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OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE

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DRAFT REGULATORY GUIDE DG-1035
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RESTART OF A NUCLEAR POWER PLANT SHUT DOWN BY A SEISMIC EVENT

A. INTRODUCTION

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

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

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

[1] Guidance is being developed in Draft Regulatory Guide DG-1034, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake 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.

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

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

B. DISCUSSION

Data from seismic instrumentation[2] and a walkdown of the nuclear power plant are used to make the initial determination of whether the plant must be shut down after an earthquake, if the plant has not already shut down from operational perturbations resulting from the seismic event.[1]

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

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

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

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

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

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

C. REGULATORY POSITION

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

1. EXCEPTIONS TO SECTION 6.3.4.1 OF EPRI NP-6695

1.1 Item (1) should read:

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

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

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

1.3 The last paragraph should read:

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

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

2. LONG-TERM EVALUATIONS

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

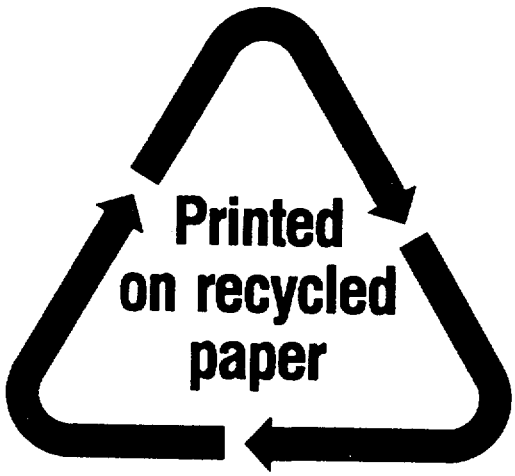
D. IMPLEMENTATION

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

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

REGULATORY ANALYSIS

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



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