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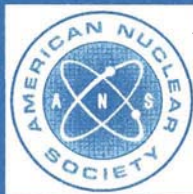
February 23, 2009
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**neutron and gamma-ray cross sections
for nuclear radiation protection
calculations for nuclear power plants**

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

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-6.1.2**

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American National Standard

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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-6.1.2-1999.)

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.

This standard 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 the focusing of 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 and tested for this purpose. A revised data set, BUGLE-80, was developed in 1980 on the basis of the BUGLE test results, and the BUGLE-80 data set was 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 was identified as meeting the requirements of the standard. The SAILOR cross section set was added to the standard in 1987-88.

The present edition of this standard cites the BUGLE-96 broad-group cross section library as the recommended set, replacing both the BUGLE-80 and SAILOR sets. The more detailed VITAMIN-B6 set is also cited as a replacement for the VITAMIN-C set. Both are based on the most recent version of the evaluated cross-section library, ENDF/B-VI, Release 3. ENDF/B-VI contains numerous significant changes to available nuclear data relative to earlier versions of ENDF/B. Improved experimental data and model predictions are included and several format changes were made to provide for better representation of the underlying physics and the extension to higher energies.

This standard is related to American National Standard Nuclear Data Sets for Reactor Design Calculations, ANSI/ANS-19.1-1989. The scope of that standard includes data of importance for reactor core design, while ANSI-6.1.2 covers radiation transport and shielding applications, especially for nuclear power plants.

This 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 provide strong reasons why he did not use the reference sets if he selects other data. The working group was unanimous in its decision to recommend specific data sets.

The membership of Working Group ANS-6.1.2 at the time it prepared this standard was:

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