American Nuclear Society

REAFFIRMED

July 23, 2002 ANSI/ANS-51.10-1991 (R2002) auxiliary feedwater system for pressurized water reactors

an American National Standard

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reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn.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 decisionmaking or a graded approach to quality assurance. Users should consider the use of these industry initiatives in the application of this standard.

REAFFIRMED

October 14, 2008 ANSI/ANS-51.10-1991 (R2008)

REAFFIRMED

August 13, 2018 ANSI/ANS-51.10-1991 (R2018)



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

ANSI/ANS-51.10-1991 Revision of ANSI/ANS-51.10-1979

American National Standard Auxiliary Feedwater System for Pressurized Water Reactors

Secretariat
American Nuclear Society

Prepared by the American Nuclear Society Standards Committee Working Group ANS-51.10

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

Approved May 10, 1991 by the American National Standards Institute, Inc.

National Standard

American 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 © 1991 by American Nuclear Society.

Any part of this standard may be quoted. Credit lines should read "Extracted from American National Standard ANSI/ANS-51.10-1991 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

Addendum to Foreword

ANSI/ANS-51.10-1991; R2002 Auxiliary Feedwater System for Pressurized Water Reactors

This standard has been reviewed and reaffirmed by the ANS Nuclear Facilities Standards Committee (NFSC) with the recognition that it may reference other standards and documents that may have been superseded or withdrawn. The requirements of this document are 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 cited 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.

The 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.

Foreword

(This Foreword is not a part of American National Standard for Auxiliary Feedwater System for Pressurized Water Reactors, ANSI/ANS-51.10-1991.)

This standard is applicable to pressurized light water reactor nuclear power plants.

The standard was originally issued in 1979 and has been extensively updated to reflect current regulatory directives, industry practice and experience, and available design guidance.

Among the major revisions incorporated in this issue of the standard is station blackout (i.e., the loss of all alternating current power sources). A requirement is included that the system be capable of operating for a plant specific duration with the loss of all alternating current power sources. The rationale for this requirement and the method of determining the plant specific duration are identified in Title 10, Code of Federal Regulations, Part 50.63, "Loss of All Alternating Current Power." In the 1979 edition of this standard, a generic duration of two hours was identified and no rationale was included.

The membership of Working Group ANS-51.10 of the Standards Committee of the American Nuclear Society during the development of this document was:

```
J. F. Garibaldi, Chairman, Ebasco Services, Inc.
```

D. G. Keith, Bechtel Power Corporation

S. Ku, GPU Nuclear Corporation

K. J. Vehstedt, New York Power Authority

W. T. LeFave, U.S. Nuclear Regulatory Commission

In addition, the following individuals assisted in the preparation of this document:

M. A. Anzalone, Ebasco Services, Inc. W. J. McTigue, Ebasco Services, Inc.

J. S. Pfabe, Ebasco Services, Inc. D. Santory, Ebasco Services, Inc.

The membership of MC-1, LWR Design Criteria Standards Management Committee, at the time of its concurrence with the technical approval was:

W. H. D'Ardenne, Chairman, General Electric Company

E. J. Borella, Ebasco Services, Inc.

D. M. Crowe, Georgia Power Company

R. Fortier, Stone & Webster Engineering Corporation J. C. Glynn, U.S. Nuclear Regulatory Commission

P. Hepner, Combustion Engineering

D. G. Keith, Bechtel Power Corporation

H. G. O'Brien, Tennessee Valley Authority

H. C. Shaffer III, Yankee Atomic Electric Company

R. C. Surman, Westinghouse Electric Corporation

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

W. T. Ullrich, Chairman M. D. Weber, Secretary

T. T. Robin	Southour Company Couriesa Inc
F. Boorboor	
C. O. Coffer	Pacific Gas & Electric Company
L. J. Cooper	Nebraska Public Power District
J. D. Crawford	
R. G. Domer	
W. H. D'Ardenne (Vice Chairman)	
S. N. Ehrenpreis	
S. B. Gerges	NUS Corporation
C. J. Gill	Bechtel National, Inc.
M. L. Hellums	Tennessee Valley Authority
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	
W. M. Rice	Duke Power Company (retired)
	nstitute of Electrical & Electronics Engineers, Inc.)
D. R. Roth	
J. C. Saldarini	
M. O. Sanford	GPII Nuclear Corporation
S. L. Stamm	
J. D. Stevenson	
T. J. Sullivan	Institute of Nuclear Power Operations
C. D. Thomas	Vankoo Atamia Floatria Company
W. T. Ullrich	
W. I. UHITICH	
O. D. W.	(for the American Nuclear Society)
G. P. Wagner	
G. L. Wessman	
G. J. Wrobel	Kochester Gas & Electric Corporation

ontents	Section 1. Introduction and Scope	Page
	1.1 Scope	
	1.2 Purpose	
	1.3 Limits of Application	1
	2. Definitions	1
	3. System Functions	2
	4. System Definition	
	5. System Performance Requirements	
	5.1 Performance Parameters	
	6. Design Requirements	
	6.1 Safety Class and Applicable Codes, Standards or Regulations	
	6.2 Conditions of Design	
	6.3 Interface	
	6.5 Design Documentation	
	7. References	14
	Appendix A System Descriptions	16
	Fig. A-1 Representative Auxiliary Feedwater System Arrangements	
	Fig. A-2a Auxiliary Feedwater System 2 Loop	20
	Fig. A-2b Auxiliary Feedwater System 4 Loop	20
	Appendix B Background and Application Guidance on Design Requirements	21