



U.S. NUCLEAR REGULATORY COMMISSION  
**STANDARD REVIEW PLAN**  
OFFICE OF NUCLEAR REACTOR REGULATION

3.2.1 SEISMIC CLASSIFICATION

REVIEW RESPONSIBILITIES

Primary - Mechanical Engineering Branch (MEB)

Secondary - None

I. AREAS OF REVIEW

General Design Criterion 2 of 10 CFR Part 50, Appendix A, in part, requires that structures, systems, and components important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions. The earthquake for which these plant features are designed is defined as the safe shutdown earthquake (SSE) in 10 CFR Part 100, Appendix A. The SSE is based upon an evaluation of the maximum earthquake potential and is that earthquake which produces the maximum vibratory ground motion for which structures, systems, and components important to safety are designed to remain functional. Those plant features that are designed to remain functional if an SSE occurs are designated seismic Category I in Regulatory Guide 1.29.

The MEB reviews the seismic classification of those structures, systems, and components (including their foundations and supports) which are important to safety and are designed to withstand, without loss of function, the effects of a SSE and specified as seismic Category I by the applicant in his safety analysis report (SAR). This review which is coordinated with each branch that has primary review responsibility for these plant features is performed for both construction permit (CP) and operating license (OL) applications. The MEB review of seismic Category I items includes the following plant features: structures, dams, ponds, cooling towers, reactor internals, fluid systems important to safety that are identified in Regulatory Guide 1.26, ventilation systems, standby diesel generator auxiliary systems, fuel handling systems, and cranes.

The applicant's proposed seismic classification may in part be presented in the form of a table<sup>1</sup> which identifies those structures, systems and components that

<sup>1</sup>See Appendices C and D, SRP Section 3.2.2 - "System Quality Group Classification," for guidance.

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USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

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are designated seismic Category I. The table should identify all activities affecting the safety-related functions of these seismic Category I plant features which should also meet the pertinent quality assurance requirements of 10 CFR Part 50, Appendix B. Details of the seismic classification of these plant features may be shown on plot plans, general arrangement drawings, and piping and instrumentation diagrams.

Where portions of structures and fluid systems are seismic Category I they also must be clearly identified. For fluid systems important to safety, the classification tables in the SAR should identify system components such as pressure vessels, heat exchangers, storage tanks, pumps, piping, and valves, have suitable footnotes defining interfaces, and be in sufficient detail so that there is a clear understanding of the extent of those portions of the system that are classified as seismic Category I.

The MEB also performs the following reviews for the SRP sections indicated:

1. Determines the acceptability of the quality group classification of system components in accordance with SRP Section 3.2.2. This information may be combined with the information in this SRP section which may result in cross-referencing rather than repetition of the information.
2. Verifies that systems and components important to safety that are designated as seismic Category I items are designed in accordance with the regulatory guides, industry codes and standards that are referenced in SRP Sections 3.2.2, 3.9.1 through 3.9.3, and
3. Determines the adequacy of the inservice testing program for pumps and valves in accordance with SRP Section 3.9.6.

## II. ACCEPTANCE CRITERIA

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

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, as it relates to the requirements that structures, systems, and components important to safety shall be designed to withstand the effects of earthquakes without loss of capability to perform necessary safety functions.
2. 10 CFR Part 100, Appendix A, as it relates to certain structures, systems, and components being designed to withstand the Safe Shutdown Earthquake (SSE) and remain functional. These plant features are those necessary to assure:
  - a. the integrity of the reactor coolant pressure boundary,
  - b. the capability to shut down the reactor and maintain it in a safe shutdown condition,
  - c. the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR Part 100.

To meet the requirements of General Design Criterion 2 and 10 CFR Part 100, Appendix A, the following regulatory guide is used: Regulatory Guide 1.29,

"Seismic Design Classification." This guide describes an acceptable method of identifying and classifying those plant features that should be designed to withstand the effects of the SSE.

### III. REVIEW PROCEDURES

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

Regulatory Guide 1.29, which identifies structures, systems, and components of light-water-cooled reactors on a functional basis, is the principal document used for identifying those plant features important to safety which, as a minimum, should be designed to seismic Category I requirements.

The staff review should establish whether the applicant has indicated compliance with Regulatory Guide 1.29 in the SAR. Where there are differences with respect to the Guide, these differences should be identified. For General Electric BWR/6 main steam lines and main feedwater lines, an acceptable alternate seismic classification to that currently specified in Position C.1.e of Regulatory Guide 1.29, is provided in Figure B-1 attached to Appendix B of SRP Section 3.2.2.

The information in the SAR identifying seismic Category I structures, systems, and components is reviewed for completeness and to assure there is sufficient detail to permit identification of specific items. This may include a review of the SAR text, tables, plot plans, general arrangement drawings, structural drawings, and piping and instrumentation diagrams, as appropriate. Where portions of a system are classified seismic Category I, the boundary limits of that portion of the system designed to Category I requirements is reviewed on the piping and instrumentation diagrams. For fluid systems which are partially seismic Category I, the Category I portion of the system should extend to the first seismic restraint beyond the isolation valves which isolate that part which is seismic Category I from the non-seismic portion of the system. In addition, where portions of a structure are classified seismic Category I, those portions of the building foundations and supports designed to Category I requirements are identified on the plant arrangement drawings. The interfaces between components and associated support structures designed to seismic Category I requirements are then checked to assure compatibility.

Structures, systems, and components that are classified seismic Category I are also reviewed to assure that these plant features are within the scope of an applicant's Quality Assurance Program. This Quality Assurance Program should be in compliance with the pertinent Quality Assurance requirements of 10 CFR Part 50, Appendix B. Regulatory Guide 1.29 is used for identifying those plant features important to safety that are within the scope of this Appendix B Quality Assurance Program. If there are items designated seismic Category I that are not identified as within the scope of the Appendix B Quality Assurance Program this information is transmitted to the Quality Assurance Branch for resolution of the issue. The seismic classification review of structures, systems, and components important to safety and the review verifying that these plant features are constructed in accordance with a 10 CFR Part 50, Appendix B Quality Assurance Program is normally performed concurrently with the quality group classification review of SRP Section 3.2.2.

In the event an applicant intends to take exception to Regulatory Guide 1.29 and has not provided an adequate justification for his proposed seismic classification, questions are prepared by the staff which may require additional documentation or analysis to establish an acceptable basis for his proposed seismic classification. Staff comments may also be prepared requesting clarification in order to assure a clear understanding of the seismic classification assigned to a system by the applicant.

If the staff's questions are not resolved in a satisfactory manner, a staff position is taken requiring conformance to Regulatory Guide 1.29.

#### IV. EVALUATION FINDINGS

The staff's review should verify that adequate and sufficient information is contained in the SAR and amendments to arrive at conclusions of the following type, which are to be included in the staff's safety evaluation report:

Structures, systems and components (excluding electrical features) that are important to safety and that are required to withstand the effects of a safe shutdown earthquake and remain functional have been classified as seismic Category I items and have been identified in an acceptable manner in Tables 3.X.X and 3.X.X, and on system piping and instrumentation diagrams in the SAR. Other structures, systems and components that may be required for operation of the facility (excluding electrical features) need not be designed to seismic Category I requirements. The structures, systems and components not required to be designed to seismic Category I include those portions of Category I systems such as vent lines, drain lines, fill lines and test lines on the downstream side of isolation valves and those portions of the systems which are not required to perform a safety function.

The staff concludes that the structures, systems and components important to safety that are within the scope of the Mechanical Engineering Branch have been properly classified as seismic Category I items and meet the requirements of General Design Criteria 2, "Design Bases for Protection Against Natural Phenomena" and 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants." This conclusion is based on the applicant having met the requirements of General Design Criterion 2, and 10 CFR Part 100, Appendix A, by having properly classified their structures, systems and components (SSC) important to safety as seismic Category I items in accordance with the positions of Regulatory Guide 1.29, "Seismic Design Classification" and by our conclusion that the identified SSC are the plant features necessary to assure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shutdown the reactor and maintain it in a safe shutdown condition, and (3) the capability to prevent and mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR Part 100.

#### V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plan for using this SRP Section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced Regulatory Guide.

#### VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."
2. 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants."
3. Regulatory Guide 1.29, "Seismic Design Classification."