RSIC Newsletter

Oak Ridge National Laboratory
POST OFFICE BOX 2008 • OAK RIDGE, TENNESSEE 37831-6362
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No. 291 *February 1989*

Help thy brother's boat across, and lo! thine own has reached the shore.—Hindu Proverb

50 YEARS WITH NUCLEAR FISSION

This is an international conference sponsored by the American Nuclear Society and the National Institute of Standards and Technology in cooperation with the Accademia Nationale Dei Lincei, the U.S. Department of Energy, the Electric Power Research Institute, the International Atomic Energy Agency, the National Academy of Sciences, the National Science Foundation, the U.S. Nuclear Regulatory Commission, the OECD Nuclear Energy Agency, Princeton University, and the University of California-Berkeley. The program presents a review of the past 50 years in nuclear fission, an overview of current research, and a preview of the future. On April 26 a special one-day symposium at the National Academy of Sciences promises to be a historic occasion with the participation of a number of pioneers in nuclear research. The conference will be held April 25–28, at the National Institute of Standards and Technology (formerly NBS) in Gaithersburg, Maryland.

CHANGES TO THE COMPUTER CODE COLLECTION

Six changes were made to the computer code collection during the month. Two new code systems were packaged, two code packages were extended with an additional hardware version, and two code packages were replaced with new technology.

CCC-179/ATR5

This code package was replaced with a newly frozen version contributed by Science Applications International Corporation of San Diego, California. ATR5 predicts energy-angular radiation environments from neutron, gamma-ray and X-ray sources created by a nuclear burst in the atmosphere. Significant improvements over the earlier versions in use by the DoD community include: (1) replacement of free-field radiation data bases for neutrons, secondary gamma rays, and prompt gamma rays; (2) overhaul of the air-over-ground correction factors that improves the accuracy of the dose correction factors and provides the two-dimensional energy-angular fluence for coupled forward-adjoint shielding calculations; (3) treatment of the influence of atmospheric moisture on radiation transport; (4) modifications to the delayed radiation model including empirical corrections based on nuclear test measurements and the provision to specify individual fissile isotopes; and (5) additional commands to facilitate specification of atmospheric conditions. ATR5 is written primarily in FORTRAN 66 but includes some

FORTRAN 77 statements and is designed to be system independent. The program requires one high-density (1.2 Mb) diskette. Reference: Excerpts from DNA Draft, SAIC-88/1911 (1989). FORTRAN; CRAY, CDC, VAX, IBM PC-AT.

CCC-363/LADTAP II

This code package was extended to include a new hardware version for the VAX contributed by Pacific Northwest Laboratory, Richland, Washington. LADTAP II calculates radiation exposure from the routine release of nuclear reactor liquid effluents to man and to other biota. Doses are calculated for the maximum individual and for the population and are summarized for each pathway by age group and organ. No changes were made in the mathematical models of LADTAP II. A summary of the changes made to the VAX version is included in Appendix C of NUREG/CR-4013. References: NUREG/CR-1276, ORNL/NUREG/TDMC-1 (March 1980) and NUREG/CR-4013, PNL-5270 (April 1986). FORTRAN; IBM (A), CDC (B), and VAX (C).

CCC-371/ORIGEN2 MICRO

Version 1.10 (Release 2) of this isotope generation and depletion code system for use on a PC was replaced by Oak Ridge National Laboratory (ORNL) with a newly frozen version. ORIGEN2 calculates the buildup, decay, and processing of radioactive materials which uses a matrix exponential method to solve a large system of coupled, linear, first-order ordinary differential equations with constant coefficients. **This version, designated CCC-371D, is recommended only for users with considerable previous experience running ORIGEN2 on a mainframe.** No detailed documentation for guiding a novice user is provided. Release 2 was designed to be more efficient using the MicroSoft FORTRAN Version 4.10 Compiler under PC DOS. I/O units are opened initially to avoid problems often encountered with the earlier PC version. Running this version requires a PC, XT, AT or PS/2 with fixed disk, one high-density diskette drive, 640K of installed RAM memory, and an 8087, 80287, or 80387 numeric coprocessor chip. The sample problem took about 2.5 hours on an 8-MHz IBM PC AT. One 5.25-in. high-density diskette is required for the D version. References: ORNL/TM-7175 (July 1980), *Nucl. Technol.* **62**, p. 335 (September 1983), and Informal Notes (December 1985, January 1985, October 1981). FORTRAN; IBM 360/370, CDC, and VAX (A), UNIVAC 1100 (B), PRIME 400 (C), and IBM PC (D).

CCC-463/GASPAR II

This code package was extended to include a VAX version contributed by Pacific Northwest Laboratory, Richland, Washington. GASPAR calculates radiation exposure to man from routine air releases of nuclear reactor effluents. GASPAR II is a companion to the CCC-363/LADTAP II program mentioned previously. While no changes were made in the mathematical models of GASPAR, some parameter values and dose factors were updated. In GASPAR II, dose rate conversion factors are read from the same data file as that used in LADTAP II, which contains data for 169 radionuclides. A summary of the changes made are included in Appendix C of NUREG/CR-4653. Reference: NUREG-0597 (June 1980) and NUREG/CR-4653, PNL-5907 (March 1987). FORTRAN; GASPAR IBM 3033 (A) and GASPAR II VAX (B).

CCC-537/TRIPOS

This Monte Carlo code system for ion transport analysis in polyatomic multilayer solids was contributed by the University of California, Los Angeles. TRIPOS couples the power-law cross sections and universal potentials together to treat the atomic collision process. It has been applied to the treatment of both surface and bulk radiation effects. The package is available on one 5.25-in. DS/DD (360k) diskette. Reference: UCLA/ENG-8807 (March 1988). FORTRAN 77; CRAY.

PSR-272/ZOTT

This computer code for the evaluation of correlated data was contributed by Los Alamos National Laboratory, New Mexico. Given an existing combined set $y(i)$ of differential and integral measurements with completely general covariances $cyy(i,j)$ and a sensitivity matrix relating the expectation values of the various measurements, ZOTT obtains a new evaluation $yp(i)$ with covariances $cyyp(i,j)$. The results $yp(i)$ are minimum-variance linear unbiased estimators of the true values, $E[y(i)]$. The method of solution is partitioned

least squares, a specialized form of correlated linear least squares featuring reduced matrix-inversion requirements (relative to methods based on solving the conventional normal equations). ZOTT is written in FORTRAN 77 and has run on the Macintosh SE personal computer, using Microsoft FORTRAN, Version 2.20; a VAX-11/785, using VMS FORTRAN; and a CRAY-1 using CFT. The package is available either on magnetic tape or on one DS/DD 5.25-in. diskette. Reference: LA-UR-2365 (Jan. 1989). FORTRAN 77; PC, VAX, and CRAY.

CHANGE TO THE DATA LIBRARY COLLECTION

During the month a new data library was added to the collection, a contribution from Italy.

DLC-135/SHAMSI

This library for fusion nucleonics analysis was contributed by the Joint Research Centre, Ispra Establishment, Italy. The ANISN-formatted, P3, 34 neutron and 14 gamma-ray coupled cross sections were collapsed from DLC-37/EPR. Data for 28 materials commonly considered in fusion reactor blanket/shield design are included. Reference: EUR 7798 EN (1982).

News From the NEA Data Bank

Johnny Rosen, Head of the NEA Data Bank, reports that the OECD Nuclear Energy Agency (NEA) has a new Director General, **Dr. Kunihiko Uematsu**, formerly of the Japanese Power Reactor and Nuclear Fuel Development Corporation (PNC). Uematsu replaces **Howard Shaper**, who has returned to Washington.

A proposed management restructuring will link the Data Bank more closely to the main part of the NEA. Nigel Tubbs is now the Deputy Head of the Data Bank with Enrico Sartori having responsibility for computer codes activity and Klaus Nordberg for nuclear data. Luis Garcia deViedma, who had been responsible for computer codes, will return to Spain to organize and direct the Information Communications Department at the Consejo de Seguridad Nuclear in Madrid.

We at RSIC extend our best wishes to Luis in this new role and look forward to continued contact.

R. W. Roussin

ABOUT PEOPLE

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.

Gerald P. Lahti was appointed an Associate at Sargent & Lundy, a Chicago-based engineering firm specializing in the design of electric power generating stations, transmission lines, and related facilities. The firm employs about 2500 and has 19 partners and 80 associates. Lahti has been with Sargent & Lundy since 1973.

As Assistant Head of the Nuclear Safeguards and Licensing Division, Lahti supervises shielding and radiological safety engineers in the design of radiation shielding and other radiation protection features incorporated in nuclear power plant designs. Lahti earned a Bachelor of Science degree in civil engineering from Wayne State University and a Master of Science degree in nuclear engineering from the University of Michigan. He is a Registered Professional Engineer in Illinois and a member of the Health Physics Society, and has served as Chairman of the Radiation Protection and Shielding Division of the ANS. Lahti was in Korea for three weeks in the fall to teach a course on outside dose assessment at the Korea Power Engineering Company.

FED Honors and Awards

The Fusion Energy Division of the American Nuclear Society announced the recipients of the 1987/1988 Outstanding Achievement Awards and the 1988 Student Award at the Eighth Topical Meeting on the Technology of Fusion Energy. **Mohamed A. Abdou**, University of California, Los Angeles, and **Robert A. Krakowski**, Los Alamos National Laboratory, received the Outstanding Achievement Award, and **Semion Sukoriansky**, Ben-Gurion University of the Negev, Israel, received the Student Award.

Abdou was recognized for outstanding contributions to fusion science and engineering, specifically for pioneering research in the areas of nuclear analysis and technology. Dr. Abdou has been a leader in reactor studies (Starfire and ANL-Demo) and in program activities such as Finesse and the U.S.-Japan Fusion Neutronics Collaboration.

Krakowski was recognized for outstanding achievement in fusion reactor systems studies, specifically as an advocate of compact, high power density reactor embodiments. He rendered outstanding service to the fusion program as a participant in such activities as ESECOM and the FED of the ANS, having been past chairman.

Semion Sukoriansky received the Student Award for research in Theoretical and Experimental Studies of Turbulence in Liquid Metals Flowing in the Presence of Strong Magnetic Fields.

NCRP Publications

The National Council on Radiation Protection and Measurements (NCRP) has released the following three reports.

NCRP Report No. 96, *Comparative Carcinogenicity of Ionizing Radiation and Chemicals,* evaluates the applicability of principles and methods developed for assessing carcinogenic risks of ionizing radiation to the assessment of carcinogenic risks of chemicals. The report reviews known carcinogenic effects of radiation and chemicals with reference to their comparative mechanisms of actions and dose effect relationships. Mathematical models for predicting carcinogenic risks from radiation and chemicals are reviewed for exposure conditions where human data are fragmentary or lacking. Major sections of the report treat the nature and mechanisms of carcinogenic effects; the nature, distribution, and sources of ionizing radiation in the environment; the nature, distribution, and sources of carcinogenic chemicals in the environment; carcinogenic effects of radiation and chemicals in humans; extrapolation from laboratory models to the human; and risk assessment. $16.00.

NCRP Report No. 97, *Measurement of Radon and Radon Daughter Products in Air,* describes measurement techniques appropriate for the assessment of radon and radon daughters in the work place and in the environment. The report presents information on radon properties, especially those properties that are important in developing proper measurement methods. Measurement strategies for typical situations are detailed and appropriate methods for particular situations are described. Calibration, standardization, and quality control are emphasized. The report treats physical properties of radon and radon daughter products; distribution of uranium, thorium, radium and radon in the environment; radon emanation and transport; measurement of radon isotopes in air; measurement of individual radon daughters and unattached radon daughters; measurement of potential alpha energy concentration; radon flux measurements; and calibration, standardization, and quality assurance. An appendix covers the critical level and lower limit of detection, units and conversion factors, and includes a glossary. $15.00.

Lauriston S. Taylor Lecture No. 12, *How Safe is Safe Enough?,* by Bo Lindell, gives two of the reasons for knowing total risk: "(1) we need to know our total background risk in order to judge if we have reasons to be worried about an extra risk of given magnitude or if we can neglect it, (2) we need to know the total incidence of 'unnecessary' harm in society in order to know if we would afford to prevent it if we were to adopt the ambition level of radiation protection in all areas of risk prevention." He uses life expectancy and infant mortality data to demonstrate that life in technologically advanced countries has become safer in the last 100 years. Lindell defines a "safe" reference population by using mortality rates for various age groups. He considers the ideas of "acceptable" and "negligible" and specifies a risk level of about twice the reference risk rate as the "border of worry." He addresses the radiation case and applies the "level of worry" to radiation risks. He then treats the additive risk model and the multiplicative risk model and faces

the question of "How much protection can we afford?" He concludes with an evaluation of the means for determining the cost per unit radiation exposure to be utilized in cost benefit analysis and the marginal sum we are willing to pay to save a life in a statistical sense. $16.00.

Those on the NCRP Standing Order List will receive copies of Report Nos. 96 and 97. However, the Taylor Lecture is not included on the Standard Order System and must be ordered separately. Those who wish to place an order or have their names added to the Standing Order List may direct their request to: NCRP Publications, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814 (phone 301-657-2652).

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.

PHYSOR '90

April 23–26, 1990, is the date set for the *International Topical Meeting on the Physics of Reactor Operation Design and Computation (PHYSOR '90)*, to be held in Marseille, France. The meeting is organized by the French Section of the ANS (SFANS), the Reactor Physics Division, the Mathematics and Computation Division of the ANS, and the Sociéte Française pour l'Energie Nucléaire (SFEN).

The conference offers a review of the development of the major fields in reactor physics, emphasizing the aspects of reactor operation. Contributed papers are invited on the following topics: Physics of Reactor Operation; Physics of Pu Recycling in Power Reactors; Advanced Reactor Design; Physics of Fuel Cycle; Basic Data and Their Validation; Reactor Physics Theory and Methods; Modern Software and Hardware Impact on Reactor Physics and Operation Methods; and Integral Experiments—Measurements and Analysis.

English summaries of 500–1000 words should be postmarked by **August 15, 1989**. Summaries may be submitted to Massimo Salvatores, DRP/SPRC Bldg. 230, CEN/CADARACHE, F.13108 Saint-Paul-Lez-Durance, France, or to Yuri Orechwa, Engineering Physics Division, Bldg. 208, Argonne National Laboratory, Argonne, IL 60439 USA.

Further information about the meeting arrangements and the program may be obtained from Yuri Orechwa at the address listed above.

Calendar

Your attention is directed to the following events of interest.

February 1989

Waste Management '89, Feb. 26–Mar. 2, 1989, Tucson, Arizona, sponsored by the University of Arizona, the American Society of Mechanical Engineers, the American Nuclear Society, and the Electric Power Research Institute. Contact: University of Arizona, Waste Management '89, Dept. NEE, College of Engineering & Mines, Tucson, AZ 85721.

March 1989

Radioactive Materials Transportation Workshop, Mar. 6–9, 1989, Oak Ridge, Tennessee. Contact: Teresa Yearwood, SAIC, P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031 ext. 403).

April 1989

25th Annual Meeting of the National Council on Radiation Protection and Measurements, Apr. 5–6, 1989, in Washington, D.C. Contact: W. Roger Ney, Executive Director, NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814.

Advances in Nuclear Engineering Computation and Radiation Shielding, Apr. 9–13, 1989, Santa Fe, New Mexico, a topical meeting sponsored by the ANS M&C and RP&S Divisions. Contact: E. W. Larsen, Technical Program Chairman, Group X-6, MS B226, Los Alamos National Laboratory, Los Alamos, NM 87545 USA (phone 313-936-0124)

Radioactive Materials Transportation Workshop, Apr. 10–13, 1989, Oakland, California. Contact: Teresa Yearwood, SAIC, P.O. Box 2501, Oak Ridge, TN 37831 (phone 615-482-9031 ext. 403).

7th International Meeting on Radiation Processing, Apr. 23–28, 1989, Leeuwenhorst Congres Center, Noordwijkerhout, The Netherlands, a biennial conference dedicated to the dissemination and advancement of the technology of industrial radiation processing. Contact: E. Franken, 7th Internatl. Meeting on Radiation Processing, P.O. Box 4240, 6710 EE Ede, The Netherlands (phone AA 31 8380 37476; Telex 37030; FAX AA 31 8380 39643).

Fifty Years With Nuclear Fission, Apr. 26–28, 1989, Gaithersburg, Maryland, sponsored by the U.S. National Institute of Standards and Technology. Contact: Jan Hauber, Room B109, Bldg. 245, NIST, Gaithersburg, MD 20899.

International Symposium on Pressure Vessel Technology and Nuclear Codes and Standards, Apr. 26–28, 1989, Seoul, D.P.R. Korea. Contact: Dr. H. H. Chung, Argonne National Laboratory, 9700 S. Cass Ave., Argonne, IL 60439.

10th Annual Meeting of the Canadian Radiation Protection Association, Apr. 30–May 3, 1989, in Victoria, British Columbia. Contact: Lutz E. Moritz, TRIUMF, 4004 Wesbrook Mall, Vancouver, B. C., Canada V6T 2A3 (phone 604-222-1047; Telex (0)-4508503; FAX 604-222-1047).

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, My 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.

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).

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).

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).

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

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

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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