

RSIC Newsletter



Oak Ridge National Laboratory
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Phone No. 615-574-6176 or FTS 624-6176
EasyLink Mailbox: 62813374
Telex (Answer Back): 854467 (ORNL EPIC UD)
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A duty dodged is like a debt unpaid; it is only deferred, and we must come back and settle the account at last.—Joseph Fort Newton

NCRP Celebrates Diamond Anniversary

The twenty-fifth annual meeting of the National Council on Radiation Protection and Measurements (NCRP) was a celebration of the Council's 60th anniversary. The Advisory Committee on X-Ray and Radium Protection, formed in 1929, preceded the Council which was reorganized in 1964 with passage of the U.S. Congress Public Law 88-376. As chartered by Congress in 1964, NCRP's task is fourfold.

(1) Collect, analyze, develop, and disseminate, in the public interest, information and recommendations about (a) protection against radiation (b) radiation protection measurements, quantities, and units, particularly those concerned with radiation protection;

(2) Provide a means by which organizations concerned with the scientific and related aspects of radiation protection and of radiation quantities, units, and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations;

(3) Develop basic concepts about radiation quantities, units, and measurements, about the application of these concepts and about radiation protection;

(4) Cooperate with the International Commission on Radiological Protection, the International Commission on Radiation Units and Measurements, and other national and international orga-

nizations, governmental and private, concerned with radiation quantities, units, and measurements, and with radiation protection.

In order to meet its goals, the Council has more than five hundred nationally recognized scientists who volunteer their time to meet NCRP objectives. The current annual report identifies six projects in areas where the Council expects to make important contributions: Radiation Protection Design Guidelines for Particle Accelerator Facilities, ALARA at Nuclear Power Plants, Assessment of Occupational Doses from Internal Emitters, Critique of the Publication "Living Without Landfills," Plutonium Facts, and Radon Facts.

Appropriately, the thirteenth Taylor Series, delivered by **Arthur C. Upton**, is entitled "Radiobiology and Radiation Protection: The Past Century and the Future Prospects." Upton, an alumnus of the University of Michigan and Chairman of the Department of Environmental Medicine at the New York University School of Medicine, has authored many scientific publications and served on national and international commissions and committees. Dr. Upton is currently serving on the Board of Directors of NCRP. Upton's distinguished career includes service as Chief of the Pathology Physiology Section of the Biology Division at Oak Ridge National Laboratory, Dean of the School of Basic Health Sciences at the State University of New York at Stony Brook, and Director of the National Cancer Institute.

IF YOU CHANGE YOUR ADDRESS, please notify us (including Building and Room No. where needed). *Third Class Mail* is returned to us at our expense if the addressee has moved. If your mail is returned, your name will be deleted from our distributions until we hear from you.

DISTRIBUTION MEDIA

RSIC has traditionally distributed microcomputer codes on diskettes and mainframe packages on magnetic tape. Rising storage charges for using the central computing system and increased postal rates have contributed to a review of current practices. We are now distributing some new mainframe packages on 5.25-in. diskettes when the amount of data can be transmitted on a reasonable number of diskettes. Sometimes files are com-

pressed using PKware file compression programs, which require no additional software to "unpack." Many users have requested that mainframe versions be distributed in this manner. We hope this practice will not inconvenience anyone. Contact us if this will pose a problem. The newsletter announcement will specify whether DS/DD (360K) or DS/HD (1.2M) diskettes are required. **At present we cannot copy to 3.5-in. diskettes.**

CHANGES TO THE COMPUTER CODE COLLECTION

During the month seven changes were made to the computer code collection. Three code systems were packaged and added to the collection, two code packages were extended with additional hardware versions, and two code packages were corrected. Three additions resulted from foreign contributions.

CCC-343/LEOPARD-MICRO

The LEOPARD package was extended to include a version for the IBM PC contributed by the School of Mechanical Engineering at the Georgia Institute of Technology, Atlanta. This spectral-dependent non-spatial fuel depletion code system determines fast and thermal spectra, using basic geometry and temperature data, based on a modified MUFT-SOFOCATE model. The code optionally computes fuel depletion effects for a dimensionless reactor and recomputes the spectra before each discrete burnup step. The code was compiled using the Microsoft Version 4.1 compiler and will run with or without a math coprocessor. The package is transmitted on one DS/DD (360K) diskette. References: EPRI 221 (July 1975), WCAP-3629-26 (Sept. 1963), IAEA-NDS-36 (Sept. 1981) and *Journal of Korean Nuclear Society* draft paper (May 1981). FORTRAN IV; CDC CYBER-175 (A) and IBM PC (B).

CCC-430/EDMULT 2.1

A corrected version of this code system for evaluation of electron depth-dose distributions in multilayer slab absorbers was contributed by the Japan Atomic Energy Research Institute, Tokai-Mura, Naka-Gun. EDMULT was developed at the

Radiation Center of Osaka Prefecture, Osaka, Japan, to compute depth-dose distributions produced by plane-parallel electron beams normally incident on single-, two-, or three-layer slab absorbers. The algorithm of the code is based on a simple model of electron penetration across the interface and uses empirical equations for transmission and backscattering. A list of the corrections is available upon request. Reference: RCOP TR-8 (November 1987). FORTRAN 77; NEAC 300 and FM78.

PSR-125/GNASH

This preequilibrium, statistical nuclear-model code package for calculation of cross sections and emission spectra was extended to include a version for VAX computers contributed by the developers at Los Alamos National Laboratory, Los Alamos, New Mexico. The existing CRAY version was enhanced with the addition of another sample case. GNASH provides a flexible method by which reaction and level cross sections, isomer ratios, and emission spectra resulting from particle-induced reactions can be calculated. Fission treatment is included, and additional level density options are available. The VAX program compiles using the VMS FORTRAN compiler, and the CRAY compiles using CFT under CTSS. Each package is transmitted on a single 5.25-in. DS/DD (360K) diskette. References: LA-6947 (November 1977) and Informal Notes (1988). FORTRAN 77; CRAY (A) and VAX (B).

PSR-239/RGENDF

This cross-section format-translation program

was contributed by the Institute of Advanced Studies, São José dos Campos, Brazil. RGENDF reformats GENDF multigroup cross section libraries generated by the GROUPE module of NJOY into ENDF/B-V, EXPANDA, PFCND, and COMPAR formats. RGENDF reads GENDF files (MF) 1, 3, 5, and 6 and calculates elastic removal cross-section, absorption cross-section, and inelastic scattering matrix reaction types. Only neutron data is interpreted. The ENDF/B-V formatted file contains files (MF) 1 and 3. The code runs on the CDC Cyber 170/750 using the FTN5 compiler. The package is transmitted on one 5.25-in. DS/DD (360K) diskette. Reference: INDC(BZL)-023/GV (1988). FORTRAN 77; CDC Cyber.

PSR-240/COMPAR

This system for comparing multigroup cross sections was contributed by the Institute of Advanced Studies, São José dos Campos, Brazil. COMPARE evaluates multigroup neutron cross sections for the elastic scattering, capture and fission reactions for one or more materials from various previously formatted files. Thus, it is possible to analyze the influence of files 2 (resonances) and 3 (background) of the evaluated nuclear data libraries. The system includes interfaces for several library formats. These are REDCOMP for GROUPIE, FLACOMP for FLANGE-II, ETOCOMP for ETOG-3 and XLACOMP for XLACS. NJOY GENDF data may be processed with PSR-239/RGENDF to convert it to COMPARE format. The package is transmitted on one 5.25-inch DS/DD (360K) diskette. Reference: INDC(BZL)-024/GV (1988). FORTRAN 77; CDC Cyber.

PSR-267/SCINFUL

Both versions of this code package have been corrected to avoid the use of an undefined variable. In line 384 of Subroutine NPX, variable **B11pp** should be changed to **Be11pp**. Battelle Laboratories, Columbus, Ohio, discovered the problem when installing the code on a personal computer. The correction was recommended by the developer at ORNL. SCINFUL is a Monte Carlo-based program to determine a scintillator full energy response to neutron detection. It provides a calculated full response anticipated for either a cylindrical NE-213 (liquid) scintillator or an NE-110 (solid) scintillator. The incident design neutron energy range is 0.1 to 80 MeV. The program may also be used to compute angle-integrated spectra of charged particles following neutron interaction with ^{12}C . Each package is transmitted on a single 5.25-in. DS/DD (360K) diskette. Reference: ORNL-6462 (March 1988) and ORNL-6463 (April 1988). FORTRAN 77; VAX (A) and CRAY (B).

PSR-270/UPDATE

This FORTRAN source file manipulator was contributed by Oak Ridge National Laboratory. UPDATE is capable of emulating a subset of the standard CDC UPDATE functions, including program library creation and subsequent modification. It runs interactively on Data General MV family computers under AOS/VS and runs in batch mode on IBM under either the MVS or MVS-XA operating systems. UPDATE is transmitted on one DS/DD diskette. References: NUREG/CR-4478(ORNL/TDMC-4) (January 1989) and informal notes (1985). FORTRAN 77; Data General (A) and IBM 3081 (B).

PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we note significant changes in the activities of people concerned with radiation protection, transport, and shielding in the nuclear industry. We, therefore, continue to carry personal items as they are brought to our attention.

Jacek Jedruch has accepted an appointment as adjunct professor in the Department of Applied Physics and Nuclear Engineering at Columbia University in New York.

Robert C. Little has assumed responsibility for the X-6 Radiation Transport Group at Los Alamos National Laboratory. He succeeded *Art Forster*, who returned to Monte Carlo development and application within the X-6 group.

Jack Celnik is now with the New York Power Authority, White Plains, New York.

Visitors to RSIC

During the month the following persons came for an

orientation visit and/or to use RSIC facilities: *Kep Disney*, Westinghouse Advanced Energy Systems, Madison, Pennsylvania; *William J. Thompson*, University of North Carolina, Chapel Hill, North Carolina; and *David M. McFarland*, Air Force Weapons Laboratory, Albuquerque, New Mexico.

CONFERENCES, COURSES, SYMPOSIA

RSIC attempts to keep its users/contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers to RSIC.

Reactor Analysis and Radiation Transport Short Courses

The Department of Nuclear Engineering at the University of Tennessee-Knoxville is offering two five-day short courses of interest to radiation transport specialists during Tennessee Industries Week (TIW-24), August 14-18, 1989.

Computational Methods in Reactor Analysis will familiarize the course participant with computational methods and computer codes currently used to describe the neutronic behavior of nuclear fission reactors. Emphasis will be placed on "understanding" the neutronic models and associated numerical methods currently employed in codes. A good understanding of the models and methods is essential for the successful use of the codes in designing new reactors and/or improving the performance and safety of existing reactors. Areas to be covered include multi-dimensional diffusion theory methods and perturbation theory methods for applications in reactor statics, space-dependent kinetics, and fuel depletion; transport theory methods including the discrete ordinates method, integral transport theory, and the Monte Carlo method; and cross section generation and processing utilizing the AMPX and SCALE systems developed at ORNL. The first day of the course will cover the fundamentals of reactor physics

beginning with the fission process and proceeding through development of the Boltzmann transport equation and the diffusion approximation of the transport equation. This material will provide a good foundation for the non-nuclear engineer for study of the more advanced material to be presented Tuesday through Friday. For the participant with some nuclear background, the first day would be a review of basic nuclear engineering.

Monte Carlo Analysis is designed specifically for the practicing engineer engaged in shield design and does not presume any prior knowledge of Monte Carlo methods. However, some understanding of radiation transport physics is desirable. A wide range of topics will be presented that will lead to a good understanding of the basics of Monte Carlo analysis and the specialized applications of Monte Carlo methods to practical shielding problems. Many advanced topics will be included that will promote the best use of existing computer code systems. Special attention will be paid to the understanding and Monte Carlo implementation of the adjoint analysis. Advantages and disadvantages of the adjoint mode versus the forward mode of analysis will be described including several practical applications of the adjoint mode of Monte Carlo analysis. Variance reduction techniques will be developed in a comprehensive fashion for both forward and adjoint calculations. The versatile computer code system, MORSE, will be described to illustrate the general features of Monte Carlo computer programs. The relationships of the Monte Carlo methods to other methods of solving radiation transport problems, such as discrete ordinates, will be described, as well as computational advantages and disadvantages of Monte Carlo versus the other methods. This course will cover, in depth, the theory and mathematics a user must have in order to understand and use the Monte Carlo method effectively to solve difficult problems in radiation transport.

The registration fee is \$695 per person for each course. The deadline for registration in these two courses is July 31, 1989. For additional information contact T. W. Kerlin, Head of the Dept. of Nuclear Engineering, University of Tennessee, Knoxville, TN 37996 (phone 615-974-2525).

Calendar

Your attention is directed to the following events of interest.

May 1989

Spring Meeting of the American Physical Society, May 1-4, 1989, Baltimore, Maryland. Contact:

Conferences, APS, 335 East 45th Street, New York, NY 10017 (phone 212-682-7341).

International Conference on Radioactive Waste Management, May 2-5, 1989, Brighton, U.K. Contact: Secretariat, British Nuclear Energy Society, 1-7 Great George Street, Westminster, London SW1P 3AA UK (phone 01-222-77 22).

Radioactive Materials Transportation Workshop, May 8–11, 1989, Albuquerque, New Mexico. Contact: Teresa Yearwood, SAIC, P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031 ext. 403).

Annual Meeting on Nuclear Technology, May 9–11, 1989, Dusseldorf, F. R. Germany. Contact: Deutsches Atomforum e.V., Conference Office JK 89, Heussallee 10, D-5300 Bonn 1, FRG (49-228-507223).

3rd World Conference on Neutron Radiography, May 14–18, 1989, Osaka, Japan. Contact: Research Reactor Institute, Kyoto University, Kumatori-cho, Osaka 590-04, Japan.

Seminar on Fission Product Transport Processes in Reactor Accidents, May 22–26, 1989, Dubrovnik, Yugoslavia. Contact: J. T. Rogers, Department of Mechanical and Aeronautical Engineering, Carleton University, Ottawa, Ontario K1S 5B6, Canada (phone 613-564-2787).

June 1989

29th Annual Conference of the Canadian Nuclear Association and the 10th Annual Conference of the Canadian Nuclear Society, June 4–7, 1989, Toronto, Canada. Contact: Canadian Nuclear Association, 111 Elizabeth Street, Toronto, Ontario M5G 1P7 Canada.

Annual Meeting of the American Nuclear Society, June 4–8, 1989, Atlanta, Georgia. Contact: ANS Meetings Dept., 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

4th International Symposium on Radiation Protection—Theory and Practice, June 4–9, 1989, Malvern, England.

Parallel Processing with Personal Computers, June 5–9, 1989, a course sponsored by the Joint Research Centre, Ispra Establishment. Contact: Secretariat "ISPRA-Courses", Centro Comune di Ricerca, I-21020 ISPRA (Varese) Italy (phone 0332-789819/789839/781128).

Packaging and Transportation of Radioactive Materials: PATRAM '89, June 11–16, 1989, Arlington, Virginia, sponsored by US-DOE. Contact: Larry Blalock, Chairman, US Organizing Comm., US Dept. of Energy, P.O. Box 2001, Oak Ridge, TN 37831-8765 (phone 615-576-0945 or FTS 626-0945).

Advanced Seminar on Selected Topics in Radiation Protection, June 12–16, 1989, in Lisbon, Portugal, a course sponsored by the Joint Research Centre, Ispra Establishment. Contact: Secretariat

"ISPRA-Courses", Centro Comune di Ricerca, I-21020 ISPRA (Varese) Italy (phone 0332-789819/789839/781128).

July 1989

Radioactive Material Transportation Workshop, July 17–20, 1989, Idaho Falls, Idaho. Contact: Teresa Yearwood, SAIC, P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031 ext. 403).

26th IEEE Annual Conference on Nuclear and Space Radiation Effects, July 24–28, 1989, Marco Island, Florida. Contact: Dante M. Tasca, General Electric Co., Room M1211, Bldg. 100, P.O. Box 8555, Philadelphia, PA 19101 (phone 215-354-4132).

Radioactive Material Transportation Workshop, July 31–Aug. 3, 1989, Kennewick, Washington. Contact: Teresa Yearwood, SAIC, P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031 ext. 403).

August 1989

International Nuclear Physics Conference, Aug. 20–26, 1989, São Paulo, Brazil, sponsored by the International Union of Pure and Applied Physics. Contact: Universidade de São Paulo, Departamento de Física Nuclear, Caixa Postal 20516, 01498 São Paulo, SP, Brazil.

September 1989

International Workshop on New Developments in Occupational Dose Control and ALARA Implementation at Nuclear Power Plants and Similar Facilities, Sept. 18–21, 1989, Brookhaven National Laboratory, Upton, New York. Contact: Dr. John W. Baum, BNL ALARA Center, Bldg. 703M, Upton, NY 11973 (phone 516-282-4214).

October 1989

First International Conference on Radioactive Nuclear Beams, Oct. 16–18, 1989, Berkeley, California, sponsored by the U.S. Dept. of Energy. Contact: J. M. Nitschke, Nuclear Science Division, Lawrence Berkeley Laboratory, 1 Cyclotron Road, Berkeley, CA 94720 (phone 415-486-6471).

November 1989

Selected Topics of Monte Carlo Applications in Science and Technology, Nov. 6–10, 1989, a course sponsored by the Joint Research Centre, Ispra Establishment. Contact: Secretariat "ISPRA-Courses", Centro Comune di Ricerca, I-21020 ISPRA (Varese) Italy (phone 0332-789819/789839/781128).

December 1989

4th International Conference on Fusion Reactor Materials, Dec. 4-8, 1989, Kyoto, Japan. Contact: Prof. S. Ishino, Dept. of Nuclear Engineering, University of Tokyo, Bunkyo-ku, Tokyo 113, Japan.

April 1990

International Conference for High-Level Radioactive Waste Management, April 8-12, 1990, Las Vegas, Nevada. Contact: Dean William Wells, Howard Hughes College of Engineering, UNLV, Las Vegas, NV 89154 (phone 702-739-3699).

June 1990

American Nuclear Society Annual Meeting, June 10-15, 1990, Nashville, Tennessee. Contact: Mary Keenan, Meetings Manager, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

17th European Conference on Controlled Fusion and Plasma Heating, June 25-29, 1990, Amsterdam, The Netherlands. Contact: F. C. Schuller, FOM-Institut voor Plasmafysica "Rijhuizen," Postbus 1207, NL-3430 BE Nieuwegein.

August 1990

International Topical Meeting on Fast Reactor Safety, Aug. 12-16, 1990, Snowbird, Utah, sponsored by the ANS. Contact: Wayne K. Letho, Argonne National Laboratory, P.O. Box 2528, Idaho Falls, ID 83403-2528 (phone 208-526-7369).

Operational Radiation Protection, Aug. 20-22, 1990, Idaho Falls, Idaho, sponsored by the ANS. Contact: Jack Liebenthal, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415-3515 (phone 208-526-1253).

October 1990

Spectrum '90: Radioactive Waste Technologies, Decontamination, Decommissioning and Hazardous Wastes, Oct. 3-5, 1990, Knoxville, Tennessee, sponsored by ANS. Contact: Thomas H. Row, ORNL, P.O. Box 2008, 4500N MS6198, Oak Ridge, TN 37831-6198 (phone 615-574-5974 or FTS 624-5974).

November 1990

American Nuclear Society Winter Meeting, Nov. 11-16, 1990, Washington, D.C. Contact: Mary Keenan, Meetings Manager, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525.

MARCH 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 22161.

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.

RADIATION SHIELDING LITERATURE
ANL-88-48, . . *Calculations of Atomic Sputtering and Displacement Cross-Sections in Solid Elements* by

Electrons with Energies from Threshold to 1.5 MV., . . Bradley, C.R., . . December 1988, . . NTIS, PC A02/MF A01

CONF-8509412, Vol.3, pp.777-790, . . *A Scatter Model for Calculation of Gamma Ray Intensities in Scatter-Transmission Geometry.*, . . Fritzsche, D., . . In: Proceedings of the Third Working Meeting Radioisotope Application and Radiation Processing in Industry. Vol.3. Leipzig (German Democratic Republic), 23-27 September 1985, . . 1986, . . Central Institute of Isotope and Radiation Research, DDR-7050 Leipzig

CONF-8510506, pp.183-187, . . *Use of the Scintillation Spectra Unfolding Method for Environmental Exposure Rates Evaluation.*, . . Bacek, D.; Sujak, P.; Kluson, J., . . In: Povinec, P.(Ed.). Low-Level Counting and Spectrometry. Proceedings of Third International Conference on Low-Level Counting. Bratislava, (Czechoslovakia), 21-25 October 1985, . . 1987, . . Bratislava (Czechoslovakia). Veda

DOE/ER/75172-5, pp.79-95, . . *Background Radiation Shielding for Radiation Detectors.*, . . Derks, W., . . In: American Nuclear Society, La Grange Park, IL. Nuclear Technology for the 2000. (Albuquerque,

NM, 19-21 March 1987), . . 1987, . . NTIS, PC A06/MF A01; MF available from INIS.

EPRI-NP-5969, . . *Problem Assessment of Discrete Radioactive Particles*, . . James, D.W., . . August 1988, . . Research Reports Center (RRC), Box 50490, Palo Alto, CA 94303

IAEA-TECDOC-457; CONF-861250, . . *Nuclear Data for Fusion Reactor Technology*, . . Proceedings of an Advisory Group Meeting Organized by the International Atomic Energy Agency and held in Gaussig, German Democratic Republic, 1-5 December 1986, . . 1988, . . MF available from INIS.

IAEA-TECDOC-457, pp.9-22; CONF-861250, pp.9-22, . . *Report of Working Group I: Nuclear Data Requirements and Status of Available Nuclear Data for Integral Calculations for Blanket, Shielding, and Activation Problems*, . . Mann, F.M.(Ch.), . . Proceedings of an Advisory Group Meeting Organized by the International Atomic Energy Agency and held in Gaussig, German Democratic Republic, 1-5 December 1986, . . 1988, . . MF available from INIS.

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