American Nuclear Society

WITHDRAWN

neutron and gamma-ray cross sections for nuclear radiation protection calculations for nuclear power plants

an American National Standard

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American National Standard
Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants

Secretariat
American Nuclear Society

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American Nuclear Society
Standards Committee
Working Group ANS-6.1.2

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Foreword

(This Foreword is not a part of American National Standard Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants, ANSI/ANS-6.1.2-1983.)

A need for computer-readable standard reference neutron and gamma-ray cross section data was identified by American Nuclear Society Standards Subcommittee ANS-6 in 1975. These cross sections are required for materials and energy ranges of importance in nuclear radiation protection and shielding calculations for nuclear power plants. It was observed at that time that data sets not meeting high standards of documentation and verification were becoming de facto standards (see, for example, American National Standard Guidelines on the Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants, ANSI/ANS-6.4-1977, p 19).

The scope of the present standard was approved by the ANS Standards Steering Committee on November 17, 1976. A working group was formed in 1976 consisting of experts from national laboratories, academia, and industry.

The standard produced by this working group provides guidance in the preparation and verification of neutron and gamma-ray cross section sets and identifies several sets of standard reference data which meet the procedures specified. The identification of standard neutron and gamma-ray data is expected to improve the efficiency of shielding and radiation protection computations by reducing redundant validating and processing operations by each user. In addition, shielding computations are expected to become more accurate as a result of focusing effort on the development and testing of nuclear data to be used as a standard. A coupled neutron-gamma multigroup cross section set, referred to as BUGLE, was developed for this purpose and tested. A revised data set, BUGLE-80, was developed in 1980 on the basis of the BUGLE test results, and the BUGLE-80 data set is identified as meeting the requirements of the standard. The BUGLE-80 data set uses a multigroup energy structure which permits useful shielding and radiation protection calculations. A more detailed coupled neutron-gamma multigroup data set, VITAMIN-C, also is identified as meeting the requirements of the standard. After a time-interval to permit adequate testing and validation of the BUGLE-80 data set, the present standard was submitted to ANS-6 and N17 for approval.

The standard is related to American National Standard Nuclear Data Sets for Reactor Design Calculations, ANSI/ANS-19.1-1983. The scope of that standard includes data of importance for reactor core design, while the present standard covers radiation transport and shielding applications, especially for nuclear power plants.

The standard is intended to prescribe recommended practices. The data sets identified are those a novice may use with some confidence and should be seriously considered by the expert. The expert might be expected to have reasons why he did not use the reference sets if he chose other data. The working group was unanimous in its decision to recommend specific data sets.

The membership of Working Group ANS-6.1 at the time it prepared this standard was:

D. R. Harris, Chairman, *Rensselaer Polytechnic Institute*
V. R. Cain, *Science Applications, Inc.*
W. M. Herwig, *Babcock & Wilcox Company*
W. C. Hopkins, *Bechtel Power Corporation*
O. I. Ozer, *Electric Power Research Institute*
S. N Purohit, *Consolidated Edison Company of New York*
P. F. Rose, *Brookhaven National Laboratory*
R. W. Roussin, *Oak Ridge National Laboratory*
W. F. Smith, *Duke Power Company*
C. R. Weisbin, *Oak Ridge National Laboratory*

At the time of approval of the standard, Subcommittee ANS-6, Radiation Protection and Shielding, of the American Nuclear Society Standards Committee had the following membership:

D. K. Trubey, Chairman, *Oak Ridge National Laboratory*
J. C. Celnik, *Stone & Webster Engineering Corporation*
D. R. Harris, *Rensselaer Polytechnic Institute*
W. C. Hopkins, *Bechtel Corporation*
E. Normand, *Northwest Energy Services Company*
P. J. Persiani, *Argonne National Laboratory*
D. J. Schuh, II, *Fabricated Systems, Inc.*

The American National Standards Committee N17, Research Reactors, Reactor Physics, and Radiation Shielding, had the following membership at the time it reviewed and approved this standard:

R. S. Carter, Chairman
T. M. Raby, Secretary

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American Institute of Chemical Engineers	D. Duffey
American Nuclear Society	R. S. Carter
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