American Nuclear Society

REAFFIRMED
September 12, 2007
ANSI/ANS-8.7-1998
(R2007)

nuclear criticality safety in the storage of fissile materials

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reviewed and reaffirmed with the recognition that it may reference other standards and documents that may have been superseded or withdrawn.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

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American National Standard for Nuclear Criticality Safety in the Storage of Fissile Materials

Secretariat
American Nuclear Society

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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 part of American National Standard for Nuclear Criticality Safety in the Storage of Fissile Materials, ANSI/ANS-8.7-1998.)

As with many standards and guides, the direct solution to a specific problem may not be immediately evident in these pages. The application of some of the mass limits and allowances permitted in storage arrangements requires groups, or individuals, experienced in criticality 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 criticality safety program.

This standard is an extension of American National Standard for Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, ANSI/ANS-8.1-1998. Attention to details of possible single-unit criticality is, therefore, presumed. The information presented in this standard is primarily directed to 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.

Working Group ANS-8.7 of Subcommittee 8 of the American Nuclear Society Standards Committee was established in November 1967 and 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 in 1975 as ANSI N16.5-1975 and was reaffirmed in 1987 as ANSI/ANS-8.7-1975 (R1987). This revision includes several textual enhancements and tabulated changes resulting from confirmatory evaluations by Working Group members Kimball and Vessard, and by individuals in industry: Russell L. Bowden of BNFL Consultancy Services, David Hanlon of AEA Technology, E. Fitz Trumble of Westinghouse Savannah River Company, and M. Wesley Waddell of the Oak Ridge Y-12 Plant. These researchers determined that uncertainties associated with the calculated values were larger than previously evaluated. Therefore, this revision includes removal of Table 5.12, Unit Mass Limit in Kilograms of Uranium-233 per Cell in Water-Reflected Storage Arrays, for oxides with H/U $\leq$ 3, 10, and 20, and the removal of limited portions of Tables 5.2, 5.5, and 5.6, Unit Mass Limit in Kilograms of Uranium per Cell in Water-Reflected Storage Arrays, for oxides at 93.2 wt-%, 50 wt-%, and 30 wt-%.

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This standard was prepared under the direction of Subcommittee 8, Fissionable Materials Outside Reactors, of the Standards Committee of the American Nuclear Society. Members of ANS-8 at the time of draft preparation and approval were:

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