U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

3.2.2 SYSTEM QUALITY GROUP CLASSIFICATION

REVIEW RESPONSIBILITIES

Primary - Organization responsible for mechanical engineering reviews

Secondary -- Organizations responsible for the review of component performance and testing

I. AREAS OF REVIEW

Nuclear power plant systems and components important to safety should be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed. Important to safety structures, systems, and components (SSCs) are those SSCs that provide reasonable assurance that the facility can be operated with adequate protection to the health and safety of the public. Described herein is an acceptable, primarily deterministic, approach to classify fluid systems important to safety and identify their applicable construction codes and standards depending on the system or component function and relative importance to safety.

The deterministic approach should be complemented, where appropriate, by applying insights from the design-specific probabilistic risk assessment (PRA).

The specific areas of review are as follows:

1. The applicant's classification design criteria for pressure-retaining components and their supports such as pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves in fluid systems important to safety.

   Excluded from this review are items that do not provide pressure integrity functions or their supports, including structures; internal parts of mechanical components such as shafts, seals, impellers, packing, and gaskets; fuel, electrical, and instrumentation systems; electrical valve actuation devices; and pump motors. Non-pressure-retaining items may have unique requirements that are not included in this Standard Review Plan (SRP) section or its associated Regulatory Guide (RG) 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," (e.g., requirements in the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code), Section III, Subsection NG that may be invoked for reactor pressure vessel (RPV) internals, as described in SRP Section 3.9.5~~).~~, "Reactor Pressure Vessel Internals").

2. The applicant's identification of the quality group classification for fluid systems important to safety and the system components including pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves (typically presented in a table in the final safety analysis report (FSAR)).

   The associated quality group classification should be consistent with the applicable ASME BPV Code and code class and the applicable quality assurance criteria in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"; ASME NQA-1; or other appropriate standards such as those identified for risk-significant mechanical systems and components. Where sufficient level of detail is not included in the table, the review may include the applicant's presentation, on suitable system descriptions and schematics or simplified piping and instrumentation diagrams (P&IDs), if applicable, of the system quality group classifications. Other branches responsible for the review of each system description and schematics or P&IDs, if applicable, included in other sections may identify to the SRP Section 3.2.2 reviewer any discrepancies in classifications from the corresponding SRP section for that system.

3. **Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC).** For design certification (DC) and combined license (COL) reviews, the staff reviews the applicant's proposed ITAAC associated with the SSCs related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria." The staff recognizes that the review of ITAAC cannot be completed until after the rest of this portion of the application has been reviewed against acceptance criteria contained in this SRP section. Furthermore, the staff reviews the ITAAC to ensure that all SSCs in this

area of review are identified and addressed as appropriate in accordance with SRP Section 14.3.

4. **COL Action Items and Certification Requirements and Restrictions.** For a DC application, the review will also address COL action items and requirements and restrictions (e.g., interface requirements and site parameters).

   For a COL application referencing a DC, a COL applicant must address COL action or information items included in the referenced DC. Additionally, a COL applicant must address requirements and restrictions (e.g., interface requirements and site parameters) included in the referenced DC. For more specific guidance, see RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

Review Interfaces

Other SRP sections interface with this section as follows:

1. The acceptability of the seismic classification of system components is determined in accordance with SRP Section 3.2.1~~.~~, "Seismic Classification." The seismic classification information may be combined and/or cross-referenced with the quality group classification information reviewed in this SRP section to minimize repetition of similar information (e.g., tables or lists of components, system drawings).

2. The systems and components important to safety that are designated as Quality Groups A, B, C, or D items are reviewed to determine if they will be constructed in accordance with the regulatory guides, industry codes, and standards that are referenced in SRP Sections 3.2.1, 3.9.1~~ through 3.9.3, 3.9.5 and 3.11.~~, "Special Topics for Mechanical Components," through 3.9.3, "ASME Code Class 1, 2, and 3 Components, and Component Supports, and Core Support Structures," 3.9.5, "Reactor Pressure Vessel Internals," and 3.11, "Environmental Qualification of Mechanical and Electrical Equipment."

3. The adequacy of the qualification and inservice testing program for pumps and valves is determined in accordance with SRP Section 3.9.6~~.~~, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints."

4. The seismic qualification of equipment is assessed in accordance with SRP Section~~–~~ 3.10~~.~~, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment."

5. The quality group classification of systems and components comprising the reactor coolant pressure boundary (RCPB) is reviewed and the adequacy of proposed RCPB construction codes and code cases is determined, as part of the staff's primary review responsibility for SRP Sections 5.2.1.1~~ and 5.2.1.2. –~~, "Compliance with the Codes and Standards Rule, 10 CFR 50.55a," and 5.2.1.2, "Applicable Code Cases."

6. The identification and evaluation of nonsafety-related risk-significant SSCs is reviewed in accordance with the guidance in SRP Chapters 17 and 19 and DC/COL-ISG-018 concerning quality assurance (QA) and reliability assurance.

7. The proposed ITAAC for quality group classifications is reviewed in accordance with SRP Sections 14.3 and 14.3.3~~.~~, "Piping Systems and Components - Inspections, Tests, Analyses, and Acceptance Criteria." SRP Section 14.3 provides generic guidance for ITAAC review, while SRP Section 14.3.3 provides guidance for ITAAC review for pressure-retaining components.

In addition, the staff will coordinate evaluations, inside and outside the branch as needed, that interface with the overall review of system safety and quality group classification addressed in those sections as follows:

The staff reviewer should identify discrepancies in system and component safety and quality group classifications, application of the quality assurance program, and codes and standards applicability in accordance with criteria and methods contained in the SRP sections corresponding to the review of the particular systems. Safety functions are not typically included in the FSAR classification tables for each component. Therefore, if any quality group classification shown on a system description and schematics or P&IDs, if applicable, is inconsistent with the specific design basis safety function of a fluid system component, the staff should request additional information from the applicant to clarify and resolve the discrepancy and document the resolution in the safety evaluation report..

1. Electrical and instrument systems that are not pressure-retaining are beyond the scope of RG 1.26 and this SRP section and are reviewed in other SRP sections including SRP Sections 3.10 and 3.11 and in Chapters 7 ~~and 8.~~"Instrumentation and Controls," and 8, "Electric Power."

~~1.~~2. The staff determines the adequacy of the inservice inspection programs for the RCPB and for ASME BPV Code Class 2 and 3 components, as part of the primary review responsibilities for SRP Sections 5.2.4 ~~and 6.6.~~, "Reactor Coolant Pressure Boundary Inservice Inspection and Testing," and 6.6, "Inservice Inspection and Testing of Class 2 and 3 Components."

~~2.~~3. The staff verifies that all items are addressed under the QA program consistent with their importance to safety, as part of the staff's primary review responsibilities for SRP Section 17.5~~.~~, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants." The applicant's QA list referenced in 10 CFR 50.34, "Contents of Applications; Technical Information," and other SRP sections should identify all SSCs covered by the quality assurance program. The QA list may also reference licensing or design basis documents that specify the specific graded quality requirements and basis for quality group classification, including safety functions. The SSCs included in the FSAR Section 3.2 tables may include items on the QA list that are not pressure-retaining and beyond the scope of SRP Section 3.2.2. In

addition, the acceptability of the entire QA list is beyond scope of the SRP Section 3.2.2 review.

~~3.~~4. The regulatory treatment of nonsafety systems (RTNSS) process is addressed in other NRC guidance and reviewed by staff responsible for those SRPs. Identification of risk-significant nonsafety-related SSCs, including RTNSS SSCs, is primarily reviewed using SRP Section 17.4, "Reliability Assurance Program," and SRP Section 19.3, "Regulatory Treatment of Non-Safety Systems for Passive Advanced Light Water Reactors," to determine their reliability for design basis events and severe accidents.

~~4.~~5. Civil structures are beyond the scope of RG 1.26 and this SRP section; quality criteria for these structures are reviewed in other SRP sections, including Section 3.8.

The specific acceptance criteria and review procedures are contained in the referenced SRP sections.

II. ACCEPTANCE CRITERIA

Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 1, "Quality Standards and Records"; and 10 CFR Part 50.55a, "Codes and Standards," as they relate to SSCs important to safety being designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed.

2. 10 CFR 52.47(b)(1), which requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the DC has been constructed and will be operated in conformity with the DC, the provisions of the Atomic Energy Act (AEA), and the U.S. Nuclear Regulatory Commission (NRC) regulations.

3. 10 CFR 52.80(a), which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license, the provisions of the AEA, and the NRC's regulations.

4. 10 CFR 52.47, "Contents of Applications; Technical Information," which requires that the information submitted for a DC must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the NRC, and procurement specifications and construction and

installation specifications by an applicant. The Commission will require, before certification, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit if the information is necessary for the Commission to make its safety determination.

5. 10 CFR 50.34 and 10 CFR 52.47, which require that the FSAR include the design bases and the technical justification upon which the design requirements have been established. Design bases as defined in 10 CFR Part 50.2, "Definitions," means that information which defines the specific functions to be performed by SSCs and the specific values or ranges of values chosen for controlling parameters as reference bounds for design.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for review described in this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

To meet the requirements of GDC 1 and 10 CFR 50.55a, the following regulatory guide is used:

1. RG 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants." This guide describes an acceptable method for determining quality standards for Quality Group B, C, and D water- and steam-containing components important to safety of water-cooled nuclear power plants.

Technical Rationale

The technical rationale for application of these acceptance criteria to the areas of review addressed by this SRP section is discussed in the following paragraphs:

GDC 1 and 10 CFR 50.55a require that systems and components be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed. Regulations in 10 CFR 50.55a also incorporate by reference the applicable editions and addenda of the ASME BPV Code, which addresses pressure integrity of components. Application of 10 CFR 50.55a and GDC 1 provides assurance that established standard practices of proven or demonstrated effectiveness are used to achieve a high likelihood that these safety functions will be performed and that the codes and standards applied are commensurate with the importance to safety of these functions.

RG 1.26 establishes an acceptable method for complying with these requirements by classifying fluid systems and components important to safety and applying

corresponding quality codes and standards to such systems and components. Fluid systems important to safety may perform any of the following functions: fission product containment, core cooling, reactor shutdown, reactivity control, post-accident containment heat removal, post-accident containment atmosphere cleanup, post-accident fission product removal, residual heat removal from the reactor and/or from the spent fuel storage pool, and containment of radioactive materials. Portions of fluid systems that provide cooling or heating, sealing, lubrication, fuel, motive power, isolation, flood protection, or leakage detection necessary to support accomplishment of any of the above functions are also considered important to safety.

The applicant's FSAR classification tables typically do not include safety functions for individual components, and additional design basis information defining the safety function used to establish the quality group classification may be needed. Nuclear Energy Institute (NEI) 97-04, "Design Bases Program Guidelines," Appendix B, referenced in RG 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases", and may be used to define design basis information regarding the specific safety function in the FSAR.

III. REVIEW PROCEDURES

The reviewer will select material from the procedures described below, as may be appropriate for a particular case.

These review procedures are based on the identified SRP acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II. For DCs, Tier 1 information is derived from Tier 2. Consequently, any design information presented in Tier 1 also should be in the appropriate Tier 2 sections.

The staff assigned to the review of quality group classification has primary review responsibility of information included in application Section 3.2.2 concerning pressure-retaining systems and their supports. The staff assists in reviews of such systems to ensure compliance with GDC 1 and coordinates the overall review with staff reviewing other SRP sections to ensure that the applicant has appropriately classified fluid systems and components important to safety using an acceptable process utilizing appropriate quality assurance measures, including construction codes and standards, with respect to the criteria presented in this SRP section. In Staff Requirements Memoranda (SRM) dated July 21, 1993, the Commission approved the staff's position in SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs," the staff should review applications for evolutionary and advanced light-water reactors using the newest codes and standards that have been endorsed by the NRC. Unapproved editions will be reviewed on a case-by-case basis. Code and standard editions used by the applicant should be identified in the application and specific editions should be reviewed by those responsible for endorsement or acceptance of those specific codes and standards. The specific edition of an adopted code or standard should be cited in Tier 2 rather than Tier 1. SRP Section 5.2.1.1 provides additional information on staff review of code and standard information.

Selection and emphasis of various aspects of the areas covered by this SRP section will be made by the reviewer on each case. The reviewer's judgment with respect to the areas to be given attention during the review is to be based on an inspection of the material presented, on the similarity of the material to that recently reviewed for other plants, and on whether items of special safety significance are involved.

1. The staff reviews the classification criteria presented in the FSAR and consistency of that criteria with regulations and regulatory guidance. Regulations in 10 CFR 50.55a identify those ASME Section III, Code Class 1 components of light-water-cooled reactors that are part of the RCPB. The detailed review of these components is conducted by the reviewer under other SRP sections as described in Subsection I. These components are designated in RG 1.26 as Quality Group A. In addition, RG 1.26 identifies, on a functional basis, water- and steam-containing components of those systems important to safety that are designated as Quality Groups B and C. Quality Group D applies to water- and steam-containing components of systems that are less safety-significant and may have different safety standards commensurate with their importance to safety.

   An applicant should use the NRC group classification system identified in RG 1.26. Any alternative approaches, such as the corresponding American Nuclear Society (ANS) classification system of Safety Classes, should be justified and cross-referenced with the classification groups in RG 1.26. Although the NRC does not currently endorse ANS classification standards (e.g., ANS 51.1, 52.1, and ANS 58.14), reference documents such NUREG/CR-5973, "Codes and Standards and Other Guidance Cited in Regulatory Documents", can support identifying industry standards that can be referenced and justified in an application. Certain additional systems not identified in RG 1.26 have established staff positions regarding quality group classification. These systems, and references establishing their acceptable classifications, are identified in Appendix A.

2. The information supplied in the application identifying application of the quality group classification criteria to fluid systems important to safety is reviewed for completeness, and the quality group classification, ASME BPV Code and code class, and quality assurance criteria of selected individual major component are checked for compliance with the above criteria. Safety functions for each component are not specifically identified in the FSAR classification table. The staff may question the basis for a particular component classification and/or confirm the classification basis during an audit or via an ITAAC to validate that the applicant has an appropriate classification process. The various modes of system operation are to be considered to ensure that the assigned NRC quality groups are acceptable. Completeness of a QA list is beyond scope of RG– 1.26 and this SRP.

3. Quality groups and their respective ASME BPV Code class for fluid systems and major pressure-retaining components are to be included in a table. The system description and schematics or P&IDs, if applicable, typically duplicate the quality group or corresponding code class information presented in the table. Where the table does not clearly describe boundaries, the system description and schematics or P&IDs, if applicable, may be reviewed to ensure that the applicant has delineated in detail the

system quality group classification boundaries for systems important to safety. ASME BPV Code class and/or quality group is generally shown in Tier 2. If during the review of Tier 1 information according to SRP Section 14.3, discrepancies are identified between Tier 1 and Tier 2 system description and schematics or P&IDs concerning quality group or ASME BPV Code class, the applicant should be requested to verify consistency between the Tier 1 and Tier 2 information.

4. "Class breaks"—that is, the boundary between classifications such as Quality Group B and Quality Group C within a system—should be located downstream of a valve that is either normally closed or capable of automatic closure when the safety function is required. This valve should be assigned the higher classification. Any change in quality group classification with no valve present is considered acceptable only when it can be demonstrated that the safety function of the system is not impaired by a failure on the lower-classification side of the boundary. Further guidance on this topic is provided in RG 1.26.

5. The following fluid systems are examples of those that are reviewed by the staff with regard to quality group classification. Typical system names are provided below, based on historical staff reviews of prior applications. It should be noted that systems whose function is equivalent to those described in RG 1.26 may not be identified by these names, but the staff should consider the systems and functions in a given application for consistency with these general principles when evaluating whether the classifications are appropriate.

Pressurized-Water Reactor Fluid Systems Subject to Quality Group Classification

- auxiliary feedwater system
- boron thermal regeneration system[1, 2]
- boron recycle system[1, 2]
- chemical and volume control system
- combustible gas control system[1, 3]
- compressed air system[1, 2, 3]
- condensate storage system[1]
- containment cooling system
- containment isolation system[3]
- containment purge system
- containment spray system
- emergency core cooling system
- emergency diesel engine fuel oil storage and transfer system[3]
- emergency diesel engine cooling water system

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1 For some plants this system may be nonsafety-related, providing it is quality group classified consistent with the positions of RG 1.26.

2 Only portions of the system that perform a safety-related function are subject to quality group classification.

3 See Appendix A for supplemental classification guidance.

- emergency diesel engine starting system
- emergency diesel engine lubrication system
- emergency diesel engine combustion air intake and exhaust system
- equipment and floor drainage system[2, 3]
- feedwater system[4]
- main steam system[4]
- pressurizer power-operated relief valves (PORVs) (including associated components and block valves)[3]
- process and post-accident sampling systems[4]
- reactor auxiliary cooling water systems (e.g., component cooling water and essential chilled water systems)[2]
- reactor coolant system
- refueling water storage system[2]
- residual heat removal system
- spent fuel pool cooling and cleanup system[2, 5]
- station service water system[2]
- steam generator blowdown system[4]
- ultimate heat sink and supporting systems[3]
- ventilation systems for areas such as control room and engineered safety features rooms[3]

Boiling-Water Reactor Fluid Systems Subject to Quality Group Classification

- combustible gas control system[3]
- compressed air system[1, 2, 3]
- condensate storage system[2]
- control rod drive hydraulic system[2]
- containment cooling system
- containment isolation system[3]
- emergency core cooling systems
- emergency diesel engine fuel oil storage and transfer system[3]
- emergency diesel engine cooling water system
- emergency diesel engine starting system
- emergency diesel engine lubrication system
- emergency diesel engine combustion air intake and exhaust system
- equipment and floor drainage system[2, 3]
- feedwater system (up to outermost containment isolation valve or shutoff valve, as applicable)
- fuel pool cooling and cleanup system[2, 5]
- main steam system (up to but not including the turbine)
- main steam isolation valve leakage control system[3]

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4 Only portions of the system inside containment, up to and including the outermost containment isolation valve, are subject to quality group classification.

5 Includes makeup water systems as described in SRP Section 9.1.3.

- nuclear boiler system
- process and post-accident sampling systems[4]
- reactor auxiliary cooling water systems (e.g., essential cooling water and chilled water systems)[2]
- reactor core isolation cooling system
- reactor recirculation system
- reactor water cleanup system
- relief valve discharge piping[6]
- residual heat removal (RHR) system
- RHR service water system
- standby gas treatment system[3]
- standby liquid control system
- station service water system[2]
- ultimate heat sink and supporting systems[3]
- ventilation systems for areas such as control room and engineered safety features rooms[3]

Clarification of the quality group classification provided in RG 1.26 and applicable to those portions of BWR main steam and feedwater systems (other than the reactor coolant pressure boundary) on the turbine side of the containment isolation valves, is provided in Branch Technical Position (BTP) 3-1 ~~and 3-2.~~, "Classification of Main Steam Components Other than the Reactor Coolant Pressure Boundary for BWR Plants," and 3-2, "Classification of BWR/6 Main Steam and Feedwater Components Other than the Reactor Coolant Pressure Boundary."

Additional guidance on the quality group classification of systems and components for typical plant designs is provided in Appendix A attached to this SRP section. Appendix A identifies quality group classifications and related references supplemental to the guidance of RG 1.26 for the classification of system components.

Table 3.2.2-1 provides a summary of the construction codes and standards for components of water-cooled nuclear power plants and is based on the NRC quality group classification system in RG 1.26. Appendix A identifies additional guidance regarding the construction of certain systems and components.

In the event an applicant intends to not follow RG 1.26, the applicant should provide adequate justification for the proposed quality group classification or an analysis to establish an acceptable basis for the proposed quality group classification, and the staff should document its evaluation of this justification in the safety evaluation report. The staff may also request additional information from the applicant to ensure a clear understanding of the quality group classifications assigned to a system by the applicant. Exceptions and alternatives to the specified quality group classifications of RG 1.26 or the guidance identified in Appendix A are acceptable only if application of an "equivalent quality level" is justified. In such cases, justification can be demonstrated if: the component is classified to meet the criteria of a higher group classification than specified in RG 1.26 or alternative design rules are based on the use of

6 Refers to the relief valves providing RCPB overpressure protection.

a more conservative design; the extent of component nondestructive examination is equal to or greater than the provisions of the specified code; and the quality assurance requirements of Appendix B, 10 CFR Part 50, are met.

For review of a DC application, the reviewer should follow the above procedures to verify that the design, including requirements and restrictions (e.g., interface requirements and site parameters), set forth in the FSAR meets the acceptance criteria. DCs have referred to the FSAR as the design control document (DCD). The reviewer should also consider the appropriateness of identified COL action items. The reviewer may identify additional COL information items; however, to ensure these COL information items are addressed during a COL application, they should be added to the DC FSAR.

For review of a COL application, the scope of the review is dependent on whether the COL applicant references a DC, an early site permit or other NRC approvals (e.g., manufacturing license, site suitability report, or topical report).

For review of both DC and COL applications, SRP Section 14.3 should be followed for the review of ITAAC. The review of ITAAC cannot be completed until after the completion of the review under this SRP section.

Regulations in 10 CFR 52.47 also state that the Commission will require, before DC, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit if the information is necessary for the Commission to make its safety determination. The staff may elect to audit available design documents such as design specifications, system description and schematics or P&IDs (if applicable), QA lists, and procurement documents associated with the quality group classification of risk-significant systems and mechanical components. An audit should be scheduled based on the availability of design documents and should occur prior to the DC or COL issuance. The staff review may include an assessment of the degree of completeness of design information supporting classifications and how quality group classification and/or code class identified in the licensing basis are translated into design documents. The audit may also be used to support resolution of quality group open items identified during the review of the application. Depending on the audit plan, the scope may be limited to a review of the design classification process and a sampling of risk-significant systems and mechanical components to validate that the applicant has an appropriate classification process in place.

IV. EVALUATION FINDINGS

The reviewer determines that the applicant has provided sufficient information and, on the basis of the review and audit (if applicable), that the information provided supports conclusions of the following type, which will be included in the staff's safety evaluation report (SER). The reviewer also states the bases for those conclusions.

1. The application includes a classification process and specific classification criteria consistent with regulatory guidance in RG 1.26 or an acceptable alternative. Pressure-retaining components of fluid systems important to safety and their supports such as pressure vessels, heat exchangers, storage tanks, pumps, piping and valves have been

classified Quality Group A, B, C, or D and have been identified in an acceptable manner in Table 3.X.X and on system piping and instrumentation diagrams in the SAR. Appropriate quality group classification consistent with RG 1.26 ensures that these components will be constructed to quality standards commensurate with the importance of the safety function to be performed. The review of Quality Group A and B (ASME Section III, Class 1 and 2) RCPB components is discussed in Section 5.2.1.1 of the SER. Other Quality Group B components of systems identified in Position C.1.a through C.1.e of RG 1.26 are constructed to ASME Section III, Class 2. Components in systems identified in Position C.2.a through C.2.d of RG 1.26 are constructed to Quality Group C standards, ASME Section III, Class 3. Components in systems identified in Position C.3 of RG 1.26 are constructed to Quality Group D standards such as ASME Section VIII and American National Standard Institute (ANSI)/ASME B31.1.

2. The staff concludes that there is reasonable assurance that pressure-retaining components of fluid systems important to safety have been properly classified as Quality Group A, B, C, or D items and meets the requirements of General Design Criterion 1, "Quality Standards and Records." This conclusion is based on the applicant having defined and applied an appropriate classification process and design process to meet the requirements of GDC 1 by having properly classified these pressure-retaining components important to safety as Quality Group A, B, C, or D in accordance with the positions of RG 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," or an acceptable alternative. The staff further concludes that the identified pressure-retaining components include major components that, in part, provide assurance that the facility can be operated with adequate protection to the health and safety of the public and those necessary (1) to prevent or mitigate the consequences of accidents and malfunctions originating within the reactor coolant pressure boundary, (2) to permit shutdown of the reactor and maintain it in a safe shutdown condition, and (3) to contain radioactive materials.

For DC and COL reviews, the findings will also summarize the staff's evaluation of requirements and restrictions (e.g., interface requirements and site parameters) and COL action items relevant to this SRP section.

In addition, to the extent that the review is not discussed in other SER sections, the findings will summarize the staff's evaluation of the ITAAC, including design acceptance criteria, as applicable.

V. IMPLEMENTATION

The staff will use this SRP section in performing safety evaluations of DC applications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 10 CFR Part 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the method described herein to evaluate conformance with Commission regulations.

~~The provisions of this SRP section apply to reviews of applications docketed 6 months or more after the date of issuance of this SRP section, unless superseded by a later revision.~~

VI. REFERENCES

1. American National Standards Institute, ANSI/ASME B16.34, "Valves-Flanged, Threaded, and Welding End."

2. American National Standards Institute, ANSI/ASME B31.1, "Power Piping."

3. American National Standards Institute, ANSI B96.1, "Specification for Welded Aluminum-Alloy Field-Erected Storage Tanks."

4. American Petroleum Institute, "Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks," American Petroleum Institute Standard 620, Sixth Edition, American Petroleum Institute Standard 650, Sixth Edition, Revision 1, "Welded Steel Tanks for Oil Storage.".

5. American Society of Mechanical Engineers, ASME BPV Code, "Section III, Division I, Nuclear Power Plant Components." New York, NY.

6. American Society of Mechanical Engineers, ASME BPV Code, "Section VIII, Division 1, Pressure Vessels," New York, NY.

7. American Water Works Association, AWWA D100, "AWWA Standard for Steel Tanks-Standpipes, Reservoirs, and Elevated Tanks for Water Storage."

8. Nuclear Energy Institute, NEI 97-04, "Guidance and Examples for Identifying 10 CFR 50.2, Design Bases," Revised Appendix B, November 2000.

9. U.S. Code of Federal Regulations, "Codes and Standards." § 50.55a, Chapter 1, Title 10, "Energy."

10. U.S. Code of Federal Regulations, "Domestic Licensing of Production and Utilization," Part 50, Chapter 1, Title 10, "Energy," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion 1, "Quality Standards and Records."

11. U.S. Code of Federal Regulations, "Domestic Licensing of Production and Utilization," Part 50, Chapter 1, Title 10, "Energy," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

12. U.S. Nuclear Regulatory Commission, BTP 3-1, "Classification of Main Steam Components Other than the Reactor Coolant Pressure Boundary for BWR Plants."

13. U.S. Nuclear Regulatory Commission, BTP 3-2, "Classification of BWR/6 Main Steam and Feedwater Components Other than the Reactor Coolant Pressure Boundary."

14. U.S. Nuclear Regulatory Commission, “Codes and Standards and Other Guidance Cited in NRC Documents.” NUREG/CR-5973.

15. U.S. Nuclear Regulatory Commission, “Quality Group Classifications and Standards for Water-, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” Regulatory Guide 1.26, ADAMS Accession No. ML14356A249.

16. U.S. Nuclear Regulatory Commission, “Design and Fabrication Code Case Acceptability ASME Section III Division 1,” Regulatory Guide 1.84, ADAMS Accession No. ML13339A515.

17. U.S. Nuclear Regulatory Commission, “Materials Code Case Acceptability ASME Section III Division 1,” Regulatory Guide 1.85.

18. U.S. Nuclear Regulatory Commission, “Guidance and Examples for Identifying 10 CFR 50.2 Design Bases,” Regulatory Guide 1.186, ADAMS Accession No. ML003754825.

19. U.S. Nuclear Regulatory Commission, “Combined License Applications for Nuclear Power Plants,” Regulatory Guide 1.206, ADAMS Accession No. No. ML070720184.

20. U.S. Nuclear Regulatory Commission, “Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light Water Reactor (ALWR) Designs,” SRM July 21, 1993, SECY 93-087, April 4, 1993.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Standard Review Plan (SRP) are covered by the requirements of 10 CFR Part 50, 10 CFR Part 52 and 10 CFR Part 73, and were approved by the Office of Management and Budget, approval numbers 3150-0011, 3150-0151 and 3150-0002.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

Table 3.2.2-1
Summary of Construction[a] Codes and Standards for Components of Water-Cooled Nuclear Power Plants by NRC Quality Classification System[b]

Component	Quality Group A	Quality Group B	Quality Group C	Quality Group D
Pressure Vessels	ASME BPV Code, Section III, Division 1, Subsection NB: **Class 1**, Nuclear Power Plant Components[c, d]	ASME BPV, Section III, Division 1, Subsection NC **Class 2**, Nuclear Power Plant Components[c, d]	ASME BPV Code, Section III, Division 1, Subsection ND: **Class 3**, Nuclear Power Plant Components[c, d]	ASME Boiler and Pressure Vessel Code, Section VIII, Division 1
Piping	Class 1 (NB)	Class 2 (NC)	Class 3 (ND)	ANSI B31.1 Power Piping
Pumps	Class 1 (NB)	Class 2 (NC)	Class 3 (ND)	Manufacturer's standards
Valves	Class 1 (NB)	Class 2 (NC)	Class 3 (ND)	ANSI B31.1 Power Piping and ANSI B16.34
Atmospheric Storage Tanks	Not applicable	Class 2 (NC)	Class 3 (ND)	API-650, AWWA D100, or ANSI B96.1
0-15 psig Storage Tanks	Not applicable	Class 2 (NC)	Class 3 (ND)	API-620
Supports	Subsection NF provisions for Class 1 supports	Subsection NF provisions for Class 2 supports	Subsection NF provisions for Class ~~2~~3 supports	Manufacturers standards
Metal Containment Components	Not applicable	Subsection NE provisions for Class MC components	Not applicable	Not applicable
Core Support Structures	Not applicable	Subsection NG provisions for Class CS components	Not applicable	Not applicable

NOTES:

[a] As defined in Sub-subarticle NCA-1110 of Section III, of the ASME BPV Code, construction is an all-inclusive term comprising materials, design, fabrication, examination, testing, inspection, and certification necessary in the manufacture and installation of components.

[b] As defined in RG 1.26, the NRC Quality Classification System identifies, on a functional basis, components of fluid systems by Quality Groups A, B, C, and D.

[c] See Section 50.55a, "Codes and Standards," of 10 CFR Part 50 for requirements with regard to the Code Edition and Addenda to be applied.

[d] The specific applicability of ASME Code Cases is covered separately in SRP Section 5.2.1.2, RGs 1.84 and 1.85, or in Commission regulations, where appropriate. Applicants proposing the use of ASME Code Cases not covered by these SRP and RGs should receive approval from the Commission before their use and should demonstrate that an acceptable level of quality and safety would be achieved.

Appendix A: Additional Guidance for Classification of Systems and Components and Application of Quality Standards

This appendix summarizes guidance supplemental to the guidance provided in Regulatory Guide (RG) 1.26 for the quality group classification of components of fluid systems important to safety.

The following references are listed in abbreviated format in the right-hand column of the table below.

1. ASME BPV Code, Section III, "Nuclear Power Plant Components," and Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," American Society of Mechanical Engineers.

2. BTP 6-3, "Determination of Bypass Leakage Paths in Dual Containment Plants."

3. RG 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant-Accident."

4. RG 1.11, "Instrument Lines Penetrating Primary Reactor Containment."

5. RG 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."

6. RG 1.72, "Spray Pond Piping Made from Fiberglass- Reinforced Thermosetting Resin."

7. RG 1.96, "Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Reactor Nuclear Power Plants."

8. RG 1.137, "Fuel Oil Systems for Standby Diesel Generators."

9. RG 1.141, "Containment Isolation Provisions for Fluid Systems."

10. RG 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

11. RG 1.151, "Instrument Sensing Lines."

12. U.S. Nuclear Regulatory Commission (NRC) Letter to All Pressurized Water Reactor Licensees and Construction Permit Holders, "Resolution of Generic Issue 70, 'Power-Operated Relief-Valve and Block Valve Reliability,' and Generic Issue 94, 'Additional Low-Temperature Overpressure Protection for Light-Water Reactors,'" Generic Letter 90-06, June 25, 1990.

Table A-1 Supplemental Guidance for Classification and Application of Quality Standards

System or Component	Quality Group	References
Combustible gas control system	B [a]	SRP Section 6.2.5, RG 1.7
Compressed air systems required to perform a safety function	C	SRP Section 9.3.1
Containment isolation system:	A/B [b]	SRP 6.2.4
Penetrations including associated piping and isolation valves	A/B [b]	RG 1.141
Instrument lines penetrating containment	B [c]	RG 1.11
Isolation barriers comprised of closed systems inside containment	B [b]	SRP 6.2.4
Isolation barriers comprised of closed systems outside containment	B [b]	SRP 6.2.4
Closed systems in secondary containment proposed as boundaries to preclude bypass leakage	B [d]	BTP 6-3
Emergency diesel engine:		
Fuel oil storage and transfer system	C[e]	SRP Section 9.5.4, RG 1.137
Cooling water system	C	SRP Section 9.5.5
Starting system	C	SRP Section 9.5.6
Lubrication system	C	SRP Section 9.5.7
Combustion air intake and exhaust system	C	SRP Section 9.5.8
Equipment and Floor Drainage System	C [f]	SRP Section 9.3.3
Gas Treatment Systems considered as engineered safeguards systems	B	
Plant ventilation systems for areas such as the control room and engineered safety features rooms	C	
PWR pressurizer PORVs, associated components, and block valves	[g]	GL 90-06
Radioactive waste management systems	[h]	RG 1.143
Safety-related instrument sensing lines	B,C [i]	RG 1.151
Ultimate heat sink and supporting systems	C [j]	SRP Section 9.2.5, RG 1.72
Main steam, essential portions	B	SRP Section 10.3
Circulating water system	D	SRP 10.4.5
PWR safety-related steam generator blowdown	B	SRP 10.4.8

NOTES:

a. RG 1.7, "Control of Combustible Gas Concentrations in Containment," describes acceptable methods for the control of combustible gas in containment, with consideration of 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors."

b. SRP Section 6.2.4 contains guidance related to classification of containment isolation systems. Containment isolation system components (e.g., isolation barriers) are normally classified as Quality Group B unless their service function dictates that Quality Group A standards be applied. RGs 1.11 and 1.141 are cited in SRP Section 6.2.4 and describe methods acceptable to the NRC staff for complying with the Commission's requirements with respect to containment isolation of fluid systems.

c. RG 1.11, "Instrument Lines Penetrating Primary Reactor Containment," describes a suitable basis that may be used to implement containment isolation design criteria for instrument lines.

d. Branch Technical Position 6-3 describes methods for determining bypass leakage paths in dual containment plants. Position B.9.B indicates that closed systems proposed as leakage boundaries to preclude bypass leakage should be designed in accordance with Quality Group B standards, as defined by RG 1.26, "Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," but that systems designed to Quality Group C or D standards that qualify as closed systems to preclude bypass leakage will be considered on a case-by-case basis.

e. RG 1.137, “Fuel Oil Systems for Standby Diesel Generators,” describes a method acceptable for complying with regulations regarding fuel-oil systems for standby diesel generators. The Regulatory Guide describes positions with respect to the design and fabrication of diesel fuel oil systems which are supplemental to those indicated by the Quality Group C classification including the application of additional standards.

f. SRP Section 9.3.3 provides criteria used to determine the safety-related portions of the equipment and floor drainage system and indicates that the safety-related portions of the system should be verified to be classified Quality Group C or higher.

g. Components of the reactor coolant system, including those comprising the RCPB, should be quality group classified accordingly. PORVs and associated components should be classified as safety-related where necessary to perform a safety-related function (e.g., mitigation of a design-basis steam generator tube rupture accident, low temperature overpressure protection of the reactor vessel, and/or plant cooldown as described in GL 90-06, “Resolution of Generic Issues 70, “PORV and Block Valve Reliability,” and Generic Issue 94, “Additional Low-Temperature Over Pressure Protection for PWRs”). As described in Reference 12, the safety-related classification should address redundant and diverse control systems designed to meet Seismic Category I criteria and those improvements that were imposed subsequent to the TMI-2 accident, such as criteria to be powered from Class 1E buses and to provide valve position indication in the control room. The PORVs and block valves should be included within a quality assurance program that is in compliance with 10 CFR Part 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants.” For PWR plants licensed before the revision date of this SRP section and whose PORVs were not constructed as safety-grade components, these components should be addressed in accordance with the positions specified in GL 90-06, Enclosure A, Section 3.1.

h. RG 1.143, “Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants,” describes a method acceptable for complying with regulations regarding radwaste management systems, including guidance for classification and quality assurance measures. Position C.1.1 and Table 1 of the RG describe codes and industry standards applicable to the design and fabrication of radwaste management systems. In addition, the RG describes positions with regard to the design and fabrication of these systems that are supplemental to those established by the codes and standards cited. RG 1.143 does not explicitly specify classifications for radwaste management system components in terms of the quality groups (A-D) described in RG 1.26.

i. RG 1.151, “Instrument Sensing Lines,” describes an acceptable method for the design and installation of safety-related instrument sensing lines, including the application of another standard in addition to the ASME Code. The RG describes an acceptable method for classifying instrument sensing lines by providing classification guidance for instrument sensing lines in terms of the ASME BPV Code, Section III code classes, which correspond to RG 1.26 Quality Groups.

j. SRP Section 9.2.5 provides review procedures and findings that verify that the ultimate heat sink and its supporting systems meet Quality Group C criteria. RG 1.72, “Spray Pond Piping Made from Fiberglass- Reinforced Thermosetting Resin,” describes an acceptable method for the design, fabrication, and testing of fiberglass-reinforced thermosetting resin piping for spray pond applications, which includes the application of a code case as supplemented by the regulatory positions. RG 1.72 position C.7.b indicates that ASME Code, Section XI inservice inspection criteria for Class 3 systems should be applied for such piping.

SRP Section 3.2.2
Description of Changes
Section 3.2.2, "System Quality Group Classification"

In addition to the changes itemized below, editorial changes were made throughout for consistency and applicability. Changes incorporated into Revision 3 include:

I. AREAS OF REVIEW

- Applicability of this SRP section to non-pressure-retaining components was updated for clarity.
- A definition of important to safety SSCs was added for clarity.
- Discussion of the alternative approach identified in 10 CFR 50.69 was removed to focus discussion on the approach discussed in RG 1.26.
- Changes were made to clarify applicability to Part 52 applications.
- A pointer was added to RG 1.206.
- A pointer to SRP Section 3.9.5 was added for clarity.
- A pointer to SRP Chapters 17 and 19 and DC/COL-ISG-018 was added to address evaluation of RTNSS SSCs.
- A pointer to SRP Section 14.3 and 14.3.3 was added to address the evaluation of ITAAC.
- Discussion of interactions with other review branches was added to clarity.

II. ACCEPTANCE CRITERIA

- Requirements from 10 CFR 52.47 and 50.34 were added to clarify requirements for design certification applications and the FSAR.
- A pointer to NEI 97-04 was added for clarity of design basis information

III. REVIEW PROCEDURES

- A pointer was added to SRP Section 5.2.1.1 for ASME code and standard review.
- Requirements from 10 CFR 52.47 were added to clarify the role of audits in the review process

IV. EVALUATION FINDINGS

- The basis for evaluation findings was updated for clarity.

V. IMPLEMENTATION

- A minor correction was made to the applicability of this SRP section based on the docketing date of the application.

VI. REFERENCES

- References were updated in concert with changes referenced above.

TABLE A-1

- Table entries for emergency diesel engine systems were updated to include relevant SRP sections.
- Entry for BWR Main Steam Isolation Valve Leakage Control System removed.
- Entries added for Main steam essential portions, circulating water system, and PWR safety-related steam generator blowdown.
  Discussion of RG 1.11 in the footnotes was trimmed for clarity.