ANSI/ANS-55.1-2021

# Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants

An American National Standard

Published by the
American Nuclear Society
555 N. Kensington Ave
La Grange Park, IL 60526

ANSI/ANS-55.1-2021

ANSI/ANS-55.1-2021

# American National Standard Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants

Secretariat
**American Nuclear Society**

Prepared by the
**American Nuclear Society**
**Standards Committee**
**Working Group ANS-55.1**

Published by the
**American Nuclear Society**
**555 North Kensington Avenue**
**La Grange Park, Illinois 60526 USA**

Approved December 2, 2021
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 It may be reaffirmed, revised, or withdrawn at any time in accordance with established procedures.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. Inquiries about requirements, recommendations, and/or permissive statements (i.e., “shall,” “should,” and “may,” respectively) should be sent to the Society headquarters, ATTN: Standards or to standards@ans.org. Action will be taken to provide appropriate response in accordance with established procedures that ensure consensus.

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 60526 USA**



Printed in the United States of America

## Inquiry Requests

The American Nuclear Society (ANS) Standards Committee will provide responses to inquiries about requirements, recommendations, and/or permissive statements (i.e., "shall," "should," and "may," respectively) in American National Standards that are developed and approved by ANS. Responses to inquiries will be provided according to the Policy Manual for the ANS Standards Committee. Nonrelevant inquiries or those concerning unrelated subjects will be returned with appropriate explanation. ANS does not develop case interpretations of requirements in a standard that are applicable to a specific design, operation, facility, or other unique situation only and therefore is not intended for generic application.

Responses to inquiries on standards are published in ANS's magazine, *Nuclear News*, and are available publicly at www.ans.org or by contacting standards@ans.org.

## Inquiry Format

Inquiry requests shall include the following:

(1) the name, company name if applicable, mailing address, and telephone number of the inquirer;

(2) reference to the applicable standard edition, section, paragraph, figure, and/or table;

(3) the purpose(s) of the inquiry;

(4) the inquiry stated in a clear, concise manner;

(5) a proposed reply, if the inquirer is in a position to offer one.

Inquiries should be addressed to

American Nuclear Society
ATTN: Standards
555 N. Kensington Avenue
La Grange Park, IL 60526

or standards@ans.org

# Foreword

(This foreword does not contain any requirements of American National Standard "Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants," ANSI/ANS-55.1-2021, but is included for informational purposes.)

A key aspect for the further development of nuclear technology is the effective management of low-level radioactive waste generated during facility operation. Fundamental to the effective management of radioactive waste is the design, construction, and operation of radioactive waste processing systems. This standard was originally issued to provide design guidance for in-plant solid radwaste systems. In 2001, the U.S. Nuclear Regulatory Commission (NRC) granted design relief in Regulatory Guide 1.143 (Rev. 2), "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," when it allowed ANSI/ASME B31.3, "Process Piping," as an option to ANSI/ASME B31.1, "Power Piping," to be used for radioactive waste systems.

The revision of this standard incorporates the design relief granted by the NRC in 2001 and to service continued operation at nuclear facilities and new nuclear facility construction.

It is the purpose of this standard to provide requirements for the design and operation of in-plant solid low-level radioactive waste processing systems. It is the intent of this standard to identify a basis for establishing uniform practices and minimum requirements for the design, fabrication, and operation of those systems as applied to nuclear facility operations (e.g., power plants, institutions, and laboratories that generate wastes approved for disposal under *Code of Federal Regulations* (CFR) Title 10, "Energy," Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"). This standard's scope does not address systems used to process waste from nuclear facilities that potentially contain fissile material in sufficient quantities to require controls to avoid criticality, i.e., wastes containing quantities of fissile or long-lived radionuclides that are classified as high-level or transuranic radioactive waste atypical of NRC-licensed commercial facilities and beyond the scope of 10 CFR 61. Systems applicable to non–low-level waste that use this standard might have to meet additional requirements beyond the scope of this standard. This standard addresses the technical practices and requirements necessary for solid radioactive waste processing operations while maintaining consideration for reducing radiation exposures to the environment, the public, and facility operating personnel.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied. A statement has been included in the references section that provides guidance on the use of references.

This standard does not incorporate the concepts of generating risk-informed insights, performance-based requirements, or a graded approach to quality assurance. The user is advised that one or more of these techniques could enhance the application of this standard.

This standard was prepared by the ANS-55.1 Working Group of the American Nuclear Society. The following members contributed to this standard:

C. C. Miller (Chair), *Pacific Gas & Electric*
P. D. Saunders (Vice Chair), *Suncoast Solutions*

C. J. Hendrix, *AVANTech*
C. A. Hendrix, *Atkins*
S. Liebenow, *Energy Solutions*
K. R. Novatny, *Sargent & Lundy*
N. Saikiran, *OneCIS*

The Fuel, Waste, and Decommissioning Consensus Committee had the following membership at the time of its approval of this standard:

J. F. Lucchini (Chair), *Los Alamos National Laboratory*
M. E. Stasko (Vice Chair), *Duke Energy Corporation*

S. O. Bader, *Orano USA*
H. D. Felsher, *U.S. Nuclear Regulatory Commission*
D. W. Hillyer, *Energy Solutions*
A. Kota (Observer), *Individual*
D. W. Lewis, *Westinghouse Government Services*
C. C. Miller, *Pacific Gas & Electric*
M. P. Sanders, *Individual*
S. W. Schilthelm, *BWX Technologies, Inc.*
T. R. Smedra, *Westinghouse Electric Company, LLC*

# Contents

## Appendix



## Tables



## Figures