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# REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.149  
(Task OL 402-5)

## NUCLEAR POWER PLANT SIMULATION FACILITIES FOR USE IN OPERATOR LICENSE EXAMINATIONS

### A. INTRODUCTION

Paragraph 55.45(a) of 10 CFR Part 55, "Operators' Licenses," requires that an applicant for an operator or senior operator license demonstrate both an understanding of and the ability to perform certain essential job tasks. Paragraph 55.45(b) specifies that these operating tests will be administered, in part, either in a simulation facility consisting solely of a plant-referenced simulator that has been certified to the Commission by the facility licensee or in a simulation facility approved by the Commission after application has been made by the facility licensee.<sup>1</sup>

This regulatory guide describes a method acceptable to the NRC staff for complying with those portions of the Commission's regulations regarding (1) certification of a simulation facility consisting solely of a plant-referenced simulator and (2) application for prior approval of a simulation facility.

The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

Any information collection activities mentioned in this regulatory guide are contained as requirements in those sections of 10 CFR Part 55 that provide the regulatory basis for this guide. The information collection requirements in 10 CFR Part 55 have been cleared under Clearance No. 3150-0018 and No. 3150-0138.

\*The substantial number of changes in this revision has made it impractical to indicate the changes with lines in the margin.

<sup>1</sup>A simulation facility is defined in §55.4 as one or more of the following components, alone or in combination, used for the partial conduct of operating tests for operators, senior operators, and candidates: (i) the plant, (ii) a plant-referenced simulator, (iii) another simulation device.

### B. DISCUSSION

Although ensuring that individuals who receive operator or senior operator licenses possess the knowledge, skills, and abilities necessary to operate the facility in a safe manner is the responsibility of facility licensees, the Nuclear Regulatory Commission must perform an independent audit of this process through its operator licensing examinations. Section 55.45, "Operating Tests," of 10 CFR Part 55 requires the candidate for a license to demonstrate (1) an understanding of and the ability to perform the actions necessary during normal, abnormal, and emergency situations; (2) the operation of systems that affect heat removal or reactivity changes; and (3) behaviors that show the individual's ability to function within the control room team in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

The use of a plant-referenced simulator for testing enables the examiner to evaluate a candidate's performance in an environment closely correlated with conditions in the specific plant for which that candidate has applied for a license. With major facility differences minimized between the testing and operating environments, examiners have been able to make pass-fail judgments with confidence.

Although the increased use of plant-referenced simulators has provided to examiners the capability for better discrimination between success and failure in a candidate than could be achieved with non-plant-referenced simulators, the staff recognizes the existence of several factors that could suggest the use of alternative systems or devices for conducting the non-walkthrough portions of operating tests. These factors

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This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience.

Written comments may be submitted to the Rules and Procedures Branch, DRR, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

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include the cost and lead time associated with procurement or upgrading of a plant-referenced simulator. Moreover, rapidly changing technology in the simulation industry is resulting in previously unavailable options that could lead a facility licensee to seek alternative ways to meet the requirements of §55.45. ANSI/ANS-3.5-1985, "Nuclear Power Plant Simulators for Use in Operator Training"<sup>2</sup> (the standard), in conjunction with this regulatory guide, provides guidance in these areas.

### C. REGULATORY POSITION

Requirements are set forth in ANSI/ANS-3.5-1985 for specifying minimum performance and configuration criteria for a simulator, for comparing a simulator to its reference plant, and for upgrading simulators to reflect changes to reference plant response or control room configuration. These requirements provide a method acceptable to the NRC staff for a facility licensee (1) to certify a simulation facility consisting solely of a plant-referenced simulator or (2) to obtain approval of a simulation facility for use in portions of reactor operator and senior operator license examinations subject to the following:

1. The references to operator training in Section 1, "Scope," of the standard should be taken to apply to operating tests for operators, senior operators, and candidates.

2. Simulation facilities as defined in §55.4 of 10 CFR Part 55, to the extent that the facility licensee applies for approval under the requirements of paragraph 55.45(b), should meet the applicable requirements of the standard.

3. The standard identifies in Section 1.1, "Background," other documents to be included as part of the standard. The applicability of one of these documents, ANSI/ANS-3.1,<sup>2</sup> should be determined by referring to Revision 2 to Regulatory Guide 1.8, "Qualification and Training of Personnel for Nuclear Power Plants."

4. Section 5.2, "Simulator Update Design Data," requires that reference plant modifications be reviewed annually against the simulator and that the simulator update design data be revised as appropriate. This should be taken to mean that the first such annual review and update should take place within one year following the facility licensee's certification as specified in paragraph 55.45(b)(5)(i) or within 18 months following the submittal of the application for approval as specified in paragraph 55.45(b)(4)(i).

5. Section 5.4, "Simulator Testing," requires the conduct of specific tests to establish simulator performance and verify its operability. In addition to these procedures, applicable malfunctions, identified in Section 3.1.2, "Plant Malfunctions," should be periodically tested

to ensure the continued acceptability of the simulation facility. These malfunctions, if applicable to the facility, should be tested in their entirety not less than every four years, approximately 25% per year. When conducted in addition to the tests required by Section 5.4 and when subjected to the performance criteria for transient operations specified in Section 4.2, "Transient Operation," these malfunction tests provide an acceptable means of demonstrating the performance and operability of the simulation facility.

6. Appendix A to the standard, "Guide for Documenting Simulator Performance," and Appendix B to the standard, "Simulator Operability Tests," should be considered integral parts of the standard.

### D. IMPLEMENTATION

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

In accordance with the requirements in §55.45 of 10 CFR Part 55, the simulation facility portion of the operating test will not be administered on other than an approved or a certified simulation facility after:

1. The facility licensee has submitted a certification in accordance with paragraph 55.45(b)(5)(i), or

2. The staff has approved an application submitted by the facility licensee in accordance with paragraph 55.45(b)(4), or

3. May 28, 1991, whichever occurs sooner.

Until that time, the NRC will continue to give examinations for a facility licensee's reference plant in accordance with Generic Letter 82-18, "Reactor Operator and Senior Reactor Operator Requalification Examinations,"<sup>3</sup> October 12, 1982.

Licensees and applicants may propose means other than those specified in Section C of this guide for meeting applicable regulations. Except in those cases in which a facility licensee submits a certification for its simulation facility or proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the NRC will use the method described in this guide in the evaluation of the application for approval submitted by the facility licensee for its simulation facility. The guidance provided in Section C has been approved for use by the staff in the evaluation of all submittals as an acceptable means of complying with the Commission's regulations specified in Section A.

If a facility licensee wishes to utilize a simulation facility for more than one nuclear power plant, it must

<sup>2</sup>Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, IL 60525.

<sup>3</sup>Available for copying for a fee or inspection at the NRC Public Document Room, 1717 H Street NW., Washington, DC.

demonstrate to the NRC in its certification or in its application that the differences between the plants are not so significant that they have an impact on the ability of the simulation facility to meet the requirements and guidance of ANSI/ANS-3.5-1985 as qualified in this regulatory guide for each of the plants. This demonstration should include an analysis and summary of the differences between each plant and the simulation facility, including:

1. Facility design and systems relevant to control room personnel;

2. Technical specifications;

3. Procedures, primarily abnormal and emergency operating procedures;

4. Control room design and instrument/control location; and

5. Operational characteristics.

**VALUE/IMPACT ANALYSIS**

A separate value/impact analysis has not been prepared for this regulatory guide. A value/impact analysis was included in the regulatory analysis for the amendments to 10 CFR Part 55 published on March 25, 1987, a copy of which was placed in the Public Document

Room at that time. This analysis is also appropriate to Revision 1 of Regulatory Guide 1.149. A copy of the regulatory analysis is available for inspection and copying for a fee at the NRC Public Document Room, 1717 H Street NW., Washington, DC.

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