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. 65 April 1970

Common sense in an uncommon degree
is what the world calls wisdom.

--Samuel Taylor Coleridge

RSIC CODE COLLECTION REVIEWED IN

Nuclear Engineering and Design

The article *"Computer Codes for Shielding Calculation - 1969," Nucl. Eng. Des.* 10, 505-517 (1969) by D. K. Trubey and Betty F. Maskewitz, has recently been published. The article lists the code packages CCC-61 to CCC-115 (plus selected earlier ones) and gives a brief description of each. Reprints of the article are available from RSIC upon request.

NEW RSIC REPORT ON ELECTRON PENETRATION

The report *"Comparisons of the Results Obtained with Several Electron-Penetration Codes,"* ORNL-RSIC-28 (March 1970) by W. Wayne Scott, has been issued.

Comparisons are given of the results obtained for several similar hypothetical problems using electron-penetration codes available from the Radiation Shielding Information Center. These codes determine the tissue surface dose as a function of shield thickness. Transmitted electron spectra from those codes which provide such spectra are also compared. Significant differences between the results given by the various codes are found.

Copies of ORNL-RSIC-28 are available from RSIC or from CFSTI.

NATIONAL NEUTRON CROSS SECTION CENTER

NOW ISSUES NNCSC NEWSLETTER

The first issue of the NNCSC Newsletter from the National Neutron Cross Section Center, Brookhaven National Laboratory, Upton, New York 11973, is now available. The Newsletter, to be issued once each two months, is intended

to describe additions to the data files and publications of NNCSC. It will also include items of general interest to those who measure, evaluate, and use nuclear cross section data. The first issue lists CSISRS experimental data input for the period Jan. - Feb. 1970.

Persons desiring to receive the NNCSC Newsletter should write to the above address.

NEW AIP NEWSLETTER AVAILABLE

The *AMERICAN INSTITUTE OF PHYSICS* is now publishing quarterly the *AIP Information and Publication Newsletter* to report developments of interest to those in the field. The first issue was dated March 1970. Requests for the Newsletter should be forwarded to K. D. Carroll, Editor, *AIP Information and Publication Newsletter*, Information Division, 335 East 45 Street, New York, N. Y. 10017.

ADDITIONS TO CODE PACKAGES CCC-82D/ANISN AND CCC-89D/DOT

A contribution from the Experiment Analysis Group, Nuclear Radiation and Design Department of Westinghouse Astronuclear Laboratory has been added to the CDC 6600 versions of ANISN and DOT code packages, CCC-82D and CCC-89D respectively. DOQ, Discrete Ordinates Quadrature (symmetric set), and ADOQ (asymmetric set), may be used to calculate discrete ordinates quadrature coefficients (direction cosines and weights) given the point coordinates and symmetry conditions. The codes are written in variable dimension FORTRAN IV. Dynamic core data storage programming allows the user to allocate the amount of core data storage at execution time, eliminating the necessity for recompilation for different size problems. DOQ was originally developed as SNAFU by R. G. Rogers, F. R. Mynatt, and W. W. Engle, Jr., at Computing Technology Center, Union Carbide Nuclear Division, and subsequently modified by R. K. Disney, S. L. Zeigler, and R. G. Soltesz at Westinghouse Astronuclear Laboratory.

GAMLEG-W has also been added to the packages. GAMLEG, gamma-ray transfer cross sections by Legendre expansion of the Klein Nishina equation, was originally reported by K. D. Lathrop, Los Alamos Scientific Laboratory (LA-3267), has been modified by R. K. Disney, R. G. Soltesz, and S. L. Zeigler of WANL. GAMLEG-W is used to produce photon transport cross sections for use in the WANL versions of ANISN and DOT. A data library is included in the package. GAMLEG is written in FORTRAN IV.

These three auxiliary routines may be requested separately for those using other versions of ANISN and DOT than that packaged for the CDC 6600, D version. A reel of tape is required for transmittal and information as to how it should be written.

NEW VERSION OF ACT-II

A FORTRAN IV version of the activation gamma-ray source strength code ACT II has been contributed to the RSIC computer code collection by Bechtel Corporation, Vernon Branch, Los Angeles, California. Operable on the GE-635, this version should be compatible with other FORTRAN IV compilers. The code is described in ORNL-RSIC-13, Volume I, as CCC-27/ ACT II. The new addition may be requested as CCC-27B. A reel of magnetic tape is required for transmittal with information as to how it should be written.

CCC-55B/ISOGEN II RADIOISOTOPE GENERATOR CODE

Contributed by
Dow Chemical Company, Rocky Flats Division, Golden, Colorado

ISOGEN II is a modification of ISOGEN (RSIC Abstract CCC-55) to remove procedures about reactor operations, leaving procedures for calculating the concentrations of radioactive decay products. The list of nuclides was expanded to more than 300, ranging from atomic numbers 81 through 102. A time sequence was added. The code is written in FORTRAN IV and is operable on the IBM 360. References: RFP-1098, HW-83785. The code package may be transmitted on one reel of magnetic tape.

ADDITION TO PSR-11/POPOP 4 PACKAGE

The POPOP-4 program receives its cross section data input from a binary tape and the original package restricted its use to IBM 360 computer facilities. A FORTRAN IV routine has been written, POPOP 4 Library Tape Maker, which makes or updates either a BCD or a binary library tape of yield data sets for use with POPOP 4.

The POPOP-4 program is used for converting gamma-ray yields from neutron reactions to secondary gamma-ray production cross sections in energy groups. This code and the above data handling codes were contributed to the Center by the Computing Technology Center, Union Carbide Nuclear Division, Oak Ridge, Tennessee. The codes are described in CTC-12 and in CTC-20, Appendix E (to be published).

New MULTIGROUP CROSS-SECTION LIBRARY AVAILABLE FROM RSIC

The DLC-11/RITTS cross-section library, in the ANISN-DOT-MORSE format is now available from RSIC. The library contains:

1. 121-group, P_3, coupled (100 neutron, 21 gamma-ray groups) microscopic cross-sections for the 11 elements, H, C, O, N, Na, Mg, P, S, Cl, K, and Ca. Also included, 121-group fluence-to-kerma conversion factors for the 11 elements.

2. 100-group, P_3, neutron microscopic cross sections for the above 11 elements.

3. 121-group, P_3, coupled, macroscopic cross sections for 11-element standard man, 4-element standard man, skin, bone, tissue, brain, lung, red marrow, and muscle.

The 100 neutron energy groups cover the range from 14.92 MeV to thermal and the 21 gamma-ray groups cover the range from 14 to 0.01 MeV.

These data were compiled by J. J. Ritts* for use in depth-dose calculations in antropomorphic phantoms. The data are further described in "The Calculation of Doses in Human Tissue," MS Thesis, University of Tennessee, Knoxville (March 1970) and in *Nucl. App. Tech.* 7(1), 89-99 (1969).

Documentation for the data and a retrieval program are included in the DLC-11 package.

The retrieval program is called JRMACRO and can also be used to read microscopic, multigroup, P_n expansion cross-section data, "mix" these data into macroscopic cross-section data as needed, and write the resulting set in a suitable output format.

Requests for DLC-11 should be accompanied by the required number of full 2400 ft. reels of magnetic tape as specified below:

If 7-track, 556 bpi:
(a) 1 tape for the 121-group coupled microscopic data for 11 elements and the JRMACRO program and sample input and output
(b) 1 tape for the 121-group coupled macroscopic data for 11-element standard man, 4-element standard man, skin, bone, and tissue
(c) 1 tape for the 121-group coupled microscopic data for brain, lung, red marrow, and muscle.

If 9-track, 800 bpi:
1 tape for entire library and retrieval program.

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*Present address: Westinghouse Electric Corporation, Advanced Reactors Division, Waltz Mill Site, Madison, Pennsylvania 15663

NOTICE TO ANISN-DOT-MORSE USERS

The JRMACRO retrieval program for DLC-11/RITTS (see item above) might be useful to ANISN-DOT-MORSE users. It can be used to "mix" cross sections (prepare macroscopic data for compounds or mixtures) before running a code like ANISN. From time-to-time some users, especially those with access to computers with smaller memory storage, have expressed a desire for this capability. JRMACRO accepts input cross sections by cards, tape written in card image format, unformatted (binary) tape, or a combination of the above. Output cross sections may be punched or written on an unformatted tape.

Requests for the DLC-11 retrieval program, JRMACRO, should be accompanied by a full 2400 ft. reel of magnetic tape. Please specify number of tracks and bit density desired.

PERSONAL ITEMS

J. Wallace Webster, formerly with RSIC, is now associated with Combustion Engineering at Windsor, Connecticut.

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David C. Irving, former ORNL Neutron Physics Division staff member, is now with Savannah River Laboratory, Aiken, South Carolina.

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We note with deep regret the death of T. V. Blosser. Bloss worked with the late E. P. Blizard in the early days of shielding research at ORNL and made measurements at all the ORNL shielding facilities. He made important measurements of the radiation in the shield of the ORNL graphite reactor (ORNL-2195) and on the nuclear ship Savannah (ORNL-3386). The latter measurements were made with the ORNL Mobile Radiation Measurement Laboratory (Nucleonics 21(2), 56 (Feb. 1963) which he developed. It was also used to measure radiation at four other reactor installations. His measurement of the fission neutron Fermi age in water essentially resolved the long-standing experiment-theory discrepancy.

Bloss possibly had no peer as a radiation detector inventor and was an expert in measuring neutrons by activation foils. He took great pride in the development of his boron-filter epithermal neutron spectrometer (ORNL-3973, Vol. I (1966) p. 60).

We will miss him.

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VISITORS TO RSIC

Visitors to RSIC during the month of March were: Major Richard W. Enz, DASA, Washington, D.C.; Ferenc Hajnal, U.S.A.E.C. Health and Safety Laboratory, New York, N.Y.; John J. Herbst, Nuclear Technology Corporation, White Plains, N. Y.; Ronald Horn, Con Edison, New York, N.Y.; J. D. Jenkins, Reactor Div., S. K. Penny, Mathematics Division, M. Saltmarsh, Electronuclear Div., and F. Kertesz, Information Centers Coordinator, all of ORNL; Johnny Rosen, European Nuclear Energy Agency, Paris, France; Maurice Wilkinson, The Boeing Co., Seattle, Wash.; R. Q. Wright, Computing Technology Center, Union Carbide Nuclear Division, Oak Ridge, Tenn.

MARCH ACCESSION LIST OF LITERATURE

The RSIC is now aware of the literature cited in the following list. This literature has either been obtained by RSIC or has been placed on order. When received, this material will be examined and assigned to various files if suitable for our information system. The accession list is divided into three fields (1) reactor and weapons shielding, (2) space and accelerator shielding, and (3) shielding computer codes. These titles are announced before processing and indexing so that there will be no delay and can serve as a prompt announcement of current literature.

RSIC is not a documentation center. Copies of the literature cited must generally be obtained from the author or from a documentation center such as the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

RSIC maintains a microfiche file of literature entered into its information system. Computer searches of this system (which produces a special bibliography) and duplicate microfiche copies of the literature in our file are available upon request. Naturally, we cannot supply copies of literature which is copyrighted (such as books or journal articles) or whose distribution is restricted. Neither service is available for the codes literature.

REACTOR AND WEAPONS SHIELDING

AEEW-R-482 August 1966

Diffusion of Water in Concrete
N. L. Hancox
Available: AEC Depository Libraries; CFSTI (U.S. Sales Only)

BNWL-1259 January 1970

Calculation of Gamma Dose Rates at the Surface of Plutonium Oxide Sources
H. H. Van Tuyl
January 1970
Available: AEC Depository Libraries; CFSTI

CEA-CONF-1427 (In French) (CONF-691008-16; SM-125/53)

Control of the Homogeneity of Shielding
J. Vertut, L. Papot
(From Symposium on Radiation Safety Problems in the Design and Operation of "Hot" Facilities, Saclay, France)
Available: AEC Depository Libraries; CFSTI

CONF-670649-15 (In Spanish) 1967

Utilization of Isotopes in Construction Problems. IV. Determination and Control of Radiation Leaks in Shielded Enclosures by the Use of Radioactive Isotopes
E. Dequidt, M. V. San Martin
(From Symposium on Applications of Radioisotopes, Madrid, Spain)
Available: AEC Depository Libraries

DEP-69-2 December 1969

Field Method for the Determination of Lead in Glass Used for Shielding Television Receiver Components
H. Levine, P. S. Ruggera
(Bureau of Radiological Health, Rockville, Md., Div. of Electronic Products)

EGG-1183-1449 August 21, 1969

Measured Low-Altitude Neutron and Gamma Dose Distributions Due to a 14-MeV Neutron Source
A. E. Fritsche, N. E. Lorimier, Z. G. Burson
Available: AEC Depository Libraries; CFSTI

JAERI-1176 (N70-12719) December 1968

Production of Group Constant for Reactor Analysis
Nuclear Data Committee
Available: CFSTI

LA-4325 October 24, 1969

Application of S_n Calculations to the Evaluation of a Shipping Container for Small Quantities of Fissile Radioactive Material
David R. Smith
Available: AEC Depository Libraries; CFSTI

NASA-TM-X-1956 February 1970

Check of a Three-Dimensional Reactor Shielding Code by Comparison with ML-1 Reactor Experiment
M. L. Wohl, R. D. Schamberger
Available: CFSTI

ORNL-NSIC-68 February 1970

Cask Designers Guide: A Guide for the Design, Fabrication, and Operation of Shipping Casks for Nuclear Applications
L. B. Shappert
Available: AEC Depository Libraries; CFSTI

ORNL-TM-2293 September 1969

Structural Analysis of the Brookhaven National Laboratory Portable Cesium Irradiator
J. H. Evans
Available: AEC Depository Library; CFSTI

ORNL-TM-2366 January 1970

Isotopes Kilowatt Program. Task I. Conceptual Design and Evaluation
R. A. Robinson
Available: AEC Depository Libraries; CFSTI

ORNL-TM-2851 February 1970

Cross-Section and Nuclear-Constant Data for Heavy Metal Nuclides (Fuels).
P. R. Kasten, C. W. Craven, Jr., R. Q. Wright
Available: CFSTI

ORNL-TR-2288 (*Radioprotection, 3, 265-91 (1968) in French*)

Resolution of the Transport Equation by the Method of Invariant Imbedding
A. Chapot

ORNL-TR-2289 (*Kernenergie, 12(10), 328-340 (1969) [In German]*)

Shielding Measurements in the Rheinsberg Nuclear Power Plant
W. Gerullis, U. E. Michaelis, J. Mertins

RD/B/M-1551 January 1970

Data for the Calculation of Gamma Radiation Spectra from Fission Products
B. S. J. Davies
Available: AEC Depository Libraries; CFSTI (U.S. Sales only)

RS-8132/189 May 1966

A Compilation of Mass Absorption Coefficients for 40 Elements
L. M. Dorety, V. M. Field
Available: AEC Depository Libraries; CFSTI

TUBIK-9 (In German) May 1968

Radiation Measurement Technique
U. Wesser, L. Metzger, H. W. Krenzer
Available: AEC Depository Libraries

WAPD-TM-691 December 1969

An Evaluation of the Neutron Reaction Cross Sections and Fission Spectrum of U-233 for ENDF/B
N. M. Steen
Available: CFSTI

WARD-3762-8 December 18, 1968

Radiation Analysis and Shielding Requirements. Low-Capacity Pump System Side Study
P. S. Bland, R. D. Burch, J. K. Martin
Available: AEC Depository Libraries; CFSTI

ACTA POLYTECH. SCAND. SER. CI, Vol. 60, p. 1-102 (1969)

Nuclear and Radiographic Methods for Study of Concrete
J. Bhargava

AUST. ELECTRON. ENG., 2, 28-29 (July 1969)

Radiation Shielding for the MRC High-Temperature Diffractometer Attachment
G. F. Taylor

HEALTH PHYS., 18, p. 87 (1970)

Radiation Protection Provided by Standard Passenger Buses
R. L. Summers, Z. G. Burson

J. COMP. PHYS., 3(1), 58-79 (August 1968)

On the Accuracy of Monte Carlo Solutions of the Non-Linear Boltzmann Equation
B. L. Hicks, M. A. Smith

NUCL. ENG. DESIGN, 10, 505-517 (1969)

Computer Codes for Shielding Calculations - 1969
D. K. Trubey, B. F. Maskewitz

NUCL. INSTR. METHODS, 74, 322-324 (1969)

Neutron Spectroscopy with a 3-He Proportional Counter
T. Fuse, T. Miura, A. Yamaji, T. Yoshimura

NUCL. Sci. Eng., 39(3), 296-310 (March 1970)

Coupled Sampling with the Monte Carlo Method in Neutron Transport Calculations
L. L. Carter, N. J. McCormick

NUCL. SCI. ENG., 39(3), 337-360 (March 1970)

An Analysis of the Neutron Capture Cross Section of 238-U Between 1 keV and 15 MeV
W. G. Davey

NUCL. SCI. ENG., 39(3), 398-400 (March 1970)

Outer Iteration Scaling in Neutron Transport Codes (Technical Note)
B. E. Clancy, I. J. Donnelly

PHYS. MED. BIOL. 14, 659-60 (Oct. 1969)

Relative Importance of Leakage and Scatter in Megavoltage Installation Design
A. C. McEwan

PHYS. REV., 175(5), 1978- (1968)

Exact Calculation of Pair Production
I. Overbo, K. J. Mork, H. A. Olsen

SOVIET J. AT. ENERGY (English Transl.) 25(3), 995- (Sept. 1968)

Differential Albedo of a Thin Beam of Fast Neutrons for a Semiinfinite Scatterer Consisting of Iron (Abstract)
L. Ya. Gudkova, V. G. Solotukhin, V. P. Mashkovich, A. I. Mis'kevich

SOVIET J. AT. ENERGY (English Transl.) 25(3), 996- (Sept. 1968)

Slowing Down of Neutrons from a Point Source in a Semiinfinite Medium (Abstract)
I. A. Kozachok, V. V. Kulik

SOVIET J. AT. ENERGY (English Transl. 25(3), 997- (Sept. 1968)

Universal Nomograms for Calculating Absorbed Doses from Plane Radiators (Abstract)
V. E. Drozdov, L. M. Suroegin, P. A. Orlenko, V. P. Tikhonov

SOVIET J. AT. ENERGY (English Transl.), 25(3), 1001- (Sept. 1968)

Back Scattering of Gamma-Radiation by Heterogeneous Barriers (Abstract)
D. B. Pozdneev

BOOK *1969*

TABLE OF SPECIFIC GAMMA RAY CONSTANTS
Dieter Nachtigall
EURATOM, Geel/Belgium

THESIS 1968

Experimental Determination of Photon Energy Distributions for 60-Co After Penetration of Thick Concrete Barriers.
Dale Edward Starchman
Kansas State University, Manhattan, Kansas

TID-21719, pp. 472-519 1966

Remote Handling of Mobile Nuclear Systems (Pages 472-519). Chapter 8. Radiation Effects
D. C. Layman, G. Thornton
Available: CFSTI

TID-21719, pp. 381-471 1966

Remote Handling of Mobile Nuclear Systems. (Pages 381-471.)Chapter 7. Shielding Calculations.
D. C. Layman, G. Thornton
Available: CFSTI

BOOK 1966

RADIATION DOSIMETRY. VOL. 2 - INSTRUMENTATION
F. H. Attix, W. C. Roesch (eds)
Academic Press $20.00 (462 pages)

BOOK 1969

RADIATION DOSIMETRY. VOL. 3 - SOURCES, FIELDS, MEASUREMENTS, AND APPLICATIONS
F. H. Attix, E. Tochlin (eds.)
2nd Edition, New York, Academic Press $37.00 (943 pages)

BOOK (*In Russian*) 1969

PROBLEMS IN THE PHYSICS OF REACTOR SHIELDING Vol. 4
D. L. Broder, A. P. Veselkin, Yu. A. Egorov, A. P. Suvorov, S. G. Tsypin
Atomizdat, Moscow

BOOK

THE ELEMENTS OF NEUTRON INTERACTION THEORY
A. Foderaro
The MIT Press $19.95
Massachusetts Institute of Technology, Cambridge, Mass. 02142

BOOK 1969

ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY. (Vol. 5)
E. J. Henley, J. Lewins (eds.)

Articles:

Methods and Data for Reactor Shield Calculations (pp. 95-183)
F. H. Clark

A Round-Off Free Solution of the Boltzmann Transport Equation in Slab Geometry (pp. 325-368)
L. Lois, J. Certaine

BOOK 1969

HANDBOOK OF RADIOACTIVE NUCLIDES
Y. Wang (ed.)
(1st Cleveland, Ohio, Chemical Rubber Co.)

SPACE AND ACCELERATOR SHIELDING

CONF-691101 (pp.) November 1969

A Solution to the Transverse Shielding Problem for High-Energy (>0.8 GeV) Electron and Proton Accelerators
K. O'Brien
(2nd International Conference on Accelerator Dosimetry and Experience, Stanford Linear Accelerator Center, November, 1969)
Available: CFSTI

NASA-CR-107571 (TR-955) 1969

An Experimental Investigation of Fluctuations and Correlations in Electromagnetic and Nuclear Showers Developing in Lead
J. J. Brecht
(Thesis, Maryland University, College Park, Md.)
Available: CFSTI as N70-15166)

NASA-TM-X-53954 August 22, 1969

Electron Bremsstrahlung Shielding at Synchronous Altitude by Electron Trapping in Dielectrics
D. L. Hollis
Available: CFSTI as N70-15058

ORNL-4442 September 1969

Analytic Representation of Photonucleon and Photopion Differential Yields Resulting from High-Energy Electrons ($50 \leq E_o \leq 400$ MeV) Incident on an Infinite Copper Target
T. A. Gabriel
Available: CFSTI as N70-15978

ORNL-4443 September 1969

Photonucleon and Photopion Production from High-Energy (50 to 400 MeV) Electrons in Thick Copper Targets
T. A. Gabriel, R. G. Alsmiller, Jr.
Available: CFSTI as N70-15832

ORNL-TR-2286 (JINR-P16-4765 in Russian) *1969*

Tissue Dosimetry of Radiation Generated by High Energy Accelerators
V. T. Golovachik, I. M. Dmitrievskii, M. M. Komochkov, V. N. Lebedev
Yu. D. Lysak, Yu. D. Semonov, V. Frolov, A. P. Cherevatenko

SLAC-TRANS-102 *February 1969*

High-Energy Interactions of Gamma Quanta and Electrons with Nuclei
V. N. Gribov

SU-HEPL-603 (AD-695419) *June 1969*

Observations on the Total Absorption of Electrons and Pions in Matter at GeV Energies
E. B. Hughes
(Presented at the Washington meeting of the Am. Phys. Soc., Apr.1969)
Available: CFSTI as N70-15782

ACTA PHYS. POL., 36, 887-99 (Nov. 1969)

Inelastic Interactions of High-Energy Protons with Atomic Nuclei
V. S. Barashenkov, K. K. Gudima, V. D. Toneev

BULL. ACAD. SCI. USSR, Phys. Ser. (English Transl.) 32(3), 452-454 (March 1968)

Angular Distribution of Electrons at Different Stages of Cascade Shower Development
V. V. Guzhavin, I. P. Ivanenko, B. E. Samosudov

BULL. ACAD. SCI. USSR, Phys. Ser. (English Transl.) 32(3), 461-463 (March 1968)

On the Magnitude of the Lead-Copper Transition Effect
A. D. Erlykin, A. K. Kulichenko

NUCL. INSTRUM. METHODS, 75, 13-17 (1969)

Range Energy Tables for High Energy Muons
P. M. Joseph

NUCL. INSTRUM. METHODS, 75, 93-102 (1969)

Activation of Air Near a Target Bombarded by 3 GeV Protons
M. Awschalom

NUCL. INSTRUM. METHODS, 75, 344-6 (1969)
(ORNL-TM-2669)

High-Energy (<18 GeV) Muon Transport Calculations and Comparison with Experiment - II.
R. G. Alsmiller, Jr., J. Barish

NUCL. INSTRUM. METHODS, 76, 157-63 (1969)

Moyer Integrals for Estimating Shielding of High-Energy Accelerators.
J. T. Routti, R. H. Thomas

NUCL. INSTRUM. METHODS, 78(2), 333-334 (1970)

A New Calculation of Dose Rates from High Energy Electrons and Photons Incident on 30 cm Water Slabs
H. L. Beck

PHYS. REV., 182(5), 1441-2 (June 1969)

Calculation of the Transition Effect in Electromagnetic Cascades for Depths Beyond Shower Maximum
C. J. Crannell

PHYS. REV. 182(5), 1435-40 (June 1969)

Experimental Determination of the Transition Effect in Electromagnetic Cascade Showers
C. J. Crannell, H. Crannell, C. R. Gillespie, K. Pinkau, R. R. Whitney

PHYS. REV., 185, 2041-2 (Sept. 25, 1969)

Two-Temperature Statistical Model of Particle Spectra. II.
M. LaPointe, J. R. Wayland

SOVIET J. AT. ENERGY (English Transl.) 25(4), 1113- (October 1968)

Passage of Electrons Through Matter
V. F. Baranov, O. A. Pavlovskii

TRANS. AMER. NUCL. SOC., 12, 968-9 (Nov. 1969) (CONF 691102)

Free-Nucleon Target Model Applied to Nucleon Penetration Through Matter
H. A. Wright, J. E. Turner
(From 17th Conf. on Remote Systems Tech., San Francisco, Calif.)

Z. NATURFORSCH, 24a, 1541-3 (Oct. 1969)

Cosmic Ray Interactions in Paraffin and Lead
J. P. Mundra, D. P. Bhattacharyya, P. K. Senchaudhury

BOOK (A70-16630)

THE SPACE ENVIRONMENT
N. H. Langton (ed.)

Article:

Radiation and Radiation Protection (pages 94-142)
J. S. Bevan
New York, American Elsevier Publishing Co., Inc. $7.00

TRANS. AMER. NUCL. SOC., 12, 969-70 (Nov. 1969) (CONF 691102)

Nucleon Transport at Energies up to 10^4 CeV
K. O'Brien
(From 17th Conf. on Remote Systems Tech., San Francisco, Calif.)

TRANS. AMER. NUCL. SOC., 12, 968 (Nov. 1969)

Measurement of Thick Target Bremsstrahlung from Tin at 4.0 and 8.0 MeV
D. G. Costello, H. Weber, J. A. Lonergan
(From 17th Conference on Remote Systems Tech., San Francisco, Calif.)

COMPUTER CODES LITERATURE

AAEC/TM-505 (mf) July 1969 SLABBO

SLABBO - A Discrete Ordinate Neutron Transport Code in Plane Geometry with Anisotropic Scattering
by B. E. Clancy

ARC 68-75 January 1968 FALLOUT CODES

Fallout Computational Techniques Final Report
by J. S. Petty, G. B. Curtis, and D. E. Wendland
FORTRAN; Contour codes for CDC 3600 and 6600; Dosage codes for CDC 6600, GE-635, and UNIVAC 1108

BNWL-1291 February 1970 2DBS

A User's Manual for 2DBS, A Diffusion Theory Shielding Code
by D. R. Marr
FORTRAN IV for UNIVAC 1108

DASA-2337; UNC-5243 January 1970 ENDT

ENDT - A FORTRAN Program to Prepare Cross-Section Data for UNC-SAM-3 from ENDF/B Tapes
by S. Kellman
FORTRAN

DASA-2338; UNC 5157 (Supl. 1) January 1970 UNC-SAM-3

Modification of UNC-SAM-2 to UNC-SAM-3
by E. S. Troubetzkoy
FORTRAN for CDC 1604

GA-8566 (mf) August 1969 SLIDER

SLIDER - A FORTRAN V Program for the Computation of the Release of Fission Products from One-Dimensional Multilayered Fuel Configurations
by K. B. Jadhav and B. W. Roos
FORTRAN V for UNIVAC 1108

ORNL-cf-70-2-31 February 1970 MORSE

The MORSE Code - A Multigroup Neutron and Gamma-Ray Monte Carlo Transport Code
by E. A. Straker, P. N. Stevens, D. C. Irving, and V. R. Cain
FORTRAN IV for CDC 1604 and IBM 360

SC-RR-69-241 (mf) May 1969 PEBB

A Computerized Method of Predicting Electron Beam Bremsstrahlung Radiation with Specific Application to High Voltage Flash X-Ray Machines
by T. H. Martin
RAX terminal for IBM 360

SC-RR-69-739 December 1969 DTF69

An Improved Capability for Solution of Photon Transport Problems by the Method of Discrete Ordinates
by James H. Renken and Kenneth G. Adams
FORTRAN for CDC 6600