



U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE AND VALUE/IMPACT STATEMENT

November 1984  
Division 1  
Task OL 402-5

Contact: J. Wachtel (301)492-9695

PROPOSED REVISION 1 TO REGULATORY GUIDE 1.149

NUCLEAR POWER PLANT SIMULATION FACILITIES FOR USE  
IN OPERATOR LICENSE EXAMINATIONS

A. INTRODUCTION

Paragraph 55.45(a) of 10 CFR Part 55, "Operators' Licenses," would, if adopted, require 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) would specify that these operating tests will be administered, in part, in a simulation facility approved by the NRC 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 with regard to obtaining approval of a simulation facility and its use for the conduct of portions of the operating tests.

Any information collection activities mentioned in this draft regulatory guide are contained as requirements in the proposed amendments to 10 CFR Part 55 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.

<sup>1</sup>A simulation facility would be 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, special senior operators, and candidates: (i) the plant, (ii) a plant-referenced simulator, (iii) another simulation device.

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 FEB. 25, 1985

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

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 a primary responsibility of the Nuclear Regulatory Commission. Section 55.45, "Operating Tests," of 10 CFR Part 55 would require the candidate to demonstrate an understanding of and the ability to perform the actions necessary during normal, abnormal, and emergency situations; the operation of systems that affect heat removal or reactivity changes; and behaviors that demonstrate team performance and time-critical actions associated with safe operation of the plant.

Based on the results of approximately 600 examinations conducted on non-plant-referenced simulators and approximately 200 on plant-referenced simulators between October 1981 and June 1982, the staff has concluded that the information gained from the non-plant-referenced simulator examinations did not provide a sound basis to judge the competence of an applicant with confidence sufficient to justify denial of a license. The examiners found that the differences between non-plant-referenced simulators and specific nuclear power plant control rooms were often too great to permit them to confidently judge a candidate's performance. In particular, examiners could not discern whether poor simulator performance demonstrated a candidate's lack of ability to operate a given plant or resulted from the candidate's lack of familiarity with the simulator.

In contrast, the staff's experience with examinations conducted on plant-referenced simulators has been favorable. 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 and unit for which the 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 greater confidence.

Although the 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 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 proposed § 55.45. ANSI/ANS-3.5-1981, "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-3.5-1981 for specifying 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 obtaining approval of a simulation facility for use in portions of reactor operator license examinations subject to the following:

1. All references to training in the standard should be taken to apply to operating tests.
2. All references to a simulator in the standard should be taken to apply to a simulation facility.
3. Section 1, "Scope," states that the standard does not apply to certain limited-scope simulators. Such simulators, alone or in combination, to the extent that the facility licensee applies for approval for their use under the proposed requirements of paragraph 55.45(b), should also meet the requirements of the standard.
4. The standard identifies in Section 1.1, "Background Data," other documents to be included as part of the standard. The applicability of these documents should be determined by referring to the latest revision of the following regulatory guides and the version of the standard the guides endorse:

---

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

ANS Standard<sup>2</sup>

## Regulatory Guide

3.1

1.8

3.2

1.33

5. The definition of operator training in Section 2, "Definitions," should be interpreted with reference to ANSI/ANS-3.1-1981.

6. The definition of reference plant in Section 2, "Definitions," should be taken to apply to a specific nuclear power plant and to a specific unit in a multi-unit station.

7. The terms "transients," "abnormal conditions," and "abnormal evolutions" used in the standard should be considered equivalent to "anticipated operational occurrences" as presently defined in Appendix A to 10 CFR Part 50.

8. Section 5.2, "Simulator Updating," requires that the reference plant be reviewed annually against the simulator. This should be taken to mean that the first such review should take place prior to the initial submittal by the facility licensee of the application for approval as specified in paragraph 55.45(b)(3).

9. The simulator performance tests discussed in Section 5.4, "Simulator Performance Testing," of the standard should include, as a minimum, all the provisions of its Appendix.

10. Item 3 of Section 5.4, "Simulator Performance Testing," requires that a performance test be conducted and a report prepared not less than every 4 years. This testing and reporting, as specified in Section D, "Implementation," of this regulatory guide, should be done in totality not less than every 4 years. A minimum of 25% of the total simulator performance tests should be done annually and reported as part of the annual report specified in paragraph 55.45(b)(3); the report should be kept on file at the facility licensee's facility. The

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

specific annual testing and reporting to be undertaken for each facility licensee should be specified in a 4-year plan submitted as part of the initial and subsequent applications for approval and will be addressed on a case-by-case basis as specified in paragraph 55.45(b)(3).

11. The reference to ANSI/ANS-3.1 in Section 6(2), "References," should be understood to mean the document dated 1981.

12. The Appendix to the standard, "Procedure for Documenting Simulator Performance," should be considered an integral part of the standard.

13. Item 2 of Section A3.2, "Abnormal Operations," of the Appendix to the standard should be taken to mean that, although Section 3.1.2 of the standard requires that a minimum of 75 abnormal and emergency conditions resulting from malfunctions be simulated, every such malfunction condition that can be introduced into the simulator by the simulator operator should be tested if such malfunctions may be used in the conduct of operating tests.

#### 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. This proposed revision has been released to encourage public participation in its development.

In accordance with the requirements in proposed § 55.45 of 10 CFR Part 55, the non-plant-walkthrough portion of the operating tests will not be administered on other than an approved simulation facility after 3 years from the effective date of the proposed amendments to Part 55. Regardless of the approach chosen, it will be the responsibility of the facility licensee to apply to the NRC for initial approval of the simulation facility in accordance with the requirements of § 55.45. Approval by the NRC staff will constitute approval for use of the simulation facility in accordance with § 55.45 for a period of 4 years, after which an application for subsequent approval should be made by the facility licensee. Except in those cases in which a facility licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the NRC staff 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 staff will use the following schedule:

1. The requirements of Section 1, "Simulator Information," and Section 2, "Simulator Data Base," of the Appendix to the standard should be complete no later than 1 year after the effective date of § 55.45 or by the time the simulation facility is placed in service for conducting portions of operating tests, whichever is later.

2. The tests discussed in Section 3, "Simulator Tests," of the Appendix to the standard should be conducted and the initial documentation should be complete no later than 2 years after the effective date of § 55.45 or by the time the simulation facility is placed in service for conducting portions of operating tests, whichever is later.

3. Deviation from the data base should be corrected and the simulation facility should be in full compliance with the requirements of ANSI/ANS-3.5-1981 as modified by this guide no later than 3 years after the effective date of § 55.45 or by the time the simulation facility is placed in service for conducting portions of operating tests, whichever is later.

After evaluating the application for approval submitted by a facility licensee, including whatever supporting documentation and analysis of simulation facility performance may be deemed necessary for the evaluation, the NRC staff will either approve the simulation facility or it will inform the facility licensee of reasons for its refusal to grant approval. Once approval has been granted for a facility licensee's simulation facility, it will be valid for 4 years, after which a subsequent application and approval will be required.

Until the NRC staff has initially approved a facility licensee's simulation facility, the NRC will continue to give examinations for that facility licensee's reference plant in accordance with Generic Letter 82-18, "Reactor Operator and Senior Reactor Operator Requalification Examinations," October 12, 1982. However, in no case may the non-plant-walkthrough portion of the operating test be administered on other than an approved simulation facility after 3 years from the effective date of § 55.45. If, after a facility licensee has

received initial approval for a simulation facility, it fails to obtain subsequent approval, the NRC will cease to conduct operating tests for that facility licensee's reference plant. The facility licensee may again apply for approval at any time. In any case in which a facility licensee informs the NRC not less than 180 nor more than 210 days before the expiration of its existing approval of its intent to apply for subsequent approval and has filed an application for subsequent approval in proper form not less than 120 days before the expiration of its existing approval, the existing approval will not expire until the staff has finally determined disposition of the application for subsequent approval.

Any requests for exemptions from the requirements of paragraph 55.45(b) will be addressed on a case-by-case basis in accordance with the plan to be submitted by the facility licensee in response to paragraph 55.45(b)(2).

If a facility licensee wishes to apply for approval of a simulation facility for use at more than one nuclear power plant unit, it must demonstrate to the NRC in its application for approval that the differences between the units 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-3.5-1981 as qualified in this regulatory guide for each of the units. This demonstration should include an analysis and summary of the differences between each unit 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.

DRAFT VALUE/IMPACT ANALYSIS

A separate value/impact analysis has not been prepared for this draft regulatory guide. A value/impact analysis was included in the regulatory analysis for the proposed amendments to 10 CFR Part 55 published on November 26, 1984, a copy of which was placed in the Public Document Room at that time. This analysis is also appropriate to proposed Revision 1 of Regulatory Guide 1.149.

**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555**

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300

FIRST CLASS MAIL  
POSTAGE & FEES PAID  
USNRC  
WASH. D.C.  
PERMIT No. G-67