American Nuclear Society

REAFFIRMED

June 16, 2015 ANSI/ANS-57.1-1992 (R2015) design requirements for light water reactor fuel handling systems

an American National Standard

REAFFIRMED

July 20, 2005 ANSI/ANS-57.1-1992 (R2005) August 12, 1998 ANSI/ANS-57.1-1992(R1998) This standard has been reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document will be met by using the version of the standards and documents referenced herein. It is the responsibility of the user to review each of the references and to determine whether the use of the original references or more recent versions is appropriate for the facility. Variations from the standards and documents referenced in this standard should be evaluated and documented.

This standard does not necessarily reflect recent industry initiatives for risk informed

This standard does not necessarily reflect recent industry initiatives for risk informed decision-making or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.



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

American National Standard Design Requirements for Light Water Reactor Fuel Handling Systems

Secretariat
American Nuclear Society

Prepared by the American Nuclear Society Standards Committee Working Group ANS-57.1

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

Approved July 28, 1992 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 ensure 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 © 1993 by American Nuclear Society.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-57.1-1992 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 part of American National Standard Design Requirements for Light Water Reactor Fuel Handling Systems, ANSI/ANS-57.1-1992.)

This standard provides minimum design requirements for the designer of fuel handling equipment for water-cooled nuclear power plants. It sets forth design requirements that can assist in design and licensing efforts. It does not, however, relieve the designer of the responsibility for compliance with any specific codes referenced herein. The designer is also reminded of U.S. Nuclear Regulatory Commission (NRC) Regulatory Guides that contain information that should be referred to in designing systems and components. The standard was developed under sponsorship of the American Nuclear Society and was first drafted in 1975. In this revision, it has been updated to reflect current criticality analysis standards and to address the potential for fuel handling systems to handle consolidated spent fuel.

This standard was developed by Working Group ANS-57.1 of the Standards Committee of the American Nuclear Society. The Working Group had the participation of the following members during the period it revised and approved the standard:

- M. J. Akins, Chairman, Gilbert/Commonwealth, Inc. J. A. Nevshemal, Todedo Edison Company T. H. Cogburn, Arkansas Power & Light Company
- W. L. Dobson, Gilbert/Commonwealth, Inc.
- J. R. Marshall, Westinghouse Electric Corporation
- I. H. Sargent, Westec Services, Inc.
- K. Steyer, U.S. Nuclear Regulatory Commission
- G. R. Street, Stearns-Catalytic

A significant contribution also was made by the following former members of ANS-57.1:

- R. W. Beer, Westinghouse Electric Corporation
- I. Bernstein, Combustion Engineering, Inc.
- J. P. Colton, U.S. Nuclear Regulatory Commission
- D Cutsinger, Stearns-Roger Corporation
- J. Dossett, Babcock & Wilcox Company
- C. N. Drummond, Babcock & Wilcox Company
- L. E. Elder, Offshore Power Systems
- L. A. Farthing, Babcock & Wilcox Company
- E. R. Fryer, Bechtel Power Corporation
- J. A. Kay, Yankee Atomic Energy Company
- R. J. Leduc, Westinghouse Electric Corporation
- S. E. Nabow, Duke Power Company
- C. W. Nilsen, U.S. Nuclear Regulatory Commission
- L. A. Steinert, General Electric Company
- P. C. Wallick, Bechtel Power Corporation
- M. L. Weimer, Offshore Power Systems

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

W. T. Ullrich, Chairman

M. D. Weber, Secretary

F. Boorboor
J. C. Bradford Bechtel National, Inc.
L. J. Cooper Nebraska Public Power District
J. D. Crawford
R. G. Domer Pacific Gas & Electric Company
W. H. D'Ardenne (Vice Chairman)
S. N. Ehrenpreis
S. B. Gerges
D. L. Gillispie Institute of Nuclear Power Operations
C. E. Johnson, Jr U.S. Nuclear Regulatory Commission
R. T. Lancet
J. F. Mallay Advanced Technology Engineering Systems, Inc.
R. E. Miller Duke Power Company
J. A. Nevshemal Toledo Edison Company
T. T. Robin Southern Company Services, Inc.
D. R. Roth
J. C. Saldarini
S. L. Stamm Stone & Webster Engineering Corporation
J. D. Stevenson Stevenson & Associates
C. D. Thomas, Jr
W. T. Ullrich Philadelphia Electric Company
(for the American Nuclear Society)
(vacant) Tennessee Valley Authority
G. P. Wagner Commonwealth Edison Company
N. Weber
G. J. Wrobel

Contents	Section	Page
	1. Introduction and Scope	1
	1.1 Introduction	
	1.2 Scope	
	1.3 Limits of Application	
	1.4 Application of Codes and Standards	
	1.4 Application of Codes and Standards	1
	2. Definitions	1
	3. System Safety Functions	3
	3.1 Prevent Criticality	3
	3.2 Prevent Cladding Breach of Irradiated Fuel	3
	3.3 Limit Radiation Exposure	3
	4 Suntan Definition	9
	4. System Definition	
	4.1 Handling Equipment	
	4.2 Handling Tools	
	4.3 Inspection Equipment	
	4.4 Temporary Storage Equipment	
	4.5 Transfer Tube Assembly	3
	5. System Functional Description	3
	5.1 General	3
	5.2 Operational	4
	6. Design Requirements	4
	6.1 General	
	6.2 Safety Classification and Design Standards	
	6.3 System Design Requirements	
	6.3.1 Safety Requirements	
	6.3.2 Analysis Requirements	
	6.3.3 Design Features	
	6.3.4 Specific Component Requirements	
	6.4 Testing and Maintenance Provisions	
	6.4.1 Testing	
	6.4.2 Maintenance	
	Oliza manifestation	10
	7. References	11