RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE DEPARTMENT OF ENERGY

Phone No. 615-574-6176 or FTS 624-6176
Telex No. 8105721076 USDOE OKRE

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

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The first step to knowledge is to know that we are ignorant—Richard Cecil

NUCLEAR ENERGY DATA CENTER ESTABLISHED IN JAPAN

A Nuclear Energy Data Center (NEDAC), authorized as a non-profit organization by the Japanese government, was established on 1 August 1981 to encourage nuclear energy development through computer program development and services. Some functions of the Japan Atomic Energy Research Institute (JAERI) in this field have been transferred to NEDAC, which, accordingly, cooperates closely with JAERI in terms of technical capability and personnel.

The major activities of NEDAC are as follows:

1. To collect and test computer programs in the field of nuclear energy and distribute them upon request. The library of computer code packages maintained by JAERI has been transferred to NEDAC, which now serves as the focal point in Japan for exchange with the OECD NEA Data Bank at Saclay in France.
2. To develop computer programs in the field of nuclear energy under contract with pertinent government agencies, nuclear organizations, and industries, and to provide utilization services using selected computer programs.
3. To provide technical personnel to assist clients who want to develop sophisticated computer software.
4. To develop a data base management system for safety evaluation and analyses in the field of nuclear reactor systems, nuclear fuel cycle facilities, waste management, and radiation protection.
5. To operate and maintain the JAERI computer facilities.

The NEDAC staff includes administrative (4), technical (31), and operating (22) personnel. Their expertise includes software development in the fields of nuclear reactor safety, structural, shielding, heat transfer, fluid dynamics, and nuclear fusion analyses.

Executive Director: *Junichi Miida*
Technical Advisor: *Takashi Hirakawa*
Director of Government Administration: *Takoshi Sawagawa*

GERMAN STANDARDS PUBLICATION AVAILABLE

Radiation Protection — Standards on Principles and Methods is a new publication from Deutsches Institüt für Normung e.V. (DIN). The book is in German and contains the full text of 55 of the most important German radiation protection standards in the following areas: principles; radiation measurement techniques and dosimetry; laboratory design and equipment; shielding; radiation sources for medicine and technology; and con-

tamination control of air and surfaces. Designated as DIN Pocket Book 159, ISBN 3-410-11339-9, the 400-page volume was edited by K. Becker and W. Erdtmann, and may be ordered for approximately $40.00 from the publisher, Beuth-Verlag Burggrafenstr. 4-10, 1000 Berlin, Germany.

CHANGES IN THE COMPUTER CODE COLLECTION

Three changes were made to the shielding codes collection including a new hardware version contributed by Martin Marietta Aerospace, a new version of RIBD-II contributed by Sandia National Laboratories, and a new code contributed by EG&G Idaho, Inc. Four changes were made to the collection of the peripheral shielding routines, one of which was a new contribution from South Africa via the OECD Nuclear Energy Agency Data Bank, and one each from Lawrence Livermore National Laboratory, Department of Energy Environmental Measurements Laboratory, and Oak Ridge National Laboratory.

CCC-346/QAD-BSA A three-dimensional point-kernel shielding code system for calculating neutron and photon dose rates and heating rates was contributed by EG&G Idaho, Inc., Idaho Falls, Idaho. Using exponential attenuation and infinite medium buildup factors, QAD-BSA computes gamma-ray attenuation. The code can also estimate neutron penetration by making use of moments method attenuation data and removal cross sections. Geometry routines can describe complicated source and shield geometries. The code adapts well to problems requiring multiple sources and sources with asymmetrical geometry. Reference: EGG-PHYS-5267. FORTRAN IV; CDC

CCC-379/SHIELDOSE Martin Marietta Aerospace, Denver, Colorado has contributed a CDC CYBER 170 version to the existing SHIELDOSE code package. FORTRAN IV; IBM 360 and CDC CYBER 170.

CCC-382/RIBD-IRT A radioisotope buildup and decay code system was contributed by Sandia National Laboratories, Albuquerque, New Mexico. The RIBD-IRT code is a modified version of RIBD-II (CCC-137). Changes were made to enable tracking of individual elements by means of weighting factors. Proper use of these weighting factors make possible, for example, calculation of time-dependent fission product source terms following a loss-of- coolant-accident (LOCA). Also, output information was expanded to aid in the study of fission-product source terms. Reference: IRT-6406-003. FORTRAN IV; UNIVAC 1100/81.

PSR-154/GAMIDENT A code system for use in the identification of unknown materials by gamma-ray spectroscopy was contributed by Lawrence Livermore National Laboratory, Livermore, California. The package includes a library file of observed gamma-ray spectra which GAMIDENT searches for matches with observed gamma-ray energies. GAMIDENT lists these matching isotopes, then applies a simple criterion that eliminates isotopes that are unlikely to have been the source of the observed photons, and lists the isotopes that are left—the likely candidates. The user then makes any further analysis required to identify the actual source isotopes. Reference: UCRL-50400, Vol. 22. LRLTRAN; CDC (LTSS System).

PSR-168/PELINSCA A nuclear model code system designed for nuclear elastic and inelastic scattering calculations was contributed by the Atomic Energy Board, Pretoria, Republic of South Africa through the NEA Data Bank, Gif-sur-Yvette, France. The optical model of PELINSCA calculates total and differential shape elastic cross sections and polarizations non-relativistically at nucleon energies up to at least several hundreds MeV, with correspondingly lower energies in the case of heavy ion reactions. The statistical model portion also allows reactions with different incoming and outgoing particles. The angular distributions of subsequent decay gamma rays of the product nucleus are calculated. Reference: PEL-202-3. FORTRAN IV; IBM 360/370.

PSR-173/BON A code developed for unfolding multisphere spectrometer neutron measurements was contributed by the Environmental Measurements Laboratory, U.S. Department of Energy, New York, New York. The program yields a differential energy spectrum and, if the system is calibrated with a known source, the integral of the spectrum is the total neutron fluence rate. FORTRAN IV; IBM 360 and CDC-6600.

PSR-174/SORA A data processing code system for storage and retrieval of data from radionuclide analyses was contributed by Oak Ridge National Laboratory. The code is designed to accept up to 14 different types of radionuclide analyses and a water-level measurement at an unlimited number of sampling locations. SORA partially fills

the need for information on the fate and transport of radionuclides placed in shallow-land disposal sites. Reference: ORNL/TM-7488. FORTRAN IV; IBM 360/370.

CHANGE TO THE DATA LIBRARY COLLECTION

A new data library was added to the collection.

DLC-90/DOSCOV A 24-group cross-section covariance data set was contributed by Electric Power Research Institute, Palo Alto, California, and Oak Ridge National Laboratory, Oak Ridge, Tennessee. This covariance library consists of 16 different dosimetry materials processed into 24-group covariance matrices using ENDF/B-V dosimetry reactions by the PSR-157/PUFF-2 code. The data library is in COVERX card image format, and is being used in the development and demonstration of an advanced methodology for LWR dosimetry applications. Reference: EPRI NP-2188. IBM 360/370.

PERSONAL ITEMS

W. E. Kreger was awarded the Nuclear Regulatory Commission's Distinguished Service Award, given for "distinguished service and excellent achievements or contributions of major significance that are clearly and demonstrably greater than normally would be expected." He was twice chairman of the ANS Radiation Protection and Shielding Division, a former ANS representative to American National Standards Committee N43, "Equipment for Nonmedical Radiation Applications," and presently serves on working group ANS-6.7.2, "Radiation Zoning of LWR Plants for Accident Conditions." Bill, formerly NRC Assistant Director for Radiation Protection, retired in December and is now taking up a new career on the west coast.

Eric Clarke has recently retired from his position as Vice President of Technical Operations, Incorporated, but will continue to be associated with Technical Operations as a consultant. Eric has also served for 10 years as ANS representative to ANSI Committee N13, Radiation Protection.

J. C. Nimal, of the CEA/CEN/Saclay Shielding Laboratory at Gif-sur-Yvette, France, informs us that the name of his shielding research group is now known as the Laboratory of Shielding and Reliability. He notes that they are working in the following fields: gamma-ray streaming through voids, gamma-ray differential albedos, fission-product evaluation, criticality studies, activation and shield design of the fusion facility (Tore Supra), and miscellaneous shield-design studies related to reprocessing plants, fuel shipping casks, research reactors, gamma-ray thermometer, PWR, etc.

The following address changes have been noted: *Jack Celnik* from Burns & Roe to Stone & Webster Engineering Corporation at New York; and *Don Steiner* from the ORNL Fusion Energy Program to the Department of Nuclear Engineering faculty of Rensselaer Polytechnic Institute of Troy, New York.

Change for United Computing Systems, Inc.

A spokesman for United Computing Systems, Inc. has informed us that the company's name has been changed to United Information Services.

CONFERENCES AND COURSES

Preliminary Program of the 2nd International Symposium on Radiation Physics Announced

The Second International Symposium on Radiation Physics is scheduled to be held May 24–29, 1982 at Penang, Malaysia. This conference, as well as the first one held in Calcutta, India in 1974, has been organized under the leadership of *Prof. A. M. Ghose*.

The sessions have the following titles: Basic Radiation Physics Data—Experimental and Theoretical, Radiation Source Types—Characteristic Spectra, Radiation Detectors—Instrumentation and Interpretation, Radiation Transport, Applications of Radiation Physics, Radiation and Environment, and Teaching of Radiation Physics.

A preliminary list of invited speakers includes *J. H. Hubbell* (NBS, USA), *R. H. Pratt* (U. of Pittsburgh, USA), *D. Jackson* (U. of Surrey, UK), *A. M. Ghose* (U. Sains Malaysia, Malaysia), *M. A. Gomaa* (AEE, Egypt), *T. Nakamura* (U. of Tokyo, Japan), *R. Jervis* (U. of Toronto, Canada), *A. Hönig* (U. of Brno, Czechoslovakia), *J. Rotblat* (UK), and *P. K. Iyengar* (BARC, India).

Further information is available from Prof. A. M. Ghose, School of Physics, Universiti Sains Malaysia, Minden, Penang, Malaysia.

Special Session for June '82 ANS

A special session entitled "LWR Safety Programs in the NEA Data Bank Library," has been scheduled for the Annual ANS meeting in Los Angeles, California, June 6–11, 1982. Presentations by the authors of three light-water reactor safety programs included in the NEA Data Bank library will be featured. These NEA Data Bank library programs are available to US and Canadian organizations and individuals through the National Energy Software Center under a Department of Energy agreement with the Organization for Economic and Cooperative Development. For more information, contact Margaret Butler, National Energy Software Center, Argonne National Laboratory, Argonne, IL 60439.

Emerging Nuclear Energy Systems

The State Research Centre of Finland and the Helsinki University of Technology, organizers of the Third International Conference on Emerging Nuclear Energy Systems, have announced that the conference will be held in Helsinki, Finland, during June 1983. The chairman is *Prof. Jorma* Routti; the Scientific Secretaries are *Dr. Seppo Karttunen* and *Dr. Rainer Salomaa*. The following people will serve on the International Program Committee: *Prof. A. Harms* (Canada), *Dr. M. Heindler* (Austria), *Prof. W. Haefele* (FRG), *Prof. J. Ligou* (Switzerland), *Dr. H. Kuroi* (Japan), and *Dr. M. Steinberg* (USA). Those organizations presently sponsoring the conference include: the Finnish Nuclear Society, the European Nuclear Society, and the American Nuclear Society. Further information may be obtained from the Conference Secretariat: State Research Centre of Finland, Nuclear Power Engineering Laboratory, Lonnrotinkatu 37, Helsinki, Finland.

UT Offers Short Courses During TIW-17

The College of Engineering of the University of Tennessee is offering two Five-Day Short Courses of interest to radiation transport specialists during Tennessee Industries Week (TIW-17), August 23–27, 1982. The registration fee of $895 for each course per person includes a modern dormitory room on the Knoxville campus with the 1982 World's Fair within walking distance. The deadline for registration in these two courses is August 16, 1982. For additional information and room arrangements please contact: *Dr. P. F. Pasqua*, Department of Nuclear Engineering, The University of Tennessee, Knoxville, Tennessee 37916.

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 are presented that will lead to a good understanding of the basics of Monte Carlo and the specialized applications of Monte Carlo to practical shielding problems. Many advanced topics are included that will enable the best use to be made of existing computer codes. 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, 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 along with descriptions of the computational advantages and disadvantages of Monte Carlo versus the other methods. This course will cover in depth the theory and mathematics that a user must have to understand and use the Monte Carlo method effectively to solve difficult problems in radiation transport.

Computational Methods in Reactor Analysis will familiarize the course participant with computational methods and computer codes that are currently used to describe the neutronic behavior of nuclear fission reactors. Emphasis will be placed on "understanding" the neutronic models and associated numerical methods that are 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 multidimensional diffusion theory methods and perturbation theory methods for applications in reactor statics, space-time kinetics,

and fuel depletion; transport theory methods including the discrete ordinates method, integral transport theory, and the Monte Carlo method; cross section generation and processing utilizing the AMPX system developed at the Oak Ridge National Laboratory. The first day of the course will cover the fundamentals of nuclear 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 to 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.

Calendar

We call your attention to the following conferences and course offerings.

April 1982

ANS Topical Meeting on the Treatment and Handling of Radioactive Wastes, Richland, Washington, April 19–22.

June 1982

The Third International Symposium on "Radiation Protection Advances in Theory and Practice," in Inverness, Scotland, June 6–11, sponsored by the Society for Radiological Protection.

American Nuclear Society 1982 Annual Meeting, Los Angeles, California, June 6–11.

Third Annual Conference of the Canadian Nuclear Society, Toronto, Canada, June 8–9. Contact: Dr. D. A. Meneley, Chairman, CNS, 1982 Annual Conference, Canadian c/o Ontario Hydro, 700 University Avenue, H16 Toronto, Ontario, Canada M5G 1X6. Nuclear Society, 111 Elizabeth Street, Toronto, Ontario, Canada M5G 1P7; Tel: (416) 592-5210 Telex: 06-217662 TWX: 610-491-1456.

American Society for Testing and Materials Eleventh International Symposium on Effects of Radiation on Materials, Mountain Shadows Resort Hotel, Scottsdale, Arizona, June 28–30.

September 1982

Thirteenth International Conference on Medical and Biological Engineering and the Sixth International Conference on Medical Physics in Hamburg, Federal Republic of Germany, September 5–11. Contact: Hamburg Messe und Congress GMBH, Congress Organisation, Postfach 30 23 60, D2000 Hamburg 36, Federal Republic of Germany.

VISITORS TO EPIC

The following persons came by for a visit and/or to use the EPIC facilities during the month of February: *Jane Flanagan,* Personnel Development, ORNL; *Bruce B. Hicks,* Director, *Walter M. Culkowski,* Meteorologist, and *Yair Yariv,* from the National Oceanographic and Atmospheric Administration/ATDL, Oak Ridge, Tennessee; *Sam Berk,* Department of Energy, Office of Fusion Energy, Washington; *Martin L. Grossbeck,* Metals and Ceraics Division, ORNL; and *G. Robert Odette,* Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, California.

FEBRUARY 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.

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