

# 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

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*The dogmas of the quiet past  
are inadequate to the stormy present.  
The occasion is piled high with difficulty,  
and we must rise with the occasion.  
As our case is new,  
so we must think anew,  
and act anew.*

- Abraham Lincoln

## NEW RSIC COMPUTER-BASED INFORMATION RETRIEVAL SYSTEM NOW IN OPERATION

The RSIC computer-based information retrieval system has been reprogrammed and is now in operation on the IBM-360 computer. The logic of the new system is similar to the old one but has additional power and flexibility. The new system is much easier to maintain, update, and operate. Retrieval of titles for bibliographies, abstracts for retrospective searches, and the selective-dissemination-of-information (SDI) operations require far less machine time now since most data are in core. Logical combinations of subject categories can be used as search queries. If you desire such a literature search, please let us know.

We are grateful to J. G. Jones, R. O. Green, Jr., and S. L. Yount for their good work on our behalf in developing the new system.

## NEW RUSSIAN BOOK TRANSLATED

A group of selected papers translated from the collection appearing in *Problems in the Physics of Reactor Shielding, No. 3*, edited by D. L. Broder, A. P. Suvorov, and S. G. Tsypin, (Jan. 1969) is now available from CFSTI as JPRS 49745 (3 Feb. 1970). A total of 16 articles were translated.

### MODIFIED FMC ADDED TO COLLECTION

Modified and returned to the RSIC Computer Code Collection is the following:

CCC-14B/FMC-G Monte Carlo Simulation of Gamma-Ray Life Histories in a Source-shield Configuration. Modifications include FASTER-type geometry and double precision arithmetic. Contributor: Aerojet General Corporation, Sacramento, California. Reference: RN-TM-0588 describes the new material. It is operable on the FORTRAN IV system of the IBM 360/65. One reel of magnetic tape should accompany a request for this FMC version which is packaged as CCC-14/B.

### NEW ADDITIONS TO THE COLLECTION

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

CCC-125/RSAC A Radiological Safety Analysis Code. Contributor: Phillips Petroleum, Idaho Falls, Idaho. Written in MAP for the IBM 7040/7044. Reference: IDO-17151. One reel of tape is needed with a request for the package.

CCC-126/ASOP Multigroup One Dimensional Discrete Ordinates Transport Code for Shield Optimization (based on CCC-82/ANISN). Contributors: Computing Technology Center and Oak Ridge National Laboratory, Union Carbide Nuclear Division, Oak Ridge, Tenn. Reference: CTC-INF-941. Written in FORTRAN IV for the IBM 360. One reel of tape is needed with a request.

CCC-127/MORSE A General Purpose Monte Carlo Multigroup Neutron and Gamma-Ray Transport Code. Contributor: Neutron Physics Division, Oak Ridge National Laboratory. Written in FORTRAN IV, MORSE is available for the CDC-1604, CCC-127A, and for the IBM 360, CCC-127B. A reel of magnetic tape should accompany a request for the code package.

### PERSONAL ITEMS

S. K. (Keith) Penny, former RSIC director, has transferred at ORNL from the Neutron Physics Division to the Mathematics Division. He is now head of a group which has had extensive experience in radiation transport calculations.

Wayne Coleman, formerly with the Nuclear Effects Laboratory, Edgewood Arsenal, is now with Science Applications, Inc., La Jolla, Calif.

### VISITORS TO RSIC

Visitors to RSIC during January and February were: John C. Garth, Air Force Cambridge Research Laboratories, Bedford, Mass.; Y. Higashihara, Power Reactor and Nuclear Fuel Development Corp., Tokyo, Japan; James A. Lonergan, Science Applications, Inc., La Jolla, Calif.; James Newell, Radiation Research Associates, Fort Worth, Texas; John Raulston, Wright Patterson Air Force Base, Dayton, Ohio.

### FEBRUARY 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

AAEC/E-199

*July 1969*

Solution of Some Problems by Collision Probability Methods.

G. Doherty

Available: AEC Depository Libraries; CFSTI (U.S. Sales Only)

AECL-3476

*August 1969*

Random Number Generators

J. Nicholls

(Atomic Energy of Canada, Limited, Chalk River, Ontario)

- AGC-NRO-1373 1969  
Coupled Discrete-Ordinates - Monte Carlo Technique and Application  
to NERVA  
D. G. Lindstrom, J. H. Price  
(Aerojet-General Corp.)
- AGC-NRO-1376 1969  
Operating Radiation Environment of Nuclear Rocket Systems  
E. A. Warman, D. R. Rogers, J. C. Courtney  
(Aerojet-General Corp.)
- AGC-NRO-1377 1969  
Comparison of Computed and Measured Radiation Levels in NERVA  
Development Engine Tests  
E. A. Warman, D. L. Foreman, J. C. Courtney  
(Aerojet-General Corp.)
- AI-AEC-Memo-12915 *January 15, 1970*  
The Evaluation of Several ENDF/B Nuclide Cross-Sections by a Monte  
Carlo Technique  
C. L. Dunford, H. Alter
- AI-AEC-Memo-12916 *January 20, 1970*  
An Evaluation of Uranium-235 Neutron Cross Section Data for Energies  
Above 15 keV  
H. Alter, C. L. Dunford
- BNL-14200 (CONF-691203-1) *December 1969*  
Gamma-Ray Spectra Following Capture of Epithermal Neutrons  
R. E. Chrien  
Available: AEC Depository Libraries; CFSTI
- CTC-INF-952 (AD-692168) *August 11, 1969*  
Development of Two-Dimensional Discrete Ordinates Transport Theory  
for Radiation Shielding  
F. R. Mynatt, F. J. Muckenthaler, P. N. Stevens  
Available: CFSTI as N70-10492
- GA-9081 (DASA-2218) *November 30, 1968*  
Measurement and Analysis of the Transport of Fast Neutrons in Liquid  
Nitrogen  
J. L. Russell, Jr.  
Available: CFSTI as AD-696226

- IAE-1791 (In Russian) 1969  
Comparative Effectiveness of Various Criteria in the Monte Carlo Method  
L. V. Maiorov, A. D. Frank-Kamenetskii  
Available: CFSTI (U. S. Sales Only); AEC Depository Libraries
- ICRU-Report No. 13 1969  
Neutron Fluence, Neutron Spectra and Kerma  
Washington, D. C.
- JPRS-49745 February 3, 1970  
Problems in the Physics of Reactor Shielding. (Vol. 3)  
D. L. Broder, A. P. Suvorov, S. G. Tsypin (eds.)  
Available: CFSTI and GPO
- K-1779 December 22, 1969  
Improved Fabrication Techniques for 6-Li Fluoride-Teflon and Lead Shields for Gamma Dosimetry  
R. D. Rivers, J. W. Williams, T. Lee, C. A. Kienberger, C. W. Weber  
Available: AEC Depository Libraries; CFSTI
- KEES--SR-84 November 30, 1969  
A University Design Study of Protection Factors in Typical American Houses  
M. J. Robinson, R. S. Reynolds, C. A. Burre, R. E. Faw  
(Kansas Engineering Experiment Station, Dept. of Nuclear Eng., Radiation Shielding Facility, Kansas State University, Manhattan, Kansas 66502)
- KFK-1013 July 1969  
Prompt Gamma Rays Emitted from Individual Fragments in Neutron-Induced Fission  
F. Horsch, W. Michaelis
- MR-6909 (DASA-2384) January 1970  
Automatic Computation of Importance Sampling Functions for Monte Carlo Transport Codes - Phase I  
B. Eriksson, S. Hui, M. H. Kalos, D. Spielberg, H. Steinberg  
(Mathematical Applications Group, Inc., 180 So. Broadway, White Plains, N. Y.)
- NASA-TT-F-528 (N69-38756)  
The Basic Principles for Optimum Shielding of Nuclear Apparatus on Board Spacecraft  
L. N. Veselovskiy  
IN: *PROBLEMS OF SPACE BIOLOGY, Vol. 6*, N. M. Sisakyan,  
(Washington, NASA, 1967)

NASA-TM-X-1909

January 1970

Multigroup Resonance-Region Cross Sections for Tungsten and Depleted Uranium for Use in Shielding Calculations  
G. P. Lahti, R. M. Westfall  
Available: CFSTI

NRSS-12

August 1969

Comparison of Uncollided Portion of Gamma Radiation Penetrating Ribbed and Plane Slabs  
G. Dubois, E. E. Morris  
University of Illinois, Urbana, Ill.

NRSS-13

October 1969

Ribbed Slab Penetration - A Summary Report  
A. B. Chilton  
University of Illinois, Urbana, Ill.

NYO-268

1969

A New Moments Solution of the Neutron Transport Equation  
C. R. Weisbin  
Pegram Nuclear Physics Laboratory, Columbia University, Department of Physics, New York, N. Y.

ORNL-RSIC-27

January 1970

A Review of Multigroup Nuclear Cross Section Preparation - Theory, Techniques, and Computer Codes  
Compiled by D. K. Trubey, J. Gurney  
Available: CFSTI

ORNL-TM-2531

September 1969

Analysis of the Oak Ridge National Laboratory Garden Carrier No. 2  
B. B. Klima  
Available: CFSTI

ORNL-TR-2234 (*Kerntechnik*, 8(12), 548-555 (1966) (In German)

Comparison of Shield Calculations and Measurements at the Kahl Reactor  
H. G. Fendler, G. Knoerzer

RLO-1543-5

1969

Water Content Measurement by Neutron Attenuation for Application to Study of Unsaturated Flow of Soil Water  
G. L. Stewart, W. H. Gardner  
Washington State University, (Department of Agronomy), Pullman, Wash.

UCRL-19375 (CONF (CONF-691101-8)

August 1969

Mathematical Considerations of Determining Neutron Spectra from  
Activation Measurements

J. T. Routti

Available: AEC Depository Libraries; CFSTI

*J. APPL. PHYS.*, 39 (11), 5116-21 (October 1968)

A Simplified Orders-of-Scattering Technique for Calculating the  
Absorption of X-Rays

R. G. Willis

*J. Math. Phys.*, 9(5), 753-9 (May 1968)

Solution of the Transport Equation with Anisotropic Scattering in  
Slab Geometry

R. L. Bowden, F. J. McCrosson, E. A. Rhodes

*J. Nucl. Sci. Technol. (Tokyo)*, 5(12), 614-623(Dec. 1968)

Calculations of Neutron Distributions by Statistical Method

T. Yamagishi, T. Sekiya

*Nucl. Sci. Eng.*, 39(1), 81-91 (January 1970)

Gamma-Ray Spectra of the Products of Thermal-Neutron Fission of  
235-U at Selected Times After Fission

L. R. Bunney, D. Sam

*Nucl. Sci. Eng.*, 39(1), 92-104 (January 1970)

Theoretical Dose Transmission and Reflection Probabilities for 0.2-  
10.0 MeV Photons Obliquely Incident on Finite Concrete Barriers

W. O. Doggett, F. A. Bryan, Jr.

*Soviet J. At. Energy (English Transl.)*, 25(1), 784- (July 1968)

Distribution of Neutrons from A Po-Be Source in a Hydrogenous  
Medium (Abstract)

V. T. Samosadnyi, S. O. Lekhtmakher

*Soviet J. At. Energy (English Transl.)*, 25(1), 787- (July 1968)

Spectral Angular Distributions of  $\gamma$ -Radiation from a Nuclear  
Explosion (Abstract)

I. V. Goryachev, B. K. Godovanki

*Soviet J. At. Energy (English Transl.)* 25(1), 788- (July 1968)

Effective Atomic Number of Infinite Homogeneous Media Containing  
 $\gamma$ -Ray Sources. (Letter to the Editor)

I. M. Khaikovich, B. M. Kolesov, V. M. Bel'for, A. K. Ovshinnikov

*Soviet J. At. Energy (English Transl.)*, 25(1), 800- (July 1968)

Effective Neutron Dose Determining Radiation Embrittlement of Ferritic Steels. (Letters to the Editor)

V. K. Adamovich

*Soviet J. At. Energy (English Transl.)*, 25(1) 814- (July 1968)

Estimates of the Attenuation by Snow Cover of  $\gamma$ -Radiation from Fallout. (Letters to the Editor)

V. V. Pavlov, I. E. Konstantinov, G. A. Fedorov

*Soviet J. At. Energy (English Transl.)*, 25(2), 878- (August 1968)

Neutron Propagation in Air at Ground Level

P. A. Yampol'skii, V. F. Kokovikhin, N. A. Kondurushkin, A. V. Bolyatko

*Soviet J. At. Energy (English Transl.)*, 25(2), 899- (Aug. 1968)

Polynomial Approximation of the Fast Neutron Spectrum Measured by Threshold Detectors. (Abstract)

A. V. Starodutsev, E. G. Ashirov, N. V. Zinov'ev

*Soviet J. At. Energy (English Transl.)*, 25(2), 920- (August 1968)

Neutron Spectrum in Air from a Critical Assembly of U-235 + Cu. (Letters to the Editor)

V. A. Terekhin, V. A. Kryzhanovskii, V. N. Konnov, L. B. Poretskii

*Soviet J. At. Energy (English Transl.)*, 25(2), 921- (August 1968)

Nomogram for Determining the Effective Atomic Number of a Medium of Complex Composition for the Transmission of  $\gamma$ -Radiation. (Letters to the Editor)

G. A. Pshenichnyi

THESIS

May 1968

Neutron Transport Theory with a Completely Degenerate Energy Transfer Kernel

James Fred Watts

Virginia Polytechnic Institute, Blacksburg, Va.

Available: AEC Depository Libraries; CFSTI as TID-25310

BOOK (In Russian)

1968

*SHIELDING OF CYLINDRICAL  $\gamma$ -RAY SOURCES*

D. P. Osanov, E. E. Kovalev

Moscow, Atomizdat 120 pages

BOOK (In Russian) (Translation in Process)

1964

*BIOLOGICAL SHIELDING OF SHIP REACTORS*

D. L. Broder, et al

Sudostroenie, Leningrad 410 pages



BOOK (In Russian) (Translation in process) 1967

*SMALL SCALE REACTOR SHIELDING*

D. L. Broder, et al  
Atomizdat, Moscow 364 pages

*SPACE AND ACCELERATOR SHIELDING*

HASL-221

January 1970

Shielding Calculations for Broad Neutron Beams Normally Incident on  
Slabs of Concrete

K. O'Brien  
Available: CFSTI

LNF-69/27

April 15, 1969

Measurements on 1-GeV Electromagnetic Cascade and Cascade-Produced  
Neutrons in Shielding Materials. (Note No. 442)

F. Lucci, M. Pelliccioni, M. Roccella  
Available: AEC Depository Libraries; CFSTI (U.S. Sales Only)

ORNL-TM-2848

January 23, 1970

Calculation of the Long-Lived Induced Activity in Soil Produced  
by 200-MeV Protons

T. A. Gabriel

ORNL-TR-2257 (JINR-P1-4562 in Russian)

1969

Experimental Investigation of the Process of Electron-Photon Shower  
Generation at Energies Ranging from 20 to 300 MeV

Z. Ogrzeval'skii, Z. S. Strugal'skii

ORNL-TR-2258 (JINR-P2-4662 in Russian)

1969

Mechanism of Interaction of High and Ultra-High Energy Particles  
with Atomic Nuclei, New Types of Elementary Particle Interactions

V. S. Barashenkov, K. K. Gudima, S. M. Eliseev, A. S. Il'inov,  
V. D. Toneev

ORNL-TR-2266 (IFVE-SEF-69-18 in Russian)

1969

Production of Negative Particles by Protons with Energies of up  
to 70 GeV

Yu. B. Bushnin, Yu. P. Gorin, S. P. Denisov, S. V. Donskov, A. F.  
Dunaitsev, V. A. Kachanov, V. I. Kotov, V. N. Kut'in, A. I. Petrukhin,  
Yu. D. Prokoshkin, E. A. Razuvaev, D. A. Stoyanova, Yu. S. Khodyrev,  
R. S. Shuvalov

- ORNL-TR-2267 (JINR-P2-4661 in Russian) 1969  
Cascade Model of Photonuclear Reactions  
K. K. Gudima, A. S. Iljinov, V. D. Toneev
- ORNL-TR-2280 (JINR-P2-4808 in Russian) 1969  
High-Energy Interactions of  $\gamma$ -Quanta with Nuclei  
K. K. Gudima, A. S. Il'inov, V. D. Toneev
- ORNL-TR-2290 (CERN-Trans-69-13 in French)  
(from IFVE-ORZ-69-5 [in Russian])  
Biological Shielding and Technique of Rapid Ejection at 70 GeV  
G. I. Britvich, V. T. Golovachik, G. I. Krupnyi, V. N. Lebedev,  
V. V. Mal'kov, N. I. Bushuev
- RPI-328-172 (CONF-691101-1) 1969  
Radiation Production at the RPI LINAC  
J. Haken, R. M. Ryan  
Available: AEC Depository Libraries; CFSTI
- RPP/N-20  
Monte Carlo Calculation of Energy Deposition by the Nucleon-  
Meson Cascade and Total-Absorption-Nuclear Cascade (TANC) Counters  
J. Ranft  
(Rutherford High Energy Laboratory, Chilton Didcot, Berkshire, England)
- RPP/R-7 September 1969  
Studies of the Cascades Induced by 4 GeV Electrons in Concrete  
F. J. Coleman, K. B. Shaw, G. R. Stevenson  
(Rutherford High Energy Laboratory, Chilton Didcot, Berkshire, England)
- UCRL-19364 (CONF-691101-12) August 1969  
Energy and Flux Determinations of High-Energy Nucleons  
H. A. Wollenberg, A. R. Smith  
Available: AEC Depository Libraries; CFSTI
- UCRL-19367 (CONF-691101-11) October 20, 1969  
Shielding Measurement at the CERN 25-GeV Proton Synchrotron  
W. S. Gilbert  
Available: AEC Depository Libraries; CFSTI
- Health Phys., 18(1), 80- (1970)  
A New Model for Calculation of High-Energy Nucleon Penetration  
Through Matter  
J. E. Turner, H. A. Wright, J. H. Grossen

*J. Appl. Phys.*, 39, 5342-3 (October 1968)

A Simple Calculation for Mean Projected Range of Fast Electrons  
T. Tabata

*Kosm. Biol. Med.*, 3(4), 24-9 (July-Aug. 1969) (In Russian)

Problems of Radiation Safety in Manned Flights of Soyuz Spacecrafts  
E. I. Vorob'ev, Yu. G. Grigor'ev, V. I. Efimov, et al.

*Phys. Rev.*, 184, 1279-1282 (August 25, 1969)

Measurement of the Primary Cosmic-Ray Proton Spectrum Between 40 and  
400 GeV  
W. K. H. Schmidt, K. Pinkau, U. Pollvogt, R. W. Huggett

*Izv. Vuz. Fiz. (USSR)*, No. 2, 137-9 (1969) (In Russian)

The Calculation of the Transition Effect for an Electron-Photon  
Shower  
A. M. Kol'chuzhkin, I. N. Shevtsova  
[To be translated in Soviet Phys. J. (USA)]

BOOK (A69-24854)

1968

*CALCULATION OF RADIATION DOSES IN SPACE*

C. Elbaz, J. F. Faugere, A. Lebeau (eds.)

ARTICLE: A Program of Dose Calculation (P. 130-164)  
J. Brettes, J. P. Philippon (A69-24862) (in French)

ARTICLE: A Method for Estimating Particle Fluxes Affecting a  
Satellite in Space (P. 165-171)  
G. Quaranta (in French) (A69-24863)

ARTICLE: Preliminary Study of the D-2 Experiment (P. 243-260)  
J. Huriet, J. Crifo, P. Coufleau (in French) (A69-24869)

(Comptes Rendus Des Journees Europeenes, Toulouse, France)

#### COMPUTER CODES LITERATURE

DASA 2396 (MR-6910)

January 1970

ANTE 2

ANTE 2 - A FORTRAN Computer Program for the Solution of the Adjoint  
Neutron Transport Equation by the Monte Carlo Technique  
by M. O. Cohen  
FORTRAN IV for CDC 6600

ORNL-CF-69-7-60

July 1969

OGRE MASTAPE

OGRE MASTAPE - Photon Interaction Cross Section Library and Data  
Handling Code  
by D. K. Trubey and H. E. Francis

UJV 2129-R

1969

MUN/MUG

Multigroup Cross Sections Calculation for Use in  $S_n$  Method  
by J. Rataj  
ALGOL for GIER

WCAP-3845-1, ENDF 114

December 1969

ETOG-1

ETOG-1 - A FORTRAN IV Program to Process Data from the ENDF/B File  
to the MUFT, GAM, and ANISN Formats  
by D. E. Kusner, R. A. Dannels, and S. Kellman  
ASA FORTRAN

WCAP-3845-2, ENDF 133

January 1970

ETOG-1

Description of the Generation of Data Decks by ETOG-1 for Use in  
Creating MUFT and GAM Libraries  
by S. Kellman and D. E. Kusner