

3.2.2 System Quality Group Classification

10 CFR 50.55a(a)(1) requires that “Structures, systems, and components must be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed.” Similarly, General Design Criterion (GDC) 1 of 10 CFR 50, Appendix A, requires that “Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.”

GDC 1 also requires that “Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions.”

To meet the requirements of 10 CFR 50.55a(a)(1) and GDC 1, the U.S. EPR complies with the requirements of 10 CFR 50.55a(c) for the reactor coolant pressure boundary, 10 CFR 50.55a(d), 10 CFR 50.55a(e), and conforms to the guidance of RG 1.26 and NUREG-0800 (Reference 4), SRP Section 3.2.2 for other pressure-retaining components and their supports.

The methodology for quality group classification of U.S. EPR SSC is a deterministic approach that employs the Quality Group A through D classifications identified in RG 1.26 and NUREG-0800, SRP Section 3.2.2. Additionally, a Quality Group E classification is used to identify pressure-retaining components and their supports that are not Quality Group A through D.

U.S. EPR component fabrication complies with the 10 CFR 50.55a rule requiring an ASME Code N-stamp for ASME Code Class 1, 2, and 3 pressure boundary components.

Table 3.2.2-1—Classification Summary lists the quality group classification of the U.S. EPR pressure-retaining components, such as pressure vessels, heat exchangers, tanks, pumps, piping, and valves. A COL applicant that references the U.S. EPR design certification will identify the quality group classification of site-specific pressure-retaining components that are not identified in Table 3.2.2-1.

The U.S. EPR subscribes to the Kraftwerks Kennzeichen System (KKS) for coding and nomenclature of SSC. The systems listed in Table 3.2.2-1 are categorized by their function (e.g., Reactor Coolant System or NSSS Support Systems). Section 1.7 provides a tabulation of the KKS codes and nomenclature cross-referenced to U.S. customary system names. Note that the following discussions of Quality Groups A through E use the U.S. customary system names to relate the relevant system functions to the appropriate quality group. Table 3.2.2-1 also lists the design codes and industry

standards that were considered in the SSC design. System quality group classification boundaries are shown on the piping and instrumentation diagram (P&ID) of that system. See Section 1.7 for a list of the P&IDs.

3.2.2.1 Quality Group A

Quality Group A applies to pressure-retaining components and their supports that form part of the reactor coolant pressure boundary, that cannot be isolated from the reactor coolant system by two automatically-closed or normally-closed valves in series, and that, if failed, could cause a loss of reactor coolant in excess of the normal reactor coolant make-up capability. ASME Code, Section III (Reference 1), Division 1, Subsections NB and NF apply to Quality Group A pressure-retaining components and their supports.

3.2.2.2 Quality Group B

Quality Group B applies to pressure-retaining components and their supports (including core support structures) that directly support the systems or portion of system functions listed in RG 1.26, Section 2.B and SRP Section 3.2.2, Table A-1. These components include:

- Portions of the reactor coolant pressure boundary that are excluded from Quality Group A.
- Safety-related components of systems that are relied upon to provide emergency core cooling, containment heat removal, or fission product removal after a design basis accident.
- Safety-related components of systems that are relied upon for reactor shutdown or residual heat removal.
- Portions of the steam and feedwater systems extending from and including the secondary side of the steam generators up to and including the outermost containment isolation valves, and the connected piping to include the first valve that is normally closed or capable of automatic closure during all modes of normal reactor operation.
- Systems or portions of systems connected to the reactor coolant pressure boundary that cannot be isolated from that boundary during all modes of operation by two normally closed or automatically closable valves.
- Safety-related combustible gas control system.
- Safety-related gas treatment systems.
- Containment isolation barriers.

ASME Code, Section III, Division 1, Subsections NC, NF, and NG apply to Quality Group B pressure-retaining components and their supports.

3.2.2.3 Quality Group C

Quality Group C applies to pressure-retaining components and their supports that are not part of the reactor coolant pressure boundary or included in Quality Group B that directly support the systems or portion of system functions listed in RG 1.26, Section 2C and SRP Section 3.2.2, Table A-1. These components include:

- Safety-related portions of cooling water and auxiliary feedwater systems that are designed to support emergency core cooling, postaccident containment heat removal, postaccident containment atmosphere cleanup, or residual heat removal from the reactor and spent fuel storage pool.
- Safety-related portions of cooling water and seal water systems that are designed to support the functioning of other safety-related systems and components.
- Portions of systems that are connected to the reactor coolant pressure boundary and capable of being isolated from that boundary by two valves during all modes of normal reactor operation.
- Systems other than radioactive waste management systems that may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses that exceed 0.5 rem to the whole body or its equivalent to any part of the body.
- Safety-related emergency diesel generator support systems.

ASME Code, Section III, Division 1, Subsections ND and NF apply to Quality Group C pressure-retaining components and their supports.

3.2.2.4 Quality Group D

Quality Group D applies to non-safety-related pressure-retaining components and their supports of systems that may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses less than or equal to 0.5 rem to the whole body or its equivalent to any part of the body. Quality Group D also applies to supplemented grade pressure-retaining components and their supports, provided that the relevant significant licensing requirements or commitments¹ do not invoke a higher quality group.

These pressure-retaining components and their supports are designed to meet the requirements of the relevant standards listed for Quality Group D in RG 1.26 Table 1

1. ANSI/ANS-58.14-1993 Section 5.6 states a “significant licensing requirement or commitment is one that is based on an NRC regulation or licensing guidance.”

(e.g., Section VIII of the ASME Code (Reference 2) and the ASME B31.1 (Reference 3)) or other relevant standards explicitly invoked by a particular significant licensing requirement or commitment, such as RG 1.143.

3.2.2.5

Quality Group E

Quality Group E identifies non-safety-related pressure-retaining components and their supports that do not meet the definition of Quality Groups A through D and are not subject to any significant licensing requirement or commitment. These pressure-retaining components and their supports may be designed to meet the requirements of relevant commercial or industrial standards generally accepted for engineering practice.