



General Electric Company
175 Curtin Avenue, San Jose, CA 95125

April 21, 1993

Docket No. STN 52-001

Chet Poslusny, Senior Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of the Nuclear Reactor Regulation

Subject: Submittal Supporting Accelerated ABWR Review Schedule - **Chapter 8
Modifications**

Dear Chet:

Enclosed are modifications of selected pages from Attachment 3 of my March 31, 1993 letter. These modifications were agreed upon in our April 21, 1993 telephone call.

Please provide copies of this transmittal to Dale Thatcher.

Sincerely,

Jack Fox
Advanced Reactor Programs

cc: Norman Fletcher (DOE)
Bob Strong (GE)

JF93-98

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A PDR

TABLE 1.8-21 (Continued)
INDUSTRIAL CODES AND STANDARDS
APPLICABLE TO ABWR

Code or Standard Number	Year	Title
IEEE		
279	1971	Criteria for Protection Systems for NPGS
308	1980	Criteria for Class 1E Power Systems for NPGS
317	1983	Electrical Penetration Assemblies in Containment Structures for NPGS
323	1983 1974	Qualifying Class 1E Equipment for NPGS
334	1974	Motors for NPGS, Type Tests of Continuous Duty class 1E
338	1977	Criteria for the Periodic Testing of NPGS Safety Systems
344	1987	Recommended Practices for Seismic Qualifications of Class 1E Equipment for NPGS
379	1977	Standard Application of the Single Failure Criterion to NPGS Safety Systems
382	1985	Qualification of Actuators for Power Operated Valve Assemblies with Safety-Related Functions for NPP
383	1974	Type Test of Class 1E Cables; Field Splices and Connections for NPGS
384	1981	Criteria for Independence of Class 1E Equipment and Circuits
387	1984	Criteria for Diesel-Generator Units Applied as Standby Power Supplies for NPGS
450	1987	Practice for Maintenance, Testing, and Replacement of Large lead Storage Batteries for Generating Stations and Substations
484	1987	Recommended Practice for the Installation Design and Installation of Large Lead Storage Batteries for NPGS

MARK-UP TEXT INSERTS

INSERT E (35 CONF)

(5) Other Criteria

- (a) IEEE 741 - "Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations"

The ABWR fully meets the requirements of this standard.

INSERT F (35 CONF)

(5) Other Criteria

- (a) IEEE 946 - "Recommended Practice for the Design of Safety-Related DC Auxiliary Power Systems for Nuclear Power Generating Stations"

The ABWR fully meets the requirements of this standard.

INSERT G (65 CONF)

E in a harsh environment
~~This~~ Equipment is designed and qualified to survive the combined effects of temperature, humidity, radiation, and other conditions related with a LOCA or other design-basis event environment at the end of their qualified and/or design life.

INSERT H (43 CONF)

These overload byprsses meet the requirements of IEEE 603, and are capable of being periodically tested (see 8.3.4.24).

INSERT I (71 CONF)

Section 5.2 of IEEE 308 is addressed for the ABWR as follows:

Those portions of the Class 1E power system that are required to support safety systems in the performance of their safety functions meet the requirements of IEEE 603. In addition, those other normal components, equipment, and systems (that is, overload devices, protective relaying, etc) within the Class 1E power system that have no direct safety function and are only provided to increase the availability or reliability of the Class 1E power system meet those requirements of IEEE 603 which assure that those components, equipment, and systems do not degrade the Class 1E power system below an acceptable level. However, such elements are not required to meet criteria as defined in IEEE 603 for: operating bypass, maintenance bypass, and bypass indication."

INSERT J (72 OPEN/CONF)

applicable, these parameters are given in terms of a time-based profile.

Estimated chemical environmental conditions are also reported in Appendix 3I.

The magnitude and 60-year frequency of occurrence of significant deviations from normal plant environments in the zones have insignificant effects on equipment total thermal normal aging or accident aging. Abnormal conditions are overshadowed by the normal or accident conditions in the Appendix 3I tables.

3.11.2 Qualification Tests and Analyses

All safety-related electrical equipment ~~that is located in a harsh environment~~ is qualified by test or other methods as described in IEEE 323.

Margin is defined as the difference between the most severe specified service conditions of the plant and the conditions used for qualification. Margins shall be included in the qualification parameters to account for normal variations in commercial production of equipment and reasonable errors in defining satisfactory performance. The environmental conditions shown in the Appendix 3I tables do not include margins.

Some mechanical and electrical equipment may be required by the design to perform an intended safety function between minutes of the occurrence of the event but less than 10 hours into the event. Such equipment shall be shown to remain functional in the accident environment for a period of at least 1 hour in excess of the time assumed in the accident analysis unless a time margin of less than 1 hour can be justified. Such justification will include for each piece of equipment: (1) consideration of a spectrum of breaks; (2) the potential need for the equipment later in the event or during recovery operations; (3) determination that failure of the equipment after performance of its safety function will not be detrimental to plant safety or mislead the operator; and (5) determination that the margin applied to the minimum operability time, when combined with other test margins, will account for the uncertainties associated with the use of analytical techniques in the derivation of environmental parameters, the number of units tested, production tolerances, and test equipment inaccuracies.

The environmental conditions shown in the Appendix 3I tables are upper-bound envelopes used to establish the environmental design and qualification bases of safety-related equipment. The upper bound envelopes indicate that the zone data reflects the worse case expected environment produced by a compendium of accident conditions.

~~and permitted by 10CFR50.49(f) (Reference 1).~~
Equipment type test is the preferred method of qualification.

3.11.4 Loss of Heating, Ventilating, and Air Conditioning

Insert G
(45) Safety-related mechanical equipment that is located in a harsh environment is qualified by analysis of materials data which are generally based on test and operating experience.

To ensure that loss of heating, ventilating, and air conditioning (HVAC) system does not adversely affect the operability of safety-related controls and electrical equipment in buildings and areas served by safety-related HVAC systems, the HVAC systems serving these areas meet the single-failure criterion. Section 9.4 describes the safety-related HVAC systems including the detailed safety evaluations. The loss of ventilation calculations are based on maximum heat loads and consider operation of all operable equipment regardless of safety classification.

The qualification methodology is described in detail in the NRC approved licensing Topical Report on GE's environmental qualification program (Reference 2). This report also addresses compliance with the applicable portions of the General Design Criteria of 10CFR50, Appendix A, and the Quality Assurance Criteria of 10CFR50, Appendix B. Additionally, the report describes conformance to NUREG-0588 (Reference 3), and Regulatory Guides and IEEE Standards referenced in Section 3.11 of NUREG-0800 (Standard Review Plan).

3.11.5 Estimated Chemical and Radiation Environment

Mild environment is that which, during or after a design basis event (DBE, as defined in Reference 2), would at no time be significantly more severe than that which exists during normal, test and abnormal events.

3.11.5.1 Chemical Environment

Equipment located in the containment drywell and wetwell is potentially subject to water spray modes of the RHR system. In addition, equipment in the lower portions of the containment is potentially subject to submergence. The chemical composition and resulting pH to which safety-related equipment is exposed during normal operation and design basis accident conditions is reported in Appendix 3I.

The COL applicant will require vendors of equipment located in a mild environment to submit a certificate of compliance certifying that the equipment has been qualified to assure its required safety-related function in its applicable environment. This equipment is qualified for dynamic loads as addressed in Sections 3.9 and 3.10. Further, a surveillance and maintenance program will be developed to ensure equipment operability during its designed life. (See Subsection 3.11.6).

Sampling stations are provided for periodic analysis of reactor water, refueling and fuel storage pool water, and suppression pool water to assure compliance with operational limits of the plant technical specifications.

3.11.3 Qualification Test Results

3.11.5.2 Radiation Environment

The results of qualification tests for safety-related equipment will be documented, maintained, and reported as mentioned in Subsection 3.11.6.

Safety-related systems and components are designed to perform their safety-related function when exposed to the normal operational radiation levels and accident radiation levels.

Electronic equipment subject to radiation exposure in excess of 1000 R and mechanical equipment in excess of 10,000 R will be qualified in accordance with Reference 1.