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. 105 August 1973

Mathematics may be compared to a mill of exquisite workmanship
which grinds you stuff of any degree of fineness,
but nevertheless what you get out depends on what you put in -
and as the grandest mill in the world
will not extract wheat flour from peapods,
so pages of formulae will not get a definite result out of loose data.

. . . T. H. Huxley

EURATOM WORKING GROUP ON REACTOR DOSIMETRY (EWGRD)

The EURATOM Working Group on Reactor Dosimetry has been created mainly to exchange information between the different EURATOM countries, to coordinate European work on reaction dosimetry, to try to set tentative norms for standardization of measurements in Europe. Its role is consultative. Each national laboratory has a permanent member; specialists are invited to the meetings at which special problems are discussed. This working group works in close cooperation with other committees and especially with the IAEA, which has two observers in the EWGRD.

The EWGRD has recently shifted somewhat the emphasis of its work from the presentation of individual papers (often conceived as progress reports) to the discussion of specific problems aimed at producing common documents. Much of the work in this respect is carried out by special subgroups. By this means the EWGRD could make recommendations agreed upon by all members without losing the advantage of the exchange of information. The arguments generally discussed in the EWGRD are: cross-sections, standardization and absolute measurements, neutron measurements, calorimetry, β and γ activity measurements, radiation damage, fuel irradiation and burn-up, detection technology and standard spectra. Special importance was put on the definition of errors. At recent meetings special emphasis was put on cross-sections and other nuclear data of detectors, and tentative recommendations were published concerning radiation damage measurements and interpretation.

Five general progress reports on the EWGRD activities were published, each containing a list of reports presented at the meetings:

1. Les activités du groupe de travail Dosimetrie d'Euratom EUR 88 f 1963, Delattre P. and Prosdocimi A.
2. The activities of the EWGRD 9/62-6/64 EUR 2179e 1964 Delattre P., Gubernator K.

3. Progress report of the EWGRD 6/64 - 6/68 EUR 4386 e 1969 U. Farinelli, M. Coppola.
4. Progress report of EWGRD 7/68 - 6/70 EUR 4528 e 1970 U. Farinelli, M. Coppola.
5. Progress report on the EWGRD 6/70 - 12/72 to be published, U. Farinelli, H. Liskien.

(From ESIS Newsletter No. 6 [July 1973] available from European Shielding Information Service, 21020 Ispra (Va), Italy)

CALIFORNIUM-252 Information Center

A ^{252}Cf Information Center has been established at the AEC's Savannah River Plant. The growing number of inquiries about the ^{252}Cf market evaluation program, as well as technical questions about ^{252}Cf, have made it necessary to centralize and make readily available such information. A current bibliography of published literature on ^{252}Cf is maintained. Questions are directed to appropriate groups for answers. Information regarding the AEC's various evaluation programs and the AEC sales program, copies of the progress reports, buyer's guide, order forms, and information and answers to questions about ^{252}Cf may be obtained by telephoning 803-824-6331, ext. C252, or by writing to Californium-252 Information Center, Savannah River Laboratory, Aiken, South Carolina 29801.

Two demonstration centers have also been established: (a) Information regarding the Louisiana State University ^{252}Cf Demonstration Center may be obtained by telephoning 504-388-2163 or by writing to Dr. John C. Courtney, Assistant Manager, Californium-252 Demonstration Center, Louisiana State University, Baton Rouge, Louisiana 70803; and (b) Information regarding the Intelcom Rad Tech ^{252}Cf Demonstration Center may be obtained by telephoning 714-565-7171, ext. 17332, or by writing to Dr. Joseph John, Technical Program Manager, Californium-252 Demonstration Center, Intelcom Rad Tech, P.O. Box 80817, San Diego, California 92138.

Literature available includes: *Californium-252 Progress*, issued quarterly and consisting of two main sections - (1) *Californium-252 News*, reports on progress in the market evaluation program, cost and availability of californium-252, market projections, announcements of meetings and publications, and other topics related to the development of californium-252 applications, which are expected to lead, eventually, to a firm market for californium-252; (2) *Californium-252 Technology Development*, reviews of applications technology developed under the market evaluation program, californium production technology, and other technical accomplishments related to californium-252 utilization. (Available from Cf-252 Information Center.) *Guide for Fabricating and Handling Californium-252 Sources*, a comprehensive review of radiation and decay properties of ^{252}Cf; permissible contamination, posting of areas, labeling of containers, survey techniques, personnel monitoring; routine handling techniques for sealed sources and unencapsulated californium; permissible radiation doses, shielding requirements, shield design; containment and ventilation; packaging and labeling

of shipping containers; inventory and control requirements; purification techniques and product description; AEC facilities and techniques for fabricating and testing encapsulated sources; and radiation units. (Copies of the guide (Document Number SRO-153) may be purchased for $3.00 each from National Technical Information Service, U.S. Department of Commerce, Springfield, Va. 22151.) *Californium-252 Buyers' Guide* presents the AEC's californium-252 sales program. Information is furnished about: price and availability; product specifications and packaging; shipping and licensing requirements; and ordering procedure. An order form and a brief summary of safety considerations are included. (Available from Cf-252 Information Center.)

STUDY COURSE ON ATOMIC ENERGY LICENSING AND REGULATION-IV

The ALI-ABA Joint Committee on Continuing Legal Education has announced a Study Course to be held in Washington, D. C., September 20-22 at the Washington Hilton. A faculty of 16 members, headed by Planning Chairman Harold P. Green, Professor at the George Washington University National Law Center, consists of leading experts in the field. Sessions will cover atomic energy law developments, amendments, and various agreements; experience in licensing nuclear power plants under the AEC's restructured rules; costs, benefits, and alternatives in the AEC's NEPA process; special problems in nuclear power licensing; and current developments and problems.

The registration fee of $225 covers the cost of materials, the course and special events. Room reservations should be made directly with the hotel where a block of rooms is being held.

For further information contact Paul A. Wolkin or Donald M. Maclay of the ALI-ABA Joint Committee, 4025 Chestnut Street, Philadelphia, Pa. 19104, or telephone 215-387-3000.

NEW IN THE LITERATURE

Attention is called to the publication of the following special literature, neither of which is available from RSIC. Please note availability in each case.

NUCLEAR DATA TABLES 11, 433-529 (1973) - *Compilation of keV-Neutron-Capture Gamma-Ray Spectra,* J. R. Bird and B. J. Allen, AAEC Research Establishment, Lucas Heights, N.S.W., Australia; I. Bergqvist, University of Lund, Lund, Sweden; J. A. Biggerstaff, Oak Ridge National Laboratory, Oak Ridge, Tenn. 37830: A compilation is presented of gamma rays observed following the capture of neutrons in the energy range 5-300 keV. Gamma-ray energies and intensities are compared with results from thermal-neutron capture and from (d,p) reactions. Tables include the properties of resonance capturing states (when known) and of final states populated by primary gamma-ray transitions. Decay schemes are given for cases in which specific neutron resonances are resolved. Typical spectra are included to illustrate the experimental results.

NUCLEAR TERMINOLOGY, an updated glossary of nuclear terminology, containing 597 items in English, French, and Russian. Includes, as an appendix, a classification system for nuclear reactors. (ISO International Standard 921, available at $41.15 from American National Standards Institute, 1430 Broadway, New York, N. Y. 10018.

PERSONAL ITEMS

Glen A. Graves, Assistant for Research in the Los Alamos Scientific Laboratory Director's Office, is going on loan from LASL for a year to the National Science Foundation (NSF) in Washington, D.C., where he will be a member of the special Energy R&D Task Force which has been established to advise the NSF Director on energy matters. He has been a contributor-user-booster of RSIC for several years.

Lincoln Jung, ORNL Reactor Division, is currently working with Technical Review, Environmental Specialists Branch, Licensing,USAEC, in Washington, D.C.

Stephen E. Binney, formerly with the Radiation and Environmental Sciences Department of EG&G, Las Vegas, is now an Assistant Professor in the Department of Nuclear Engineering, Oregon State University at Corvallis.

Arthur Reetz of NASA Headquarters is again associated with Warren Keller in Washington, D.C. as Program Engineer for the Mariner Jupiter-Saturn 1977 Mission.

Leonard Galanter has left Brookhaven National Laboratory and is now working with New York State Atomic and Space Development Authority as Director of Nuclear Power Siting.

The following changes of address are noted: *John Burgio* from Picatinny Arsenal, Dover, New Jersey to the Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico; and, *A. M. Nakashima* from the Jet Propulsion Laboratory, Pasadena, to Bechtel Power Corporation, Norwalk, California.

COMPUTER CODE COLLECTION CHANGES

Several changes have been recently made to the collection including additions, different hardware versions made available, and modifications and corrections made to existing code packages.

CCC-75/G-33 (75C)

The Los Alamos Scientific Laboratory contributed the latest G^3 - the 6th generation of the code, and it has been packaged as CCC-75C/G^3-6ED: Multigroup Gamma-Ray Scattering Code. FORTRAN IV, CDC 6600. Reference: LA-5176. This version replaces the original G^3-3rd generation formerly packaged. The package includes a bi-cubic 2-dim spline coefficient generator, an evaluator, and associated subroutines.

CCC-82/ANISN (82H)

The CEA Nuclear Research Center, Fontenay-aux-Roses, France, has contributed through the OECD NEA Computer Programme Library their version of the discrete ordinates transport code ANISN, including several extensions and modifications made to the original package. FORTRAN IV, IBM 370. References: CEA-N-1358 (ORNL-tr-2419) and CEA-N-1335 (ORNL-tr-2408). CCC-82H.

CCC-115/GADJET (115B)

Kansas State University has contributed a revised version of the Monte Carlo Gamma-Ray Adjoint Energy Transport Code (GADJET) in Complex Three-Dimensional Geometry, simplifying and standardizing the FORTRAN IV, operable on the CDC 6600. It is packaged as CCC-115B/GADJET.

CCC-179/ATR-II (179C)

A new frozen model of the ATR (Air Transport of Radiation) code and data package is available as CCC-179C/ATR-II. Contributed by Science Applications, Incorporated, La Jolla, California. FORTRAN IV, IBM 360. Reference: SAI-73-534-LJ (in publication, DNA-number to be assigned).

CCC-203/MORSE-CG

General Purpose Monte Carlo Multigroup Neutron and Gamma-Ray Transport Code. Several corrections have been made to the combinatorial geometry routines through the cooperation of MAGI, ORNL, and SAI, Albuquerque. All versions: CCC-203A (UNIVAC), CCC-203B (CDC 6600), and CCC-203C (IBM) have been corrected and are in the process of repackaging. It is suggested that requesters ask for an entire package in order to get all changes made recently.

CCC-204/SWANLAKE

A new model has been contributed by Oak Ridge National Laboratory of the SWANLAKE Code which Utilizes ANISN Radiation Transport Calculations for Cross Section Sensitivity Analysis. This version has been modified to make it more user-oriented and replaces the previous model.

CCC-212/ADJMOM

Adjoint Moments Method Gamma-Ray Transport Code, contributed by the National Bureau of Standards, Washington, D.C. FORTRAN IV, IBM 360. Reference: NBS-TN-748.

CCC-213/ACRA

Kernel Integration Code - Gamma-Ray Dose from a Radioactive Cloud, contributed by Oak Ridge National Laboratory. FORTRAN IV, IBM 360. Reference: ORNL-TM-4082.

CCC-215/TESS Multigroup Discrete Ordinates Code for Slab and Spherical Geometries, contributed by Argonne National Laboratory, Illinois. FORTRAN IV, CDC 3600. Reference: ANL-7406.

CCC-216/SHADOK 3-6 Transport Code - P_1 Scattering in Infinite Cylindrical and Spherical Geometries by Polynomial Approximation, contributed by the Swiss Federal Institute for Reactor Research (EIR), Wurenlingen, through the OECD NEA Computer Programme Library. FORTRAN IV, CDC 6600. Reference: EIR-Nr. 5087.

CCC-217/ORIGEN Isotope Generation and Depletion Code - Matrix Exponential Method, contributed by Oak Ridge National Laboratory. FORTRAN IV. Reference: ORNL-4628.

PERIPHERAL SHIELDING CODES (PSR)

PSR-20/LAPHANO A new updated CDC 6600 version was supplied by LASL, replacing the frozen model of 3/73 announced in the June Newsletter. It may be requested as PSR-20B/LAPHANO-CDC(6/73). The package contains documentation, I-O for a sample problem and the source program.

PSR-37/SASSI An updated model has been packaged as SASSI-7/73: Calculation of Neutron Scattering from a Spherical Optical Potential. This contribution from CNEN, Centro di Calcolo, Bologna, Italy, replaces the two earlier versions formerly publicized. FORTRAN IV, IBM 360. References: CNEN-CEC(68)18 and CNEN-RT/FI(71)6.

PSR-57/SATURN R. H. Johnson, University of Illinois, in using SATURN (designed to be compatible with ANISN-W) with ANISN (IBM 360 version) discovered that a small change must be made for compatibility with the latter version: delete the record (card) RNG20120 from Subroutine RING2 of SATURN.

PSR-60/RESPMG Response Matrix Generation Code, contributed by Oak Ridge National Laboratory. May be used in conjunction with PSR-14/05S or similar program. FORTRAN IV, IBM 360. Reference: ORNL-TM-2594.

PSR-61/LAPHAN P_0 to P_4 Multigroup Photon-Production Matrices Generator Using ENDF Data, contributed by Los Alamos Scientific Laboratory. FORTRAN IV, CDC 6600. References: LA-4963, LA-4750-MS and LA-4337.

PSR-62/MORN Calculation of the Response of Sodium Iodide Crystals to Gamma Rays, contributed by Oak Ridge National Laboratory. FORTRAN IV, IBM 360. Reference: ORNL-TM-2579.

CORRECTIONS TO ORNL-4464 AVAILABLE

E. A. Straker, SAI, Huntsville, Alabama, has asked that RSIC publish the following information on Errata for ORNL-4464, "Neutron and Secondary Gamma Ray Transport in Infinite Homogeneous Air."

"In 1969 the above report containing basic data for the transport of neutrons and secondary gamma rays through the atmosphere was published. In the past four years, numerous errors in the report have been discovered by users of the data. For the errors of which I am aware, I have listed the corrections in the attachment. It should be noted that some of the tabular data are wrong, Air Kerma for example, due to errors in input to the edit program; while some other errors were typographical and do not affect the tabular data."

The attachment will be sent from RSIC on request.

VISITORS TO RSIC

Visitors to RSIC during the month of July were: G. P. Cavanaugh, University of Illinois, Urbana; R. E. DeKinder, Jr., White Sands Missile Range, New Mexico; R. K. Disney, Westinghouse Advanced Reactors Division, Pittsburgh, Pa.; E. Hedaya, Jerusalem, Israel; H. W. Morton, Nuclear Fuel Services, Inc., Rockville, Md.; Y. Shima, Soreq Nuclear Research Center, Yavne, Israel; M. H. Turner, III and G. L. Wells, Dallas Baptist College, Dallas, Tex.

JULY ACCESSION OF LITERATURE

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

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

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

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Assembly of Atomic Reactors (Power and Research Types).
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Fast-Neutron Spectra Behind Materials and Compositions Used in Nuclear-Reactor Shielding, An Atlas.
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Calculations of the Lifetimes of Prompt Neutrons in a Reactor by the Monte Carlo Method.
Frank-Kamenetskii, A.D.; Yudevich, M.S.
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The Use of Threshold Detectors to Evaluate Neutron Leakage Spectra for Dosimetry Calculations.
Boot, S.J.
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Calculation of the Controlled Thermonuclear Standard Blanket as Established by the ORNL Working Session Neutronics Committee: Phases I and II.
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Gamma Dose Rate at an External Point on the Major or Minor Axis of a Solid Radioactive Spheroid Source.
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Comparison of One and Two Dimensional Discrete Ordinate Calculations with Experimental Results.
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Measurement of Energy and Place Dependence of Neutron Importance Function in Fast Critical Zero-Energy Facilities.
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The Shielding of Gamma Radiation by Very Heavy Concrete with Density of More than 4 g/cc.
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Evaluated Neutron Reaction Data for Uranium 235.
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