ANSI/ANS-8.7-2022

Nuclear Criticality Safety in the Storage of Fissile Materials

An American National Standard

Published by the
American Nuclear Society
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American National Standard Nuclear Criticality Safety in the Storage of Fissile Materials

Secretariat
American Nuclear Society

Prepared by the
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Working Group ANS-8.7

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American National Standard

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Foreword

(This foreword does not contain any requirements of American National Standard "Nuclear Criticality Safety in the Storage of Fissile Materials," ANSI/ANS-8.7-2022, but is included for informational purposes.)

As is the case with many standards and guides, the direct solution to a specific problem may not be immediately evident in these pages. When dealing with fissile material, the application of some of the mass limits and allowances permitted in storage arrangements requires groups, or individuals, experienced in nuclear criticality safety to examine the contingencies attendant to handling massive pieces, to deviations from established procedures, or to those perturbations or mishaps commonly encountered in storage areas. This standard should be considered not as a substitute for detailed safety analyses, but rather as an integral part of the analysis for the attainment of a sound nuclear criticality safety program.

This standard is an extension of ANSI/ANS-8.1-2014 (R2018), "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors." Attention to details of possible single-unit criticality accidents is, therefore, presumed. The information presented in this standard is primarily directed to nuclear criticality safety and is based on validated Monte Carlo calculations. Water is adopted as a standard reflector for storage arrays; because of the variety and thicknesses of concretes that may occur in the more usual conditions of storage, an unambiguous presentation of information is difficult.

This standard provides an orientation and direction to nuclear criticality safety practices. Individual safety groups concerned with specific problems are encouraged to publish solutions to these problems, detailing the bases. Future reviews and revisions of this standard may make use of the information to expand the areas of applicability.

The ANS-8.7 Working Group under the Fissionable Material Outside Reactors Subcommittee (ANS-8) of the American Nuclear Society (ANS) was established in November 1967 and has prepared a number of drafts of this standard. One draft underwent a one-year trial use and comment period in 1973. This standard was approved by the American National Standards Institute (ANSI) in 1975 as ANSI N16.5-1975 and was reaffirmed in 1987 as ANSI/ANS-8.7-1975 (R1987). In 1998, a revision was made to include several textual enhancements and tabulated changes resulting from confirmatory evaluations. The 1998 revision removed the table of unit mass limits of uranium-233 per cell in water-reflected storage arrays for oxides with $H/U \leq 3$, 10, and 20 and removed limited portions of tables for unit mass limits of uranium per cell in water-reflected storage arrays for oxides at 93.2 wt%, 50 wt%, and 30 wt%, because of identified uncertainties associated with the calculated values. This revision makes textual enhancements to bring consistency between this standard and the current series of ANS-8 standards. No changes to the calculation limits have been made.

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 methods could enhance the application of this standard.

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