



U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH
DRAFT REGULATORY GUIDE AND VALUE/IMPACT STATEMENT

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Division 1
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RESPONSE-TIME TESTING OF PROTECTION SYSTEM INSTRUMENT CHANNELS

A. INTRODUCTION

Section 50.55a, "Codes and Standards," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires, among other things, that means be provided for checking the operational availability of each protection system input sensor during reactor operation. This requirement results from the incorporation by reference of IEEE Std 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations,"¹ by paragraph 50.55a(h).

Criterion 21, "Protection System Reliability and Testability," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, in part, that protection systems be designed to permit periodic testing during reactor operation.

Criterion XI, "Test Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 requires, in part, that a test program be established to ensure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed.

This regulatory guide describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to response-time testing of instrumentation in protection systems.

¹Copies may be obtained from the Institute of Electrical and Electronic Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

This regulatory guide and the associated value/impact statement are being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. They have not received complete staff review and do not represent an official NRC staff position.

Public comments are being solicited on both drafts, the guide (including any implementation schedule) and the value/impact statement. Comments on the value/impact statement should be accompanied by supporting data. Comments on both drafts should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch, by

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Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Technical Information and Document Control.

B. DISCUSSION

The licensee of a nuclear power plant is required to develop a test program to ensure that structures, systems, and components will perform satisfactorily in service. This program must include the capability for checking the operational availability of each protection system and its components. Periodic testing is needed, not only to discover protection system component failure, but to ensure that the protection systems and their components are in a condition that will provide agreed-upon performance. Response time is one of the minimum performance requirements specified for protection systems in Section 3(9)(a) of IEEE Std 279-1971.

ISA-dS67.06, "Response Time Testing of Nuclear-Safety-Related Instrument Channels in Nuclear Power Plants,"² was prepared by a committee of the Instrument Society of America (ISA). This standard delineates requirements and methods for determining the response-time characteristics of pressure and temperature channels in a nuclear power plant. Draft 0 of ISA-dS67.06 was approved by the ISA Nuclear Power Plant Standards Committee on October 21, 1980.

C. REGULATORY POSITION

The requirements in Draft 0 of ISA-dS67.06, "Response Time Testing of Nuclear-Safety-Related Instrument Channels in Nuclear Power Plants," dated October 21, 1980, provide a basis acceptable to the NRC staff for meeting the requirements for response-time testing of instrument channels that use pressure or temperature measurements in nuclear power plant protection systems subject to the following:

1. The term "nuclear-safety-related instrument channels" as used in ISA-dS67.06 should, for the purposes of this guide, be understood to mean those instrument channels in protection systems.
2. In Section 6.3 of ISA-dS67.06, which pertains to calibration verification with respect to response-time testing, the recommendation in the last sentence should be treated as a requirement.

²Copies may be obtained from the Instrument Society of America, 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, North Carolina 27709.

3. Section 10.0, "Test Results," of ISA-dS67.06 requires that an investigation be made as to the cause if a rate of change in response-time characteristics is such that the allowable response time will be exceeded prior to the next test. The investigation should be made if the rate of change in response-time characteristics is such that the allowable response time may be exceeded prior to the next test.

D. IMPLEMENTATION

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

This proposed guide has been released to encourage public participation in its development. Except in those cases in which an applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method to be described in the active guide reflecting public comments will be used by the NRC staff in its evaluation of applicants' and licensees' programs for response-time testing of protection system instrument channels after the implementation date to be specified in the active guide. Implementation by the staff will in no case be earlier than June 1982.

DRAFT VALUE/IMPACT STATEMENT

1. THE PROPOSED ACTION

The licensee of a nuclear power plant is required by the Commission's regulations to develop a test program to ensure that systems and components will perform satisfactorily in service. Specific guidance is needed for testing instrument channels of protection systems to determine response-time characteristics in order that the degradation in performance of instrument channels can be detected and maintenance can be performed to keep the channels within acceptable limits. Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems," provides basic guidance for response-time testing. More definitive guidance, however, has been developed by the Instrument Society of America (ISA) in Draft 0 of ISA-dS67.06, "Response Time Testing of Nuclear-Safety-Related Instrument Channels in Nuclear Power Plants," dated October 21, 1980. The proposed action would endorse ISA-dS67.06, with appropriate supplementary material, in a regulatory guide.

2. VALUE/IMPACT ASSESSMENT

2.1 General

The proposed action would provide definitive guidance for determining the response-time characteristics of instrument channels in protection systems.

Value

The value of the proposed action would be more effective tests and better surveillance of the performance of instrumentation in protection systems. Endorsing a national consensus standard reduces the expenditure of staff resources in developing the guidance.

Impact

Most of the impact on industry has already occurred during development, review, and approval of the consensus standard. Additional impact associated with the NRC endorsement of the standard should be minimal.

2.2 Regulatory Position 2

Regulatory Position 2 was included to state that the recommendation in the standard to evaluate the effect of calibration adjustment on response-time characteristics should be considered as a requirement.

Value

Since instrumentation calibration may not be performed in conjunction with response-time testing (or vice versa), it is important that possible effects on response time caused by instrument calibration be determined. An evaluation of these effects would permit adjustments to be made at the time of calibration to keep the response time within acceptable limits.

Impact

There should be no impact because the regulations require that the response-time characteristics of instrument channels be maintained within acceptable limits.

2.3 Regulatory Position 3

Regulatory Position 3 was included to call for an investigation to determine the cause if the rate of change in response-time characteristics is such that the allowable response time may be exceeded prior to the next scheduled test.

Value

Prediction of when response time will be unacceptable in the future is not an exact science. When it is determined that the rate at which the response-time characteristics appear to be deteriorating is such that the response time may be out of limits before the next test, an investigation as to the cause would permit preventive maintenance or repairs that could prevent a failure.

Impact

There should be no impact because the regulations require that the response-time characteristics of instrument channels be maintained within acceptable limits.

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