

NRC RAI 3.11-41

ESBWR DCD specifies the application of ASME Standard QME-1-2007 for the qualification of safety-related valves to be used in ESBWR nuclear power plants. The ESBWR DCD identifies Revision 2 to RG 1.100 as a reference for the ESBWR design. In July 2009, the NRC staff conducted an audit at the GEH offices in Wilmington, NC, that found that GEH is specifying the use of ASME QME-1-2007 in the design and procurement specifications for the qualification of ESBWR mechanical equipment. In September 2009, the NRC issued Revision 3 to RG 1.100 that accepts with minimal conditions the use of ASME Standard QME-1-2007 for the functional qualification of mechanical equipment. Recently, GEH indicated that its review of Revision 3 to RG 1.100 determined that its application of ASME QME-1-2007 for the functional qualification of mechanical equipment is consistent with this latest revision to RG 1.100. Therefore, the NRC staff requests that GEH update the ESBWR DCD to reference Revision 3 to RG 1.100 in Table 1.9-21.

GEH Response

GEH accepts RG 1.100 Revision 3 only for its endorsement of QME-1-2007 with exceptions and clarifications. DCD Tier 2 Table 1.9-21 will be revised to list both Revisions 2 and 3 of RG 1.100 and to clarify the extent to which GEH will apply RG 1.100 Revision 3. The RG 1.148 listing in Table 1.9-21 will also be revised to include a comment stating that this Regulatory Guide is subsumed by RG 1.100 Revision 3.

GEH will continue to apply IEEE-344-1987 for seismic qualification of electrical equipment as endorsed in Revision 2 of RG 1.100. DCD Tier 2 Table 1.9-22 contains a note indicating that the NRC has not endorsed the 2004 version of IEEE-344. The note will be modified to remove this comment given that RG 1.100 Revision 3 now endorses that revision of the IEEE standard.

GEH has determined that the applicability statement for RG 1.165 in DCD Tier 2 Table 1.9-21 should indicate this is a COL activity rather than something that applies to the design certification process. The attached markups include a correction to this unrelated item.

DCD Impact

DCD Tier 2, Tables 1.9-21 and 1.9-22 will be revised in Revision 7 as noted in the attached markups.

Enclosure 2

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Response to Portion of NRC Request for

Additional Information Letter No. 384

Related to ESBWR Design Certification Application

DCD Tier 2 Section 3.11

Environmental Qualification of Mechanical and Electrical Equipment

DCD Markups for RAI Number 3.11-41

Table 1.9-21

NRC Regulatory Guides Applicability to ESBWR

RG No.	Regulatory Guide Title	Appl. Rev.	Issued Date	ESBWR Appli-cable?	Comments
1.97	Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident	3	05/1983	Yes	Instrument Ranges Only
1.97	Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants	4	06/2006	Yes	
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor	0	03/1976	No	Superseded by BTP ESTB 11-5 in SRP 11.3.
1.99	Radiation Embrittlement of Reactor Vessel Materials	2	05/1988	Yes	
1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants	2	06/1988	Yes	URD optimization – see Table 1.9-21a.
1.100	Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants	3	09/2009	Yes	Rev 3 applies only for its endorsement of ASME QME-1-2007 otherwise Rev 2 applies.
1.101	Emergency Response Planning and Preparedness for Nuclear Power Reactors	5	06/2005	—	COL
1.102	Flood Protection for Nuclear Power Plants	1	09/1976	Yes	
1.105	Setpoints for Safety-Related Instrumentation	3	12/1999	Yes	

Table 1.9-21

NRC Regulatory Guides Applicability to ESBWR

RG No.	Regulatory Guide Title	Appl. Rev.	Issued Date	ESBWR Appli-cable?	Comments
1.143	Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants	2	11/2001	Yes	
1.144	Auditing of Quality Assurance Programs for Nuclear Power Plants		Super-seded		See Table 1.9-21b. Withdrawn 07/31/1991
1.145	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants	1	11/1982	—	COL. Reissued 02/1983 to correct page 1.145-7.
1.146	Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants		Super-seded		See Table 1.9-21b. Withdrawn 07/31/1991
1.147	Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1	14	08/2005	—	COL.
1.148	Functional Specification for Active Valve Assemblies in Systems Important to Safety in Nuclear Power Plants	0	03/1981	Yes	Subsumed by RG 1.100, Revision 3
1.149	Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations	3	10/2001	—	COL
1.150	Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations	1	02/1983	Yes	
1.151	Instrument Sensing Lines	0	07/1983	Yes	
1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants	2	01/2006	Yes	

Table 1.9-21

NRC Regulatory Guides Applicability to ESBWR

RG No.	Regulatory Guide Title	Appl. Rev.	Issued Date	ESBWR Appli-cable?	Comments
1.162	Format and Content of Report for Thermal Annealing of Reactor Pressure Vessels	0	02/1996	—	COL
1.163	Performance-Based Containment Leak-Test Program	0	09/1995	Yes	
1.164	(Not yet issued)				
1.165	Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion	0	03/1997	~~Yes~~ —	COL
1.166	Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions	0	03/1997	—	COL
1.167	Restart of a Nuclear Power Plant Shut Down by a Seismic Event	0	03/1997	No	
1.168	Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	1	02/2004	—	COL
1.169	Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0	09/1997	—	COL
1.170	Software Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0	09/1997	—	COL
1.171	Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0	09/1997	—	COL
1.172	Software Requirements Specifications for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0	09/1997	—	COL

Table 1.9-22

Industrial Codes and Standards[1] Applicable to ESBWR

Code or Standard Number	Year	Title
323-1974	1974	Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations (Note – this earlier version is applied to RG 1.89 qualification of equipment in a harsh environment)
323-2003	2003	Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations
334-1994	1994 (R 1999)	IEEE Standard for Qualifying Continuous Duty Class 1E Motors for Nuclear Power Generating Stations (Note: 2006 version exists)
336-1985	1985 (R 1991)	Standard Installation, Inspection and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities
338-1987	1987 (R 2000)	Standard Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems (Note: 2006 version exists)
344-1987	1987 (R 1993)	Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations (Note: 2004 version exists~~, but it is not endorsed by NRC~~.)
352-1987	1987 (R 2004)	Guide for General Principles of Reliability Analysis of Nuclear Power Generating Station Safety Systems (including errata dated 4 April 1994)
379-2000	2000	Standard Application of the Single Failure Criterion to Nuclear Power Generating Station Safety Systems
381-1977	1977 (R 1984)	Standard Criteria for Type Tests of Class 1E Modules Used in Nuclear Power Generating Stations
382-1996	1996 (R 2004)	Standard for Qualification of Actuators for Power-Operated Valve Assemblies with Safety-Related Functions for Nuclear Power Plants (Note: 2006 version exists)
383-2003	2003	Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations
384-1992	1992 (R 1998)	Standard Criteria for Independence of Class 1E Equipment and Circuits
420-2001	2001	Standard for the Design and Qualification of Class 1E Control Boards, Panels, and Racks Used in Nuclear Power Generating Stations
450-2002~~1975~~	~~1975~~2002	Recommended Practice for Maintenance, Testing, and Replacement of Vented ~~Large~~ Lead-Acid ~~Storage~~ Batteries for Stationary Applications~~Generating Stations and Substations~~
484-2002~~1975~~	~~1975~~2002	Recommended Practice for Installation Design and Implementation of Vented~~Large~~ Lead-Acid ~~Storage~~ Batteries for Stationary Applications~~Generating Stations and Substations~~
485-1997	1997 (R 2003)	Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications
497-2002	2002	Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations