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# REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

**REGULATORY GUIDE 1.186**

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## GUIDANCE AND EXAMPLES FOR IDENTIFYING 10 CFR 50.2 DESIGN BASES

### A. INTRODUCTION

In 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Section 50.2, "Definitions," contains a definition of "Design Bases." Although the NRC staff and the nuclear industry have always agreed that it is important to understand what constitutes the design bases of a plant, there has not been agreement about the implementation of the definition in 10 CFR 50.2.

The guidance presented here is not mandatory, and licensees may choose not to change their implementation of the definition of what constitutes design bases. Licensees who choose to implement this guidance are expected to apply it in a uniform manner.

The information collections contained in this regulatory guide are covered by the requirements of 10 CFR Part 50, which were approved by the Office of Management and Budget, approval number 3150-0011. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Written comments may be submitted to the Regulatory Guides Branch, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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## B. DISCUSSION

### OBJECTIVE

The staff's objective is to develop guidance that provides a better understanding of what constitutes design bases information. This guide is intended to clarify the term design bases in connection with the NRC's regulations that use this term.

### BACKGROUND

In the mid-1980s, the NRC staff conducted many system-specific engineering inspections and developed inspection findings that demonstrated that some licensees had not adequately maintained their design bases information as required by NRC regulation. In response to the problems identified during the NRC inspections and those identified by licensees, most reactor licensees initiated design bases reconstitution programs. These programs sought to identify missing design documentation and to selectively regenerate missing documentation.

In October 1990, the Nuclear Management and Resources Council (NUMARC) published its "Design Bases Program Guidelines," NUMARC 90-12.<sup>1</sup> The staff concluded that these guidelines provided a useful standard framework for implementing design reconstitution programs. The guidelines briefly discussed the definition of design bases information but did not focus on it.

In February 1991, the NRC staff published NUREG-1397, "An Assessment of Design Control Practices and Design Reconstitution Programs in the Nuclear Power Industry."<sup>2</sup> This report gave the results of a survey reflecting the scope and performance of several utility design change control programs and design document reconstitution programs. This report included a definitions section that stated that design bases include only the design constraints that are included in current licensing bases and form the bases for the staff's safety judgments.

In August 1992, the Commission published a policy statement on "Availability and Adequacy of Design Bases Information at Nuclear Power Plants."<sup>1</sup> In the policy statement, the Commission concluded that:

[M]aintaining current and accessible design documentation is important to ensure that (1) the plant physical and functional characteristics are maintained and are consistent with the design bases as required by NRC regulation, (2) systems, structures, and components can

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<sup>1</sup> Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; e-mail <[PDR@NRC.GOV](mailto:PDR@NRC.GOV)>.

<sup>2</sup> Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402-9328 (telephone (202)512-1800); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161; (telephone (703)487-4650; <<http://www.ntis.gov/ordernow>>. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike, Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; email is [PDR@NRC.GOV](mailto:PDR@NRC.GOV).

perform their intended functions, and (3) the plant is operated in a manner consistent with the design bases.

In the policy statement, the Commission also said that all power reactor licensees should assess the accessibility and adequacy of their design bases documentation and decide whether a design reconstitution program is necessary. With regard to the NUMARC guidance, the Commission stated that:

The guidance outlines a framework to organize and collate nuclear power plant design bases information. This information provides the rationale for the design bases consistent with the definition of design bases contained in 10 CFR 50.2.

In response to the findings relating to the regulatory burden of team inspections identified in the 1991 Regulatory Impact Survey and voluntary implementation of the NUMARC guidance by licensees, the staff reduced its effort on specific, resource-intensive, design-related team inspections and followed the issue of accurate and accessible design documentation at plants principally as an element of inspection and follow up of operations-related activities.

In 1996, the staff's findings during inspections and reviews began to identify broad programmatic weaknesses that resulted in design and configuration deficiencies at some plants; these deficiencies could have affected the operability of required equipment, raised unreviewed safety questions, or indicated discrepancies between the plant's Updated Final Safety Analysis Report and the as-built or as-modified plant or plant operating procedures. As a result of these findings, the staff issued a letter<sup>3</sup> in accordance with 10 CFR 50.54(f) to all licensees requesting information to provide the NRC added confidence and assurance that the plants were operated and maintained within the design bases and any deviations were reconciled in a timely manner.

SECY-97-160,<sup>1</sup> dated July 24, 1997, informed the Commission of the follow up activities resulting from the staff's review of licensee responses to the 10 CFR 50.54(f) request. In this paper, the staff stated that--

Based on the review of licensee responses to the 50.54(f) letter, the staff concluded that while licensees had established programs and processes to maintain their facility's design bases, there was a need to implement plant-specific follow up activities. This determination was based upon the staff having identified: (1) instances in which licensees failed to reconcile regulatory performance with their assertions that their programs and processes were effective in maintaining their design bases, or (2) that there was a need to gain a better understanding or to validate a particular aspect of a licensee's programs and processes.

SECY-97-160 referred to the above-mentioned follow-up activities as Phase 4 and stated that they were to be a combination of architect-engineer design team inspections led by the Office of Nuclear

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<sup>3</sup> Letter from J. Taylor, EDO, NRC, to all nuclear utility CEOs, October 9, 1996. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; email <[PDR@NRC.GOV](mailto:PDR@NRC.GOV)>.

Reactor Regulation and region-led inspections, such as safety system functional inspections and safety system engineering inspections.

In addition to the 10 CFR 50.54(f) letters and the inspection activities, the staff conducted lessons-learned reviews regarding Millstone and Maine Yankee. One of the conclusions of these reviews was that the definition of design bases should be clarified. In SECY-97-205,<sup>1</sup> dated September 10, 1997, the staff provided the Commission with several options for an integrated approach to solving the problems identified during the lessons-learned reviews. In the staff requirements memorandum<sup>1</sup> on SECY-97-205, dated March 24, 1998, the Commission directed the staff to continue to develop guidance regarding design bases issues, such as specifying the type of information to be considered as design bases information. This effort was subsequently included in the staff's response to the Chairman's tasking memorandum<sup>1</sup> of August 7, 1998. This regulatory guide provides the guidance requested by the Commission.

#### **DEVELOPMENT OF INDUSTRY GUIDELINE, NEI 97-04**

In October 1997, NEI submitted NEI 97-04, "Design Bases Program Guidelines," which is an update to NUMARC 90-12. NEI 97-04 gave additional examples of design bases information and directly addressed the reportability of conditions outside the design bases of the plant. This submission started a series of letters and public meetings that led to the NRC staff proposing to endorse Appendix B to NEI 97-04, with exceptions, in Draft Regulatory Guide DG-1093. DG-1093 was issued for public comment in April 2000.

After the public comment period, the staff held a public meeting with NEI to discuss the public comments received and additional editorial changes to the NEI document proposed by the NRC staff. NEI agreed to make revisions to Appendix B to NEI 97-04 to address these comments and to incorporate some of the editorial changes. On July 27, 2000, NEI submitted a prepublication draft of a revised Appendix B to NEI 97-04 for NRC endorsement.

NEI 97-04 was developed to help utilities organize and collate design bases information and supporting design information. The staff has concluded that these guidelines provide a useful standard framework for implementing design reconstitution programs; however, the industry has not requested staff review and endorsement of the entire document. This regulatory guide only applies to Appendix B of NEI 97-04.

#### **DEFENSE IN DEPTH**

The staff considers aspects of the designed defense-in-depth strategies such as redundancy, diversity, and independence to be important aspects of the plant's principal design criteria. These strategies and criteria are specifically required by several regulations, especially the General Design Criteria. These criteria require that such capabilities be implemented for individual structures, systems, and components through plant design features, such as multiple components, independent power supplies, and physical separation. These criteria provide part of the standard for judging the adequacy of the plant's design bases.

## **C. REGULATORY POSITION**

Appendix B, “Guidelines and Examples for Identifying 10 CFR 50.2 Design Bases” (dated November 27, 2000),<sup>4</sup> to NEI 97-04 provides guidance and examples that are acceptable to the staff for providing a clearer understanding of what constitutes design bases information.

## **D. IMPLEMENTATION**

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

Except in those cases in which an applicant or licensee proposes an acceptable alternative method for complying with the specified portions of the NRC’s regulations, the methods described in this guide will be used in the evaluation of submissions in regard to design bases information.

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<sup>4</sup> Copies of Appendix B to NEI 97-04 are available on <[WWW.NRC.GOV](http://WWW.NRC.GOV)> through NRC’s Public Electronic Reading Room under Accession Number ML003771698. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR’s mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; e-mail <[PDR@NRC.GOV](mailto:PDR@NRC.GOV)>.

## VALUE/IMPACT STATEMENT

A separate Value/Impact Statement was not prepared for this regulatory guide. The Value/Impact Statement that was prepared for and printed with the draft of this guide, DG-1093, in April 2000, is still applicable. That Value/Impact Statement concluded that the value to individual licensees, the industry, the NRC, and the public that results from a clearer understanding of the interpretation of 10 CFR 50.2 design bases outweighs the costs to licensees and the NRC that are currently associated with confusion regarding the definition.

Copies of the Value/Impact Statement are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; e-mail <[PDR@NRC.GOV](mailto:PDR@NRC.GOV)>.

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