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."

The requirements of 10 CFR 50.55a and the guidelines of RG 1.26 define the quality group classifications and the relevant quality standards applicable to safety-related structures, systems, and components (SSCs) containing water, steam, or radioactive material in light-water-cooled nuclear power plants.

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, and conforms to the guidance of RG 1.26 for "other safety-related components containing water, steam, or radioactive material."

The methodology for quality group classification of U.S. EPR SSCs employs the Quality Group A through D classifications identified in RG 1.26. Additionally, a Quality Group E classification is used to identify those SSCs that do not meet the criteria for any of the RG 1.26 quality group classifications.

In addition to safety-related SSCs containing water, steam, or radioactive material, the RG 1.26 quality group classifications are also used for other fluid handling systems and for certain non pressure-retaining components, depending on their safety related function. In these cases, the applicable portions of the relevant quality standards are applied.

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 SSCs identified in the FSAR. Components listed in this table include 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 SSCs that are not identified in this table.

The U.S. EPR subscribes to the Kraftwerks Kennzeichen System (KKS) for coding and nomenclature of SSCs. 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 applicable design code for the SSCs. 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 portions of components 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. Quality Group A also applies to the supports of such components. These components and their supports are designed to meet the requirements for Class 1 components in the ASME Code, Section III (Reference 1).

3.2.2.2 Quality Group B

Quality Group B applies to the following types of components and their supports:

- 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.

These components, and their supports, are designed to meet the requirements for Class 2 components in the ASME Code, Section III (Reference 1) and the applicable ASME codes identified in SRP 3.2.2, Table 3.2.2-1.

3.2.2.3 Quality Group C

Quality Group C applies to the following types of components, and their supports, that are not part of the reactor coolant pressure boundary or included in Quality Group B:

- 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.

These components and their supports are designed to meet the requirements for Class 3 components in the ASME Code, Section III (Reference 1) and the applicable ASME codes identified in SPR 3.2.2, Table 3.2.2-1.

3.2.2.4 Quality Group D

Quality Group D applies to non-safety-related portions of systems and components 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 systems and components, provided that the relevant significant licensing requirements or commitments[1] do not invoke a higher quality group.

These 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 (e.g., Section VIII of the ASME Code (Reference 2) and the ASME B31.1 (Reference 3)) or other relevant

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."

standards explicitly invoked by a particular significant licensing requirement or commitment.

3.2.2.5 Quality Group E

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