



GE Energy

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Subject: **Response to Portion of NRC Request for Additional Information  
Letter No. 75 Related to ESBWR Design Certification Application –  
Environmental Qualification of Safety-Related Mechanical and  
Electrical Equipment – RAI Numbers 3.11-1 through 3.11-5**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

James C. Kinsey  
Project Manager, ESBWR Licensing

DO68

Reference:

1. MFN 06-387, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application*, October 10, 2006

Enclosure:

1. MFN 07-174 – Response to Portion of NRC Request for Additional Information Letter No. 75 Related to ESBWR Design Certification Application – Environmental Qualification of Safety-Related Mechanical and Electrical Equipment – RAI Numbers 3.11-1 through 3.11-5

cc: AE Cabbage USNRC (with enclosures)  
DH Hinds GE (with enclosures)  
RE Brown GE (w/o enclosures)  
eDRF 0000-0063-7989/1

**Enclosure 1**

**MFN 07-174**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 75**

**Related to ESBWR Design Certification Application**

**Environmental Qualification of Safety-Related**

**Mechanical and Electrical Equipment**

**RAI Numbers 3.11-1 through 3.11-5**

**NRC RAI 3.11-1**

*DCD, Tier 2, Revision 1, Section 3.11.2.2 states that safety-related mechanical equipment located in a harsh environment are qualified by analysis of materials data, which are generally based on test and operating experience. Provide examples of the environmental qualification methods and standards applied to mechanical equipment (including pumps, power-operated valves, safety-related valves, and check valves) located in harsh environments. Identify the nonmetallic subcomponents, applicable environmental conditions, required operating life, capabilities of the nonmetallic subcomponents, and basis for the environmental qualification of mechanical equipment located in a harsh environment. Discuss the surveillance and maintenance program to be developed for mechanical equipment located in a harsh environment to ensure functionality during their design life.*

**GE Response**

GE EQ program is based on the methodology/guidelines provided in NEDE-24326-1-P (Class III, January 1983); "GENERAL ELECTRIC ENVIRONMENTAL QUALIFICATION PROGRAM" which is a Licensing Topical Report (LTR) based on interpretation of the NUREG-0588, Cat. I. requirements.

Please note that the GE EQ program is predicated on test, analysis or test + analysis, GE does not use operating experience (See response to NRC RAI 3.10-3 S01).

Surveillance and maintenance are addressed in respective equipment Installation Operation Manual (IOM), based on EQ life of components. The selection of the specific equipment is currently not finalized, however, pumps will be excluded since the system employs a passive design to enhance safety. If a electro-pneumatic actuator assembly is chosen for the power operated valves, then a surveillance and maintenance program will be employed that will consist of periodically replacing non-metallic parts and lubricants. Recommended replacement intervals are included in the respective IOM.

**DCD Impact**

No DCD changes will be made in response to this RAI.

**NRC RAI 3.11-2**

*DCD, Tier 2, Revision 1, Section 3.11.2.2 states that vendors of equipment located in a mild environment are required to submit a certificate of compliance certifying that the equipment has been qualified to assure the required safety-related function in the applicable environment. The DCD also states that a surveillance and maintenance program shall be developed to ensure the operability during its design life. Provide examples of the environmental qualification methods and standards for mechanical equipment (including pumps, power-operated valves, safety-related valves, and check valves) located in mild environments, and the surveillance and maintenance program to be developed to ensure functionality during their design life.*

**GE Response**

All safety related equipment located in a mild environment will require the vendor to supply a certificate of compliance to the requirements of NEDE-24326-1-P (Class III, January 1983); "GENERAL ELECTRIC ENVIRONMENTAL QUALIFICATION PROGRAM" which is a Licensing Topical Report (LTR) based on interpretation of the NUREG-0588. Specific examples of Equipment Qualification for ESBWR including hardware specific surveillance and maintenance programs can not be furnished since equipment will not be procured until after a COL License has been issued.

**DCD Impact**

No DCD changes will be made in response to this RAI.

**NRC RAI 3.11-3**

*DCD, Tier 2, Revision 1, Section 3.11.5 states that the COL holders shall prepare the Environmental Qualification Document (EQD) summarizing the qualification results for all equipment identified in DCD Section 3.11.1. Provide the basis for environmental qualification of safety-related mechanical equipment being addressed by the COL holder, rather than the COL applicant.*

**GE Response**

The basis for environmental qualification of safety-related mechanical equipment is the methodology/guidelines provided in NEDE-24326-1-P (Class III, January 1983); "GENERAL ELECTRIC ENVIRONMENTAL QUALIFICATION PROGRAM" which is a Licensing Topical Report (LTR) based on interpretation of the NUREG-0588, Cat. I, as referenced by either the COL applicant or holder.. It is the responsibility of the COL holders to maintain the Equipment Qualification records summarized in the Environmental Qualification Document.

**DCD Impact**

No DCD changes will be made in response to this RAI.

**NRC RAI 3.11-4**

*DCD, Tier 2, Revision 1, Section 3.11.5 states that the COL holders shall record and maintain the results of the qualification tests in an auditable file in accordance with the requirements of 10 CFR 50.49(j). In that 10 CFR 50.49(j) applies to electrical equipment, discuss the provisions for recording and maintaining the results of environmental qualification of safety-related mechanical equipment.*

**GE Response**

Recording and maintaining the results of the environmental qualification of the safety related mechanical equipments follows 10 CFR 50.49(j), Reg Guide 1.89 and IEEE Std 323. Despite being originally generated to address EQ for safety related electrical components/parts, they are also applicable to safety related mechanical equipments as well. The COL holders will have complete and auditable records available which describe the environmental qualification method used for all mechanical and electrical equipment in sufficient detail to document the degree of compliance with NUREG-0800, thereafter such records will be updated and maintained current as equipment is replaced, tested or otherwise qualified.

**DCD Impact**

No DCD changes will be made in response to this RAI.

**NRC RAI 3.11-5**

*DCD, Tier 2, Revision 1, Section 3.11 discusses the environmental qualification of safety-related mechanical equipment. Discuss the evaluation of the degradation of the performance of ESBWR equipment under adverse environments (such as the reduction in electric motor output under high temperature conditions).*

**GE Response**

Equipment performance degradation from the environmental aging conditions for the EQ considerations, follow the GE EQ program guidelines addressed in NEDE-24326-1-P.

Test specimens will be exposed to the required DBE Environmental Aging Profile and de-ionized water spray rates, as applicable. The test specimens will be subject to the baseline function test and then disassembled and inspected. Test reports are drafted based on the accumulative data.

**DCD Impact**

No DCD changes will be made in response to this RAI.