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. Described herein is an acceptable 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. An alternative approach identified in 10 CFR 50.69 is a risk-informed categorization process that applies industry guidelines for categorizing Systems, Structures, and Components (SSCs) according to a risk-informed safety class. The risk-informed approach described in Regulatory Guide (RG) 1.176 and RG 1.201 is optional and subject to the limitations of 10 CFR 50.69. Successful application of an acceptable risk-informed categorization approach depends on a high quality PRA and an approved method to assign applicable codes and standards. Considering that RG 1.201 currently is to be used only as interim guidance for trial use and that an acceptable risk-informed method to assign applicable codes and standards to a risk-informed safety class does not exist, this SRP section does not include criteria for reviewing a risk-informed categorization approach.

The specific areas of review are as follows:

Revision 2 - March 2007

1. The applicant's classification system for pressure-retaining components such as pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves in fluid systems important to safety, and the applicant's assignment of quality groups to those portions of systems necessary to perform safety functions. Excluded from this review are: 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.

2. The applicant's data, presented in the safety analysis report (SAR) in the form of a table that identifies the fluid systems important to safety; the system components such as pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves; the associated quality group classification, applicable American Society for Mechanical Engineers (ASME), Boiler and Pressure Vessel Code (Code) and code class; and the quality assurance criteria. In addition, the review includes the applicant's presentation, on suitable piping and instrumentation diagrams, of the system quality group classifications.

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 structures, systems, and components (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 items (referred to as COL license information in certain DCs) 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.

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. 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, etc.).

2. The systems and components important to safety that are designated as Quality Groups A, B, C, or D items are verified to determine if they are 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, and 3.11.

3. The adequacy of the qualification and inservice testing program for pumps and valves is determined in accordance with SRP Section 3.9.6.

4. The seismic qualification of equipment is assessed in accordance with SRP 3.10.

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.

In addition, the staff will coordinate evaluations that interface with the overall review of system safety and quality group classification as follows:

1. The staff reviews 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.

2. Specific information or assistance may be necessary to review electrical and instrumentation systems needed for functioning of plant features important to safety.

3. The staff determines the adequacy of the inservice inspection programs for the RCPB and for ASME Code Class 2 and 3 components, as part of the primary review responsibilities for SRP Sections 5.2.4 and 6.6.

4. 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.

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

II. ACCEPTANCE CRITERIA

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

1. 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1 and 10 CFR Part 50.55a, as they relate to structures, systems, and components 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 inspections, tests, analyses, and acceptance criteria (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 plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and the NRC's 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 Atomic Energy Act, and the NRC's regulations.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for the 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 Classification 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. 10 CFR 50.55a also incorporates by reference the applicable editions and addenda of the ASME Code. 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 which 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. 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.

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.

The staff assists in reviews of such systems and coordinates the overall review to ensure that all fluid systems and components important to safety are acceptably classified and that appropriate quality assurance measures, including construction codes and standards, are applied 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.

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 judgement 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. 10 CFR 50.55a identifies those ASME Section III, Code Class 1 components of light-water-cooled reactors important to safety 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 important to safety. An applicant may use the NRC Group Classification system identified in RG 1.26 or, alternately, the corresponding American Nuclear Society (ANS) classification system of Safety Classes if they are cross-referenced with the classification groups in RG 1.26. There are also systems of light-water-cooled reactors important to safety that are not identified in RG 1.26 for which there are 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 fluid systems important to safety is reviewed for completeness, and the quality group classification, ASME Code and code class, and quality assurance criteria of each individual major component are checked for compliance with the above criteria. The various modes of system operation are checked to ensure that the assigned NRC quality groups are acceptable.

3. The piping and instrumentation diagrams are reviewed to ensure that the applicant has delineated in detail the system quality group classification boundaries for systems

important to safety. Changes in quality group classification are considered to be acceptable normally only at valve locations, with the valve assigned the higher classification. A change in quality group classification with no valve present is normally 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.

The following fluid systems important to safety for pressurized water reactor (PWR) and boiling water reactor (BWR) plants are examples of those that are reviewed by the staff with regard to quality group classification. Typical PWR and BWR system names are provided below, based on historical staff reviews of prior applications. It should be noted that systems whose function is important to safety in accordance with RG 1.26 and that are used in passive system light water reactor (LWR) designs or non-LWR designs may not be identified by these names.

FLUID SYSTEMS IMPORTANT TO SAFETY FOR PWR PLANTS

Auxiliary Feedwater System
Boron Thermal Regeneration System[1,2]
Boron Recycle System[1,2]
Chemical and Volume Control System
Combustible Gas Control System[1,6]
Compressed Air System[1,2,6]
Condensate Storage System[1]
Containment Cooling System
Containment Isolation System[6]
Containment Purge System
Containment Spray System
Emergency Core Cooling System
Emergency Diesel Engine Fuel Oil Storage and Transfer System[6]
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[2,6]
Feedwater System[3]
Main Steam System[3]
Pressurizer Power-Operated Relief Valves (PORVs) (including associated components and block valves)[6]
Process and Post-Accident Sampling Systems[3]
Reactor Auxiliary Cooling Water Systems (e.g., Component Cooling Water and Essential Chilled WaterSystems)[2]
Reactor Coolant System
Refueling Water Storage System[2]
Residual Heat Removal System
Spent Fuel Pool Cooling and Cleanup System[2,4]
Station Service Water System[2]
Steam Generator Blowdown System[3]
Ultimate Heat Sink and Supporting Systems[6]
Ventilation Systems for Areas such as Control Room and Engineered Safety Features Rooms[6]

FLUID SYSTEMS IMPORTANT TO SAFETY FOR BWR PLANTS

Combustible Gas Control System[6]
Compressed Air System[1,2,6]
Condensate Storage System[2]
Control Rod Drive Hydraulic System[2]
Containment Cooling System
Containment Isolation System[6]
Emergency Core Cooling Systems
Emergency Diesel Engine Fuel Oil Storage and Transfer System[6]
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[2,6]
Feedwater System (up to outermost containment isolation valve or shutoff valve, as applicable)
Fuel Pool Cooling and Cleanup System[2,4]
Main Steam System (up to but not including the turbine)
Main Steam Isolation Valve Leakage Control System[6]
Nuclear Boiler System
Process and Post-Accident Sampling Systems[3]
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[5]
Residual Heat Removal (RHR) System
RHR Service Water System
Standby Gas Treatment System[6]
Standby Liquid Control System
Station Service Water System[2]
Ultimate Heat Sink and Supporting Systems[6]
Ventilation Systems for Areas such as Control Room and Engineered Safety Features Rooms[6]

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1 For some plants this system may be non-safety-related, providing it is quality group classified consistent with the positions of RG 1.26.
2 Portions of the system that perform a safety-related function.
3 Portions of the system to outermost containment isolation valve.
4 Includes makeup water systems as described in SRP Section 9.1.3.
5 Refers to the relief valves providing RCPB overpressure protection.
6 See Appendix A for supplemental classification guidance.

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 BTP 3-2.

Additional guidance on the quality group classification of systems and components important to safety 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 take exception to RG 1.26 it should be supported with adequate justification for the proposed quality group classification or an analysis to establish an acceptable basis for the proposed quality group classification. Staff comments may also be prepared requesting clarification, in order 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 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 final safety analysis report (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 action items; however, to ensure these COL action 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 (ESP) 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 this section.

IV. EVALUATION FINDINGS

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report. The reviewer also states the bases for those conclusions.

1. Pressure-retaining components of fluid systems important to safety 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. These components have been 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 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 met the requirements of GDC 1 by having properly classified these pressure-retaining components important to safety 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," and by the staff's conclusion that the identified pressure-retaining components are 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 submitted six months or more after the date of issuance of this SRP section, unless superseded by a later revision.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulations, Regulatory Guides, Appendix A, Branch Technical Position 3-1, Branch Technical Position 3-2, and in documents referenced therein.

VI. REFERENCES

1. 10 CFR 50.55a, "Codes and Standards."

2. 10 CFR Part 50, Appendix A, General Design Criterion 1, "Quality Standards and Records."

3. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

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

5. Regulatory Guide 1.84, "Design and Fabrication Code Case Acceptability ASME Section III Division 1."

6. Regulatory Guide 1.85, "Materials Code Case Acceptability ASME Section III Division 1."

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

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

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

10. API Standard 620, Sixth Edition, "Recommended Rules for Design and Construction of Large, Welded, Low-Pressure Storage Tanks," American Petroleum Institute.

11. API Standard 650, Sixth Edition, Revision 1, "Welded Steel Tanks for Oil Storage," American Petroleum Institute.

12. Boiler and Pressure Vessel Code, “Section III, Division I, Nuclear Power Plant Components," American Society of Mechanical Engineers.

13. Boiler and Pressure Vessel Code, “Section VIII, Division 1, Pressure Vessels," American Society of Mechanical Engineers.

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

15. Regulatory Guide 1.176, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Graded Quality Assurance.”

16. Regulatory Guide 1.201, “Guidelines for Categorizing Structures, Systems and Components in Nuclear Power Plants, According to their Safety Significance.”

17. 10 CFR 50.69, “Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors.”

18. SRM July 21, 1993, SECY 93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light Water Reactor (ALWR) Designs," April 4, 1993.

19. Branch Technical Position 3-1, “Classification of Main Steam Components Other than the Reactor Coolant Pressure Boundary for BWR Plants.”

20. Branch Technical Position 3-2, “Classification of BWR/6 Main Steam and Feedwater Components Other than the Reactor Coolant Pressure Boundary.”

TABLE 3.2.2-1

SUMMARY OF CONSTRUCTION[1] CODES AND STANDARDS FOR COMPONENTS OF WATER-COOLED NUCLEAR POWER PLANTS BY NRC QUALITY CLASSIFICATION SYSTEM[2]

	NRC Quality Classification System			
Components	**Quality Group A**	**Quality Group B**	**Quality Group C**	**Quality Group D**
Pressure Vessels	ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NB -Class 1, Nuclear Power Plant Components [3,4]	ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NC -Class 2, Nuclear Power Plant Components[3,4]	ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection ND -Class 3, Nuclear Power Plant Components [3,4]	ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
Piping	As above	As above	As above	ANSI B31.1 Power Piping
Pumps	As above	As above	As above	Manufacturers standards.
Valves	As above	As above	As above	ANSI B31.1 Power Piping and ANSI B16.34
Atmospheric Storage Tanks	Not applicable	As above	As above	API-650, AWWA D100, or ANSI B96.1
0-15 psig Storage Tanks	Not applicable	As above	As above	API-620
Supports	As above except Subsection NF	As above except Subsection NF	As above except Subsection NF	Manufacturers standards
Metal Containment Components	Not applicable	As above except Subsection NE, Class MC	Not applicable	Not applicable
Core Support Structures	Not applicable	As above except Subsection NG	Not applicable	Not applicable

NOTES:

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

2 As defined in Regulatory Guide 1.26, the NRC Quality Classification System identifies, on a functional basis, components of fluid systems by Quality Groups A, B, C, and D.

3 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.

4 The specific applicability of ASME Code Cases is covered separately in SRP Section 5.2.1.2, Regulatory Guides 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 Regulatory Guides should receive approval from the Commission prior to their use and should demonstrate that an acceptable level of quality and safety would be achieved.

APPPENDIX A

Additional Guidance for Classification of Systems and Components and Application of Quality Standards

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

REFERENCES

1. Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant-Accident."

2. Regulatory Guide 1.11, "Instrument Lines Penetrating Primary Reactor Containment."

3. Regulatory Guide 1.26, "Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."

4. Regulatory Guide 1.72, "Spray Pond Piping Made from Fiberglass- Reinforced Thermosetting Resin."

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

6. Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators."

7. Regulatory Guide 1.141, "Containment Isolation Provisions for Fluid Systems."

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

9. Regulatory Guide 1.151, "Instrument Sensing Lines."

10. Branch Technical Position 6-3, "Determination of Bypass Leakage Paths in Dual Containment Plants."

11. 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," (NRC Generic Letter No. 90-06)," June 25, 1990.

12. NRC Memorandum from E. S. Beckjord for F. P. Gillespie, "Resolutions 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,"" November 16, 1989.

13. Boiler and Pressure Vessel Code, "Section III, Nuclear Power Plant Components," and "Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components," American Society of Mechanical Engineers.

Table A-1

Added Guidance for Classification and Application of Quality Standards

	System or Component	Quality Group	References
1.	Combustible Gas Control System	B (1)	RG 1.7
2.	Compressed Air Systems required to perform a safety function	C	SRP 9.3.1
3.	Containment Isolation System:	A/B (2)	SRP 6.2.4
	a. Penetrations including associated piping and isolation valves	A/B (2)	RG 1.141
	b. Instrument lines penetrating containment	B (3)	RG 1.11
	c. Isolation barriers comprised of closed systems inside containment	B (2)	SRP 6.2.4
	d. Isolation barriers comprised of closed systems outside containment	B (2)	SRP 6.2.4
	e. Closed systems in secondary containment proposed as boundaries to preclude bypass leakage	B (4)	Branch Technical Position 6-3
4.	Emergency Diesel Engine:		
	a. Fuel Oil Storage and Transfer System	C (5)	RG 1.137
	b. Cooling Water System	C	
	c. Starting System	C	
	d. Lubrication System	C	
	e. Combustion Air Intake and Exhaust System	C	
5.	Equipment and Floor Drainage System	C (6)	SRP 9.3.3
6.	Gas Treatment Systems which are considered as engineered safeguards systems	B	

Table A-1 (continued)

	System or Component	Quality Group	References
7.	BWR Main Steam Isolation Valve Leakage Control System and necessary subsystems	B/A (7)	RG 1.96
8.	Plant Ventilation Systems for areas such as the control room and engineered safety features rooms	C	
9.	PWR Pressurizer PORVs, associated components, and Block Valves	(8)	Generic Letter 90-06
10.	Radioactive Waste Management Systems	(9)	RG 1.143
11.	Safety-Related Instrument Sensing Lines	B,C (10)	RG 1.151
12.	Ultimate Heat Sink and Supporting Systems	C (11)	SRP 9.2.5, RG 1.72

NOTES:

(1) RG 1.7 describes acceptable methods for the control of combustible gas in containment, with consideration of 10 CFR 50.44, "Standards for Combustible Gas Control Systems in Light-Water-Cooled Power Reactors."

(2) 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.

(3) RG 1.11 describes a suitable basis which may be used to implement containment isolation design criteria for instrument lines. Position C.1.c indicates that protection system sensing lines penetrating or connected to primary reactor containment should be provided with an isolation valve capable of automatic operation or remote operation, and should be located in the line outside the containment as close to the containment as practical. Position C.1.d indicates that such lines should be conservatively designed up to and including the isolation valve and of a quality at least equivalent to the containment [generally Group B per NOTE (2) above]. Position C.2 indicates that sensing lines for instruments that are not part of the protection system should meet the above provisions or should be provided with one automatic isolation valve inside and one automatic valve outside containment as close to containment as practical.

(4) 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 a leakage boundary to preclude bypass leakage should be designed in accordance with Quality Group B standards, as defined by RG 1.26, 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.

(5) RG 1.137 describes a method acceptable for complying with regulations regarding fuel-oil systems for standby diesel generators. The Reg. 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.

(6) 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.

(7) RG 1.96 describes an acceptable basis for evaluating the need for, and design of, leakage control systems for BWR main steam isolation valves. Position C.1 of the Regulatory Guide describes the appropriate classification for leakage control systems as Quality Group B, with the exception of the unisolable portion of the system connected to the RCPB, which should be classified as Quality Group A. Appendix A of the Regulatory Guide describes measures supplemental to the ASME Code to be applied for Quality Group A portions of the system.

(8) 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 Generic Letter 90-06). As described in Reference 12, the safety-related classification should address redundant and diverse control systems designed to 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.

For PWR plants licensed prior to 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 Generic Letter 90-06, Enclosure A, Section 3.1.

(9) RG 1.143 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 Regulatory Guide describe codes and industry standards applicable to the design and fabrication of radwaste management systems. In addition, the Regulatory Guide 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.

Table A-1 (continued)

(10) RG 1.151 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 Regulatory Guide describes an acceptable method for classifying instrument sensing lines by providing classification guidance for instrument sensing lines in terms of the ASME Boiler and Pressure Vessel Code, Section III code classes, which correspond to RG 1.26 Quality Groups.

(11) 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 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.