

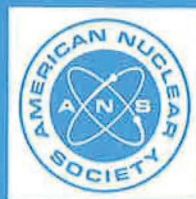
American Nuclear Society

**nuclear power plant simulators
for use in operator training**

an American National Standard

WITHDRAWN

ANSI/ANS



published by the
American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA

**American National Standard
Nuclear Power Plant Simulators
for use in Operator Training**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-3.5**

Published by the
**American Nuclear Society
555 North Kensington Avenue
La Grange Park, Illinois 60525 USA**

Approved April 13, 1981
by the
American National Standards Institute, Inc.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

CAUTION NOTICE: This American National Standard may be reviewed or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of this standard may receive current information, including interpretation, on all standards published by the American Nuclear Society by calling or writing to the Society.

Published by

American Nuclear Society
555 North Kensington Avenue, La Grange Park, Illinois 60525 USA

Price: \$16.00

Copyright © 1981 by American Nuclear Society.

Any part of this Standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-3.5-1981 with permission of the publisher, the American Nuclear Society." Reproduction prohibited under copyright convention unless written permission is granted by the American Nuclear Society.

Printed in the United States of America

Foreword

(This Foreword is not a part of American National Standard Nuclear Power Plant Simulators for Use in Operator Training, ANSI/ANS-3.5-1981).

Nuclear power plant simulators have become an important tool in training of nuclear power plant operators. Acceptance of the use of simulators in operator training programs has resulted in the need for a standard describing the minimum configuration and performance of such a unit. The objective of this standard is to specify minimum simulator performance and configuration criteria necessary for effective training.

It is not the intent of this standard to imply that a simulator is necessary for an effective operator training program. Suitable training can be attained by other means. It is the responsibility of the individual organizations to establish a program to prepare the staff properly to operate and maintain the nuclear facility. How the job is accomplished must be determined by each party, weighing the factors involved.

The standard has been revised to extend the minimum operating range of simulators and make the standard apply to simulators used in operator training. The minimum training, steady state, transient and accident exposure required to obtain a Nuclear Regulatory Commission (NRC) operator, or senior operator license and to maintain that license, have been included in the capability of a simulator. Also included is guidance for the upgrading of simulators to reflect reference plant response and physical changes and to require a data base on the reference plant configuration and performance be maintained.

When a simulator is used in an operator training program, it shall meet the requirements set forth in this standard.

Working Group ANS-3.5 of the Standards Committee of the American Nuclear Society had the following membership:

N. S. Elliott, Chairman, *Babcock & Wilcox Company*
F. L. Kelly, *Personnel Qualification Service*
P. F. Walzer, *Combustion Engineering, Inc.*

H. J. Abercrombie, *Tennessee Valley Authority*
E. W. Merschoff, *U. S. Nuclear Regulatory Commission*

Certain highly technically qualified individuals provided additional expert assistance and advice to the working group during the development of the standard. They are:

G. D. Crawford, *Singer Link Division*
J. R. Hill, *Westinghouse Electric Corporation*
J. J. Holman, *U. S. Nuclear Regulatory Commission*

R. M. Rosser, *Babcock & Wilcox Company*
A. P. Stevens, *Electronic Associates, Inc.*
G. Warner, *Singer Link Division*
J. S. Wiebe, *U. S. Nuclear Regulatory Commission*

The membership of Subcommittee ANS-3, Reactor Operations, had the following membership at the time of its approval of this standard:

G. C. Andognini, *Boston Edison Company*
H. T. Babb, *South Carolina Electric & Gas Company*
S. E. Bryan, *U. S. Nuclear Regulatory Commission*
W. W. Crouch, *Power Authority of the State of New York*
F. A. Dougherty, *EDS Nuclear Inc.*
N. S. Elliott, *Babcock & Wilcox Company*
H. Falter, *Power Systems*
H. J. Green, *Tennessee Valley Authority*
F. L. Kelly, *Personnel Qualification Services*
H. L. Ottoson, *Southern California Edison Company*
F. Palmer, *Commonwealth Edison Company*

W. J. Ritsch, *EDS Nuclear Inc.*
R. J. Rodriguez, *Sacramento Municipal Utility District*
D. J. Skovholt, *U. S. Nuclear Regulatory Commission*
J. D. Shiffer, *Pacific Gas & Electric*
J. E. Smith, *Duke Power Company*
P. Snyder, *American Nuclear Insurers*
E. L. Thomas, *Institute of Nuclear Power Operations*
W. T. Ullrich, *Peach Bottom Atomic Power Station*
G. K. Whitham, *Argonne National Laboratory*
P. Walzer, *Combustion Engineering, Inc.*

The American Nuclear Society's Nuclear Power Plant Standards Committee (NUPPSCO) had the following membership at the time of its approval of this standard.

J. F. Mallay, Chairman
M. D. Weber, Secretary

Name of Representative	<i>Organization Represented</i>
G. A. Arlotto	U. S. Nuclear Regulatory Commission
R. G. Benham	General Atomic Company (for the Institute of Electrical and Electronics Engineers Inc.)
R. E. Allen (Alt.)	United Engineers & Constructors, Inc. (for the Institute of Electrical and Electronics Engineers Inc.)
R. V. Bettinger	Pacific Gas and Electric Company
P. Bradbury	Westinghouse Advanced Reactor Division
D. A. Campbell	Westinghouse Electric Corporation
C. O. Coffey	Kaiser Engineers
L. J. Cooper	Nebraska Public Power District
W. H. D'Ardenne	General Electric Company
C. J. Gill	Bechtel Power Corporation
H. J. Green	Tennessee Valley Authority
A. R. Kasper	Combustion Engineering, Inc.
R. W. Keaten	GPU Services Corporation
J. W. Lentsch	Portland General Electric Company
J. F. Mallay	Babcock & Wilcox Company (for the American Nuclear Society)
A. T. Molin	United Engineers and Constructors, Inc.
J. H. Noble	Chas. T. Main, Inc.
E. P. O'Donnell	Ebasco Services, Inc. (for the Atomic Industrial Forum)
T. J. Pashos	Quadrex/Nuclear Services Corporation
P. T. Reichert	Catalytic, Inc.
M. E. Remley	Rockwell International
J. Stacey	Yankee Atomic Electric Company
S. L. Stamm	Stone & Webster Engineering Corporation
J. D. Stevenson	Structural Mechanics Associates (for the American Society of Civil Engineers)
G. Wagner	Commonwealth Edison Company
G. L. Wessman	Torrey Pines Technology
J. E. Windhorst	Southern Company Services, Inc. (for the American Society of Mechanical Engineers)
E. R. Wiot	NUS Corporation

Contents	Section	Page
1.	Scope	1
1.1	Background	1
2.	Definitions	1
3.	General Requirements	2
3.1	Simulator Capabilities	2
3.2	Simulator Environment	3
3.3	Systems to be Simulated and the Degree of Completeness	3
3.4	Simulator Training Capabilities	4
4.	Performance Criteria	4
4.1	Steady State Operation	4
4.2	Transient Operation	4
5.	Simulator Update	5
5.1	Simulator Data Base Updating	5
5.2	Simulator Updating	5
5.3	Use of Feedback for Updating	5
5.4	Simulator Performance Testing	5
6.	References	5
Appendix	Procedure for Documenting Simulator Performance	6