

RSIC Newsletter



RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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Everyone's future is, in reality, an urn full of unknown treasures from which all may draw unguessed prizes. . . . Lord Dunsany

RSIC ORIENTATION VISIT TO EUROPEAN SHIELDING GROUPS

Betty F. Maskewitz returned on June 20th from a series of orientation visits to radiation protection and shielding groups in five countries, eleven separate installations. She attended the CODATA conference held in Sicily, following which she held discussions with RSIC contributor-users in Italy, Hungary, Poland, France and England. The following installations were visited: the European Shielding Information Service (ESIS), Euratom in Ispra (Varese), Italy; the Central Research Institute of Physics and the Budapest Technical University Training Reactor Center in Budapest, Hungary; the Institute of Nuclear Research in Swierk-Otwock, and the Institute of Physics and Nuclear Techniques of the University of Mining and Metallurgy in Krakow, Poland; the CEA/CEN/Saclay in Gif-sur-Yvette, France to which other French shielding specialist groups were invited; UKAEA Winfrith Establishment, Dorchester, Dorset; and the Royal Naval College in Greenwich, England where a meeting was held with other UK shielding specialists.

On behalf of the Biomedical Computing Technology Information Center (BCTIC), Ms. Maskewitz visited the Institute of Oncology in Warsaw, Poland and also held discussions with biomedical computing specialists at the University of London, England.

Discussions were held with leaders of the OECD Nuclear Energy Agency Data Bank at CEA/CEN/Saclay and Ms. Maskewitz attended the NEA Data Bank Steering Committee meeting at OECD headquarters in Paris as an observer. She was invited to address the Steering Committee on matters of common concern to RSIC and the Data Bank.

Much information was exchanged during the visits, the bonds between RSIC and its European contributor-user community were strengthened, and plans were made to implement cooperative procedures for achieving greater reciprocity in international information exchange in the radiation protection, radiation transport, and shielding fields.

ANS—RP&S HONORS ASHLEY AND BARTINE

The American Nuclear Society Radiation Protection and Shielding Division (RP&S) presented its annual award for Outstanding Service to the Division and to the shielding community to Ramon L. Ashley and to David E. Bartine at the recent San Diego meeting. The citations read as follows:

Ramon L. Ashley

Served as the third Chairman of the Division during the very important early, still formative stages of the Division. His enthusiastic and imaginative leadership of the Division provided appropriate stimulus to its further growth and development.

Developed the concept of the ANS-SD documents, whereby important special sessions in shielding were published by the Society and thereby were made available to a broader segment of the community.

Was co-editor of ANS-SD-1, the very first in the series and an important contribution to the understanding of shield calculation accuracy.

In his professional career he has developed and implemented many concepts in radiation and radiological protection, as related to various systems in commercial or test development and use.

David E. Bartine

Served as Chairman of the Division's Program Committee for nearly two years, providing leadership and guidance for the short and longer term development of the programs of sessions and papers that will keep the majority of Division members informed about subjects of interest. This difficult job is one which, when done as well as he has done, provides a stimulating basis for member participation and interest at the twice yearly ANS meetings.

Has been instrumental in the SWANLAKE calculational methodology development, by which the forward and adjoint capabilities of ANISN are coupled and analyses can be performed, demonstrating the sensitivity of results to various parameter variations. This code has been used extensively in sensitivity analyses for shielding calculations related to nuclear reactors, nuclear weapons and fusion reactors.

Has been active in technical considerations related to alternative fuel cycles, and in particular has been involved in the physics of several advanced reactor concepts.

Ashley and Bartine are the third set of recipients of this special award initiated in 1975 to give recognition to those members judged to have given outstanding service to the international shielding community. The first citations went to Marshall Grotenhuis (NRC) and to Betty F. Maskewitz (RSIC) in 1975, followed by citations awarded to Herbert Goldstein (Columbia University) and A. Edward Profio (UC/Santa Barbara) in 1976.

NEW ANS FELLOWS HONORED AT SAN DIEGO

The American Nuclear Society elevated twenty-one members to Fellows in ceremonies held at the meeting in San Diego on June 20. There were several who are well known for their contributions to radiation transport, shielding, and related technical areas. Among this group are: John J. Dorning (University of Illinois); Charles M. Eisenhauer (National Bureau of Standards); Robert J. Howerton (Lawrence Livermore Laboratory); James E. McLaughlin (DOE Environmental Measurements Laboratory); Walter Meyer (University of Missouri-Columbia); Dade W. Moeller (Harvard University); John Moteff (University of Cincinnati); Fred R. Mynatt, Robert W. Peelle, and Rafael B. Perez (Oak Ridge National Laboratory); and Norman M. Schaeffer (Radiation Research Associates).

ANS—RP&S ELECTS OFFICERS

The 1978-79 newly-elected officers for the American Nuclear Society Radiation Protection and Shielding Division (RP&S) were announced at the San Diego meeting. They are as follows:

Chairman: S. A. W. Gerstl, Los Alamos Scientific Laboratory

Vice Chairman/Chairman Elect: W. E. Kreger, Nuclear Regulatory Commission

Secretary: S. E. Binney, Oregon State University

Treasurer: G. P. Lahti, Sargent and Lundy

Executive Committee (3-year term): J. P. Davis, Consolidated Edison Co.
T. R. Crites, Lawrence Livermore Laboratory
W. F. Miller, Jr., Los Alamos Scientific Laboratory

The new chairman announced leaders of the following committees: Program—R. K. Disney, Nominations—Betty F. Maskewitz, Membership—E. T. Boulette, Publicity—J. C. Courtney, and Honors & Awards—D. K. Trubey.

INTERNATIONAL SCHOOL OF RADIATION DAMAGE AND PROTECTION

The "Ettore Majorana" International Center for Scientific Culture is sponsoring a 10-day course on *Calculational Techniques in Shielding and Dosimetry* at the Villa San Rocca in Erice (Italy) October 25—November 3, 1978. The course is devoted to scientists interested in using computer techniques for

solving problems in radiation transport, dosimetry, shielding, and activation-spectrum analysis, and to students who intend to work in this field of applied research. Lecturers, most of whom have contributed to the design of the various computer codes that will be used for demonstration purposes (e.g. EGS, HETC, MORSE, ETRAN, ANISN, SAMPO), will place a strong emphasis on applications in this course. A large variety of problems will be presented in order to provide an interest to those outside the field of radiation protection as well.

A summary of the general program and lecturers follows:

General Program

- Computer methods in radiation protection and dosimetry as viewed by the user of existing codes.*
- A review of basic techniques in radiation transport: analytic, Monte Carlo, discrete ordinates, etc.*
- Low energy neutron-photon transport codes (MORSE, DOT, ANISN, OSR) with application to problems in engineering and physics.*
- Basic analog Monte Carlo techniques applied to electromagnetic cascade shower simulation.*
- Application of electromagnetic shower codes (EGS, ETRAN, CASCADE, EPSC) to problems in engineering, medical physics, dosimetry and high energy physics detector design.*
- Intercomparison of the basic Monte Carlo methods presently used in simulating hadronic cascades.*
- Application of hadronic cascade codes (CASIM, FLUTRA, HETC, JINR) to problems of accelerator shielding and activation.*
- Methods for coupling various existing codes (e.g., MORSE/HETC, EPSC/HETC, EGS/CASPER).*
- Basic techniques and codes used in activation-spectrum analysis (SAMPO, LYRA, DIBRE, SAND-II).*
- Computer methods applied to spectrum analysis using activation detectors around high and low energy accelerators (both electron and proton).*
- The importance of data bases and cross section libraries (and processing codes).*
- Information centers for shielding and dosimetry and for the central repository of codes and cross sections (RSIC, ESIS).*

Lecturers

- T. A. ARMSTRONG, Science Applications, Inc., USA.
 - H. DINTER, Deutsches Elektronen-Synchrotron, Fed. Rep. of Germany.
 - W. ENGLÉ, Oak Ridge National Laboratory, USA.
 - T. GABRIEL, Oak Ridge National Laboratory, USA.
 - T. NAKAMURA, University of Tokyo, Japan.
 - W. R. NELSON, Stanford Linear Accelerator Center, USA.
 - K. O'BRIEN, Environmental Measurements Laboratory, USA.
 - C. PONTI, European Shielding Information Service, Italy.
 - J. RANFT, Karl Marx University, German Democratic Republic.
 - J. T. ROUTTI, Helsinki University of Technology, Finland.
 - G. R. STEVENSON, European Organization for Nuclear Research, Laboratory II, Switzerland.
 - A. VAN GINNEKEN, Fermi National Accelerator Laboratory, USA.
- Lecturers from USSR are also expected.

The total fee, including full board and lodging arranged by the School, is \$250.00, and the closing date for applications is August 15, 1978. For further information, contact the Director of the Course: Dr. Walter R. Nelson, Radiation Physics Group, Stanford Linear Accelerator Center, P. O. Box 4349, Stanford, CA 94305, USA.

AN ENGINEERING APPROACH TO MONTE CARLO ANALYSIS

A special 5-day course on Monte Carlo analysis is being offered by the College of Engineering of the University of Tennessee during the week of September 11-15, 1978. This course is designed specifically for the practicing engineer engaged in shield design and does not presume any prior knowledge of Monte Carlo methods. An understanding of the basics of Monte Carlo methods is emphasized along with their specialized application to practical shielding problems. The versatile Monte Carlo computer code, MORSE, will be described. Special attention will be given to the understanding and use of the ALBEDO option. Acquisition

of the correct Monte Carlo code and/or the appropriate cross-section data for your job will be discussed.

Participating staff includes: P. N. STEVENS (University of Tennessee), V. R. CAIN (Science Applications, Incorporated), and R. W. ROUSSIN and D. K. TRUBEY (Radiation Shielding Information Center (RSIC), ORNL). For additional information about the course and/or registration, write or call Dr. F. N. Peebles, Dean of Engineering, The University of Tennessee, Knoxville, Tenn. 37916, Phone: 615-974-5321.

AUGUST SENSITIVITY-UNCERTAINTY SEMINAR-WORKSHOP—INFORMAL DRESS SUGGESTED

Plans are being finalized for the RSIC seminar-workshop (S-W) on the "Theory and Application of Sensitivity and Uncertainty Analysis," to be held at the Royal Scotsman Inn in Oak Ridge, Tennessee, August 22-24, 1978. If you have not already done so, contact the motel directly for reservations. (Royal Scotsman Inn, 420 S. Illinois, Oak Ridge, Tenn. 37830, Phone 615-483-4371). If you plan to give a paper at the seminar, send the abstract immediately to RSIC for use in preparing the final program. Those who plan to attend should return to RSIC the application form attached to the April and/or May RSIC Newsletter).

Leaders of the S-W will emphasize informality throughout the sessions, and they suggest that participants bring light-weight, informal summer attire in order to be comfortable in Tennessee's normally hot August. For those who like to wear them, shorts will be proper attire for the technical sessions. The motel has a swimming pool and participants are reminded to bring swimming attire.

For further information on the seminar-workshop, see the June RSIC Newsletter.

CALL FOR COMMENTS ON STANDARDS

Comments are requested on NRC Regulatory Guide 8.19, *Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants—Design Stage Man-Rem Estimates*, no later than the deadline, July 17, 1978, by: Secretary of the Commission, Attn: Docketing & Service Branch, U.S. NRC, Washington, D.C. 20555. This guide may be obtained from: NRC, Attn: Director, Division of Technical Information and Document Control, Washington, D.C. 20555.

Comments on the following two standards are also requested no later than July 7, 1978. They may be ordered from The American Nuclear Society, 555 N. Kensington Ave., LaGrange Park, Ill. 60525. The standards are: BSR/ANS-6.6.1, *Calculation and Measurement of Direct and Scattered Gamma Radiation from Nuclear Power Plants*, (new standard), Price, \$7.50; and BSR/ANS-19.5, *Requirements for Reference Reactor Physics Measurement*, (new standard), Price, \$5.00.

IRRADIATION FACILITIES AVAILABLE AT ENGINEERING TEST REACTOR

The U.S. Department of Energy (DOE) has evaluated the current testing schedule of the Engineering Test Reactor (ETR) and has determined that irradiation facilities in the ETR can be made available to additional experiment sponsors.

Because of a limited number of high flux irradiation facilities in the United States, there has been a growing dependence on foreign reactors to fulfill the needs of U.S. experimenters. The continuing need for development and safety testing of water, gas, liquid metal cooled, and alternate reactor fuels and materials appears to justify a DOE commitment to making the ETR available as a long term irradiation facility in this country.

The ETR, located at the Idaho National Engineering Laboratory (INEL), is a 175 MW (thermal) water-cooled test reactor. It contains large in-core test facilities for capsules and lead-type experiments, and installed out-of-pile support facilities capable of providing PWR/BWR environment. The reactor provides thermal neutron flux levels of up to 7×10^{14} n/cm²-sec and epithermal flux levels of up to 8.5×10^{14} n/cm²-sec. The reactor can be ramped on short periods (about 5 seconds), leveling out at any desired power or flux level. Available support capabilities include engineering, technical and craft effort for test design and fabrication, and/or assembly, irradiation testing, and hot laboratory post irradiation examination.

Operation of the ETR is administered through DOE-Idaho Operations Office, and the operating contractor is

EG&G Idaho, Inc. The ETR is an established facility which has continually been upgraded since its construction. It is capable of providing reliable irradiation data in a variety of operating modes by personnel with twenty years of multi-sponsor reactor and test experience. In addition, the operation for the past three years in support of the Sodium Loop Safety Facility has broadened this experience to encompass gas, high vacuum, and sodium technology as well as safety related testing.

If commercial facilities are available in the United States which can provide the needed irradiation services, DOE will not provide the ETR for other than DOE-funded programs.

Those interested in considering the ETR for future irradiation testing because suitable nuclear testing facilities in the United States are not available may write for information to Mr. N. Bonicelli, Chief, Test Reactor Branch, DOE-Idaho Operations Office, 550 Second Street, Idaho Falls, ID 83401; or call FTS 583-1984, Commercial (208) 526-1984. This information will include cost and schedule data, points of contact, and an invitation to attend a prospective experimenter's presentation and tour in Idaho scheduled for this summer.

VISITORS TO RSIC

The following persons came for an orientation visit and/or to use RSIC facilities during the month of June.

Herbert C. Benhardt, University of Kentucky, Lexington; Charles Clifford, Radiation Research Associates, Fort Worth, Texas; Mary R. Ford, Health Physics Division, ORNL; Herbert Goldstein and Yen-Wan H. Liu, Columbia University, New York, N.Y.; G. L. Simmons, Science Applications, Inc., La Jolla, Calif.; G. G. Warner, UCND Computer Sciences Division, ORNL; and Dr. Guy Wolber, Electricité de France, Paris, France.

RSIC GRAB BAG

We offer the following extra copies of documents on a first-come, first-served basis. We will honor requests until the supply is exhausted. If you want to add to your reference shelf, please order while the supply lasts.

Fast Reactor Cross-Section Processing Codes - Is There a Dollar's Worth of Difference Between Them?

C. R. Weisbin, N. M. Greene, H. Henryson, II, R. J. LaBauve, C. Durston, D. E. Cullen, and R. B. Kidman.

Shield Design and Streaming Calculations for the Sodium Cooled PEC Reactor, M. Prosperi, R. Tavoni, and N. Travaglini.

The Methods of Calculation Used in the Design of the Shielding Within the Primary Containment of a Commercial S.G.H.W.R., L. M. C. Dutton and P. A. Solari.

Intermediate-Energy ($40 \text{ MeV} \leq E_\gamma \leq 400 \text{ MeV}$) Photonuclear Interactions, T. A. Gabriel.

Radiological Safety Design Considerations for a Laser-Fusion Facility, M. S. Singh.

Nonelastic Interactions of Nucleons and π -Mesons With Complex Nuclei at Energies Below 3 GeV, Hugo W. Bertini, Mirian P. Guthrie, and Arline H. Culkowski, ORNL-TM-3148.

Production of Low Energy Gamma Rays by Neutron Interactions with Fluorine for Incident Neutron Energies Between 0.1 and 20 MeV, G. L. Morgan and J. K. Dickens, ORNL-TM-4823.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in the computer code collection during the month.

CCC-94/SCAP

This package, kernel integration code system in complex geometry, was extended to include a CDC-7600 Version (B), contributed by Westinghouse Electric Corporation, Advanced Nuclear Systems Division in Madison, Pennsylvania. The original UNIVAC 1108 code packaged was a contribution of NASA Marshall Space Flight Center in Huntsville, Alabama.

CCC-234/SCORE-4

The SCORE code package was updated by replacing SCORE-3 with SCORE-4, a newer frozen model of the multigroup removal diffusion theory shielding code system for X-Y and R-Z geometries with inset boundaries, a contribution of the SCORE developers, UKAEA Risley Establishment, Lancashire, England through the OECD NEA Data Bank at Saclay, Gif-sur-Yvette, France. SCORE allows use of inset boundary conditions and will optimally calculate the mesh interval requirements of each shield region. The mesh interval limitation depends upon the amount of fast core storage available. Reference: Informal documents by B. L. Richardson.

CCC-273/DACRIN

The code package for airborne radionuclide organ dose calculations was updated to correct a packaging error called to RSIC attention by Charles Shih, Kaiser Engineers, Oakland, California. Twenty-two records (card images) of data library information (listed as page 63 of the DACRIN document) were missing from the code package. These records (31st through the 52nd card images having ID's 44103 RU22 through 451031 RH 5) were inserted into the code package.

CCC-312/LEAF

LEAF, designed to calculate fission product release from a reactor containment building for arbitrary radioactive decay chains, was contributed by Los Alamos Scientific Laboratory, Los Alamos, New Mexico. Reference: LA-NUREG-6570-MS. FORTRAN IV; IBM 360.

CCC-317/CYGAS

The gamma-ray attenuation code package for large gamma-ray sources shielded by coaxial cylinders was contributed by the Institut for Atomenergi, Kjeller, Norway, through the OECD NEA Data Bank. Reference: Informal. FORTRAN IV; IBM 360.

CCC-318/RASC-2D

Two-dimensional shielding code system for typical fast reactor shield design was contributed by Kawasaki Heavy Industries, Ltd., and the Power Reactor and Nuclear Fuel Development Corporation of Japan through the OECD NEA Data Bank. The code system includes options for removal cross-section adjustment, capture and activation gamma source calculations based on a 2-D few group neutron flux, and for a line-of-sight calculation in annular ducts with axial symmetrical geometry.

PSR-119/ERIC-2

ERIC-2, designed for the calculation of resonance integrals and cross sections for fissile and non-fissile nuclides for thermal or fast reactors, was contributed by UKAEA Winfrith Establishment, Dorchester, Dorset, through the OECD NEA Data Bank. In addition to providing group data for fast and thermal reactor calculations, ERIC-2 can be used for general investigations of resonance integrals and their associated Doppler effect. Reference: AEEW-R 323. FORTRAN IV; IBM 360.

CHANGES IN THE DATA COLLECTION

The following changes were made during June.

DLC-25/MASS

The atomic mass evaluation data package was updated with mass adjustments which were supplied by the ORNL Nuclear Data Project.

DLC-38/ORYX-E

The ORIGEN data library package was updated to correct an error called to RSIC attention by M. Erdmann, Interatom, Federal Republic of Germany. Data points for Fe-55 and Ni-59 decay by electron capture (Q values) were changed from .232 and 1.074 respectively, to zero in both cases. For electron capture essentially all of the energy is given off by neutrino emission (which is not recoverable heat) and should not be included in the ORIGEN Q-value. Current users of DLC-38 may correct the two values in their local data

library package rather than request the updated package. The error also appears in the data included in the CCC-217/ORIGEN package; however, since it is included there only for the purpose of demonstrating the sample problem, it will not be updated. Persons requesting CCC-217/ORIGEN should also request the DLC-38/ORIX-E data package in order to have the latest updates of ORIGEN libraries.

JUNE 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 of out-of-print reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

THIS LITERATURE IS ON ORDER. IT IS NOT IN OUR SYSTEM. PLEASE ORDER FROM NTIS OR OTHER AVAILABLE SOURCE AS INDICATED.

REACTOR AND WEAPONS RADIATION SHIELDING LITERATURE

- | | |
|---|---|
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1976
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Determination of the Isotopic Composition of Plutonium by Gamma-Ray Spectrometry.
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Dep., NTIS (U.S. Sales Only)</p> <p>AERE-R-8753
The Status of Fission Product Yield Data (FPND) in 1977.
Cunningham, J.G.
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Fusion/Fission Damage Ratios for Neutron-Induced Displacement Damage in Silicon.
Van Antwerp, W.R.; Hollandsworth, C.E.; Youngblood, J.E.
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NTIS</p> | <p>COO-2458-10
Sensitivity Analysis for Shielding Data Evaluation by Interactive Graphics Computing.
Parvez, A.; Becker, M.
1976
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PWR and BWR Radiation Environments for Radiation Damage Studies.
Gritzner, M.L.; Simmons, G.L.; Albert, T.E.; Straker, E.A.
September 1977
Science Applications Inc., La Jolla, Calif.</p> <p>EPRI-NP-616, Vol.I
A Calorimetric Measurement of Decay Heat from ²³⁵U Fission Products from 10 to 10⁵ Seconds.
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University of California, Berkeley, Calif. 94720</p> <p>HEDL-TME-77-51
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Effect of Neutron Constants Neutron Calculation of a Thermonuclear Reactor Blanket.
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Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow, Inst. Atomnoj Ehnergii
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Nuclear Physics Constants of Gamma-Emitting Isotopes in the Technological Environment of Reactors.
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Kyllingstad, G.
September 29, 1977
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- ORNL/TM-6245; ENDF-262
Review and Combination of Experimental Results for Neutron Emission per Fission of ²³²Th.
Gwin, R.
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Measurements of the Average Number of Prompt Neutrons Emitted per Fission of ²³⁹Pu and ²³⁵U.
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