American Nuclear Society

WITHDRAWN

neutron and gamma-ray flux-to-dose-rate factors

an American National Standard

No longer being maintained as an American National Standard. This standard may contain outdated material or may have been superseded by another standard. Please contact the ANS Standards Administrator for details.

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

ANSI/ANS-6.1.1-1977 (N666)

ANSI/ANS-6.1.1-1977
(N666)

American National Standard Neutron and Gamma-Ray Flux-to-Dose-Rate Factors

Secretariat
American Nuclear Society

Prepared by the
American Nuclear Society
Standards Committee
Working Group ANS-6.1.1

Published by the
American Nuclear Society
555 North Kensington Avenue
LaGrange Park, Illinois 60525

Approved March 17, 1977
by the
American National Standards Institute, Inc.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

CAUTION NOTICE: This American National Standard may be reviewed or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this Standard no later than five years from the date of publication. Purchasers of this Standard may receive current information, including interpretation, on all standards published by the American Nuclear Society by calling or writing to the Society.

Published by

American Nuclear Society
555 North Kensington Avenue, LaGrange Park, Illinois 60525

Printed in the United States of America

Foreword

(This Foreword is not a part of American National Standard Neutron and Gamma-Ray Flux-to-Dose-Rate Factors, ANSI/ANS-6.1.1-1977)

The project scope of ANS-6.1, one of eight working groups which make up Subcommittee ANS-6 of the American Nuclear Society Standards Committee, is to provide or select reference cross sections and related nuclear data for use in radiation analysis and shielding computations. In April 1973, ANS-6.1 was assigned the task of writing a draft standard containing recommended data for converting neutron and gamma-ray fluxes to biological dose rates. Responsibility for writing the standard was assumed by the ANS-6.1.1 chairman. Initial drafts were submitted for comments to the ANS-6 chairman, the members of ANS-6.1.1, and researchers in this field outside the subcommittee. The membership of Working Group ANS-6.1.1 is as follows:

M. E. Battat, Chairman, *Los Alamos Scientific Laboratory*
D. E. Bartine, *Oak Ridge National Laboratory*
D. R. Harris, *Los Alamos Scientific Laboratory*
J. H. Hubbell, *National Bureau of Standards*
R. W. Roussin, *Oak Ridge National Laboratory*

Following approval by ANS-6.1.1, the first draft of N666 was submitted for balloting to the ANS-6 subcommittee chairman and working group chairmen. Final resolution of comments received and the one negative ballot cast was achieved in May 1975 and the document was prepared for transmittal to American National Standards Committee N17.

Because of the increasing concern for the effects of nuclear radiation exposure, it has become important to specify standard methods and data used to estimate the magnitude of radiation fields in nuclear facilities. The usual analytic procedure in estimating the radiation attenuation of shields or other geometric configurations is to compute the scalar flux density as a function of energy at selected locations and to integrate this spectrum, multiplied by flux-to-dose-rate conversion functions, over energy. Since several conversion functions have been in common use, the working group has chosen specific functions for neutrons and gamma rays to serve as a standard.

The chosen neutron response functions are those most recently recommended by the National Council on Radiation Protection and Measurement (NCRP). The gamma-ray functions are taken from similar work. The assumption is made that the important parameter is the maximum dose rate in tissue irradiated by a beam having normal incidence. This assumption gives results which are conservative for assumed whole-body exposures, since other angular distributions result in lower maximum values.

The membership of Subcommittee ANS-6, Radiation Protection and Shielding, at the time the draft standard was approved for submission to N17 was:

D. K. Trubey, Chairman, *Oak Ridge National Laboratory*
M. E. Battat, *Los Alamos Scientific Laboratory*
G. G. Biro, *Gibbs and Hill, Inc.*
B. A. Engholm, *General Atomic Company*
H. E. Hungerford, *Purdue University*
P. J. Persiani, *Argonne National Laboratory*
G. L. Simmons, *Science Applications, Inc.*
E. A. Warman, *Stone and Webster Engineering Corporation*

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:

W. L. Whittemore, Chairman
R. S. Carter, Secretary

Organization Represented	*Name of Representative*
American College of Radiology	Michel M. TerPogossian
American Institute of Chemical Engineers	Richard Duffy
American Nuclear Society	W. L. Whittemore
American Physical Society	W. W. Havens, Jr.
	Herbert Goldstein (Alt)
American Public Health Association	Charles G. Amato
	William A. Holt (Alt)
American Society of Mechanical Engineers	Roy A. Axford
American Society of Radiologic Technologists	John H. Tolan
Health Physics Society	Charles A. Willis
Institute of Electrical & Electronics Engineers	H. A. Thomas
National Bureau of Standards	R. S. Carter
	Tawfik M. Raby (Alt)
National Council on Radiation Protection & Measurement	Arthur B. Chilton
U.S. Nuclear Regulatory Commission	Karl R. Goller
	Robert J. Schemel (Alt)
U.S. Energy Research & Development Administration	Phillip B. Hemmig
	John W. Lewellen (Alt)
Individual Members	J. E. Olhoeft
	Alfred M. Perry
	E. A. Warman

Contents