RSIC Newsletter

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(For RSIC TELEX Communication Only)

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Every man has in himself a continent of undiscovered character.
Happy is he who acts the Columbus to his own soul.—Sir J. Stevens

CHANGES TO THE COMPUTER CODE COLLECTION

During the month five changes were made to the computer code collection. Three new code systems were packaged and added to the collection, an existing version of a code package was replaced with a newly-frozen version, and an existing code package was updated. Four changes resulted from foreign contributions.

CCC-269/RSYST 80

This integrated modular code system for shielding and reactor physics calculations was updated to make changes in three records of the program. The suggestions for change came from the University of Stuttgart, Stuttgart, Fed. Rep. of Germany and the OECD Nuclear Energy Agency (NEA) Data Bank, Gif-sur-Yvette, France. A detailed description may be requested from RSIC. The corrections affect two subroutines, RSYADR and RSYSCH, of member RSYTSTK and are necessary to avoid data blocks in BASIS, BIB and UBI from being destroyed when these data bases approach capacity. SYSTEM SOURCE (file 2 of the package) contains all three of the records which were changed. Reference: IKE-BRN-4-12 (ORNL/TR-2796) (July 1973), IKE R No. 4-35 (ORNL/TR-2970) (December 1974), (ORNL/TR-4193) (April 1976), and informal notes. FORTRAN IV and Assembler; IBM 360/370.

CCC-335/GALE

The CDC version (C) of this gaseous and liquid effluents boiling water (BWR) and pressurized water (PWR) reactor radiological assessment code system was replaced by a newly frozen version provided by the U.S. Nuclear Regulatory Commission. The new BWR portion contains tests for copper piping. The new PWR portion of the code system contains so many changes, especially for licensing, that all current users should send a tape and a request for the complete code. The (A) and (B) versions of the code were not affected by this update. FORTRAN IV; IBM 360 (A), UNIVAC 1100 (B) and CDC (C).

CCC-482/SMART-MANYCASK

This code package for calculating radiation dose rates relative to casks was contributed by Ship Research Institute, Nuclear Ship Division, Tokyo, Japan. SMART calculates radiation dose rate at the center of the outer cask surface. It can be applied to determine the radiation dose rate on each cask if source conditions, characteristic function, and material conditions in the bottle regions are given. MANYCASK calculates radiation dose rate distribution in a space surrounded by many casks. If the dose rate on each cask surface can be measured, MANYCASK can be applied to predict the spatial dose rate distribution for any case of cask configuration. Reference: *Nucl. Sci. Eng.* **87:** 152–180 (1984), and informal notes. FORTRAN 77 and FORTRAN IV; FACOM-M180.

CCC-483/FINELM

This multigroup finite element diffusion code system was contributed by Eidg. Institut für Reaktorforschung, Würenlingen, Switzerland, through the OECD NEA Data Bank, Gif-sur-Yvette, France. The system solves the neutron diffusion equation in X-Y, R-Z, R-θ, X-Y-Z and R-θ-Z geometries using the finite-element method. LaGrangian elements of linear or higher degree to approximate the spatial flux distribution have been provided. The method of dissections, coarse mesh rebalancing and Chebyshev acceleration techniques are available. Simple user-defined input is achieved through extensive input subroutines. Reference: EIR-Bericht Nr. 442. FORTRAN IV; VAX 11/780.

CCC-488/PROCIV

This code package for calculating the protection factors against radioactive fallout for apartment buildings in a residential area was contributed by Joint Army-Civil Defense Committee, Arcueil, France, through the OECD NEA Data Bank, Gif-sur-Yvette, France. Each house is simulated by a cylindrical tower. The material thickness traversed by the photons is converted to an equivalent layer of air. The shielding by neighboring houses is taken into account. Reference: OLS-84-38. FORTRAN V; UNIVAC 1110.

CHANGES TO THE DATA LIBRARY COLLECTION

Two changes were made to the data library collection. A new data library was packaged and one data library package was updated.

DLC-88/TPASGAM85

This radioactive decay library of gamma-ray energies, branching ratios, and cross sections has been updated and now contains gamma-ray and x-ray decay information for 1438 radionuclides. The Oak Ridge National Laboratory data consist of gamma-ray energies and intensities as well as cross-section information useful in activation analysis. Four separate files of data and two short computer routines are included. The first file gives data for radionuclides ordered by increasing Z and increasing mass. A second file consists of text references to the source of data in the first file. A third file of the 12518 gamma-rays presents the gamma-rays in order of increasing energy. A fourth file presents half lives, in order of increasing lifetime, in seconds and, for convenience, in larger units (minutes, hours, days, and years). A fifth file is a short FORTRAN routine FIXISO which is included for the purpose of easily revising the primary data file.

A standard 2400-ft. reel of computer tape is needed for the full package, but the first table is also available on diskette formatted for the IBM PC. The data are formatted in ASCII format and in dBase III DBF format for data display by a retrieval program, NUCLIDE ID. The compiled program is executable and does not require the dBase III interpreter. It can search for a nuclide by identification or gamma-ray energy. One 360K diskette is needed for the ASCII data; three are needed for the dBase data. Reference: Informal notes.

DLC-119/HILO86

This 66-neutron, 22-photon group, P_5, cross-section library for multigroup transport calculations for neutron and photon energies up to 400 MeV and 20 MeV, respectively, was contributed by Oak Ridge National Laboratory. It is an upgrade of a similar library, DLC-87/HILO; it includes cross sections based on ENDF/B-V below 20 MeV (collapsed from DLC-113/VITAMIN-E) and corrects elastic scattering data above 19.6 MeV such that the total cross section agrees with experiment. Data are included for H, ^{10}B, ^{11}B, C, N, O, Na, Mg, al, Si, S, K, Ca, Cr, Fe, Ni, W, and Pb. A retrieval code is provided for translation to unformatted form. Ref. ORNL/TM-9801.

PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we take note of the movement 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.

Harry M. Murphy is retiring from service in the Department of the Air Force in June 1986. His most recent work with the Air Force was in the Satellite Assessments Section of the Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico. Murphy will continue his work as a private consultant writing, revising, debugging and documenting computer programs. His address is 3912 Hilton Ave., NE, Albuquerque, NM 87110. Murphy has been an active participant in RSIC activities and a contributor to the RSIC collection. We wish him success in his new venture.

Dr. Edward Larsen has accepted a position with the Department of Nuclear Engineering at the University of Michigan, Ann Arbor. He will be leaving the X-6 Division at Los Alamos National Laboratory where he has been active in developing methods in neutron and photon transport.

Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *C. M. Jensen,* Oak Ridge Associated Universities, Tenn.; *Hsueh-li Yin,* INER, Lung-Tan, Rep. of China; *Prasad K. Nair,* Southwest Research Institute, San Antonio, Texas; and *Chuck Garrett,* U.S. Dept. of Energy, Washington, D. C.

LSU Seeks Engineering Dean

Louisiana State University (LSU) invites nominations and applications for the position of Dean of the College of Engineering. The faculty includes approximately 130 members from the Departments of Agricultural, Chemical, Civil, Electrical & Computer, Industrial, Mechanical, and Petroleum Engineering.

Individuals with a doctoral degree or equivalent professional experience are encouraged to apply. A significant record of scholarship, professional achievement, and proven leadership ability with interest in the continued development of graduate and research programs will be considered in the selection of the new dean.

Nominations of qualified candidates are solicited and should be made as soon as possible through submission of name, title, telephone number, and current address. Interested individuals should submit a letter of application, a complete curriculum vitae, and three references to Dr. Arthur Sterling, Chairman, Dean of Engineering Search Committee, Office of Academic Affairs, 146 Thomas Boyd Hall, Louisiana State Univ., Baton Rouge, LA 70803-3103.

ANS Glossary Published

The *Glossary of Terms in Nuclear Science and Technology* is an updated version of American National Standard N1.1-1976. It was prepared by Subcommittee ANS-9 of the ANS Standards Committee, chaired by Harry Alter of the U.S. Dept. of Energy. It is available from ANS for $22.00. The 1976 issue has been withdrawn and no further effort to revise it as a standard will be made by the ANS Standards Committee.

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.

Radiation Transport and Reactor Analysis 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-21), September 15–19, 1986.

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 employed in reactor analysis codes is essential for the successful use of the codes in designing new reactors 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 nonnuclear 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 August 31, 1986. For additional information contact P. F. Pasqua, Head of the Dept. of Nuclear Engineering, University of Tennessee, Knoxville, TN 37996.

Calendar

Your attention is directed to the following additional events of interest to the radiation shielding and protection community.

July 1986

23rd International Conference on High-Energy Physics, July 16–23, 1986, Berkeley, California. Contact: S. C. Loken, 50-137 Lawrence Berkeley Lab., Univ. of California, Berkeley, CA 94720.

23rd Annual Conference on Nuclear and Space Radiation Effects, July 21–23, 1986, Providence, Rhode Island, sponsored by the Nuclear and Plasma Sciences Society and the Inst. of Electrical and Electronics Engineers. Contact: Sandra Grawet, Science Applications International Corp., 2615 Pacific Coast Highway, Hermosa Beach, CA 90254 (phone 213-318-2611).

August 1986

Occupational and Environmental Radiation Protection, Aug. 11–15, 1986, a course sponsored by Harvard School of Public Health, Boston, Massachusetts. Contact: Office of Continuing Education, Dept. A, Harvard School of Public Health, 677 Huntington Ave., Boston, MA 02115 (phone 617-732-1171).

Criticality Accident Dosimetry Training Course, Aug. 11–15, 1986, Oak Ridge, Tenn., sponsored by ORNL. Contact: C. S. Sims, ORNL, Bldg. 7710, P.O. Box X, Oak Ridge, TN 37831 (phone 615-574-5851).

19th DOE/NRC Nuclear Air Cleaning Conference, Aug. 13–15, 1986, Seattle, Washington. Contact: Melvin W. First, Conference Chairman, Harvard Air Cleaning Laboratory, 665 Huntington Ave., Boston, MA 02115-9957 (phone 617-732-1164).

International Nuclear Physics Conference, Aug. 25–30, 1986, Harrogate, United Kingdom. Contact: Inst. of Physics, 47 Belgrave Square, London SWIX 8QX (phone 01-235-6111).

8th International Conference on Solid State Dosimetry, Aug. 26–29, 1986, St. Catherine's College, Oxford, organized by the National Radiological Protection Board, U.K. Contact: Miss L. Ashby, National Radiological Protection Board, Chilton, Didcot, Oxfordshire, U.K.

September 1986

International Conference on Nuclear and Radiochemistry, Sept. 1–5, 1986, Beijing, sponsored by the Chinese Nuclear Society and Chinese Chemical Society. Contact: Prof. Liu Yuanfang, Dept. of Technical Physics, Beijing Univ., Beijing, People's Republic of China.

International Conference on Reliable Fuels for Liquid-Metal Reactors, Sept. 7–11, 1986, Tucson, Arizona, sponsored by ANS, AIME, and the U.S. Dept. of Energy. Contact: E. A. Aitken, Tech. Prog. Chairman, General Electric Co., Nuclear System Technology Div., 310 DeGuigne Dr., Sunnyvale, CA 94088 (phone 408-738-7237).

Annual Information Meeting of the Canadian Nuclear Fuel Waste Management Program, Sept. 7–12, 1986, Winnipeg, Canada. Contact: R. S. Dixon, Publicity Chairman, Nuclear Fuel Waste Management, Pinawa, Manitoba, Canada ROE 1LO.

International Conference on Radioactive Waste Management, Sept. 7–12, 1986, Winnipeg, Manitoba, Canada, sponsored by the Canadian Nuclear Society and ANS. Contact: Dr. T. S. Drolet, CFFTP, 2700 Lakeshore Rd. West, Mississauga, Ontario, Canada L5J 1K3 (phone 416-823-6654).

Conference on the Treatment and Containment of Radioactive Wastes and Disposal in Arid Environments (Radwaste '86), Sept. 7–13, 1986, sponsored by Atomic Energy Corp. of South Africa, Electricity Supply Commission of South Africa, and Nuclear Development Corp. of South Africa. Contact: Radwaste Conf. Secretariat, NUCOR, Private Bag X256, Pretoria 0001, South Africa (phone 27-12-21-3311 ext. 677).

14th SOFT—Symposium on Fusion Technology, Sept. 8–12, 1986, Avignon, France. Contact: A. Torossian, Dept. de Recherches sur la Fusion Controlee, Centre d'Études Nucleaires de Cadarache, B.P. No. 1, F-13108 Ste-Paul-lez Durance, France.

4th European congress and 13th Regional Congress of the International Radiation Protection Association and Technical Exhibition, Sept. 15–19, 1986, Salzburg, Austria, sponsored by the Austrian Association for Radition Protection; Austrian Ministry of Health and Environmental Protection, Austrian Ministry of Science; and Austrian Research Centre. Contact: A. Hefner, Österreichischer Verband f. Strahlenschutz, A-2444 Seibersdorf, Austria (phone 02254 80-2509 or 2560).

Advances in Reactor Physics and Safety Meeting, Sept. 17–19, 1986, Saratoga Springs, N. Y., sponsored by ANS. Contact: Norman C. Francis, Knolls Atomic Power Lab., River Road, Schenectady, NY 12301, or Donald R. Harris, Rensselaer Polytechnic Inst., Troy, NY (phone 518-270-6407).

October 1986

American Physical Society Nuclear Physics Division Meeting, October 9–11, 1986, Vancouver, Canada. Contact: APS, 335 E. 45th St., New York, NY 10017 (phone 212-682-7341).

Nuclear Transportation Issues, Oct. 19–22, 1986, Charleston, South Carolina, sponsored by the Atomic Industrial Forum. Contact: Conference Office, AIF, 7101 Wisconsin Ave., Bethesda, MD 20814-4891 (phone 301-654-9260).

Hanford Life Sciences Symposium: Radiation Protection—A Look to the Future—Celebrating Four Decades of Research at Hanford, Oct. 21–23, 1986, Richland, Washington, sponsored by the Dept. of Energy. Contact: William J. Bair, Environment, Health and Safety Research Program, Battelle, Pacific Northwest Laboratories, P.O. Box 999, Richland, WA 99352 (phone 509-375-2421).

November 1986

International Symposium on Nuclear Material Safeguards, Nov. 10–14, 1986, sponsored by IAEA. Contact: IAEA, Conf. Service Section, P.O. Box 100, A-1400 Vienna, Austria.

United Nations Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy, Nov. 10–28, 1986. Contact: Executive Secretary, UN Conf. for the Promotion of Internatl. Cooperation in the Peaceful Uses of Nuclear Energy, Vienna International Centre, P.O. Box 500, A-1400 Vienna, Austria.

International Symposium on Nuclear Material Safeguards, Nov. 10–14, 1986, Vienna, sponsored by the IAEA. Contact: IAEA, Conference Service Section, P.O. Box 100, A-1400 Vienna, Austria.

ANS and Atomic Industrial Forum Joint Meeting, Nov. 16–21, 1986, Washington, D. C. Contact: D. G. Pettengill, ANS, 555 N. Kensington Ave., La Grange Park, IL 60535 (phone 312-352-6611 ext. 257).

MAY 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.

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