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. 8 July 14, 1965

A LETTER TO THE EDITOR

I was delighted to see the editorial in your Newsletter of June 11, 1965. I am glad to see that someone is taking leadership to help standardize the meanings of some of the technical terms which are being thrown around. I have some very definite comments on some of these matters.

I am bothered particularly by the term "relaxation length." I realize, because of my training as a physicist, why this term has crept into usage. However, I think that it basically is an improper term since there is nothing that is "relaxing" in the particular circumstance that it occurs in shielding. My own very strong preference is for a term such as "attenuation length." If my own preference does not obtain general acceptance, I would still much prefer the term "e-folding length" to the term "relaxation length."

I also have a comment with respect to the term "mean free path." In the first place, I usually hyphenate this term, although this is not highly important. A probably more important comment relates to the two meanings of this term. It may be used either to mean the average distance of a photon or particle to interaction, or to mean a certain length measured in units of a mean-free-path. In this respect it is very much like the ordnance term "caliber," which may either be used to represent the diameter of the barrel of a gun or the length of the gun in terms of the diameter used as a unit. My own personal method of distinguishing between these two concepts is to use the term "mean-free-path" to refer to the original basic unit which is the average of path length to interaction, and to use for any distance measured in terms of that basic unit, the expression "mean-free-path lengths."

I hope my comment is of assistance in clarifying rather than confusing these issues. Thanks very much for the opportunity.

Arthur B. Chilton
University of Illinois

THREE INFORMATION CENTERS RELATED TO RSIC

From time to time scientists who deal with shielding from radiation need information which is related but not strictly in the shielding field. Three information centers are briefly described here, which can aid the scientist in securing information which is on the fringe area of shielding.

Nuclear Safety Information Center (NSIC)

The broad field of nuclear safety as covered by NSIC touches on shielding from radiation in two areas. The first area is the diffusion and deposition of radioactive material near the earth's surface in connection with reactor operations and the atmospheric transport and fallout in the troposphere and stratosphere as a result of nuclear weapons tests. The second area includes waste disposal and effluent monitoring, environment surveillance, radionuclide movement in soil and water, uptake by flora and fauna, processes that influence movement and retention, as well as the determination of ultimate radiation exposure to man.

You may contact NSIC by writing:

Wm. B. Cottrell, Director
Nuclear Safety Information Center
Oak Ridge National Laboratory
P. O. Box Y
Oak Ridge, Tennessee 37831

Isotopes Information Center (IIC)

In the broadest sense, the scope of IIC includes anything that has to do with the production and use of isotopes. More specifically the IIC deals with application of isotopes in industry and research and current awareness of related applications in biology, medicine, agriculture, and education.

You may contact IIC by writing:

P. S. Baker, Director
Isotopes Information Center
Oak Ridge National Laboratory
P. O. Box X
Oak Ridge, Tennessee 37831

Radiation Effects Information Center (REIC)

The REIC deals with information related to radiation effects in a broad sense and hence touches on areas somewhat related to shielding from radiation. The information about radiation effects that the REIC considers are: (1) nuclear reactors and pulse facilities; (2) space environment, including charged-particles radiation, electromagnetic radiation, and cosmic rays, and ultrahigh vacuum, magnetic fields, gravitational fields, and micrometeorites when associated with radiation environments; (3) machine sources.

You may contact REIC by writing:

Radiation Effects Information Center
Battelle Memorial Institute
505 King Avenue
Columbus 1, Ohio

ATTN: E. N. Wyler

RESULTS OF THE RSIC COORDINATORS' MEETING IN GATLINBURG

A group of 33 persons met during the Gatlinburg ANS meeting so that the coordinators and the RSIC staff might exchange suggestions for better service and cooperation.

One suggestion has already been acted upon. This was to provide the punched holes that you see in this newsletter. An inquiry was made as to whether the newsletter might publish news submitted by readers. The answer was in the affirmative subject to space and scope limitations.

The suggestions in the area of computer codes touched upon the machine and/or system compatibility problems and the need for feedback to RSIC from users of shielding codes and included a suggestion that RSIC sponsor seminars on certain useful codes.

It was agreed that a more efficient job of standardizing to a system could be done if the RSIC staff had more information on hardware and software available at user installations. The suggestion that a factual questionnaire be sent to the coordinators will be followed in the near future.

Several complimentary comments were made regarding the RSIC bibliographies, literature searches, and the SDI service.

It was interesting to note that four persons present were willing to accept microfiche as document copy if RSIC should provide such service. An affirmative answer was given to a question raised as to whether RSIC was interested in internal reports.

A lively discussion ensued on slant penetration of gamma rays. The outcome was that a survey of the methods of calculation and the data presently available is needed and that more research needs to be performed.

RSIC also made suggestions to the coordinators. These consisted mostly of pleas to inform of current work, reports, and code development.

RECENT VISITORS TO RSIC

The following people visited RSIC during the month of June: V. F. Menshikov and S. P. Potapov, members of the State Committee for the Utilization of Atomic Energy of the USSR, Moscow, USSR; I. I. Gedeonov, Khlopine Radium Institute, Lenigrad, USSR; Donald C. Coonfield and George G. Rishey, DOW Chemical, Golden, Colorado; Milo Solomito, Jr., University of Tennessee, Knoxville; Ed Donovan, Atomics International, Canoga Park, California; Lyman J. Templin, Argonne National Laboratory, Illinois; Frank J. Patti, Burns and Roe, Inc., New York; Arthur B. Chilton, University of Illinois, Urbana, Illinois; Lester G. Epel, Brookhaven National Laboratory, Upton, New York; Herbert Goldstein, Columbia University, New York; Dave T. Goldman, National Bureau of Standards, Washington; Wilbur Bunch, Battelle-Northwest, Richland, Washington; and John Carver, G. E. Vallecitos, California.

ADDITIONS TO MARCH 17 NEWSLETTER LIST OF COMPLETE CODE PACKAGES

CCC-26: GRACE-II
GAMMA-RAY KERNEL INTEGRATION DOSE RATE AND HEATING CODE (CYLINDERS AND SPHERES), contributed by Atomics International, Canoga Park, California
FORTRAN, IBM-7090-4, CDC-1604 (Reference: WL-TDR-64-40)

CCC-27: ACT II
ACTIVATION GAMMA-RAY SOURCE STRENGTH CODE, SIMPLE GEOMETRY, FINITE DILUTION, contributed by Westinghouse Electric Company, Astronuclear Laboratory, Pittsburgh, Pennsylvania
FORTRAN, IBM-7090-4 (Reference: NAA-SR-4649)

CCC-28: QAD
KERNEL INTEGRATION CODE, PENETRATION AND HEATING IN COMPLEX GEOMETRY, contributed by Los Alamos Scientific Laboratory, N Division, Los Alamos, New Mexico
FORTRAN, IBM 7090-4 (Reference: to be published)

CCC-29: MARTY-G
MONTE CARLO GAMMA-RAY RADIATION TRANSPORT AND HEAT DEPOSITION RATES IN LIQUID HYDROGEN - SLABS AND CYLINDERS, contributed by NASA, George C. Marshall Space Flight Center, Huntsville, Alabama
FORTRAN, IBM 7090
(Reference: NASA TN D-1115)

CCC-30: MARTY-N
MONTE CARLO NEUTRON RADIATION TRANSPORT AND HEAT DEPOSITION RATES IN LIQUID HYDROGEN - SLABS AND CYLINDERS, contributed by NASA, George C. Marshall Space Flight Center, Huntsville, Alabama
FORTRAN, IBM 7090
(Reference: NASA TN D-1115)

CCC-31: BREMRAD
EXTERNAL AND INTERNAL BREMSSTRAHLUNG CALCULATION CODE, contributed by Chemical Laboratory, Battelle-Northwest Laboratories, Richland, Washington
FORTRAN, IBM 7090
(Reference: HW-83784)

CCC-32: LIGHT
INELASTIC GAMMA PRODUCTION CODE, contributed by Lockheed Nuclear Products, Lockheed-Georgia Company and NASA, George C. Marshall Space Flight Center, Huntsville, Alabama
FORTRAN, IBM 7090
(Reference: ER-6643)

CCC-33: SALOMON
MONTE CARLO GAMMA TRANSPORT CODE LAMINATED SLABS, contributed by Research Institute of National Defense, Stockholm, Sweden
FORTRAN, IBM 7090-4
(Reference: A-4403-441)

CCC-34: TOPIC
A FORTRAN PROGRAM FOR CALCULATING TRANSPORT OF PARTICLES IN CYLINDERS, contributed by Phillips Petroleum Co., Atomic Energy Division, Idaho Falls, Idaho
IBM 7090-4
(Reference: IDO-16968)

CCC-35: DIPSEA
MONTE CARLO DOSE CALCULATION, ISOTROPIC POINT SOURCE, EXPONENTIAL ATMOSPHERE, contributed by Technical Operations Research, Burlington, Massachusetts, and MIT Lincoln Laboratory, Lexington, Massachusetts.
FORTRAN-FAP, IBM 7090-4
(Reference: TO-B 64-12)

CCC-36: EMPIRE-II
MULTI-GROUP DISCRETE ORDINATE TRANSPORT CODE, SLAB GEOMETRY, contributed by Westinghouse Corporation, Bettis Atomic Power Laboratory, Pittsburgh.
FORTRAN, PHILCO-2000
(Reference: WAPD-TM-436)

JUNE ACCESSION LIST OF LITERATURE

The following accession list consists of literature which the RSIC obtained through its usual scanning procedures. This literature will be examined for assignment to various files or for possible rejection. The accession list is divided into three fields of (1) reactor and weapons shielding, (2) space and accelerator shielding, and (3) shielding computer codes.

Reactor and Weapons Shielding

UCRL-14007

Tabulated Neutron-Induced Gamma Production Cross Sections for Primary Neutron Energies of 0.1 to 15 MeV
Nanette Chazan - January 13, 1965

ORNL-RSIC-3

A Comparison of First- and Last-Flight Expectation Values Used in an O5R Monte Carlo Calculation of Neutron Distributions in Water
D. K. Trubey and M. B. Emmett - May 1965

ORNL-RSIC-7

Tabulated Values of Scattered Gamma-Ray Fluxes in Iron Interpolated from Moments-Method Calculations
D. K. Trubey - May 1965

USNCEL TN-707

The Variation of Dose Attenuation of Two-Legged Concrete Ducts with Incident Gamma-Ray Energy
J. M. Chapman - April 16, 1965

USNRDL-tr-829

A Computer Program for Unfolding Pulse-Height Distributions
C. V. Smith and N. E. Scofield - March 5, 1965

BNL-918

Least Squares Analysis of the 2200 m/sec Parameters of U-233, U-235, and Pu-239
Rudolph Sher and Joan Felberbaum - March 1965

GA-6087 (NASA CR-54290)(Revised edition)

Neutron Cross Sections for U-238
G. D. Joanou and C. A. Stevens - April 16, 1965

ORNL-TM-1077

Slowing-Down Spectra of Neutrons in Lithium Hydride
V. V. Verbinski - May 1965

CEA-R-2774

Contribution to the Study of Neutron Propagation in Cavities
Gilbert Hasselin - March 1965

NAVWEPS-8300, Vol. VII

Bibliography on the Vulnerability of Nuclear Weapons: Nuclear Radiation Environment
P. L. Morgan, Earl B. Massengill, Jr., et al. - April 30, 1965

CRC-1210

Methods of Dosimetry and Flux Measurements and Their Application in the NRX Reactor
A. W. Boyd, H. W. J. Connor, et al. - January 1965

LADC-6756

Use of Discrete Ordinates Methods for Solution of Photon Transport Problems
K. D. Lathrop - 1965

BOOK

Group Constants for Nuclear Reactor Calculations
I. I. Bondarenko, Editor - Publisher - Consultants Bureau, New York - 1964

SC-TM-64-1791

Calibration of the Sandia Laboratory 10,000 Curie Cobalt-60 Gamma Irradiation Facility
Louis H. Sanders and Irving Auerbach -- February 1965

P-1495 (AD-606998)

Invariant Imbedding and Neutron Transport Theory. IV. Generalized Transport Theory
Richard Bellman, Robert Kalaba, and G. Milton Wing - September 1958

EIR-BERICHT NR-78

Neutron Flux Measurements in Bent Air Ducts through Water
Jean-Marie Paratte and Akbar Etemad - March 1965

AEEW-M-513

Neutron Cross-Sections of Be9 in the Energy Range 1 MeV to 15 MeV
G. Doherty - March 1965

UCRL-12339 (Vol. I and Vol. II)

Gamma Dose Rates and Integrated Doses from Neutron-Induced Residual Radioactivity in Soil
R. M. Lessler and F. W. Guy - March 1, 1965

SC-RR-65-141

Transmission of X Rays through Air
James H. Renken - April 1965

AWRE-O-100/64

Neutron Cross Sections of U-233 in the Energy Range 4 to 15 MeV
A. C. Douglas -- January 1965

CONF-654-32

Self-Shielding in Closely Spaced Slab Lattices
S. W. Kitchen and K. R. Edgar - 1964

JINR-P-1950

On "Beating" of Nuclear Radiation Due to a Particle Flux of Variable Intensity
V. G. Baryshevskii and M. I. Podgorentskii - 1965

CEA-R-2442

Experimental Measurement of Neutron Spectra in the Reflector of a Light Water Reactor
Pierre Brethe - 1964

WAPD-T-1728

The Analytical and Monte Carlo Analysis of an Experiment Designed to Illustrate Spatial and Energy Interference Among Resonance Nuclides
N. R. Candelore and R. C. Gast - December 1964

UCRL-11902

The Prompt Gamma Ray, Prompt Electron and Prompt X-Ray Spectra Associated with Fission Fragments of Specific Mass
Harry R. Bowman, Stanley G. Thompson, et al. - January 27, 1965

HW-SA-3525

Neutron Spectrum Measurements at Hanford Work Locations
G. W. R. Endres - May 15, 1964

IEA-83

Measurements of Fast Neutron Fluxes and Spectra at the I. E. A. 6 Mw Reactor
S. B. Herdad, A. A. Suarex, et al. - December 1964

Bull. Inst. Chem. Research (Kyoto University), 43(1), 22-44 (1965)

Streaming of Gamma Rays through Metallic Pipes
H. Kakimoto, T. Saigusa and S. Shimizu

USNCEL tr-377

An Absolute Measurement of Thermal Neutron Albedo for Several Materials
D. R. Doty - May 1965

AFWL-TR-64-180

Measurement of Fast Neutron Spectra in an Infinite Medium of CH_2
A. E. Profio and J. Kirkbride - April 1965

AE-184

Energy Dependent Removal Cross-Sections in Fast Neutron Shielding Theory
H. Gronroos - May 1965

AE-185

A New Method for Predicting the Penetration and Slowing-Down of Neutrons in Reactor Shields
L. Hjarne and M. Leimdorfer - May 1965

ORNL-RSIC-4

Some Calculations of the Fast-Neutron Distribution in Ordinary Concrete from Point and Plane Isotropic Fission Sources
D. K. Trubey and M. B. Emmett - June 1965

ORNL-RSIC-8

Survey of Methods for Calculating Gamma-Ray Heating
H. C. Claiborne - June 1965

RRA-M51

Simulation of Fallout Gamma Radiation Fields by Monoenergetic Plane Isotropic Sources
R. L. French - June 21, 1965

RRA-T51

Neutron and Gamma Radiation Penetration Into Concrete-Shielded Underground Structures
R. L. French, M. B. Wells, and N. M. Schaeffer - May 31, 1965

USNRDL tr-817

Calculated Efficiencies of Lithium-Drifted Germanium Detectors
H. P. Hotz, J. M. Mathiesen and J. P. Hurley - February 1965

Space and Accelerator Shielding

AMP 160

The Electron Plasma-Experiment Theory and Applications
R. H. Levy and G. S. Janes - June 1965

AVCO Research Report 213

The Effect of Coherent Radiation on the Stability of a Crossed-Field Electron Beam
R. H. Levy - June 1965

Nucl. Instr. and Methods, 33, 261-267 (1965)

Shielding Measurements on 4.8-GeV Bremsstrahlung
G. Bathow, E. Freytag, and K. Tesch

NBS Report 8678

Calculation of Energy Dissipation by Electrons in Water
M. J. Berger - April 22, 1965

Shielding Computer Codes

RP/TN82 DSN

Fortran DSN
by B. Clancy, A. Scott, and M. Steps
Fortran IV for IBM-7040, -7044

D2-90684-1 SPARES

Slides Used in Symposium on Space Radiation Environment and Shielding Codes
April 1965

EUR 2204.1 January 1965 GAMMONE

Program for Gamma-Ray Attenuation Through Multilayer Composite Shields
by L. Criscuolo and M. G. Cerisola
Fortran for IBM-704

WAPD-BT-31 1964 GR-1
Pages 43-49

Penetration of Point Monodirectional Gamma Rays Through Slab Shields

ORNL-tr-624 June 1964 ARIEL
(ISS-64/21)

The Ariel Program for the Study of Photoproduction Reactions in Hydrogen
by G. Farchi and P. Lanciani
Fortran IV for IBM-7040 Computer

GEMP-272 January 1964 18-1

Addenda to GEMP-102 Describing Program 18-1
by J. P. Yalch and J. E. MacDonald
Fortran for IBM-7090 Computer

FOA A RAPPORT A-4411-411 January 1965 PROTOS

A Monte Carlo Procedure for Calculating the Migration of Protons Taking Account only of Electromagnetic Interactions
by C. Johansson and M. Leimdorfer
Fortran II for IBM-7090 Computer