

American Nuclear Society

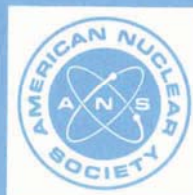
WITHDRAWN

**March 23, 2000
ANSI/ANS-1-1987**

**safety guide for
the performance of
critical experiments**

an American National Standard

**No longer being maintained as an
American National Standard. This
standard may contain outdated
material or may have been
superseded by another standard.
Please contact the ANS Standards
Administrator for details.**



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

ANSI/ANS-1-1987
Revision of
ANSI/ANS-1-1981

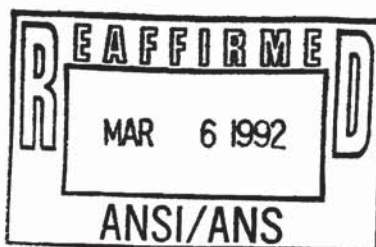
**American National Standard
Safety Guide for the Performance
of Critical Experiments**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-1**

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

Approved June 24, 1987
by the
American National Standards Institute, Inc.



American National Standard

Designation of this document as an American National Standard attests that the principles of openness and due process have been followed in the approval procedure and that a consensus of those directly and materially affected by the standard has been achieved.

This standard was developed under the procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to assure that competent, concerned, and varied interests have had an opportunity to participate.

An American National Standard is intended to aid industry, consumers, governmental agencies, and general interest groups. Its use is entirely voluntary. The existence of an American National Standard, in and of itself, does not preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard.

By publication of this standard, the American Nuclear Society does not insure anyone utilizing the standard against liability allegedly arising from or after its use. The content of this standard reflects acceptable practice at the time of its approval and publication. Changes, if any, occurring through developments in the state of the art, may be considered at the time ~~that the standard~~ is subjected to periodic review. It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures. Users of this standard are cautioned to determine the validity of copies in their possession and to establish that they are of the latest issue.

The American Nuclear Society accepts no responsibility for interpretations of this standard made by any individual or by any ad hoc group of individuals. Requests for interpretation should be sent to the Standards Department at Society Headquarters. Action will be taken to provide appropriate response in accordance with established procedures that ensure consensus on the interpretation.

Comments on this standard are encouraged and should be sent to Society Headquarters.

Published by

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

Copyright © 1987 by American Nuclear Society.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-1-1987 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 Safety Guide for the Performance of Critical Experiments, ANSI/ANS-1-1987.)

Critical experiments are an essential part of nuclear research and development. They yield information valuable for the design of nuclear reactors, for the specification of processes and operations with fissionable materials, and for furthering fundamental scientific knowledge.

Because of this diversity of purpose and the exploratory nature of critical experiments, their conduct differs from routine reactor operation. In many cases, for example, it is not possible to predetermine the exact value of operational controls or of shutdown devices, for to obtain the required information is the purpose of the experiment. Good practice dictates a minimum of perturbation extraneous to the equipment necessary to the objective of the experiment. Accordingly, assemblies for this purpose are often equipped with control and safety devices quite different from those in reactors designed to produce power. The information demanded from critical experiments requires great latitude in both the equipment and the operational practices to allow the necessarily frequent and often extensive changes in the assembly configuration.

These requirements result in a higher probability of an accidental nuclear excursion than could be tolerated for reactors. This greater probability is made acceptable by the absence of the large fission-product inventory and large internal energy that characterize reactors which have produced power; effective radiation protection therefore can be provided in a properly designed facility by simple operating rules.

This Guide contains nuclear safety criteria and practices that have evolved and have been tested during more than four decades of critical experimentation. It was initially prepared by Subcommittee ANS-1, Performance of Critical Experiments, of the American Nuclear Society Standards Committee and was approved by the Subcommittee on November 1, 1966. On August 18, 1967, the document was certified by the Board of Directors of the Society as ANS-STD.1-1967.

A revision of ANS-STD.1-1967 was prepared by the then Subcommittee ANS-1 on July 6, 1971 and was certified by the Society as ANS-STD.1-1972 on September 19, 1972. The membership of the subcommittee which prepared that revision was:

Dixon Callihan, Chairman, *Union Carbide Corporation, Nuclear Division*
E. B. Johnson, Secretary, *Union Carbide Corporation, Nuclear Division*
E. D. Clayton, *Battelle Pacific Northwest Laboratories*
D. F. Hanlen, *Westinghouse Electric Corporation, Atomic Power Division*

R. G. Luce, *General Electric Company, Knolls Atomic Power Laboratory*
Eldon I. Nowstrup, *U.S. Energy Research and Development Administration*
H. C. Paxton, *Los Alamos Scientific Laboratory*
Glenn A. Price, *Brookhaven National Laboratory*
W. C. Redman, *Argonne National Laboratory*
Norman L. Snidow, *Babcock and Wilcox Company*

The stature of and the breadth of interest in this standard were increased on April 29, 1975 when it was approved as an American National Standard by the American National Standards Institute, Inc. The designation then was ANSI N405-1975.

The content of N405-1975 was reaffirmed October 21, 1981 and the standard was revised in 1986, with consensus being achieved on November 7. The membership of the *ad hoc* group performing those actions is:

E. D. Clayton, *Battelle Pacific Northwest Laboratories*
 E. B. Johnson, *Oak Ridge National Laboratory*
 D. W. Magnuson, *Union Carbide Corporation, Nuclear Division (retired)*
 H. C. Paxton, *Los Alamos National Laboratory (retired)*
 Dixon Callihan, *Union Carbide Corporation, Nuclear Division (retired)*

This most recent version includes textual modifications solely for the purpose of updating references and of recounting procedural matters necessary to the action. The technical content has in no way been altered.

The American Nuclear Society Consensus Committee N17, Research Reactors, Radiation Physics and Radiation Shielding, had the following membership at the time of its approval of this standard:

R. S. Carter, Chairman
 T. M. Raby, Secretary

J. D. Buchanan	Health Physics Society
A. D. Callihan (Subcommittee ANS-1)	Individual
R. E. Carter	U.S. Nuclear Regulatory Commission
R. S. Carter	American Nuclear Society
A. De La Paz (Subcommittee ANS-14)	Department of U.S. Army
D. Duffey	American Institute of Chemical Engineers
H. Goldstein	American Physical Society
P. B. Hemming	U.S. Department of Energy
J. W. Lewellen (Alt.)	
W. A. Holt	American Public Health Association
L. I. Kopp (Subcommittee ANS-10)	U.S. Nuclear Regulatory Commission
J. E. Olhoeft	Individual
T. M. Raby	National Bureau of Standards
W. J. Richards (Subcommittee ANS-15)	Argonne National Laboratory
M. M. Ter Pogossian	American College of Radiology
D. K. Trubey (Subcommittee ANS-6)	Oak Ridge National Laboratory
A. Weitzberg (Subcommittee ANS-19)	NUS Corporation
W. L. Whittemore	Individual

Contents	Section	Page
	1. Scope	1
	2. Definitions	1
	2.1 Limitations	1
	2.2 Glossary of Terms	1
	3. Administrative Practices	1
	4. Design Criteria	2
	5. Operational Practices	3
	6. References	3