U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

November 2006
Division 1

DRAFT REGULATORY GUIDE

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DRAFT REGULATORY GUIDE DG-1152

(Proposed Revision 4 of Regulatory Guide 1.26, dated February 1976)

QUALITY GROUP CLASSIFICATIONS AND STANDARDS FOR WATER-, STEAM-, AND RADIOACTIVE-WASTE-CONTAINING COMPONENTS OF NUCLEAR POWER PLANTS

A. INTRODUCTION

General Design Criterion 1, "Quality Standards and Records," as set forth in Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10, Part 50, of the *Code of Federal Regulations* (10 CFR Part 50), "Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Under 10 CFR 50.55a, "Codes and Standards," certain systems and components of boiling- and pressurized-water-cooled nuclear power reactors must be designed, fabricated, erected, and tested in accordance with the standards for Class 1, 2, and 3[1] components given in Section III, "Nuclear Power Plant Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code or equivalent quality standards. This guide describes a quality classification system related to specified national standards that may be used to determine quality standards acceptable to the staff of the U.S. Nuclear Regulatory Commission (NRC) for satisfying General Design Criterion 1 for other safety-related components containing water, steam, or radioactive material in light-water-cooled nuclear power plants.

[1] In editions of the ASME Boiler and Pressure Vessel Code published before 1971, Section III uses the terms Class A, Class B, and Class C in lieu of Class 1, Class 2, and Class 3. Copies of ASME standards discussed herein may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016-5990; telephone (800) 843-2763; http://catalog.asme.org/home.cfm?CATEGORY=CS&TaxonomyItemID=3021.

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with regulatory guides is not required. The NRC issues regulatory guides in draft form to solicit public comment and involve the public in developing the agency's regulatory positions. Draft regulatory guides have not received complete staff review and, therefore, they do not represent official NRC staff positions.

This regulatory guide contains information collections that are covered by the requirements of 10 CFR Part 50 which the Office of Management and Budget (OMB) approved under OMB control number 3150-0011. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

B. DISCUSSION

In the early 1970s, the NRC staff developed a quality classification system to provide licensees with guidance for satisfying General Design Criterion 1. The system consists of four quality groups, A through D; methods for assigning components to those quality groups; and specific quality standards applied to each quality group. When the NRC issued Revision 2 of Regulatory Guide 1.26[2] in June 1975 and Draft Revision 3 for public comment in February 1976, 10 CFR 50.55a required only that components of the reactor coolant pressure boundary be designed, fabricated, erected, and tested to the highest available national standards; this corresponded to the quality standards for Quality Group A of the NRC system. On March 15, 1984, the Commission published a final rule [Volume 49 of the *Federal Register*, page 09711 (49 FR 09711)] amending 10 CFR 50.55a to incorporate by reference the criteria in Section III of the ASME Code, as they relate to the design and fabrication of Class 2 and 3 components (Quality Group B and C components, respectively).

Because the quality group classification system is well-established, this proposed revision of Regulatory Guide 1.26 retains the method described in previous versions for determining acceptable quality standards for Quality Group B, C, and D components. Other systems not covered by this guide, such as instrument and service air, diesel engines and their generators and auxiliary support systems, diesel fuel, emergency and normal ventilation, fuel handling, and radioactive waste management systems[3], should be designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed. The evaluation to establish the quality group classification of these other systems should consider the guidance provided in Regulatory Positions 1 and 2 of this guide.

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[2] All regulatory guides listed herein were published by the U.S. Nuclear Regulatory Commission. Many are available electronically through the NRC's public Web site at http://www.nrc.gov/reading-rm/doc-collections/reg-guides/ and/or the Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html. Single copies of regulatory guides may also be obtained free of charge by writing the Reproduction and Distribution Services Section, ADM, USNRC, Washington, DC 20555-0001, or by fax to (301) 415-2289, or by email to DISTRIBUTION@nrc.gov. Copies are also available for inspection or copying for a fee from the NRC's Public Document Room (PDR), which is located at 11555 Rockville Pike, Rockville, Maryland; the PDR's mailing address is USNRC PDR, Washington, DC 20555-0001. The PDR can also be reached by telephone at (301) 415-4737 or (800) 397-4205, by fax at (301) 415-3548, and by email to PDR@nrc.gov.

[3] Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," provides specific guidance on the quality group classification of radioactive waste management systems.

C. REGULATORY POSITION

(1) The Quality Group B standards given in Table 1 of this guide should be applied to water- and steam-containing pressure vessels, heat exchangers (other than turbines and condensers), storage tanks, piping, pumps, and valves that are either (a) part of the reactor coolant pressure boundary defined in 10 CFR 50.2(v) but excluded from the requirements of 10 CFR 50.55a[4] pursuant to footnote 2 of that section, or (b) not part of the reactor coolant pressure boundary but part of the following:

(a) systems or portions of systems[5] important to safety that are designed for (i) emergency core cooling, (ii) postaccident containment heat removal, or (iii) postaccident fission product removal

(b) systems or portions of systems[4] important to safety that are designed for (i) reactor shutdown or (ii) residual heat removal

(c) (i) those portions of the steam systems of boiling-water reactors extending from the outermost containment isolation valve up to but not including the turbine stop and bypass valves[6], and (ii) connected piping up to and including the first valve that is either normally closed or capable of automatic closure during all modes of normal reactor operation; alternatively, for boiling-water reactors containing a shutoff valve (in addition to the two containment isolation valves) in the main steam line and the main feedwater line, those portions of the steam and feedwater systems extending from the outermost containment isolation valves up to and including the shutoff valve or the first valve that is either normally closed or capable of automatic closure during all modes of normal reactor operation

(d) (i) those portions of the steam and feedwater systems of pressurized-water reactors extending from and including the secondary side of steam generators up to and including the outermost containment isolation valves, and (ii) connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure during all modes of normal reactor operation

(e) systems or portions of systems[4] that are connected to the reactor coolant pressure boundary and are not capable of being isolated from the boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure

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[4] The regulations in 10 CFR 50.55a specify the Quality Group A standards for pressure-containing components of the reactor coolant pressure boundary.

[5] The system boundary includes those portions of the system necessary to accomplish the specified safety function and connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure when the safety function is required.

[6] The turbine stop valve and turbine bypass valve, although not included in Quality Group B, should be subjected to a quality assurance program at a level generally equivalent to Quality Group B.

(2) The Quality Group C standards given in Table 1 of this guide should be applied to water-, steam-, and radioactive-waste-containing pressure vessels; heat exchangers (other than turbines and condensers); storage tanks; piping; pumps; and valves that are not part of the reactor coolant pressure boundary or included in Quality Group B but part of the following:

(a) cooling water and auxiliary feedwater systems or portions of those systems[4] important to safety that are designed for (i) emergency core cooling, (ii) postaccident containment heat removal, (ii) postaccident containment atmosphere cleanup, or (iv) residual heat removal from the reactor and from the spent fuel storage pool (including primary and secondary cooling systems), although Quality Group B includes portions of those systems that are required for their safety functions and that (i) do not operate during any mode of normal reactor operation and (ii) cannot be tested adequately

(b) cooling water and seal water systems or portions of those systems[4] important to safety that are designed for the functioning of components and systems important to safety, such as reactor coolant pumps, diesels, and the control room

(c) systems or portions of systems[4] that are connected to the reactor coolant pressure boundary and are capable of being isolated from that boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure[7]

(d) systems, other than radioactive waste management systems[2], not covered by Regulatory Positions 2.a through 2.c (above) that contain or may contain radioactive material and whose postulated failure would result in conservatively calculated potential offsite doses (using meteorology as recommended in Regulatory Guide 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Boiling-Water Reactors," and Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Pressurized Water Reactors") that exceed 0.5 rem to the whole body or its equivalent to any part of the body; only single component failures need be assumed for those systems located in Seismic Category I structures, and no credit should be taken for automatic isolation from other components in the system or for treatment of released material, unless the isolation or treatment capability is designed to the appropriate seismic and quality group standards and can withstand loss of offsite power and a single failure of an active component

(3) The Quality Group D standards given in Table 1 of this guide should be applied to water- and steam-containing components that are not part of the reactor coolant pressure boundary or included in Quality Groups B or C, but are part of systems or portions of systems that contain or may contain radioactive material.

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[7] Components in influent lines may be classified as Quality Group D if they are capable of being isolated from the reactor coolant pressure boundary by an additional valve that has high leaktight integrity.

Table 1

Components	QUALITY STANDARDS		
	Quality Group B	**Quality Group C**	**Quality Group D**
Pressure Vessels	ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components,"[a,b] Class 2	ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components,"[a,b] Class 3	ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, "Rules for Construction of Pressure Vessels"
Piping	As above	As above	ANSI B31.1.0 Power Piping
Pumps	As above	As above	Manufacturers' standards
Valves	As above	As above	ANSI B31.1.0
Atmospheric Storage Tanks	As above	As above	API-650, AWWA D 100, or ANSI B96.1
0–15 psig Storage Tanks	As above	As above	API-620

[a] See 10 CFR 50.55a for guidance regarding the ASME Code and addenda to be applied.

[b] Other regulatory guides or Commission regulations cover the specific applicability of code cases, where appropriate. Applicants proposing the use of code cases not covered by guides or regulations should demonstrate that an acceptable level of quality and safety would be achieved.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this draft regulatory guide. No backfitting is intended or approved in connection with its issuance.

The NRC has issued this draft guide to encourage public participation in its development. Except in those cases in which an applicant or licensee proposes or has previously established an acceptable alternative method for complying with specified portions of the NRC's regulations, the methods to be described in the active guide will reflect public comments and will be used in evaluating (1) submittals in connection with applications for construction permits, standard plant design certifications, operating licenses, early site permits, and combined licenses; and (2) submittals from operating reactor licensees who voluntarily propose to initiate system modifications if there is a clear nexus between the proposed modifications and the subject for which guidance is provided herein.

REGULATORY ANALYSIS

1. Statement of the Problem

The NRC issued draft Revision 3 of Regulatory Guide 1.26 for comment in February 1976, but never finalized it. That regulatory guide describes a quality classification system related to specified national standards that may be used to determine quality standards acceptable to the NRC staff for satisfying General Design Criterion 1 for safety-related components containing water, steam, or radioactive material in light-water-cooled nuclear power plants. The guidance provided in Regulatory Guide 1.26 is outdated and inconsistent with NRC regulations. On August 23, 2005, a user need memorandum from J.E. Dyer, Director, Office of Nuclear Reactor Regulation, to Carl J. Paperiello, Director, Office of Nuclear Regulatory Research, requested that the staff revise Regulatory Guide 1.26 to support design certification reviews and combined license applications for new reactors.

2. Objective

The objective of this regulatory action is to update NRC guidance for determining quality standards to be applied for designing, fabricating, erecting, and testing components for new construction to be consistent with changes that have been made to the regulations.

3. Technical Rationale

General Design Criterion 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. The regulations in 10 CFR 50.55a incorporate by reference the applicable editions and addenda of the ASME Boiler and Pressure Vessel Code. Regulatory Guide 1.26 provides guidance for complying with specific requirements.

Fluid systems important to safety may perform any of the functions of fission product containment, core cooling, reactor shutdown, reactivity control, postaccident containment heat removal, postaccident containment atmosphere cleanup, postaccident 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 the accomplishment of any of the above functions are also considered important to safety. The application of 10 CFR 50.55a and General Design Criterion 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 of these functions to safety.

4. Proposed Changes

(1) The NRC published Revision 2 of Regulatory Guide 1.26 in June 1975, and issued Revision 3 for public comment in February 1976. During that timeframe, 10 CFR 50.55a incorporated by reference only the Class 1 criteria established in Section III of ASME Code (for the design and fabrication of Quality Group A components). Portions of the Class 2 and 3 criteria were still in development. On March 15, 1984, the Commission published a final rule (49 FR 09711) amending 10 CFR 50.55a to incorporate by reference the Class 2 and 3 requirements of Section III (for the design and fabrication of Quality Group B and C components, respectively). The staff has updated Regulatory Guide 1.26 in draft Revision 4 to reference the Class 2 and 3 criteria of Section III. The updated guidance will ensure that the appropriate quality standards are applied for designing, fabricating, erecting, and testing the components for new construction.

(2) Footnote b of Table 1 in draft Revision 3 of Regulatory Guide 1.26 provides guidance that an ASME Code N-symbol stamp need not be applied for Class 2 and 3 components. As discussed in the Statement of Considerations for the initial 10 CFR 50.55a rule, dated June 12, 1971 (36 FR 11423), and in Regulatory Issue Summary 2005-17, 10 CFR 50.55a required the design of certain reactor coolant pressure boundary components to comply with the Class 1 criteria in Section III of the ASME Code, with one notable exception. As stated in 10 CFR 50.55a(b), an ASME Code symbol stamp need not be applied to components constructed to ASME Code criteria. Instead, 10 CFR 50.55a(b)(2) permitted inspection and quality surveillance systems other than those specified by ASME if they provided an acceptable level of quality and safety. The agency granted that exception because no provision existed at the time for foreign manufacturers to comply with the administrative enforcement provisions of the ASME Code (see 49 FR 09712). Consequently, foreign suppliers that were fully qualified in other respects could not be authorized to apply an ASME Code symbol stamp to components, and were excluded from supplying components for domestic nuclear power plants. At the same time, extensive construction activities were underway, and the enormity of the industry's construction effort made the N-symbol criterion a manufacturing critical path. Following implementation of the 1971 rule, this situation changed, and ASME subsequently authorized foreign suppliers to apply ASME Code symbol stamps.

As discussed in Generic Letter 89-09, "ASME Section III Component Replacements," dated May 8, 1989, an N-symbol issue once again confronted the industry in 1989. Because of the decline in nuclear plant orders, a number of utilities were experiencing difficulties in obtaining replacements for components originally constructed in accordance with the ASME Code. The limited demand for nuclear-grade components resulted in some companies not maintaining their Certificates of Authorization and related agreements with authorized inspection agencies. In other cases, companies discontinued product lines or sold them to another company that did not have a Certificate of Authorization. Some of those companies retained the capability to provide components that met the design, fabrication, and examination criteria in Section III of the ASME Code, but could not stamp the components accordingly. The generic letter stated that the staff position "does not apply to new construction of the addition of complete systems to operating power reactors."

The March 15, 1984, amendment to 10 CFR 50.55a effectively required the use of the N-symbol stamp by requiring Quality Group A, B, and C components to be constructed to the Class 1, 2, and 3 standards in Section III of the ASME Code. The industry is currently moving aggressively to ensure that an adequate number of certificate holders will exist in the next few years. Authorized inspection agencies have begun auditing manufacturers. Thus, the circumstances that led to the inclusion of footnote b in the guide no longer exist. Deletion of the footnote will make the guide consistent with NRC requirements. In addition, the N-stamp requirement ensures that plants will use components of an acceptable level of quality and safety. Finally, ASME Code symbol stamping is an acceptable method for fulfilling quality assurance criteria, as specified in Criterion VIII, "Identification and Control of Materials, Parts, and Components," and Criterion XIV, "Inspection, Test, and Operating Status," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50.

(3) Quality classifications depend on the specific reactor technology, and an industry consensus standard is in preparation to develop safety/quality classifications for new reactor designs. Fluid systems in advanced or passive reactor designs may have different names and functions than those in operating reactors. Safety classifications are to be based on safety functions for that specific technology rather than system names; therefore, guidance should be specific to the particular technology. For example, component cooling water, diesel generator systems, and backup feedwater systems may not have a safety function for new passive reactor designs.

It should be noted that the user need request from the Office of Nuclear Reactor Regulation asked for additional guidance on classifying the auxiliary feedwater system in pressurized-water reactors and safety relief valve discharge systems in boiling-water reactors. Because of the pending issuance of an industry consensus document, the staff subsequently decided not to make additional changes to the guide at this time. The staff is reviewing advanced reactor criteria and the Standard Review Plan and will reconsider the need for revisions to the guide at a future date.

(4) Footnote 2 in Revision 3 indicated that the NRC was developing specific guidance on the quality group classification of radioactive waste management systems. The NRC has now published this guidance in Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants." The NRC is proposing to revise footnote 2 to reference Regulatory Guide 1.143.

5. Alternative Approaches

The NRC staff considered the following alternative approaches to the problem of outdated guidance regarding the quality group classifications and standards for water-, steam-, and radioactive waste-containing components of nuclear power plants:

(1) Do not revise Regulatory Guide 1.26.
(2) Update Regulatory Guide 1.26.

5.1 Alternative 1: Do Not Revise Regulatory Guide 1.26

The NRC has modified the requirements in 10 CFR 50.55a since it issued Revision 2 of Regulatory Guide 1.26 in June 1975. Some of the guidance in Revision 2 and draft Revision 3 is inconsistent with the regulations. Thus, the NRC did not consider refraining from revising Regulatory Guide 1.26 to be a good approach.

5.2 Alternative 2: Update Regulatory Guide 1.26

The NRC staff recommends revising Regulatory Guide 1.26. This alternative would have the following consequences:

(1) **Benefits:** Current guidance is outdated. Revising the regulatory guide would make it consistent with current regulatory requirements and ensure compliance with the intent of the regulations.

(2) **Costs:** No costs would be associated with the revised guidance. Other standards address the classification of components; the guide only provides clarification relative to these standards. The guide only applies to the construction of new facilities.

6. Conclusion

Based on the regulatory analysis, the staff recommends issuing draft Revision 4 of Regulatory Guide 1.26. The staff sees no adverse effects associated with this proposed revision.

BACKFIT ANALYSIS

This draft regulatory guide provides licensees and applicants with new guidance that the NRC staff considers acceptable to determine quality standards acceptable for satisfying General Design Criterion 1 for other safety-related components containing water, steam, and radioactive material in light-water-cooled nuclear power plants. The application of this guide is voluntary. Current versions of Regulatory Guide 1.26 are inconsistent with NRC requirements. Therefore, licensees may not continue to use the earlier versions of this regulatory guide. Nonetheless, no backfit, as defined in 10 CFR 50.109, "Backfitting," is either intended or implied.