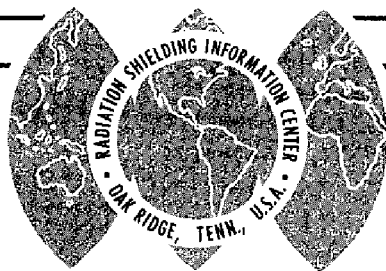


# RSIC Newsletter



RADIATION SHIELDING INFORMATION CENTER

## OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ATOMIC ENERGY COMMISSION

POST OFFICE BOX X •  
OAK RIDGE, TENNESSEE 37831

No. 88

March 1972

*To be fond of learning  
is to be at the gate of knowledge  
....Chinese Proverb*

*D. K. Trubey New Chairman  
of ANS Shielding Standards Subcommittee*

D. K. (Dave) Trubey, RSIC staff member, has recently succeeded Norman M. Schaeffer, Radiation Research Associates, as chairman of the American Nuclear Society (ANS) Standards Subcommittee ANS-6, Shielding. The shielding subcommittee is part of Section 3 which also has a new chairman, W. E. (Bill) Kreger of Physics International. The former chairman was J. E. (Jim) McLaughlin of the AEC Health and Safety Laboratory.

The shielding subcommittee, sponsored by the ANS Shielding and Dosimetry Division and created in 1964 with P. S. (Phil) Mittelman as chairman, has delegated work to working groups on cross sections, benchmark problems, shield performance evaluation, shield materials, and nomenclature. A standard entitled "Program for Testing Biological Shielding in Nuclear Reactor Plants," by H. C. Claiborne et al., has been completed. This document, ANS-6.3, received a favorable ballot by American National Standards Institute (ANSI) Committee N18 in December. Other activities of ANS-6 are summarized in the report by H. C. Claiborne, D. J. Dudziak, and N. M. Schaeffer, "Activities of the ANS-6 Subcommittee on Radiation Shielding Standards," ORNL-TM-3251 (December 1970).

The ANS-6 chairman solicits volunteers to contribute to the efforts of the various working groups. He also would like to receive suggestions which can be used to further the work in the area of shielding standards.

*Standards Subcommittee ANS-10,  
Mathematics and Computation,  
Met at ORNL*

The American Nuclear Society Standards Subcommittee ANS-10, Mathematics and Computation, D. R. (Dave) Vondy, Chairman, met at ORNL February 28-29 to work on the revision of their ANS Std. 2-1967, "A Code of Good Practices for

the Documentation of Digital Computer Programs." The draft standard ANS-10.2 (ANS Std. 3-1971), "Recommended Programming Practices to Facilitate the Interchange of Digital Computer Programs," has been submitted to the American National Standards Institute. Betty Maskewitz of RSIC is a member of ANS-10.

*Concrete Radiation Shield Standard  
Published for Trial Use*

A draft standard, "Concrete Radiation Shields," ANS 11.13, has been published by the American Nuclear Society for trial use and comment. The trial period ends May 30, 1972 for revision and approval as an American National Standard. Copies may be obtained from the American Nuclear Society, 244 E. Ogden Ave., Hinsdale, Ill. 60521. Suggestions for revision should be directed to H. G. Duggan, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tenn. 37830.

*ENDF/B Version III  
Neutron Cross Section Data  
Now Available*

The National Neutron Cross Section Center (NNCSC) has made available revised and extended cross section data known as ENDF/B III. This version of the library has included gamma-ray production data for some of the elements important for shielding problems. The contents of the tapes are listed in Table I. (See page 3.)

Requests for data from the U.S. and Canada should be addressed to the National Neutron Cross Section Center, Brookhaven National Laboratory Upton, N. Y. 11973. Requests from the O.E.C.D. countries should be addressed to the Centre ENEA de Compilation de Donnees Neutroniques (CCDN), B. P. 9, 91-Gif-sur-Yvette, France.

*ADDITIONS TO THE COMPUTER CODES COLLECTION*

- |                 |  |
|-----------------|--|
| CCC-173/ZEBRA 1 | Monte Carlo Electron Transport Code, contributed by Harry Diamond Laboratories (U.S. Army), Washington, D.C. Reference: HDL-TR-1536. FORTRAN IV; IBM 360/75/91.  |
| CCC-174/RACER   | Calculation of Potential External Dose from Airborne Fission Products Following Postulated Reactor Accidents, contributed by Battelle Pacific Northwest Laboratories, Richland, Washington. Reference: BNWL-B-69 FORTRAN V, UNIVAC 1108. |

TABLE I. ENDF/B-III Tape Contents

TAPE NO.	MAT NO.	MATERIAL	TAPE NO.	MAT NO.	MATERIAL
301	1088	He	306	1026	Xe-135
	1115	Li-6		1027	Sm-149
	1116	Li-7		1028	Eu-151
	1120	H-2		1029	Eu-153
	1133	N-14*		1031	Dy-164
	1134	O-16*		1032	Lu-175
	1146	He-3		1033	Lu-176
	1148	H-1*		1042	U-233 (RSFP)
	1154	Be-9*		1045	U-235 (RSFP)
	1155	B-10		1052	Pu-239 (RSFP)
	1160	B-11		1066	U-233 (SSFP)
	1165	C-12		1067	U-233 (NSFP)
				1068	U-235 (SSFP)
302	1014	Mg	308	1069	U-235 (NSFP)
	1135	Al-27*		1070	Pu-239 (SSFP)
	1149	Cl*		1071	Pu-239 (NSFP)
	1151	Si*		1138	Ag-107
	1156	Na-23*		1139	Ag-109
303	1017	V		1141	Cs-133
	1019	Mn-55	308	1043	U-234
	1085	Cu-63		1050	Pu-238
	1086	Cu-65		1056	Am-241
	1087	Cu		1057	Am-243
	1118	Co-59		1105	Pu-240
	1150	K*		1106	Pu-241
	1152	Ca*		1110	U-233
304	1121	Cr		1117	Th-232
	1123	Ni		1119	Pa-233
	1124	Fe*		1157	U-235
305	1030	Gd		1158	U-238
	1060	W-182		1159	Pu-239
	1061	W-183		1161	Pu-242
	1062	W-184		1162	Cm-244
	1063	W-186			
	1083	Re-185			
	1084	Re-187			
	1111	Mo			
	1126	Ta-181			
	1127	Ta-182			
	1136	Pb*			
	1164	Nb			
	1166	Au-197			

RSFP = Rapidly Saturating Fission Products  
SSFP = Slowly Saturating Fission Products  
NSFP = Non-Saturating Fission Products

\*Contains gamma-ray production data.

TABLE I. (continued)

<u>TAPE NO.</u>	<u>MAT NO.</u>	<u>MATERIAL</u>	<u>TAPE NO.</u>	<u>MAT NO.</u>	<u>MATERIAL</u>
307*	1201	Kr-83	307	1229	Cs-135
	1202	Zr-95	(cont.)	1230	Cs-137
	1203	Nb-95		1231	La-139
	1204	Mo-95		1232	Ce-141
	1205	Mo-97		1233	Pr-141
	1206	Mo-98		1234	Pr-143
	1207	Mo-99		1235	Nd-143
	1208	Mo-100		1236	Nd-145
	1210	Ru-101		1237	Nd-147
	1211	Ru-102		1238	Pm-147
	1212	Ru-103		1239	Pm-148
	1213	Ru-104		1240	Pm-149
	1214	Ru-105		1241	Pm-151
	1215	Ru-106		1242	Sm-147
	1217	Rh-105		1243	Sm-148
	1218	Pd-105		1244	Sm-150
	1219	Pd-106		1245	Sm-151
	1220	Pd-107		1246	Sm-152
	1221	Pd-109		1247	Sm-153
	1223	Cd-113		1248	Eu-154
	1224	I-131		1249	Eu-155
	1225	I-135		1250	Eu-156
	1226	Xe-131		1251	Eu-157
	1227	Xe-133		1252	Gd-155
				1253	Gd-157
				1254	Pm-148m

\*Evaluations for Fission Product Data

PSR-38/PHROG      Generator of Fast Neutron Spectra and Average Multigroup Constants, contributed by Idaho Nuclear Corporation, Idaho Falls, Idaho. Reference: IN-1435 (April 1971). .FORTRAN IV, IBM 360.

#### UPDATE FOR PSR-35

Program EDITOR has been updated to accommodate the recently released ENDF/B-III data. Programming was added to process the number of prompt neutrons per fission (ENDF/B File 1, MT=456) and the LR flag in ENDF/B File 3. Due to the implementation of the revised formats for radioactive decay data (MT=453) and fission product yield data (MT=454), the updated version of EDITOR will not process ENDF/B-II File 1 data in some cases. The revised subroutines needed to process ENDF/B-III will not significantly alter the core size required to execute the program.

#### PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON NATURAL AND MANMADE RADIATION IN SPACE RECENTLY ISSUED

PROCEEDINGS OF THE NATIONAL SYMPOSIUM ON NATURAL AND MANMADE RADIATION IN SPACE. E. A. Warman, editor, NASA TM X-2440, is now available from the National Technical Information Service, Department of Commerce, Springfield, Va. 22151, for \$10.00. The document contains the manuscripts of 140 technical papers delivered in 24 separate sessions of the National Symposium on Natural and Manmade Radiation in Space, which was held in Las Vegas, Nevada, in March, 1971. These proceedings reflect an interdisciplinary topical theme concentrating on most aspects of radiation in space. A strong radiobiological representation is included in addition to discussions of radiation transport, detection and shielding. The bases for analytical predictions of naturally occurring space radiation are explored, along with some reports of space radiation measurements. The radiation aspects of space nuclear power and space nuclear propulsion systems are reviewed.

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*We have been informed by L. W. Bower of the death of Victor J. Bell, head of the ENEA Computer Programme Library, in an accident in Italy. Victor was one of the founders of the ENEA Computer Programme Library. He left there to head the ENEA Neutron Data Compilation Centre at Gif-sur-Yvette, France, and returned about two years ago to Ispra, Italy, to head the Library. He has made many visits to RSIC on matters of mutual concern. He will be missed by his many friends and colleagues.*

#### PERSONAL ITEMS

*Olavi Vajaavuori*, formerly of Otaniemi, Finland, is now employed by the TVO Power Company at Niitykumpu, Finland.

We welcome *Edward Oblow* to the Neutron Physics Division of ORNL. Dr. Oblow comes to us from Columbia University where he was associated with Prof. Herbert Goldstein.

*Jean Rastoin* has transferred from Fontenay-aux-Roses to Saclay where he is employed by the Service des Etudes Micaniques et Theoriques of CEN.

*Siegfried Gerstl* has accepted an assignment in the Applied Physics Division of Argonne National Laboratory, where he will be involved in LMFBR shielding development and improvement of 2-D transport methods.

*Milo Solomito* has accepted the position of Radiation Physicist in the Radiology Department of the Methodist Hospital in Memphis, Tenn. He will be very much involved in nuclear medicine.

#### VISITORS TO RSIC

Visitors to RSIC during the month of February were: Paul Blakely, Nuclear Safety Information Center, Bobbie Neal Collier and Carol Cen, Ecological Sciences Information Center, Don Steiner, Thermonuclear Div., all of ORNL; F. Cautz, D. Simpson, E. Tomlinson, D. Wilson, University of Tennessee, Knoxville; A. M. Craig, AEC Technical Information Center, Oak Ridge, Tenn.; R. W. Enz and W. J. Summa, Air Force Weapons Laboratory, Kirtland AFB, New Mexico; R. O. Green, J. G. Jones, and S. L. Yount, Union Carbide Nuclear Div. Computing Technology Center, Oak Ridge; R. W. Green, Gulf General Atomic, San Diego, Calif.; W. H. Harless, Jr., and B. A. Hutchins, General Electric Co., Sunnyvale, Calif.; R. C. Paquette, Westinghouse Advanced Reactors Division, Madison, Pa.; H. A. Rose, FDA, Washington, D. C.; M. Rosenstein, Bureau of Radiological Health, Rockville, Md.; G. L. Simmons, National Bureau of Standards, Washington, D. C.; J. K. Sherrod, S. Leftwich, J. Norman, M. Thomas, C. Kelly, J. Malcolm, L. L. Shoun, D. Olsen, H. E. Bivins, J. A. Mintor, L. O. Moré, J. D. Archibald, A. Mitchell, E. A. McCully, K. L. Crutchfield, Library School for Information Science, University of Tennessee, Knoxville; and N. H. Barth, General Electric, M. K. Butler, Argonne National Laboratory, J. W. Gratteau, Gulf General Atomic, R. C. Liikala, Brookhaven National Laboratory, H. E. P. Krug, Jr. Control Data Corp., N. H. Marshall, Aerojet Nuclear Corporation, J. E. Olhoeft, Westinghouse Nuclear Energy Systems, G. R. Poetschat, Babcock & Wilcox, members of the ANS-10 Standards Subcommittee.

## FEBRUARY ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22151.

RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies are available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

Special bibliographies and selected computer-printed abstracts of the literature in the RSIC system are available upon request. The Selective Dissemination of Information (SDI) Service is available by submitting a list of subject categories defining the recipient's interests.

## REACTOR AND WEAPONS SHIELDING

AEROSPACE REPORT NO. TOR-0172(S2320-01)-2, Vol. 1      July 12, 1971

Neutron and Gamma-Ray Environments for Point Neutron Sources in an Air-Over-Ground Geometry. Vol. I.  
Prepared by R. L. Beck and W. W. Brown  
Avail.: San Bernardino Operations, The Aerospace Corp., San Bernardino, Calif.

AEROSPACE REPORT NO. TOR-0172(S2320-01-2)-2, Vol. II      July 12, 1971

Neutron and Gamma-Ray Environments for Point Neutron Sources in an Air-Over-Ground Geometry. Vol. II  
Prepared by R. L. Beck and W. W. Brown  
Avail.: San Bernardino Operations, The Aerospace Corporation, San Bernardino, Calif.

AERE-PR/HPM-15

May 1971

Health Physics and Medical Division Progress Report, January - December 1970  
J. E. Johnston (ed.)  
Avail.: NTIS

ASTM C637-69T

1969

Tentative Specification for Aggregates for Radiation-Shielding Concrete  
ASTM  
Avail.: American Society for Testing and Materials, Philadelphia, Pa.

ASTM C638-69T

1969

Tentative Descriptive Nomenclature of Constituents of Aggregates for  
Radiation-Shielding Concrete  
American Society for Testing and Materials  
Avail.: ASTM, Philadelphia, Pa.

BS 4513 1969

1969

Specification for Lead Bricks for Radiation Shielding  
British Standards Institution, London  
Avail.: American National Standards Institute, New York, N.Y.

CEA-CONF-1755 (CONF-710302-12; N71-37248)

March 1971

Research of a Biasing System for the Calculation of the Deep  
Penetration of Neutrons by a Monte Carlo Method  
J. M. Lanore  
Avail.: Dep.

CN-28/K-12 (CONF-710607-135; N72-10547)

June 17, 1971

Neutronic and Thermal Design Aspects of Thermonuclear Fusion Reactor  
Blankets  
H. Borgwaldt, W. H. Koehler, K. E. Schroeter  
Avail.: Dep.

CONF-701002, pp. 437-51

October 1970

Microscopic Fission-Neutron-Spectra Measurements  
T. Wiedling  
From Symposium on Neutron Standards and Flux Normalization, Argonne,  
Ill.

CONF-710301 (Vol. 1), pp. 98-105

August 1971

Integral Test of Inelastic Scattering Cross Sections Using Measured  
Neutron Spectra from Thick Shells of Ta, W, Mo, and Be.  
D. F. Shook, D. Fieno, C. H. Ford, R. L. Alexander  
Avail.: Dep.; NTIS

CONF-710302 (Vol. 2), pp. 557-607

March 1971

Elimination of Ray Effects by Converting Discrete Ordinate Equations  
to Spherical Harmonic-Like Equations  
K. D. Lathrop  
Avail.: Dep.; NTIS

CONF-710302 (Vol. 2), pp. 617-24

March 1971

Arrangement of Ordinates in Deep-Penetration Cylindrical and X-Y  $S_n$   
Calculations.  
E. M. Gelbard  
Avail.: Dep.; NTIS



CONF-710302 (Vol. 2), 771-81

March 1971

Machine Generation of Monte Carlo Sampling Functions  
H. A. Steinberg, E. S. Troubetzkoy, M. H. Kalos  
Avail.: Dep.; NTIS

CONF-710302 (Vol. 2), 794-7

March 1971

Non-Linear Monte Carlo  
J. Brooks, M. H. Kalos, H. A. Steinberg, E. S. Troubetzkoy  
Avail.: Dep.; NTIS

CONF-710302 (Vol. 2), 803-32

March 1971

Some Applications of the Monte Carlo Method at the EURATOM Research  
Center, Ispra  
W. Matthes  
Avail.: Dep.; NTIS

CONF-710302 (Vol. 2), pp. 871-6

March 1971

Monte Carlo Sampling with Continuously Varying Cross Sections Along  
Flight Paths  
L. L. Carter, E. D. Cashwell, W. M. Taylor  
Avail.: Dep.; NTIS

THE PHYSICS PROBLEMS OF REACTOR SHIELDING

CONF-701208

December 1970

- (1) Today's Activities on Reactor Shielding Studies in Japan (pp. 55-71)  
S. Miyasaka, Y. Higashihara
- (2) The Science of Reactor Shielding - an End to Empiricism in the  
1970's? A Review of Contemporary United Kingdom Shielding  
Techniques with an Indication of Future Trends (pp. 109-141)  
J. Butler
- (3) Reactor Shielding in Switzerland (pp. 143-155)  
V. Herrnberger, J. Ligou
- (4) Work on Radiation Transport in India (pp. 157-165)  
D. V. Gopinath

Avail.: OECD Publications Center, Suite 1207  
1705 Penn. Ave., NW, Washington, D.C. 20006 (\$5.00)

CONF-710315-11

1971

Role of the National Laboratories in the RDT Standards Program  
W. J. Hallett  
Avail.: NTIS

EGG-1183-1479

April 17, 1970

Coherent and Incoherent X-Ray Scattering Factors for Three- and Four-  
Electron Atoms  
R. T. Brown  
Avail.: Dep.; NTIS

HEDL-TME-71-153  
(ENDF-164)

October 1971

FTR Set 300, Multigroup Cross Sections for FTR Design  
R. E. Schenter, R. B. Kidman, J. V. Nelson  
Avail.: Dep.; NTIS

ICRU-20

October 1971

Radiation Protection Instrumentation and Its Application  
International Commission on Radiation Units and Measurements  
Avail.: ICRU, Washington, D. C., \$3.50 (60 p.)

INDC(CCP)16/L

July 1971

Collection of USSR Reports on Nuclear Data Topics  
Compiled by the IAEA  
(IAEA Nuclear Data Section, Karntner Ring 11, A-1010, Vienna)

IRI-183-71-6

1970

Gamma Rays from Isotopes Produced by (n,gamma)-Reactions  
M. de Bruin, P. J. M. Korthoven  
Avail.: Dep.; NTIS (U.S. Sales only)

JUL-794-PC (In German)

September 1971

Shielding of the Fast Neutrons from Neutron Generators  
P. F. Sauermann  
Avail.: Dep.; NTIS (U.S. Sales only)

KFK-1445

July 1971

Numerical Solution of the Three Dimensional Neutron Transport Equation  
W. Kinnebrock  
Avail.: Dep.; NTIS (U.S. Sales only)

KFKI-71-55

1971

Prompt Fission Neutron Spectra  
Gy. Kluge  
Avail.: Dep.; NTIS (U.S. Sales only)

LA-DC-13268 (CONF-711125-4)

1971

Two Dimensional Air Transport from a Point, Anisotropic Source  
K. D. Lathrop  
Avail.: Dep.; NTIS

LB/G-3007 (CONF-691060-23, IAE-1912, N72-10554)

April 1970

Determination of Neutron Fluxes in the MR Reactor Loops and  
Materials-Testing Channels  
V. I. Vikhrov, A. V. Borodin, V. N. Perevezentsev  
Avail.: Dep.

LBL-379 (CONF-711119-5)

October 1971

Absorbed Dose: An Unfortunate "Red Herring" in Radiation Protection  
A. Rindi, R. H. Thomas  
Avail.: Dep.; NTIS

MR-7013 (DASA-2583, AD-716453)

December 1970

Automatic Computation of Importance Sampling Functions for Monte  
Carlo Transport Codes: Phase II. Final Report  
H. A. Steinberg, M. H. Kalos, E. Troubetzkoy  
(Mathematical Applications Group, Inc., White Plains, N. Y.)

NOLTR-70-222 (AD-722012)

November 1, 1971

Some Calculations of the Transmission of Gamma Radiation Through  
Homogeneous Slabs. Final Report.  
C. M. Huddleston  
Avail.: NTIS

NOLTR-71-154 (AD-732375)

September 2, 1971

Exposure Rates from Experimentally Fractionated Fission Products  
L. R. Bunney, D. Sam  
Avail.: NTIS

ORNL-4741

February 1972

A Study of the Effect of Source Asymmetry on Time-Dependent Neutron  
and Secondary Gamma-Ray Transport in Air  
B. J. McGregor, E. A. Straker  
Avail.: NTIS

ORNL-TM-3396

February 1972

Nuclear Weapons Free-Field Environment Recommended for Initial  
Radiation Shielding Calculations  
J. A. Auxier, Z. G. Burson, R. L. French, F. F. Haywood, L. G.  
Mooney, E. A. Straker

ORNL-TM-3482

February 1972

The Testing of  $^{238}\text{U}$  Secondary Gamma-Ray Production Data Sets from  
the POPOP4 Library

W. E. Ford, III, J. S. Gillen

ORNL-TM-3553

September 1971

Convergence of the Discrete Ordinates Method for Anisotropically  
Scattering Multiplying Particles in a Subcritical Slab

P. Nelson, Jr.

Avail.: Dep.; NTIS

ORNL-RSIC-5 (Vol. 3)

August 1971

Bibliography, Subject Index, and Author Index of the Literature  
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J. Gurney, A. B. Gustin (eds.)

Avail.: NTIS

RISO-M-1437

October 1971

RESOREX: A Procedure for Calculating Resonance Group Cross-  
Sections

H. Neltrup

Avail.: Dep.; NTIS (U.S.Sales only)

SCL-RR-710232

September 1971

Ray Tracing and Geometrical Probability

J. F. Schipper

Avail.: NTIS

S/N 1740-0319 (Item 37B)

Computers, Tools for the Advancement of Medicine

Issued by Superintendent of Documents, GPO, Washington, D.C. 20402

Avail.: Public Documents Distribution Center, 5801 Tabor Ave.,  
Philadelphia, Pa. 19120 (\$0.35)

STI/PUB-269, pp. 445-52

1971

Monitoring System for the Assessment of Reactor Shield Performance

J.R.A. Lakey, A. Martin

(In Advances in Physical and Biological Radiation Detectors)

Avail.: Vienna; International Atomic Energy Agency

UCI-34-P-126-X-3

November 1971

Gamma Transition Energies of the Major Fission Products Report No.  
1971-1

P. M. Grant, G. E. Miller, F. S. Rowland

Avail.: Dep.; NTIS

UCRL-51045

April 30, 1971

Cable Shielding from Photon Scattering for PINEX Experiments  
D. M. Buchia, T. L. Harper, J. K. Wobser  
Avail.: NTIS

ZJE-105

1971

Transport Correction of Higher Order and Removal Systems  
V. Valenta, O. Veverka, V. Krysl  
Skoda Works, Nuclear Power Construction Dept., Information Centre,  
Plzen, Czechoslovakia

*Aust. J. Phys.*, 24, 341-9 (June 1971)

General Formulation of the Transfer Equation. I. Anisotropic  
Scattering  
C. J. Cannon

*Eur. J. Cancer*, 7 (No. 2-3), 99-104 (May 1971) (CONF-700655, pp. 99-104)

Physical Characteristics of Fast Neutron Beams  
D. K. Bewley

*Eur. J. Cancer*, 7 (No. 2-3), 105-114 (May 1971) (CONF-700655, pp. 105-114)

Production and Shielding of 15 MeV Neutrons  
J. J. Broerse, A. C. Engels, J. S. Groen

*Eur. J. Cancer*, 7 (No. 2-3), 115-20 (May 1971) (CONF-700655, pp. 115-20)

Dosimetry in Neutron Radiotherapy  
H. H. Rossi

*Eur. J. Cancer*, 7 (No. 2-3) 121-7 (May 1971) (CONF-700655, pp. 121-7)

Collimation of 14 MeV Neutron Beams  
D. Greene, D. Major

*Eur. J. Cancer*, 7 (No. 2-3) pp. 129-34 (May 1971) (CONF-700655, pp. 129-34)

Radiotherapeutic Requirements of 14 MeV Fast Neutron Beams with  
Respect to Depth-Dose and Collimation  
W. Duncan, D. Greene, D. Major

*Health Phys.*, 21(1), 97-104 (July 1971)

Dosimetric Field Quantities in Health Physics  
J. Neufeld

*Health Phys.*, 21(1), 120-3 (July 1971)

Neutron Spectra and the Resulting Fluence-Kerma Conversions for  
 $^{241}\text{Am-Li}(\alpha, n)$  and  $^{210}\text{Po-Li}(\alpha, n)$  Sources  
K. W. Geiger, L. Van Der Zwan

*Health Phys.*, 21(2), 253-72 (Aug. 1971)

Absorbed Dose, Dose Equivalent, and LET Distributions in Cylindrical  
Phantoms Irradiated by a Collimated Beam of Monoenergetic Neutrons  
T. D. Jones, W. S. Snyder, J. A. Auxier

*Health Phys.*, 21(4), 609-10 (Oct. 1971)

Radiation Quantities in Health Physics  
B. M. Wheatley

*High Temp. R., USSR*, 9(1), 23-26 (1971)

TAU-EF Method in Theory of Radiation Transport  
A. P. Napartovich

*Indian J. Phys.*, 44(1), 68-70 (Jan. 1970)

Effective Atomic Numbers for Scattering Processes of Gamma Rays  
in Alloys  
M. S. Murty, M. N. Seetaramanath, J. Rama Rao, K. Parthasaradhi

*Indian J. Pure Appl. Phys.*, 6(10), 574-5 (Oct. 1968)

Effective Atomic Numbers in Compounds  
K. Parthasaradhi

*J. Appl. Chem. USSR (Eng. Transl.)*, 43(12), 2777-80 (Dec. 1970)

Effect of Ionizing Radiation on Cements  
Yu. S. Cherkinskii, A. T. Koroleva, I. V. J. Vereshchinskii

*J. Nucl. Med., Suppl.*, 12(4), 5-32 (March 1970)

Radionuclide Decay Schemes and Nuclear Parameters for Use in Radiation-  
Dose Estimation. Part 2  
L. T. Dillman

*J. Phys. (Paris)*, 32 (5-6), 413-414 (May 1971)

Incoherent Photon Scattering by Bound Electrons  
O. Pingot

*J. Quant. Spectrosc. Radiative Transfer* 11(6), 921-48 (June 1971)

Properties of New Numerical Approximations to the Transport Equation  
K. D. Lathrop, B. G. Carlson

*J. Quant. Spectrosc. Radiative Transfer*, 11(6), 949-62 (June 1971)

Numerical Solution of the Unsteady Radiation-Transfer Equation  
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