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ANSI/ANS-54.1-1989

American Nuclear Society

general safety design criteria for a liquid metal reactor nuclear power plant

WITHDRAWN

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ERRATA

American National Standard General Safety Design Criteria for a Liquid Metal Reactor Nuclear Power Plant, ANSI/ANS-54.1-1989

Page 9, Subsection 3.4.10, Structural and Equipment Cooling Systems, final paragraph, first sentence:

The word "not" should replace the word "now" in the first sentence of final paragraph of subsection 3.4.10; it should read:

> Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system nuclear safety function can be accomplished, assuming a single failure.

May 1989

ANSI/ANS-54.1-1989

American National Standard General Safety Design Criteria for a Liquid Metal Reactor Nuclear Power Plant

Secretariat
American Nuclear Society

Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-54.1

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American National Standard

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

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Foreword

(This Foreword is not a part of American National Standard for General Safety Design Criteria for a Liquid Metal Reactor Nuclear Power Plant, ANSI/ANS-54.1-1989.)

Pursuant to the provisions of Title 10, Part 50, Section 50.34 of the Code of Federal Regulations, an application for a nuclear power plant construction permit must include the principal design criteria for a proposed facility. The principal design criteria establish the necessary design, fabrication, construction, testing and performance requirements for structures, systems and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.

General design criteria, which establish the minimum requirements for the principal design criteria, for nuclear power plants are identified in the Code of Federal Regulations, Title 10, Part 50, Appendix A (10CFR50A). While these criteria provide guidance for all types of nuclear power plants, they are specifically oriented toward water reactors. This is recognized in the Code of Federal Regulations which states: "These General Design Criteria establish minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in design and location to plants for which construction permits have been issued by the Commission. The Design Criteria are also considered to be generally applicable to other types of nuclear power units and are intended to provide guidance in establishing the principal design criteria for such other units."

As a result of the increased design and development activities directed toward the establishment of commercial liquid metal reactor (LMR) plants, the need for more specific guidance for the design of these plants was recognized. Consequently, the American Nuclear Society Subcommittee ANS-24 (subsequently renamed Working Group ANS-54.1) was established in 1970 to develop and interpret these criteria for the LMR. The working group included representatives from the reactor and architect-engineer vendors, utilities, and the Atomic Energy Commission's regulatory and development divisions (later renamed the Nuclear Regulatory Commission and the Department of Energy). The efforts of this group resulted in General Safety Design Criteria for an LMFBR Nuclear Power Plant. Early in 1975, the group balloted in favor of issuing these criteria for trial use and comment, and ANSI N214, General Safety Design Criteria for an LMFBR Nuclear Power Plant was issued for trial use and comment in April 1975. The application of these criteria resulted in comments, which were addressed by the group. Subsequent comments by ANS-54 and by the Nuclear Power Plant Standards Committee (NUPPSCO) were addressed, but the proposed standard was withdrawn so that later information could be incorporated and the standard could be made applicable to large loop and pool type designs as well as small modular reactors. In developing the current standard, emphasis was placed on retaining the 10CFR50, Appendix A criteria without change wherever applicable to LMRs. Changes and/or additions were made to reflect the unique characteristics of LMRs. The Clinch River Breeder Reactor Plant licensing experience, which demonstrated one acceptable approach for licensing LMRs by meeting all the requirements for a Construction Permit, was factored into this standard. The standard also provides alternatives for controlling the risk of loss of core coolable geometry. In the process of providing these alternatives, the inherently safe core configurations and passive heat removal systems being developed under the advanced LMR program were considered. This resulted in the current standard.

The ANS-54.1 Working Group which prepared the final version of this standard consisted of the following membership:

L. E. Strawbridge, Chairman, *Westinghouse Electric Corporation*
Q. L. Baird, *Hanford Engineering Development Laboratory*
G. Berg, *Rockwell International Corporation*
C. S. Ehrman, *Burns and Roe, Inc.*
O. E. Gray, *Consolidated Management Office for the LMFBR*
J. R. Humphreys, *U.S. Department of Energy*
T. L. King, *U.S. Nuclear Regulatory Commission*
W. R. Rolf, *Commonwealth Edison Company*

At the time of approval of this standard, the American Nuclear Society Standards Subcommittee ANS-54 consisted of the following membership:

R. T. Lancet, Chairman, *Rockwell International Corporation*
R. F. Stearns, Secretary, *Bechtel Group, Inc.*
H. Alter, *U.S. Department of Energy*
C. Bijlani, *Burns & Roe, Inc.*
H. W. Buschman, *Argonne National Laboratory-West*
C. Cox, *Westinghouse-Hanford*
G. L. Gyorey, *GE Advanced Nuclear Technology*
T. L. King, *U.S. Nuclear Regulatory Commission*
H. R. Michael, *Stone & Webster Engineering Corporation*
M. Natta, *Institute de Protection et de Surete Nucleaire (France)*
J. M. Rich, *Sargent & Lundy*
W. R. Rolf, *Commonwealth Edison Company*
W. J. Rowan, *Consultant*
L. E. Strawbridge, *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:

L. J. Cooper, Chairman
M. D. Weber, Secretary

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F. Boorboor ..... United Engineers & Constructors*
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D. Lambert ..... Tennessee Valley Authority
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J. K. McCall ..... Pacific Gas and Electric Company
R. E. Miller ..... Duke Power Company
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W. M. Rice ..... Duke Power Company (retired)
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W. T. Ullrich ..... Philadelphia Electric Company
G. P. Wagner ..... Commonwealth Edison Company
G. L. Wessman ..... Consultant
G. J. Wrobel ..... Rochester Gas & Electric Corporation

*Affiliation at time of balloting

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