RSIC Newsletter

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POST OFFICE BOX 2008 ! OAK RIDGE, TENNESSEE 37831-6362
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No. 327 *February 1992*

Decision and determination are the engineer and fireman of our train to opportunity and success.)Burt Lawlor

DETERMINISTIC SEMINAR/TORT-DORT WORKSHOP REVIEWED

Closing evaluations of the Deterministic Seminar/TORT-DORT Workshop indicate that those attending found both the seminar and workshop beneficial. Remarks from the participants show that topics were right on target. Many useful suggestions were included in the evaluations, such as, breaking the workshop into beginning, intermediate, and expert levels, presenting the seminar papers after the workshop, and providing more time for hands-on problem solving. These comments are used for planning future seminar/workshops.

The mix of theory/applications seemed just about right.

The 111 participants in the seminar/workshop represented forty-eight U.S. and international organizations which included academic, industrial, utility, medical, and laboratory facilities. There were ten scientists attending from abroad; four from Canada, two from Japan, and one each from the People's Republic of China, Finland, Germany, and The Netherlands.

I appreciate your ...attention to keeping the proceedings on-schedule.

The papers presented at the seminar fit in well with the interest of the attendees. The proceedings of the seminar will be published as an ORNL/RSIC report. Those who attended will be placed on the distribution of the proceedings. If you **did not attend** and want to receive the proceedings a request form is appended to the end of the newsletter. A list of the papers presented follows.

V. S. Arakali and S. M. Barnes, ``Radiation Transport in High-Level Waste Form,"
Ahmed Badruzzaman, ``Nodal Discrete Ordinates Methods)An Update,"
H. Brockmann, ``Improved Treatment of Two-Dimensional Neutral Particle Transport Through Voids Within the Discrete Ordinates Method by Use of Generalized View Factors,"

Roy A. Castelli and D. A. Barnett, ``COGEDIF)Automatic TORT and DORT Input Generation from MORSE Combinatorial Geometry Models,"

Bradley Clark, *et al*, ``THREEDANT: A Three-Dimensional Diffusion-Accelerated Neutral Particle Transport Code for x-y-z and r-T-z Geometries,"

Katsumi Hayashi, *et al*, ``DOG-II Input Generator Program for DOT3.5 Code,"

L. J. Lorence, Jr. and J. E. Morel, ``CEPXS/ONELD: A One-Dimensional Coupled Electron-Photon Discrete Ordinates Code Package,"

Betty F. Maskewitz, ``History of the RSIC Seminar/Workshop,"

David W. Nigg, ``Biomedical Applications of Two- and Three-Dimensional Deterministic Radiation Transport Methods,"

R. T. Perry, *et al*, ``Reactivity Effects of Light Water Insertion in a Heavy Water System: A Comparison of Four Transport Codes,"

Frej Wasastjerna, ``Out-of-Core Flux Calculation Methods in Finland."

Alice Rice

CHANGES TO THE COMPUTER CODE COLLECTION

Three changes were made to the computer code collection during the month. Two new code systems were packaged and an existing code package was corrected. Two changes resulted from foreign contributions.

CCC-543/TORT-DORT

The TORT-DORT package was corrected to complete the output files and to clarify information files. This January 1992 release is designated Version 1.5.15. In October 1991 Oak Ridge National Laboratory under Defense Nuclear Agency sponsorship released a newly frozen version of this three-dimensional discrete ordinates transport code system, designated Version 1.5.11 (19 Sep 91). Sample case 6 of the TORT-DORT output file was omitted from the RSIC distribution of this release but has been now been added to the package. Both Cray and IBM RISC System/6000 versions are provided. On Cray, UNICOS version 5 was used with the CFT77 compiler; on IBM, AIX version 2 was used with the XLF compiler. The entire package is available on either one DC 6150 tape cartridge or 2 DS/HD (1.2MB) diskettes. References: ORNL-6268 (November 1987), ORNL-5851 (July 1982), ORNL/TM-8362 (Sept. 1982). Fortran, CAL, C; Cray and IBM RISC/6000.

Notice for DORT Two-Dimensional Discrete Ordinates Code Users

The latest version of DORT (1.5.15 dated 2 January 1992) and the peripheral codes in the Discrete Ordinates System (DOS) are found in package CCC-543/TORT-DORT. The DORT source is included for Cray computers running the UNICOS operating system or the IBM RS/6000 workstation running AIX. These versions were contributed by the developer at ORNL.

A personal computer version of DORT, converted from an earlier release (ORNL Mod 5, 12 Oct 89) of the CCC-543 package by Idaho National Engineering Laboratory, is distributed as CCC-532/DORT-PC. This version runs on IBM PC or PS/2 computers with at least 640K RAM, a math coprocessor and 40 Mb of fixed disk.

PSR-309/SC2N3N

The Institute of Atomic Energy, Beijing, China, through the International Atomic Energy Agency (IAEA), Vienna, and the NEA Data Bank, Gif-sur-Yvette, Cedex, France, contributed this code system to calculate the (n,2n) and (n,3n) cross sections in the energy region from threshold to about 25 MeV with the systematic parameters which well reproduce the experiment in the mass region of $23 \leq A \leq 238$. The parameterized formulas for fitting measured data and getting local parameters are based on the constant temperature evaporation model and the exciton model under some approximations. The codes run on the Vax family of computers under the VMS operating system. The package is distributed on 1 DS/HD (1.2MB) diskette. References: IAEA0917. Fortran 77; Vax.

PSR-310/NX1-NX2

The Institute of Atomic Energy, Beijing, China, through the IAEA and the NEA Data Bank, contributed this code system to calculate excitation functions. NX1 calculates excitation functions of (n,p) and (n,alpha) reactions, and NX2 calculates excitation functions for (n,d) and (n,3 He) reactions. The maximum incident neutron energy considered is 20 MeV, and the target mass number is between 23 and 197. The codes run on the Vax family of computers under the VMS operating system. The package is distributed on 1 DS/HD (1.2 MB) diskette. References: INDC (CPR)-8/L (June 1986). Fortran 77; Vax.

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.

Industrial Radiation and Radioisotope Measurement Applications

The *2nd Topical Meeting on Industrial Radiation and Radioisotope Measurement Applications* will be held September 8!11, 1992, in Raleigh, North Carolina. The organizers aim for an international and national participation of those with an interest in the use of nuclear radiation and radioisotopes for industrial measurements. Sessions are planned on the following topics:

Industrial Radiation Gauges
Industrial Radiation Analyzers
Radioisotope Tracers in Hydrology
Radioisotope Tracers in Industrial Processes
Industrial Radiography
Industrial Tomography
Nuclear Measurements in Geophysics
Nuclear Measurements in Bulk Media
Nuclear Reaction Analysis
New Developments in Hardware and Software for Industrial Radiation Measurements
Nuclear Measurements in Process Control
Radiation Detection and Assay Technology

Detailed information about the meeting may be obtained from T. Chris Clark, Research Triangle Institute, P.O. Box 12194, Research Triangle Park, NC 27709 USA.

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-27), August 17 ! 21, 1992.

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 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 $895 per person for each course. The deadline for registration in these two courses is July 31, 1992. For additional information contact T. W. Kerlin, Head of the Dept. of Nuclear Engineering, University of Tennessee, Knoxville, TN 37996 (phone 615-974-2525).

CalendarYour attention is directed to the following events of interest.

March 1992

Waste Management '92, Mar. 1 ! 5, 1992, Tucson, Arizona. Contact: University of Arizona, College of Engineering, Building 20, Tucson, AZ 85721.

1992 Topical Meeting on Advances in Reactor Physics, Mar. 8 ! 11, 1992, Charleston, South Carolina, sponsored by the ANS Reactor Physics and Mathematics and Computations Divisions. Contact: Russ Ferrara, Westinghouse Savannah River Co., Savannah River Laboratory, Bldg. 786-1A, Room 5, Aiken, South Carolina 29808 (phone 803-725-8233).

Radiation Transport Calculations Using EGS4, Mar. 9 ! 12, 1992, a four-day, 80386 microcomputer-based course to be held in Seattle, Washington, sponsored by Inst. of Applied Physics and Medicine. Contact: Susan Walker, IAPM, 701 16th Ave., Seattle, WA 98122 (phone 206-553-7330).

Practical Radiation Shielding, Mar. 9 ! 13, 1992, Atlanta, Georgia, a course sponsored by Shonka Research Associates, Inc., and the Georgia Institute of Technology. Contact: Georgia Tech Continuing Education, Georgia Institute of Technology, Atlanta, GA 30332-0385 (phone 404-894-2400, 800-325-5007).

International Symposium on Applications of Isotopes and Radiation Conservation of the Environment, Mar. 9!8, 1992, Karlsruhe, Germany. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria (phone 222-2360).

Introduction to Radiation Protection, Mar. 16!20, 1992, Cambridge, Massachusetts. Contact: David J. Allard, Arthur D. Little, Inc., 20 Acorn Park, Cambridge, MA 02154 (phone 617-864-5770 ext. 3584).

China '92-China International Nuclear Industry Exhibition, Mar. 19!23, 1992, Beijing. Contact: Lin Yi or Wang Gang Li, CCPIT, Beijing Subcouncil, Room 415, 4/F, 2nd Central Building, Haulong Street, Nanheyan, East City District, 100006 Beijing, People's Republic of China (phone 5125184, Fax 5125183).

Occupational and Environmental Radiation Protection, Mar. 23!27, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

3rd European Particle Accelerator Conference, Mar. 23!8, 1992, Berlin. Contact: G. Plass, CERN, AC Division, CH-1211 Geneva 23,, Switzerland (phone 41/22-767 61 11).

Radon 2000, Mar. 26!27, 1992, London, sponsored by the National Radiological Protection Board. Contact: NRPB Press Office, Chilton, Didcot, Oxon OX11 0RQ (phone 0235-831600; Fax 0235-833891).

April 1992

28th Annual Meeting of the National Council on Radiation Protection and Measurements, Apr. 1!2, 1992, Washington, D.C. Contact: NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814 (phone 301-657-2652).

Basic Radiation Safety & Management, Apr. 23!24, 1992, Chicago, Illinois, a seminar presented by Stan A. Huber Consultants, Inc. Contact: Stan A. Huber Consultants, Inc., 200 N. Cedar Road, New Lenox, IL 60451 (phone 815-485-6161; Fax 815-485-4433).

New Horizons in Radiation Protection and Shielding, Apr. 26!May 1, 1992, Pasco, Washington, a topical meeting of the ANS Radiation Protection and Shielding Division. Contact: Wilbur Bunch, HO-36, Westinghouse Hanford Co., P.O. Box 1970, Richland, WA 99352 (phone 509-376-6313).

May 1992

Radiation Protection Instrumentation, May 11!15, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

8th International Radiation Protection Association Conference, May 17!22, 1992, Montreal, Canada. Contact: G. Webb, NRPB, IRPA 8 Secretariat, Chilton, Didcot, Oxon OX11 ORQ, United Kingdom.

International Symposium on Numerical Transport Theory, May 26!28, 1992, in Moscow. Contact: Prof. T. A. Germogenova, The Keldysh Institute of Applied Mathematics, USSR Ac. of Sci., Miusskaya Sq. 4, Moscow A-47, 125047, USSR (fax 095-972-0737). Participants from the U.S. may contact Prof. Paul Nelson, Dept. of Nuclear Engg., Texas A&M University, College Station, TX 77843-3133 (fax 409-845-6443).

June 1992

American Nuclear Society Annual Meeting, June 7!12, 1992, Boston, Massachusetts. Contact: Mary Keenan, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 708-352-6611).

10th Topical Meeting on Technology of Fusion Energy, June 7!12, 1992, Boston, Massachusetts, sponsored by the American Nuclear Society and the U.S. Department of Energy. Contact: Stephen O. Dean, Fusion Power Associates, 2 Professional Drive, Suite 248, Gaithersburg, MD 20879 (phone 301-258-0545).

Environmental Radiation Surveillance, June 8!12, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

In-Place Filter Testing Workshop, June 8!12, 1992,

Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

Planning for Nuclear Emergencies, June 15 ! 19, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

July 1992

1992 Nuclear and Space Radiation Effects Conference, July 13 ! 17, in New Orleans. Contact: Nelson S. Saks, NSREC Technical Program Chairman, Naval Research Laboratory, Code 6813, 4555 Overlook Ave., Washington, DC 20375-5000 (phone 202-767-2534, Fax 202-767-0546).

Techniques in Nuclear Radiation Shield Analysis, July 13 ! 17, 1992, a course sponsored by the University of Texas at Austin. Contact: Continuing Engineering Studies, The University of Texas at Austin, College of Engineering, ECJ 10.324, Austin, TX 78712 (phone 512-471-3506, Fax 512-471-0831).

15th International Conference on High Energy Accelerators, July 20 ! 24, 1992, Hamburg, Fed. Rep. of Germany. Contact: F. Willeke, Deutsches Elektronen-Synchrotron, Notkestrasse 85, 2000 Hamburg 52, FRG.

August 1992

SLOPOS5, 5th International Workshop on Slow-Positron Beam Techniques for Solids & Surfaces, Aug. 6 ! 10, 1992, Jackson Hole, Wyoming, USA. Contact: Eric H. Ottewitte, Idaho National Engineering Laboratory, P.O. Box 1625, Idaho Falls, ID 83415-2114 USA (phone 208-526-1751; Fax 208-526-9267).

Basic Radiation Safety & Management, Aug. 13 ! 14, 1992, Newport Beach, California, a seminar presented by Stan A. Huber Consultants, Inc. Contact: Stan A. Huber Consultants, Inc., 200 N. Cedar Road, New Lenox, IL 60451 (phone 815-485-6161; Fax 815-485-4433).

Nuclear Technologies for Space Exploration, Aug. 16 ! 19, 1992, Jackson Hole, Wyoming. Contact: Dr. David Woodall, INEL EG&G Idaho, P.O. Box 1625, Idaho Falls, ID 83415-2516.

Occupational and Environmental Radiation Protection, Aug. 17 ! 21, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

September 1992

IRRMA '92, 2d Topical Meeting on Industrial Radiation and Radioisotope Measurement Applications, Sept. 8 ! 11, 1992, Raleigh, North Carolina. Contact: William F. Troxler, Troxler Electronic Laboratories, Inc., P.O. Box 12057, Research Triangle Park, NC 27709 (phone 919-549-8661).

Hazardous and Radioactive Waste Management (Spectrum 92), Sept. 13 ! 17, 1992, sponsored by the ANS and the U.S. Dept. of Energy. Contact: Dr. Clyde W. Frank, EM-50/6B-158, U.S. Dept. of Energy, 1000 Independence Ave., SW., Washington, DC 20585 (phone 202-586-6382)

8th International Meeting on Radiation Processing, Sept. 14 ! 19, 1992, Beijing, China, sponsored by the International Atomic Energy Agency. Contact: International Meeting on Radiation Processing, P.O. Box 1012 (30), Beijing 100 822, China.

International Symposium on Nuclear Data Evaluation Methodology, Sept. 28 ! Oct. 2, 1992, Upton, New York, sponsored by Brookhaven National Laboratory. Contact: C. L. Dunford, Brookhaven National Laboratory, NNDC/197D, Upton, New York.

14th International Conference on Plasma Physics and Controlled Nuclear Fusion Research, Sept. 30 ! Oct. 7, 1992, Wuerzburg, Germany, sponsored by the International Atomic Energy Agency. Contact: IAEA, Conference Service Section, P.O. Box 100, A-1400 Vienna, Austria.

October 1992

Selection and Preparation of Witnesses for Environmental Litigation, Oct. 22 ! 23, 1992, a course sponsored by the University of Texas at Austin. Contact: Continuing Engineering Studies, The University of Texas at Austin, College of Engineering, ECJ 10.324, Austin, TX 78712 (phone

512-471-3506, Fax 512-471-0831).

November 1992

1992 ANS/ENS International Meeting, Nov. 15!20, 1992, Chicago. Contact: General Chair James D. Shiffer, Pacific Gas & Electric Co., 77 Beale St., San Francisco, CA 94106 (phone 415-973-4684).

Basic Radiation Safety & Management, Nov. 19!20, 1992, Chicago, Illinois, a seminar presented by Stan A. Huber Consultants, Inc. Contact: Stan A. Huber Consultants, Inc., 200 N. Cedar Road, New Lenox, IL 60451 (phone 815-485-6161; Fax 815-485-4433).

April 1993

Joint International Conference on Mathematical Methods and Supercomputing in Nuclear Applications, Apr. 19!23, 1993, Karlsruhe, Germany. Contact: H. Kuesters, KFK/INR, Postfach 3640 D-W-7500 Karlsruhe 1, Germany, or W. Werner, GRS, D-W-8046 Garching, Germany.

JANUARY 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

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COMPUTER CODES LITERATURE

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Software Reliability Models for Critical Applications. . . . Pham, H.; Pham, M. . . . EG&G Idaho; Idaho Falls, ID. . . December 1991

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DETERMINISTIC METHODS IN RADIATION TRANSPORT SEMINAR PROCEEDINGS

You may Fax this request to 615-574-6182 if you wish.

Name: _____

Organization: _____

Address: _____

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Fold and return this request to: