



DRAFT REGULATORY GUIDE

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1 DRAFT REGULATORY GUIDE DG-1035
2 (Previously Issued as Draft DG-1018)

3 RESTART OF A NUCLEAR POWER PLANT
4 SHUT DOWN BY A SEISMIC EVENT

5 A. INTRODUCTION

6 Paragraph IV(a)(3) of Proposed Appendix S, "Earthquake Engineering Criteria for
7 Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and
8 Utilization Facilities," would require shutdown of the nuclear power plant if vibratory
9 ground motion exceeding that of the operating basis earthquake ground motion (OBE)
10 occurs or if significant plant damage occurs.¹ Prior to resuming operations, the
11 licensee must demonstrate to the NRC that no functional damage has occurred to those
12 features necessary for continued operation without undue risk to the health and safety
13 of the public.

14 This guide is being developed to provide guidance acceptable to the NRC staff for
15 performing inspections and tests of nuclear power plant equipment and structures prior
16 to restart of a plant that has been shut down by a seismic event.

17 Regulatory guides are issued to describe and make available to the public such
18 information as methods acceptable to the NRC staff for implementing specific parts of
19 the Commission's regulations, techniques used by the staff in evaluating specific
20 problems or postulated accidents, and guidance to applicants. Regulatory guides are
21 not substitutes for regulations, and compliance with regulatory guides is not required.

22 Guidance is being developed in Draft Regulatory Guide DG-1034, "Pre-
23 Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake
24 Actions," to provide criteria for plant shutdown.

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received complete staff review and does not represent an official NRC staff position.

Public comments are being solicited on the draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rules Review and Directives Branch, DFIPS, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Comments will be most helpful if received by May 12, 1995.

Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Office of Administration, Distribution and Mail Services Section.

1 Regulatory guides are issued in draft form for public comment to involve the
2 public in the early stages of developing the regulatory positions. Draft
3 regulatory guides have not received complete staff review and do not represent
4 official NRC staff positions.

5 Any information collection activities mentioned in this draft regulatory
6 guide are contained as requirements in the proposed amendments to 10 CFR Part
7 50 that would provide the regulatory basis for this guide. The proposed
8 amendments have been submitted to the Office of Management and Budget for
9 clearance that may be appropriate under the Paperwork Reduction Act. Such
10 clearance, if obtained, would also apply to any information collection
11 activities mentioned in this guide.

12 B. DISCUSSION

13 Data from seismic instrumentation² and a walkdown of the nuclear power
14 plant are used to make the initial determination of whether the plant must be
15 shut down after an earthquake, if the plant has not already shut down from
16 operational perturbations resulting from the seismic event.¹

17 The Electric Power Research Institute has developed guidelines that will
18 enable licensees to quickly identify and assess earthquake effects on nuclear
19 power plants in EPRI NP-6695, "Guidelines for Nuclear Plant Response to an
20 Earthquake,"³ December 1989. This regulatory guide addresses sections of
21 EPRI NP-6695 that relate to postshutdown inspection and tests, inspection
22 criteria, inspection personnel, documentation, and long-term evaluations.

23 EPRI NP-6695 has been supplemented to add inspections and tests as a
24 basis for acceptance of stresses in excess of Service Level C and to recommend
25 that engineering evaluations of components with calculated stresses in excess
26 of service Level D focus on areas of high stress and include fatigue analyses.

27 Holders of an operating license or construction permit issued prior to
28 the implementation date to be specified in the active guide may voluntarily
29 implement the methods to be described in the active guide and the methods

30 ²Guidance is being developed in Draft Regulatory Guide DG-1033, the third
31 Proposed Revision 2 to Regulatory Guide 1.12, "Nuclear Power Plant
32 Instrumentation for Earthquakes," that will describe seismic instrumentation
33 acceptable to the NRC staff.

34 ³EPRI reports may be obtained from the Electric Power Research Institute,
35 Research Reports Center, P.O. Box 50490, Palo Alto, CA 94303.

1 being developed in Draft Regulatory Guides DG-1033, "Nuclear Power Plant
2 Instrumentation for Earthquakes," and DG-1034, "Pre-Earthquake Planning and
3 Immediate Nuclear Power Plant Operator Postearthquake Action."

4 C. REGULATORY POSITION

5 After a plant has been shut down by an earthquake, the guidelines for
6 inspections and tests of nuclear power plant equipment and structures that are
7 depicted in EPRI NP-6695 in Figure 3-2 and specified in Sections 5.3.2
8 (including Tables 2-1, 2-2, and 5-1), 5.3.3 (includes Table 5-1), and 5.3.4;
9 the documentation to be submitted to the NRC specified in Section in 5.3.5;
10 and the long-term evaluations that are specified in Section 6.3 (all sections
11 and subsections), with the exceptions specified below, would be acceptable to
12 the NRC staff for satisfying the requirements proposed in Paragraph IV(a)(3)
13 of the Proposed Appendix S to 10 CFR Part 50.

14 1. EXCEPTIONS TO SECTION 6.3.4.1 OF EPRI NP-6695

15 1.1 Item (1) should read:

16 If the calculated stresses from the actual seismic loading conditions
17 are less than the allowables for emergency conditions (e.g., ASME Code
18 Level C Service Limits or equivalent) or original design bases, the item
19 is considered acceptable, provided the results of inspections and tests
20 (Section 5.3.2) show no damage.

21 1.2 The second dashed statement of Item (3) should read:

22 -- An engineering evaluation of the effects of the calculated stresses
23 on the functionality of the item. This evaluation should address all
24 locations where stresses exceed faulted allowables and should include
25 fatigue analysis.

26 1.3 The last paragraph should read:

27 Reanalysis of safety-related piping systems is not considered necessary
28 unless there is observed damage to the piping systems. Experience has
29 shown that piping systems designed to the ASME Code are not damaged by
30 inertia loads resulting from an earthquake. If damage occurs, it will
31 most likely occur in the piping supports or as damage to the pipe at

1 fixed supports caused by relative support displacements. These types of
2 damage would be detected by the plant walkdown inspections and post-
3 shutdown inspections described in Sections 4 and 5 of this report. In
4 general, piping reanalysis should be performed on a sampling basis to
5 verify the adequacy of piping and to assess the need for supplemental
6 nondestructive examination of potential high-strain areas.

7 2. LONG-TERM EVALUATIONS

8 Coincident with the long-term evaluations, the plant should be restored
9 to its current licensing basis. Exceptions to this must be approved by the
10 Director, Office of Nuclear Reactor Regulation.

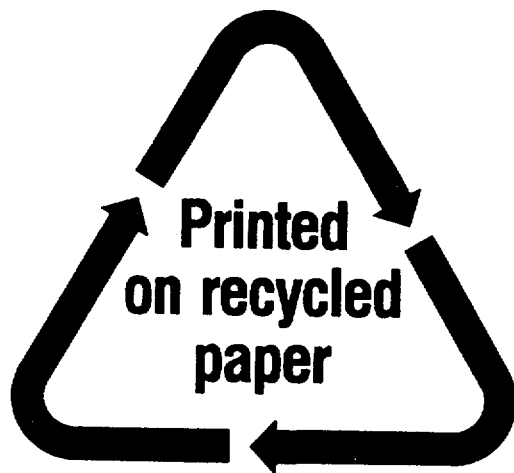
11 D. IMPLEMENTATION

12 The purpose of this section is to provide guidance to applicants and
13 licensees regarding the NRC staff's plans for using this regulatory guide.

14 This draft guide has been released to encourage public participation in
15 its development. Except in those cases in which the applicant proposes an
16 acceptable alternative method for complying with the specified portions of the
17 Commission's regulations, the method to be described in the active guide
18 reflecting public comments will be used in the evaluation of applications for
19 construction permits, operating licenses, combined licenses, or design
20 certification submitted after the implementation date to be specified in the
21 active guide. This guide would not be used in the evaluation of an
22 application for an operating license submitted after the implementation date
23 to be specified in the active guide if the construction permit was issued
24 prior to that date.

1 REGULATORY ANALYSIS

2 A separate regulatory analysis was not prepared for this regulatory
3 guide. The draft regulatory analysis, "Proposed Revision of 10 CFR Part 100
4 and 10 CFR Part 50," was prepared for the proposed amendments, and it provides
5 the regulatory basis for this guide and examines the costs and benefits of the
6 rule as implemented by the guide. A copy of the draft regulatory analysis is
7 available for inspection and copying for a fee at the NRC Public Document
8 Room, 2120 L Street NW. (Lower Level), Washington, DC, as Secy 94-194.



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