



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN

BRANCH TECHNICAL POSITION 3-1

**CLASSIFICATION OF MAIN STEAM COMPONENTS OTHER THAN THE REACTOR
 COOLANT PRESSURE BOUNDARY FOR BWR PLANTS**

REVIEW RESPONSIBILITIES

Primary - Organization responsible for mechanical engineering reviews

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

A. BACKGROUND

A pipe classification of "D + QA" for main steam line components of BWR plants was proposed by the General Electric Company in 1971 as an alternative to Quality Group B and has been accepted by the staff in a number of licensing case reviews.

However, a number of potential problems which are applicable to main steam lines of BWR plants have been identified. These problems relate to postulated breaks in high-energy fluid-containing lines outside the containment. The criteria pertaining to protection necessary for structures, systems, and components outside containment from the effects of postulated pipe breaks, as described in Appendix C to Branch Technical Position 3-3, reference ASME Section III, Class 2, which corresponds to NRC Quality Group B.

ASME Code Section XI contains in-service inspection criteria for Class 2 components. Steam lines classified as "D + QA" could be interpreted to be exempt from these inspection criteria. Such interpretations would be contrary to the intent of the code and inconsistent with

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USNRC STANDARD REVIEW PLAN

This Standard Review Plan, NUREG-0800, has been prepared to establish criteria that the U.S. Nuclear Regulatory Commission staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The Standard Review Plan 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 an acceptable method of complying with the NRC regulations.

The standard review plan sections are numbered in accordance with corresponding sections in Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of Regulatory Guide 1.70 have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) are based on Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

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requirements of the NRC Codes and Standards rule, Section 50.55a of 10 CFR Part 50.

Furthermore, the applicability of the following NRC Regulatory Guides, Standard Review Plan section, and Regulations, as they relate to ASME Section III, Class 2 components, is not always clearly identified or implemented in case applications wherever "D + QA" classification is adopted:

1. SRP Section 3.9.3, "ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures."
2. Regulatory Guide 1.26, "Quality Group Classifications and Standards."
3. 10 CFR 50.55a, "Codes and Standards for Nuclear Power Plants."
4. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants."

In view of the foregoing, we find it necessary to clarify the quality group classification criteria for main steam components for BWR plants.

B. BRANCH TECHNICAL POSITION

The main steam line components of BWR plants should conform to the criteria listed in items 1 through 5 of the attached Table A-1. BWRs that do not include a main steam isolation valve leakage control system or main steam line shutoff valves and that credit fission product hold-up and retention in main steam piping and/or the condenser to address main steam isolation valve leakage in analyses of accident radiological consequences, should also conform to the criteria specified in item 6 of Table A-1. Figure A-1 illustrates acceptable quality group and seismic classifications for BWR main steam piping and components.

C. REFERENCES

1. 10 CFR 50.55a, "Codes and Standards."
2. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."
3. Regulatory Guide 1.26, "Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."
4. Branch Technical Position 3-3, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment."
5. 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.
6. Letter of March 22, 1973, J. A. Hinds to J. M. Hendrie.
7. Letters of August 13, 1973 and November 26, 1973, J. M. Hendrie to J. A. Hinds.
8. ANSI/ASME B31.1, "Power Piping," American National Standards Institute (1973).

9. 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; New York
10. GEZ-4982A, "General Electric Large Steam Turbine - Generator Quality Control Program."

Table A-1

CLASSIFICATION REQUIREMENTS FOR BWR MAIN STEAM COMPONENTS OTHER THAN THE REACTOR COOLANT PRESSURE BOUNDARY

<u>Item</u>	<u>System or Component</u>	<u>Classification Quality Group</u>
1.	Main Steam Line from 2nd Isolation Valve to Turbine Stop Valve.	B ^{4.b.c}
2.	Main Steam Line Branch Lines to First Valve.	B ^{4.a.b.c}
3.	Main Turbine Bypass Line to Bypass Valve.	B ^{4.c}
4.	First Valve in Branch Lines Connected to Either Main Steam Lines or Turbine Bypass Lines.	B ^{4.b.c}
5.	a. Turbine Stop Valves, Turbine Control Valves, and Turbine Bypass Valves. ^{4.c}	D + QA ¹ or Certification ²
	b. Main Steam Leads from Turbine Control Valves to Turbine Casing. ^{4.c}	D + QA ^{1,3} or Certification ²
6. ⁴	a. Main Steam drain lines from 2nd containment isolation valve to the first normally closed valve.	B ^{4.c}
	b. First normally closed valve outside containment and Main Steam drain line piping to condenser hotwell.	D ^{4.c}
	c. Condenser anchorages and piping inlet nozzles to the condenser.	See Note 4.c
	d. Steam lines from auxiliary steam shutoff valves and power cycle auxiliary equipment.	D ^{4.d}

¹ The following criteria should be met in addition to the Quality Group D criteria:

- a. All cast pressure-retaining parts of a size and configuration for which volumetric examination methods are effective should be examined by radiographic methods by qualified personnel. Ultrasonic examination to equivalent standards may be used as alternate to radiographic methods.
- b. Examination procedures and acceptance standards should be at least equivalent to those specified as supplementary types of examination in ANSI B31.1-1973, Par. 136.4.

² The following qualification shall be met with respect to the certification criteria:

- a. The manufacturer of the turbine stop valves, turbine control valves, turbine bypass valves, and main steam leads from turbine control valves to the turbine casing should utilize quality control procedures equivalent to those defined in

Table A-1 (continue)

General Electric Publication GEZ-4982A, "General Electric Large Steam Turbine - Generator Quality Control Program."

- b. A certification should be obtained from the manufacturer of these valves and steam leads that the quality control program so defined has been accomplished.

³ The following criteria should be met in addition to the Quality Group D criteria:

- a. All longitudinal and circumferential butt weld joints should be radiographed (or ultrasonically tested to equivalent standards). Where size or configuration does not permit effective volumetric examination, magnetic particle or liquid penetrant examination may be substituted. Examination procedures and acceptance standards should be at least equivalent to those specified as supplementary types of examinations, Paragraph 136.4 in ANSI B31.1-1973.
- b. All fillet and socket welds should be examined by either magnetic particle or liquid penetrant methods. All structural attachment welds to pressure retaining materials should be examined by either magnetic particle or liquid penetrant methods. Examination procedures and acceptance standards should be at least equivalent to those specified as supplementary types of examinations, Paragraph 136.4 in ANSI B31.1-1973.
- c. All inspection records should be maintained for the life of the plant. These records should include data pertaining to qualification of inspection personnel, examination procedures, and examination results.

⁴ For design and classifications for evolutionary and passive BWR main steam piping and components, including those comprising main steam isolation valve leakage hold-up and retention paths, as illustrated in Figure A-1, are as follows:

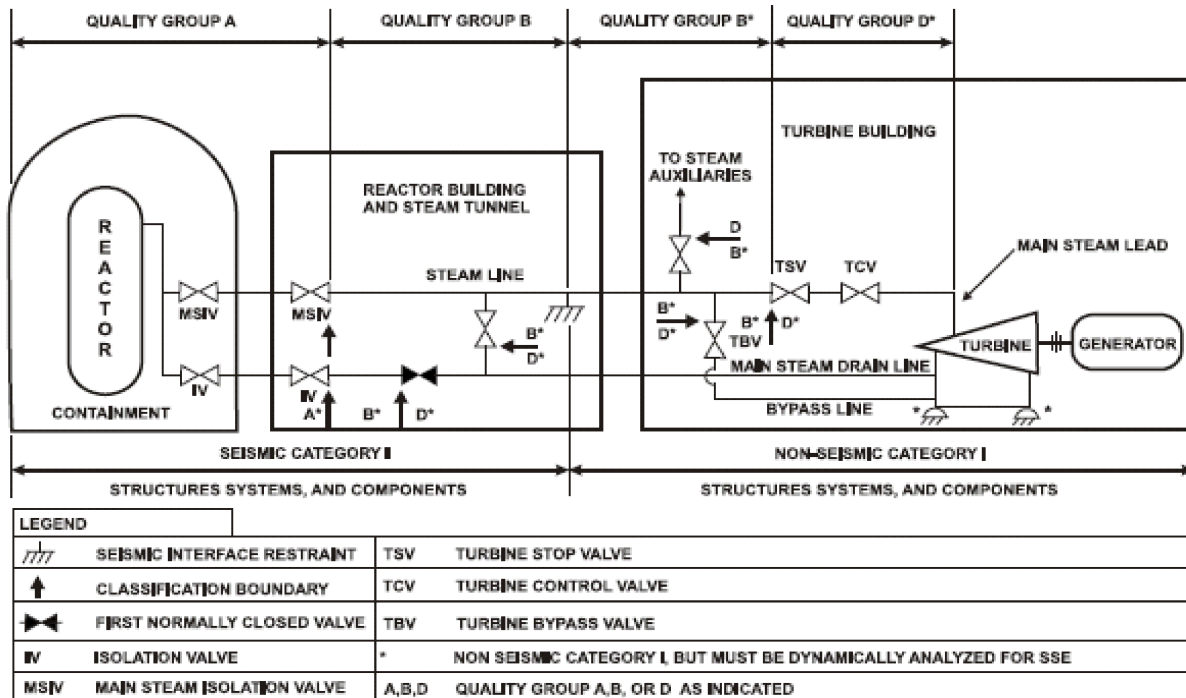
- a. The "First Valve" in Table A-1, Item 2 refers to the first normally closed valve.
- b. The main steam line piping from the outermost containment isolation valve up to the seismic interface restraint should be classified as seismic Category I, as should connecting branch lines up to the first normally closed valve. The seismic interface restraint should provide a structural barrier between the seismic Category I portions of main steam piping in the reactor building and the non-seismic Category I portions of such piping in the turbine building. The seismic interface restraint should be located inside a seismic Category I building. Main steam line piping from the seismic interface restraint up to, but not including, the turbine stop valve (including branch lines to the first normally closed valve) and steam drain line piping from the outermost containment isolation valve to the condenser hotwell, should be classified and analyzed as described in 4.c below. All pertinent quality assurance requirements of Appendix B to 10 CFR Part 50 apply to the main steam line piping from the seismic interface restraint up to, but not including, the turbine stop valve (including branch lines to the first normally closed valve).

Table A-1 (continue)

- c. These components may be classified as nonsafety-related and non-seismic Category I but should be analyzed using a dynamic seismic analysis method to demonstrate structural integrity under safe shutdown earthquake (SSE) loading conditions. The dynamic input for such analyses should be derived from time history analyses of the buildings (e.g., turbine building). Alternate methods, other than a time history approach, used for generating floor response spectra should be submitted for review and approval

on a case-by-case basis. The failure of non-seismic Category I components resulting from a seismic event must not cause failure of the main steam piping, main steam drain and bypass lines, or the condenser.

- d. These components need not be seismically analyzed as described above.



**FIGURE A-1
EVOLUTIONARY AND PASSIVE DESIGN BWR MAIN STEAM SYSTEM
QUALITY GROUP AND SEISMIC CLASSIFICATION DIAGRAM**

PAPERWORK REDUCTION ACT STATEMENT

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

PUBLIC PROTECTION NOTIFICATION

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