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 37830

No. 83 October 1971

Knowledge is of two kinds.
We know a subject ourselves,
or we know where we can find information upon it.
... Samuel Johnson - Boswell's Life of Johnson

SEMINAR-WORKSHOP NEWS

Interest in the Radiation Transport in Air Seminar-Workshop to be held in Oak Ridge on November 15-17, 1971, continues to grow. In addition to the agenda published in the September Newsletter, the Seminar program will include the following papers.

MAGI-SGD, A Monte Carlo Program to Calculate Neutron Flux and Secondary Gamma-Ray Dose Rate from a Nuclear Weapon Detonation and the Auxiliary Routine, NUDATA - Herbert A. Steinberg and M. O. Cohen, Mathematical Applications Group, Inc., White Plains, New York.

Development of an Improved Point Source Moments Method Technique - Austin O'Dell, EG&G, Goleta, California.

Modifications and Applications of the SORS-G Monte Carlo Code - Norman A. Harris and Austin O'Dell, EG&G, Goleta, California

Nitrogen Gamma Rays - Glenn Reynolds and Martin Sperling - Science Applications, Inc., La Jolla, California.

A Last-Collision Model of the Air-Ground Interface Effect on Fast-Neutron Angle Distributions - L. G. Mooney and R. L. French, Radiation Research Associates, Fort Worth, Texas.

Time-Dependent, Two-Dimensional Energy Deposition in Air Due to a Prompt Neutron Source - W. H. Roach, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Two-Dimensional Transport from a 14 MeV Source in Air-Over-Ground Using the LASL TWOTRAN-FC Program - Henry Sandmeier, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

The Simulation of Low Energy Photon Transport and the Simulation of the Adjoint Neutron Transport Equation with Monte Carlo - L. L. Carter, E. D. Cashwell, and R. G. Schrandt, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Multigroup Monte Carlo and S_n Methods for Air Transport - D. R. Harris, D. R. Koenig, and W. Preeg, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Two Dimensional Air Transport from an Anisotropic Point Source - Kaye D. Lathrop, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Neutron Dose Relative to Delivery of Air to Air Rockets - J. Malik, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

****

To RSIC Public Utilities Customers:

We note that as a group you are conspicuously missing from the distribution lists of the RSIC Selective Dissemination of Information Service (SDI). Can it be that we have not provided categories that serve your interests? Please let us know if there are classes of information which interest you but which do not appear to be covered by our existing category set.

- The Scribble Editor

****

READERS RESPOND TO NEWSLETTER INQUIRIES

NON-IBM TO IBM FORTRAN CONVERSION CODES WANTED:

We are grateful:

To Carla Messina, Physicist, Data Systems Design Group, Office of Standard Reference Data, National Bureau of Standards, Washington, D. C., for calling our attention to SCRAMBLE and SUBSTITUTE, NBS Technical Note 470, which she says will transform eight character variable names to six character names, asterisks to apostrophes, invalid variable names and functions to valid ones and foreign card codes to BCD or EBCDIC;

And to Charles A. Crummer, Technical Staff Member, Applied Computing Technology, Mathematics and Computation Center, The Aerospace Corporation, San Bernardino, California, for calling our attention to the FORTRAN Conversion Aid Program, IBM Document No. PRPQ FA 1287, to be used in conjunction with a special compiler for the conversion of codes designed for the IBM 7094, the UNIVAC 1108, and CDC 6000-series FORTRAN to that for the IBM 360/370 compilers.

We will look into the possibilities suggested above - and will be pleased to receive additional comments on the subject of hardware-to-hardware conversion.

BOY-WANTS-GIRL, OR DECAY CHAIN COMPUTER CODE NEEDED:

Several letters and telephone calls were referred to the requester, Dr. George G. Biro, Gibbs and Hill, Inc., who conceived of the idea of the Newsletter as an exchange medium between shielding scientists. It is interesting to note that in more than one case the caller/letter-writer called attention to computer code packages in the RSIC collection. In more instances, however, RSIC received leads to interesting code development in this area, some of which will soon be made available. Dr. Biro joins us in expressing appreciation to all those who responded to the ad.

CURRENT WORK AND PROBLEMS

We continue with this issue of the Newsletter, the *CURRENT WORK AND PROBLEMS* feature which reports in brief on work in progress at various installations. The name in parentheses below identifies the person who reported the work at his installation.

To assist you in reporting your current work and problems, we include as the last page of this issue a copy of the questionnaire designed for that purpose.

Research and Technical Department, Bellaire Research Laboratories, Texaco, Inc., Bellaire, Texas (Harry Smith) will utilize SAM-C and MORSE to assist in the development of geophysical logging instruments. Typical problems simulated may be of the types using Californium-252 neutron sources as outlined in the Texaco contributions as published in the first eight AEC issues of Californium-252 Progress.

RSIC STAFF NEWS

We are pleased to report that David K. Trubey is rejoining the RSIC technical team following a year with the ORNL-NSF Environmental Program where he assisted in the development of the Environmental Information System (EIS). In support of basic RSIC functions, he will bring new 'know-how' in the computer technology of information handling to apply to the improvement of the RSIC systems. In addition, he will add strength to RSIC technical development functions which will allow us to better serve the industry.

Miss Mary Nicholson, a graduate of the University of Tennessee, with a Master's Degree from the University of Michigan, has joined RSIC as an information specialist. She assists in the many tasks associated with information collection, analysis, packaging, and distribution.

ADDITIONS TO THE COMPUTER CODE COLLECTION

Operable, tested with a sample problem, and available for distribution are the following code packages.

CCC-167/ELF — Monte Carlo Neutron Transport Code for Cylinders and Spheres, contributed by CEA/CEN, Fontenay-aux-Roses Nuclear Research Center, France, through the ENEA Computer Programme Library, Ispra, Italy. Reference: CEA-Note N-1361. FORTRAN IV, IBM 360.

CCC-168/FASTER III — Monte Carlo Neutron and Gamma-Ray Transport Code in Generalized Geometry, contributed by A. R. T. Research Corporation, Los Angeles, California. Reference: ART-45, Volumes I and II. FORTRAN IV; CCC-168A, UNIVAC 1108; CCC-168B, IBM 360.

PSR-31/SWIFT — Monte Carlo Neutron Spectra Unfolding Code, contributed by the USAEC Health and Safety Laboratory, New York, N. Y. Written in FORTRAN IV, CDC 6600. References: HASL-244 and Nucl. Instr. Meth. 91, 573-577 (1971.)

PSR-33/GAROL — Calculation of Resonance Neutron Absorption in Two-Region Problems, contributed by General Atomic, San Diego, California, through the Argonne Code Center. Written in FORTRAN IV for the IBM 7090/7094, one reel of tape is needed for transmittal. The Data Library is available as DLC-13/GARLIB. Reference: GA-6637.

PSR-34/EVP XIX — Analytical Model of the Evaporation Step in Spallation Reactions, contributed by The Swedish Research Councils' Laboratory, Studsvik, Nykoping, Sweden, and the CERN Computer Science Library, Geneva, Switzerland. FORTRAN IV, CDC 6600.

PSR-35/EDITOR — ENDF Format Data Processor, contributed by the Oak Ridge National Laboratory. FORTRAN IV, IBM 360. Reference: ORNL-TM-3266 (ENDF-142).

UPDATES TO EXISTING CODE PACKAGES

The following code packages have been recently updated.

PSR-13C/SUPERTOG (SUPERTOG II MOD 2)

The following modifications are required to process the Li-6 and Li-7 data (MAT = 8073 and 8074). The (n,2n) alpha reaction is now processed and added into the total cross section and into the scattering matrix. There have also been some revisions to the LF = 1 treatment, and the LF = 5 treatment has been added. Also, the total cross section is now printed out. An additional input card is now required in subroutine SNØUT. The purpose of this card is to read in σ_A, $\nu X \sigma_F$, σ_T, and $\sigma_{g \to g}$ for the thermal group. This card follows all other input data and is required only if IPUN = 2.

CCC-17H/05R F. A. R. Schmidt, Stuttgart Technical University (IKE), Germany, has returned to RSIC his working version of 05R. It is operable on the CDC 6600, and contains modifications and extensions and special sample problems contributed by the IKE Research Group. One reel of tape is needed for transmittal, and the CCC-17H version should be requested.

CCC-144/TIMOC Monte Carlo Three-Dimensional Neutron Transport Code Package has been extended to include the auxiliary cross section handling code and data library, CODAC. The program processes a TIMOC library from the ENDF/B Version I Data File. CODAC Reference: EUR 4521 e. A reel of tape is required for the above addition to TIMOC.

CCC-150B/MAP An IBM 360 version has been made operable and is available as CCC-150B in this Kernel Integration Code Package. This version includes a sample problem using surface leakage data from a CCC-169/DOT-IIW discrete ordinate transport solution in r,z geometry. It is contributed by the Westinghouse Astronuclear Laboratory, Pittsburgh, Pa.

TEXTBOOK ON INTERACTION THEORY PUBLISHED

A textbook designed for use in the teaching of interaction theory has been published by The MIT Press. Entitled *THE ELEMENTS OF NEUTRON INTERACTION THEORY*, the book is authored by Anthony Foderaro, Professor of Nuclear Engineering, Pennsylvania State University.

In his Preface the author writes: *"This book consists of material pertinent to the understanding of neutron interactions in the energy range below 20 MeV, the range of interest in nuclear reactors. The first four chapters present those topics in classical and quantum mechanics which are fundamental to an understanding of the kinematics and dynamics of any non-relativistic two-body collision between spinless particles. Chapter 5 covers the properties of neutrons and nuclei that influence their interactions. Chapter 6 generalizes the theory of the first five chapters to include interactions between particles with spin and culminates in the general theory of nuclear interactions. Each of the next five chapters is devoted to one of the principal neutron interactions of interest to nuclear engineers, from elastic scattering to fission. The final chapter deals with neutron interactions in which the motion and the bindings of the target atoms are significant."*

CHECK YOUR REFERENCES

RSIC requests each author to check his references listed in ORNL-RSIC-5, 6, 11, and 12. Please call to our attention any glaring errors or inconsistencies.

CORRECTION FOR ORNL-RSIC-6, Vol. II, Accession #1231, which was formerly a Russian article by Blinov et al and which had been duplicated in the system, has been replaced by an article by Gerald P. Lahti and P. F. Hermann. Pages 23 and 24 of this newsletter replace pages 57 and 58 and should be inserted in your copy to make this correction.

CORRECTION TO ORNL-RSIC-5, Vol. II. Please strike the old Russian Accession #1231 from category 111110. Add the following reference as Accession #1231 to categories

Category	Method	Emphasis	Category	Method	Emphasis
111110	0	1	863000	0	3
521130	0	3	870003	0	3
620000	0	3	870092	0	3
795082	0	3	881000	0	3
795103	0	3			

Comparison of tungsten and depleted uranium in minimum-weight layered shields for a space power reactor
Lahti, G. P. & Hermann, P. F.
NASA-TM-X-1874
N69-35817
NTIS

PERSONAL ITEMS

A.R.T. Research Corporation has opened an office in the Washington, D. C. area headed by *Tom Jordan*. They are temporarily located in Germantown, Maryland.

Roger S. Reynolds, formerly on the staff of Kansas State University, has accepted a position in the Nuclear Engineering Department of Mississippi State University.

John Weiler, formerly with Ingalls Nuclear Shipbuilding, Pascagoula, Mississippi, has accepted a position with the Essex Corporation as Director, Radiation Safety.

John R. Fleming recently joined the Los Angeles office of Science Applications, Inc. (SAI). He was formerly employed in the Vulnerability and Hardness Laboratory of TRW.

A. C. Whittier has transferred from General Electric of Canada to the Sheridan Park office of Atomic Energy of Canada, Ltd.

Westinghouse Atomic Power Division has changed its name to *Westinghouse Nuclear Energy Systems Division*, but still has the same address: P. O. Box 355, Pittsburgh, Pa., 15230.

N. R. Byrn is currently associated with the Huntsville, Alabama, office of Science Applications, Inc.

Gary L. Bennett has transferred from the nuclear rocket program at NASA Lewis Research Center, Cleveland, to the space (nuclear) electric power program, Safety Branch, USAEC Space Nuclear Systems Division, Washington, D. C.

Arthur B. Chilton has returned to the University of Illinois following a six-months leave spent at the National Bureau of Standards in Washington, D. C., at the conclusion of which he published "Effect of Material Composition on Neutron Penetration of Concrete Slabs," NBS-10425.

Having completed graduate study and work in Europe, *Dr. Sümer Sahin* has returned to Trabzon, Turkey, where he is assisting in the establishment of the new Nuclear Energy Institute at the Karadeniz Technical University (KTU). Dr. Sahin is interested in developing a shielding capability within the research activities of the Institute.

VISITORS TO RSIC

Visitors to RSIC during the month of September were: J. A. Bachman, Wright-Patterson AFB, Ohio; D. K. Baker, TVA, Chattanooga, Tenn.; N. E. Banks and Janet Lacetera, Aberdeen Proving Ground, Md.; G. P. Cavanaugh, University of Illinois, Urbana, Ill.; L. T. Dillman, Ohio Wesleyan University, Delaware, O.; S. A. W. Gerstl, Westinghouse Advanced Reactors Div., Madison, Pa.; J. G. Gratton and P. Jacques, USAEC Division of Technical Information, Washington, D.C.; T. M. Jordan, A.R.T. Research Corp., Los Angeles, Calif.; J. E. Mott, University of Tennessee, Knoxville, Tenn.; A. Onodera, Hitachi Shipbuilding & Engineering Co., Ltd., Tokyo, Japan; D. G. Stenstrom, Argonne National Laboratory, Argonne, Ill.; G. U. Ulrickson, Environmental Information Systems, ORNL.

SEPTEMBER 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 abstracts of the literature in the RSIC system may be requested through the Selective Dissemination of Information (SDI) Service, which is available to all.

REACTORS AND WEAPONS SHIELDING

AAEC-TM-585 *February 1971*

Table of Gamma Rays from (n, gamma) Produced Nuclides
R. A. Greig, R. E. Porritt, S. J. Bone

ACI Monograph No. 6 *1971*

Hardened Concrete: Physical and Mechanical Aspects
Adam M. Neville
Avail.: American Concrete Institute, P. O. Box 4754, Redford Station, Detroit, Mich. 48219

AERE-R-6622 *March 1971*

Specific II. A Monte Carlo Program for High Energy Neutron Spectrum Estimation
D. W. Holbrough, B. A. Lipscombe

AERE-R-6658 *March 1971*

COSMIC: A Monte Carlo Program for Thermal Neutron Re-Thermalisation Studies
P. Carter, D. Holbrough

ANSI N 5.3 1964 *1965*

American Standard: Guide for Design and Operation of Shipping Containers for Irradiated Solid Fuel from Nuclear Reactors
American Institute of Chemical Engineers
Avail.: American National Standards Institute, New York

ANSI N 7.2 1963 *1964*

American Standard: Radiation Protection in Nuclear Reactor Fuel Fabrication Plants. Natural (or Normal) and Enriched Uranium, Thorium, and Plutonium
American Standards Association
Avail.: American National Standards Institute, New York

ASTM E 170-63 *1965*

Standard Definitions of Terms Relating to Dosimetry
American Society for Testing and Materials
Avail.: American Society for Testing and Materials, Philadelphia

AWRE-0-3 71 *February 1971*

Elastic and Inelastic Scattering of 5.0 MeV Neutrons by Sodium
R. E. Coles

BAW-1365 *May 1971*

1000-MWe LMFBR Accident Analysis and Safety Design Study, Final Report
Babcock and Wilcox, Lynchburg, Va.

BAW-3647-21 *August 1971*

Physics Verification Program Part III, Tasks 5 and 6 - Quarterly Technical Report January-March 1971
M. N. Baldwin, G. T. Fairburn
Babcock and Wilcox, Research and Development Div., Lynchburg Research Center, Lynchburg, Va.

BMI-1913 *August 1971*

FRCRL 2 - A Computer Code for Calculating Fission-Product Release in Reactor Accident Analysis, Topical Report, Task 18
R. L. Ritzman, D. L. Morrison

BNL-50,203 *August 1970*

Time and Dose Relationships in Radiation Biology as Applied to Radiotherapy, NCI-AEC Conference, Carmel, California, September 15-18, 1969

CEA-CONF-1672 (In French) *1970*

Harmful Effects Due to the Use of Fluorine in Nuclear Installations
R. Bittel, B. Vaubert
Avail.: NTIS

CEA-N-1408(1) (In French) *February 1971*

Radioactive Contamination in Workshops and Laboratories - Techniques for Detection and Measurements
B. Werderer
Avail.: NTIS

CEA-N-1413 (In French) *February 1971*

Study of Clothes Providing Effective Tritium Protection
P. Marteau
Avail.: NTIS

CEA-N-1424 (In French) *March 1971*

Development of a Multigroup Photon Cross Section Library: BIP/G1
C. Devillers, C. Dupont

CEA-R-4110 (In French) *January 1971*

A Study of the Radioprotective Power of Imidazole, Benzimidazole, and Naphazoline on Mice Placed in a Pure Oxygen Atmosphere
A. Mourret, R. Rinaldi
Avail.: NTIS

CEX-65.92 July 1971

Differential Measurements of Fast-Neutron Air-Ground Interface Effects, Project 9.2 - Operation Henre
R. L. French, L. G. Mooney

CONF-690454, pages 301-8 1969

Nuclear Environment Against Which Equipment Must Be Hardened
C. N. Davidson, W. P. Schneider
Avail.: Mt. Prospect, Ill.; Institute of Environmental Sciences 665 p. $18.00

CONF-690454, pages 319-22 1969

Analytical Descriptions of the Nuclear Weapon Environment and Effects
R. T. Castle
Avail.: Mt. Prospect, Ill.; Institute of Environmental Sciences 665 p. $18.00

CONF-710211-1 1970

Computer Calculation of Bone Doses Following Acute Exposure to ^{90}Sr Aerosols
P. G. Voilleque
Avail.: Dep., NTIS

CONF-710301 (Vol. 1) August 1971

Proceedings of the Third Conference Neutron Cross Sections and Technology, March 15-17, 1971, Parts 1 - 3.
University of Tennessee, ORNL, ANS, AEC, and APS

CONF-710301 (Vol. 2) August 1971

Proceedings of the Third Conference Neutron Cross Sections and Technology, March 15-17, 1971. Parts 4 - 6.
University of Tennessee, ORNL, ANS, AEC, and APS

COO-1105-120

Characteristics of Some TLD Solid Systems
F. M. Lin, J. R. Cameron, Wisconsin University, Madison, Wis.
Avail.: Dep., NTIS

COO-2122-6 1970

The Iron Dog in Eskimo Culture
W. C. Hanson, Colorado State University, Fort Collins, Colo.

CRC Crit. Rev. Radiol. Sci., 1, 363-433 August 1970

Solid-State Dosimetry
K. Becker

DASA-2618 (AD-725162) November 1970

A User's Guide to the FSCATT Code
R. H. Fisher, J. W. Wiehf
Avail.: NTIS

DP-Report-441 July 1966

Safety of Operations in the Dragon Fuel Element Laboratory During 1965. Project Dragon.
E. R. Batchelor, C. R. Brooks, A. J. Eycott, M. S. T. Price, R. P. Stinden, J. S. Sneddon, B. Gardham, J. Holliday, R. Lewis
Avail.: NTIS

GULF-RT-10394 November 2, 1970

Development and Verification of Design Methods for Ducts in a Space Nuclear Shield, Phases 1, 2, 3. Final.
R. J. Cerbone, W. E. Selph et al.

GULF-RT-10523 March 16, 1971

Fast Reactor Spectrum Measurements. Technical Summary Report, February 1, 1970 - January 31, 1971
J. C. Young, G. M. Borgonovi, J. M. Neill et al.

GULF-RT-A-10739 June 21, 1971

Neutron Cross-Section Research. Final Report.
A. D. Carlson, M. P. Fricke
Avail.: Dep.; NTIS

HEDL-TME-71-42 April 1971

Displacement Cross Sections for Stainless Steel and Tantalum Based on a Lindhard Model
D. G. Doran

JUL-751-PC (In German) April 1971

Shielding of Fast Neutrons from the Cyclotron for Medical-Biological Research
P. F. Sauermann
Avail.: Dep.; NTIS (U.S. Sales only)

KAPL-Trans-4 (IAE-1954 in Russian)

Neutron Thermalization in H_2O at 318°K and 77°K
S. N. Ishmaev, I. P. Sadikov, A. A. Chernyshov
Avail.: Dep.; NTIS

KFK-1214 (CONF-700701-5, SM-133/33, N71-27144) July 1970

Studies of Radiative Neutron Capture and Delayed Fission Gamma-Ray Spectra from Uranium and Plutonium as a Basis for New Nondestructive Safeguards Techniques
P. Matussek, W. Michaelis, C. Weitkamp, H. Woda
Avail.: Dep.

MATT-846 May 1971

Lead Shielded Dewar Development
G. D. Martin, J. W. Willard
Princeton University, N. J. (Plasma Physics Lab.)

MR-7002 (AD-706853) April 1970

TERF Monte Carlo Fallout Code Calculations
M. O. Cohen
Avail.: NTIS

NASA-CR-1834 August 1971

Radiation Effects Design Handbook. Section 4. Transistors
J. E. Drennan, D. J. Hamman
Available: NTIS

NASA-CR-1871 September 1971

Radiation Effects Design Handbook. Section 5. The Radiations in Space and Their Interactions with Matter
M. L. Green, D. J. Hamman
Avail.: NTIS

NASA-CR-1872 August 1971

Radiation Effects Design Handbook - Section 6. Solid-State Photodevices
J. E. Drennan
Avail.: NTIS

NASA-TN-D-6464 August 1971

Energy Dependence of Electron-Induced Radiation Damage in Tungsten
J. A. DiCarlo, J. T. Stanley

NBS Handbook 85 (ICRU-10b) 1964

Physical Aspects of Irradiation
National Bureau of Standards
Supt. of Documents, GPO, Washington, D.C.

NCRP A-1 1968 1968

X-Ray Protection Standards for Home Television Receivers
NCRP
Washington, D. C., National Council on Radiation Protection and Measurements

NCRP 29 1962 — 1962

Exposure to Radiation in an Emergency
Chicago, University of Chicago
Avail.: NCRP Publications, Washington, D.C.

NOLTR-71-103 — June 18, 1971

Gamma-Ray Spectra of Fractionated Fission Products
L. R. Bunney, D. Sam
Naval Ordnance Laboratory

NP-18727 — 1970

Annual Report to the Director-General of Health for the Year Ended 30 June 1970
D. J. Stevens (Director), Commonwealth X-Ray and Radium Laboratory, Melbourne, Australia
Avail.: NTIS

NSJ-tr-157 — March 1969
(Translated from Nippon Genshiryoku Gakkaishi, 11, 144-9 (March 1969))

Gamma-Ray Leakage Through a Junction Between Lead and Concrete Walls
S. Miyasaka, Y. Kanemori, Y. Fukushima, T. Yamada
Avail.: Dep.; NTIS (U.S. Sales only)

ORNL-4690 — August 1971

Annual Report for 1970. Applied Health Physics and Safety
Oak Ridge National Laboratory (Health Physics & Safety Div.)

ORNL-4716 — August 1971

MORSEC, a Revised Cross-Section Module for the MORSE Multigroup Monte Carlo Code
E. A. Straker, M. B. Emmett

ORNL-TM-3379 — April 1971

KeV Neutron Capture Gamma Ray Spectra
J. R. Bird, I. Bergqvist et al.

ORNL-TM-3442 — August 30, 1971

A Calculation of Neutron Energy-Dependent Capture Gamma-Ray Yield Spectra for Iron and Comparisons with Experiments
J. E. White, C. Y. Fu, K. J. Yost

ORNL-TM-3457 — July 1971

Neutron-Capture-Gamma Ray Spectrum Calculations for Materials for Possible Use in a ^{252}Cf Neutron Activation Facility
V. A. DeCarlo, E. D. Arnold

ORNL-TM-3509 *August 13, 1971*

Energies and Intensities of Gamma Rays Emitted by a ^{226}Ra Source
J. K. Dickens

ORNL-TM-3519 *September 3, 1971*

Calculated Perturbations in Threshold Foil Measurements Due to Neutron Interactions in B_4C Shells
W. E. Ford, III, J. S. Gillen

ORNL-TM-3521 *August 1, 1971*

Progress Report for June, 1971, 189A Number 10028, Activity Number 40 01 61, Fast Reactor Shielding
ORNL

ORNL-TR-2485 (CEA-Bib-190 in French)

Isotopic Electric Generators
F. Laveissiere

ORO-2791-32 *February 15, 1971*

Compilation of Cross Sections and Angular Distributions of Gamma Rays Produced by Neutron Bombardment
P. S. Buchanan, D. O. Nellis, W. E. Tucker

PB-189506 (UVA-TRM-1; CONF-691059) *October 28, 1969*

Proceedings of the Conference on the Transportation of Radioactive Material (Held in Charlottesville, Virginia), October 26-28, 1969
Avail.: NTIS

RCN-147 *April 1971*

Experimental Study of the Neutron Attenuation in Concrete Shields for Fast and Thermal Reactors, with the Aid of Simulated Concrete Configurations
K. A. Verschuur, W. H. J. Quaadvliet
Patten, the Netherlands, Reactor Centrum Nederland

RLO-2225-T-1-1 *1969*

Radiological Aspects of Nuclear Power and the Aquatic Environment
A. H. Seymour, Washington University

RRA-T701 *February 26,1971*

A Last-Collision Model of the Air-Ground Interface Effect on Fast-Neutron Angle Distributions
L. G. Mooney, R. L. French

RT/FI(71)10 April 6, 1971

Solutions to the Third Form of the Boltzmann Equation in the Study of Neutron Penetration in a Multilayer Shield
F. Premuda

SC-RR-70-427 June 1970

Pulsed Electron Beam Energy Deposition Profiles Using Solid Radiation Sensitive Plastics
L. A. Harrah
NTIS

TID-25690 March 1971

ENDF B Cross Section Preparation and Testing in the Joshua System
D. R. Finch, H. C. Honeck, J. W. Stewart, II, W. V. Baxter

UARAEE-103 1970

Thermal Neutron Capture Gamma-Rays in Iron
A. M. Hassan, H. M. Abu-Zeid, I. Hamouda

UCRL-50,936, REV. 2 June 1971

Predictions of Long Distance Radioactivity and Radiation Doses to Man in 13 Hypothetical Excavation Applications
T. V. Crawford, K. R. Peterson et al.

UCRL-51,054 May 24, 1971

Comparison of U.S. and U.S.S.R. Methods of Calculating the Transport, Diffusion, and Deposition of Radioactivity
J. B. Knox, T. V. Crawford et al.

UCRL-72445 (Rev. 1) (CONF-710801-2) August 16, 1971

Shielded Neutron Shipping Cask
C. L. Hanson, M. S. Coops, E. D. Arnold
Dep.; NTIS

WANL-TME-1895 January 1969

Determination of the Shielding Requirements for the NPTR Fuel Handling System
J. M. Ravets, J. S. Stefanko
Dep.; NTIS

ZJE-67 1970

Thermal Stresses in Reactor Outlet Piping Transition Part Under Thermal Shocks
J. Kunes, V. Svigler, O. Vavroch
(Skoda-Concern, Nuclear Power Plants Div., Information Centre, Plzen-Czechoslovakia)

Defektoskopiya, No. 1, 124-8 (1971) (In Russian)

Radiation Defectoscopy of Concrete and Reinforced Concrete by Means of Betatron Bremsstrahlung
V. A. Vorob'ev, Yu. D. Gavkalov

Isotopenpraxis, 6, 390-6 (Nov. 1970) (In German)

Two Special Gamma-Ray Irradiation Plants to Produce Mean and Elevated Exposure Rates Within the ^{60}Co Gamma-Radiation Energy Range.
H. Rothe, O. Hecker

J. Inst. Nucl. Eng., 12, 31-5 (Mar.-Apr. 1971)

Technology of Reactor Thermal Shields. Part 1.
G. C. Burman, J. R. A. Lakey

J. Nucl. Sci. Technol. (Tokyo), 8(5), 294- (1971)

(Data) Available Computer Codes for Radiation Shielding Calculations in Japan
K. Takeuchi

J. Radiol., 52(6-7), 377- (1971) (In French)

Dosimetry - New Values of Conversion Factor-F
P. Pizon

J. Quant. Spectrosc. and Radiat. Transfer (GB), 11(2), 175-96 (Feb. 1971)

Generalized Differential Approximations in One-Dimensional Radiative Transfer
D. Finkelman

Meccanica, 5(4), 523-61 (Dec. 1970) (Italy)

The Initial-Value Problem for Neutron Transport in a Finite Body with Generalized Boundary Conditions
A. B. Morante

Nucl. Eng. Design, 16(3), 249-252 (July 1971)

The Calculation of the Total Dose in Concretes for Radiation Shielding Design
M. Havranek

Nucl. Eng. Design, 16(3), 369-374 (July 1971)

Concrete for Pressure Vessels, Shielding and Containment of Nuclear Reactors
M. F. Kaplan

Nucl. Eng. Design, 16(4), 399-407 (July 1971)

A Quality Factor Concept for Evaluation of the Surface Type Gamma-Ray Backscatter Soil Density Gauges
R. P. Gardner, W. L. Dunn, F. H. McDougall

Nucl. Eng. Design, 16(4), 408-414 (July, 1971)

Design Optimization of the Surface Type Gamma-Ray Backscatter Soil Density Gauges Using Conventional Components with the Dual-Gauge Principle
W. L. Dunn, F. H. McDougall, R. P. Gardner

Nucl. Eng. Design, 16(4), 429-443 (July 1971)

Energy and Angular Distributions of ^{60}Co Gamma Rays Penetrating a Concrete Shield
R. M. Rubin, R. E. Faw, M. J. Coolbaugh, J. M. Royer

Nucl. Instrum. Methods, 92(4), 571-6 (April 15, 1971)

On the Optimal Generation of 14 MeV Neutrons by Means of Tritiated Titanium Targets
M. Guillaume, G. Delfiore, G. Weber, M. Cuypers

Nucl. Sci. Eng., 45(3), 245-254 (Sept. 1971)

The Effectiveness of Acceleration Techniques for Iterative Methods in Transport Theory
W. H. Reed

Nucl. Sci. Eng., 45(3), 255-268 (Sept. 1971)

Remedies for Ray Effects
K. D. Lathrop

Nucl. Sci. Eng., 45(3), 269-278 (Sept. 1971)

Group Transfer Matrices and Their Relation to Basic Cross Section Data
M. Segev

Nucl. Sci. Eng., 45(3), 297-307 (Sept. 1971)

Neutron Inelastic Scattering Cross Sections for Iron, Nickel, Niobium, and Tantalum from Threshold to 1.8 MeV
V. C. Rogers, L. E. Beghian, F. M. Clikeman

Radiochem. Acta, 15(4), 169- (1971) (In German)

Analytical Evaluation of Prompt Gamma-Radiation After Neutron-Capture
R. Henkelmann

Z. Phys., 245(3), 198- (1971)

Gamma-Rays from Thermal-Neutron Capture in Gold
A. A. Elkady, D. Duffey, P. F. Wiggins

THESIS (N71-26392) *1969*

Multiple Scattering Calculations of Gamma Photon Transport
Sergio Cangiano
Maryland, University, College Park
Avail.: Univ. Microfilms Order No. 70-11615

THESIS *1971*

A Dynamic Technique for Measuring Thermal Conductivity in Cylindrical Geometry Designed for Use in Radiation Damage Studies
Carl Arthur Erdman
University of Illinois, Urbana, Ill.

THESIS (N71-26277) *1969*

High Energy Gamma Ray Attenuation Through Slabs of Concrete, Iron and Lead
D. H. Risher, Jr.
Virginia University, Charlottesville
Avail.: Univ. Microfilms Order No. 70-8089

BOOK *1971*

PATHOLOGY OF IRRADIATION
Charles C. Berdjis (ed.)
Baltimore, Williams and Wilkins Co.

SPACE AND ACCELERATOR SHIELDING

NASA-TM-X-65584 (N71-28978) *April 17, 1971*

Trapped Particle Radiation Encountered by Selected Low Altitude Skylab Missions: Space Stations in an Ambient Radiation Environment
E. G. Strassinopoulos
Avail.: NTIS

ORNL-TR-2480 *December 1970*

ELDOSE Program for the Calculation of Absorbed Dose Distributions in Thin Shields
J. Bourrieau, R. Schuttler
Avail.: Dep.; NTIS

ORNL-TM-3353 (CONF-710423-1) *April 12, 1971*

Muon Transport and the Shielding of High-Energy (≤ 500 GeV) Proton Accelerators
R. G. Alsmiller, Jr., F. S. Alsmiller, J. Barish, Y. Shima
Avail.: Dep.; NTIS

ORNL-TM-3438 (THESIS) *August 18, 1971*

Low-Energy Electron Transport by the Method of Discrete Ordinates
D. E. Bartine, R. G. Alsmiller, Jr., F. R. Mynatt, W. W. Engle, Jr., J. Barish
(Dissertation by D. E. Bartine submitted to the University of Missouri-Rolla)

ORNL-TR-2433 (JINR-P2-5331, In Russian)

Angular and Energy Distributions of Particles Produced in Inelastic π-N and N-N Collisions at Very High Energies
V. S. Barashenkov, S. M. Eliseev
Avail.: Dep.; NTIS

ORNL-TR-2518 (NP-18798, in French) (THESIS) *February 5, 1971*

Simulation of an Electron Avalanche in He Using a Monte Carlo Method
J. F. Denes

RPP/A-83 *June 1971*

Estimation of the Induced Radioactivity of the Ground Water System in the Neighbourhood of a Proposed 300 GeV High Energy Accelerator Situated on a Chalk Site
G. B. Stapleton, R. H. Thomas

RPP/R-9 (CONF-710423-4) *1971*

Distribution of Dose and Induced Activity Around External Proton Beam Targets
G. S. Levine, D. M. Squier, G. B. Stapleton, G. R. Stevenson, K. Goebel, J. Ranft
Avail.: Dep.; NTIS (U.S. Sales only)

IL NUOVO CIMENTO, 3(3), 521-547 (July 1971)

Cosmic-Ray Propagation in the Atmosphere
K. O'Brien

J. Nucl. Mater., 39, 229-33 (May 1971)

Photon Irradiation Effects in Type 321 Stainless Steel
D. W. Keefer, A. G. Pard, C. G. Rhodes, D. Kramer

Nucl. Sci. Eng., 45(2), 107-116 (August 1971)

A Method for Solving Time-Dependent Electron Transport Problems
M. C. Cordaro, M. S. Zucker

Z. Phys., 243, 464-79 (1971) (In Germany)

Electron-Photon Cascades in Lead at Primary Energies of 100, 200, and 400 MeV
R. Brockmann, P. Keil, G. Knop, P. Wucherer

COMPUTER CODES LITERATURE

AFWL-TR-70-185 *September 1971* *NUDATA*

NUDATA - A Computer Program to Prepare Cross-Section Data for the MAGI-SGD Code
by M. O. Cohen, Mathematical Applications Group, Inc.
ASA FORTRAN, CDC 6600

AFWL-TR-70-186, Vol. 1 *September 1971* *MAGI-SGD*

MAGI-SGD, A Monte Carlo Program to Calculate Neutron Flux and Secondary Gamma-Ray Dose from a Nuclear Weapon Detonation. Volume 1: Theory and Test Results
by Herbert A. Steinberg, Mathematical Applications Group, Inc.
ASA FORTRAN, CDC 6600

CEA N-1255 (ORNL-tr-2519) *February 1970* *ELF-NEUTRON*

ELF-NEUTRON Program
by Francois Gervaise, CEA/CEN Fontenay-aux-Roses, France

CEA N-1203 (ORNL-tr-2527) *October 1969* *PICFEE*

Program for the Integration of Elementary Fission Curves with Consideration of the Development of Fissile Nuclides
by Bertrand Barre, CEA/CEN Fontenay-aux-Roses, France
FORTRAN IV, IBM 360/50, 360/65, 360/91

ORNL-4695 *August 1971* *REFCO, POW76*

Two Computer Codes (REFCO and POW76) for Calculating the Fuel Cycle Cost of a Nuclear Power Reactor
by Royes Salmon, Oak Ridge National Laboratory
FORTRAN IV, IBM 360

ORNL-4716 *August 1971* *MORSEC*

MORSEC, A Revised Cross-Section Module for the MORSE Multigroup Monte Carlo Code
by E. A. Straker and M. B. Emmett, Oak Ridge National Laboratory
FORTRAN IV, IBM 360

ORNL-CF-71-8-22 *August 1971* *MORSE-GEOM-MORSEC-SAMBO*

MORSE-GEOM-MORSEC-SAMBO Input Instructions
by C. E. Burgart, Oak Ridge National Laboratory
FORTRAN IV, IBM 360

ORNL-TM-3518 *August 1971* *XCHEKR*

XCHECKR - A Multigroup Cross-Section Editing and Checking Code
by C. E. Burgart and E. A. Straker, Oak Ridge National Laboratory
FORTRAN IV, IBM 360

RCN-146 *June 1971* *RAGA*

RAGA: A Monte Carlo Program for Calculation of Gamma-Ray Transport in a Reactor Shield for Multi-region Slab Geometry Using Exponential Transformation

by K. A. Verschuur, J. Molenaar and A. W. den Houting, Reactor Centrum Nederland, Petten, the Netherlands

48K Philips Electrologica X8 Computer

1228. J. Greenborg, "Neutron Flux and Gamma-Ray Dose Distributions in the NPR Shield," Nucl. Appl. 2, 5, 430-439 (October 1966).

Extensive neutron and gamma-ray measurements were performed in the reflector and primary shield of the NPR, a large power and plutonium production reactor. The measurements yielded fast, epithermal, and thermal-neutron flux and gamma-ray dose distributions through approximately 9 ft of reflector and shield assembly. Emphasis was placed on obtaining absolute flux and dose measurements with respect to reactor power.

The measured fluxes and dose rates were compared to those calculated by the removal diffusion theory computer program MAC; a calculation in 18 removal groups and 31 diffusion groups. Agreement is excellent for fast-neutron flux and gamma-ray dose rate in the concrete shield and for thermal and epithermal flux in the graphite reflector. Calculations of thermal and epithermal fluxes in the concrete shield are in lesser agreement with measured values; generally within a factor of 2.

1229. J. S. Hurst, Machinability of Some Infrequently Used Materials, Y-1550 (September 21, 1966). Availability: $2.00 CFSTI.

This report contains a compilation of methods which have been used for the successful machining of twenty-four material types which are infrequently encountered on a production basis. Methods reflect the craftsman's empirical determinations rather than an exhaustive study of the subject, since the variability of engineering materials precludes an absolute machining procedure unless large quantities of data over long runs are available. However, the data presented can serve either as enabling information for the one-of-a-kind job, or as the starting point for additional research.

1230. J. W. Smith, "Distribution of Neutron Dose with Depth," Kerntechnik 7, 6, 266-268 (1965).

Results of measurements of neutron depth dose are compared with flux to dose conversion functions. Best agreement is found with the Snyder Neufeld function.

1231. G. P. Lahti and P. F. Hermann, "Comparison of Tungsten and Depleted Uranium in Minimum-Weight, Layered Shields for a Space Power Reactor," NASA-TM-X-1874 (September 1969) (N69-35817). Availability: NTIS.

The weights of layered spherical shields for a fast spectrum 2.2-megawatt-thermal nuclear space power reactor have been calculated for two candidate gamma shield materials, tungsten and depleted uranium, using natural lithium hydride as the material for neutron shielding. Each shield configuration was optimized to a dose rate constraint of 2 millirem per hour at 20 meters. A one-dimensional discrete ordinates transport program and a steepest-descent method optimization program were used.

10-1-71
Replacement in 1231.

RADIATION SHIELDING INFORMATION CENTER

INFORMATION FORM FOR NEWSLETTER

The information provided on the reverse side is for publication in the RSIC Newsletter. It should cover such things as measurements and calculations related to shields (reactor, radioisotope, nuclear weapon, space radiations), engineered or partially engineered shield structured under test or construction, and peripheral matters such as relevant cross section measurements, and instrument development. There is no need to be formal; a handwritten note will do. Do not send data. Simply enumerate problems being worked on. Reasons of security, proprietary interest, or priority of a dissertation should cause you to limit your report.

Please send information to:

RADIATION SHIELDING INFORMATION CENTER
Oak Ridge National Laboratory
P. O. Box X
Oak Ridge, Tennessee 37830

Thank you for your cooperation.

Sincerely,

Betty F. Maskewitz mwl

Betty F. Maskewitz (Mrs.)
RSIC Coordinator

BFM/mwl

NAME:

DATE:

ORGANIZATION:

TELEPHONE:
AREA CODE:
EXTENSION:
FTS NO.:

ADDRESS:

PROBLEMS BEING WORKED ON:

WORK AREAS YOU FEEL NEED IMMEDIATE EFFORT:

NAMES AND ADDRESSES OF OTHERS FROM WHOM RSIC SHOULD SOLICIT NEWS OF SHIELDING:

(Use additional pages if necessary)