# RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE U.S. DEPARTMENT OF ENERGY

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*No. 174* *June 1979*

*To be conscious that you are ignorant of the facts is a great step to knowledge.*
*. . . Benjamin Disraeli*

## RSIC NEWSLETTER DISTRIBUTION QUERY APPENDED

Each year, we query the *RSIC Newsletter* distribution to see if our list is current and to see if we have names on our distribution that for several reasons should not be there. In this way we are able to keep our distribution within manageable limits, and are not compounding the unwanted paper problem. Escalating publication and mailing costs make it more imperative that we not mail newsletters to dead-letter boxes. We therefore deeply appreciate an immediate response from our reader community even though it may be a terse note written across our inquiry that you are no longer interested. The shielding community remains small and somewhat fractionated. We need the cooperation and collaboration of each one of you to keep RSIC viable in your service.

We again ask leading questions for information which enable us to continue to freely serve your needs. We will treat your response as privileged information which will not be publicized unless you explicitly direct us to do so. We also ask questions aimed at the determination that we are adequately serving your information needs. Please comment freely and give us your suggestions for RSIC improvement.

We ask that you turn now to the last page of this issue; detach the page; fill it out using additional paper as needed; and mail immediately. September 1st is the final deadline for response. We will immediately afterwards begin the review and purge of the distribution list.

## CURRENT WORK AND PROBLEMS

RSIC often receives communications from members of our international shielding community giving us a brief statement of their current work and problems. In the interest of furthering information exchange, we share a few such items and encourage readers to write similar letters with sharing intended.

G. B. Bishop writes that the Nuclear Group in the Mechanical Engineering Department at Liverpool University in England are working on the penetration behaviour of 6.2-MeV gamma rays through common shielding materials, multi-layered shields and shield irregularities. The results are published and several publications have been reviewed by RSIC.

Dr. H. Schraube of the Gesellschaft für Strahlen-Und Umweltforschung mbH at Münichen (FRG) notes that his laboratory is concerned with aspects of production, measurement and application of neutrons in health physics, biology and medicine, and is also interested in radiation transport problems. The laboratory is part of the Health Physics Department in the Institute for Radiation Protection.

Dr. D. T. L. Jones of the National Accelerator Centre, Medical Component, Karl Bremer Hospital, Republic of South Africa writes that he is involved in the design of a neutron and proton therapy facility based on a 200-MeV sector cyclotron, involving inter alia, shielding and collimation calculations, labyrinth designs, etc.

Toshimasa Miura, Senior Officer for Shielding Experiments at the Ship Research Institute, Tokai Branch, Tokai-Mura, Naka-Gun, Ibaraki-Ken, Japan, introduced us to the several activities in the field of radiation shielding at his Institute. Two sections in the Institute are involved in shielding studies. One is the shield structure section in the nuclear ship division in Tokyo, and the other is the shield effects section in the

Tokai branch in Ibaraki. In the former, mainly theoretical studies have been performed on the following items: evaluation of cross sections of reactor structural materials; fundamental study on the methods used in discrete ordinates transport codes; and the evaluation and development of discrete ordinates codes, Monte Carlo codes and other calculational codes. In the latter section, both experimental and theoretical studies have been performed. Experimental studies made to evaluate discrete ordinates transport codes are: radiation streaming in various kinds of annular ducts and circular ducts, penetration problem of high energy gamma-rays from $^{16}N$, and radiation distribution in a cavity. Evaluation and development of discrete ordinates codes have been made. PALLAS is a discrete ordinates transport code developed in the Institute. The following computer codes are also frequently used: ANISN, DOT, TWOTRAN, MORSE, RADHEAT, FERDO, SAND-II, and SPEC-4. Dr. Toshimasa Miura states that he is also very interested in radiation streaming in duct and cavity.

Dr. Min-Fong Su, Shielding Director of the Institute of Nuclear Energy Research of Lung-Tan, Taiwan, writes that although they are in the beginning of their shielding effort, several persons are involved in the area of radiation transport and shielding. The main purpose is to implement a computer code system for the shielding design and analysis for power plants under construction by Taipower Company. AMPX, AXMIX, ANISN, DOT-3, and some plotting codes have been applied in the neutron and gamma-ray coupled transport calculations and analysis. Nuclear heat calculations were also made. For those reactor components outside the reactor vessel, the QAD-P5A, AKERN code system, and EMERALD-NORMAL are used for the shielding calculations. These RSIC-packaged codes were converted to run on the CDC CYBER 73 computer, and the resulting new packages were returned to the RSIC collection. They are now interested in implementing Monte Carlo codes for use in design work of streaming.

## PERSONAL ITEMS

**Charles W. Garrett** has left Maryland Emergency Medical Services to work in Resource Applications of the US Department of Energy, Washington, D.C.

## ORAU PROFESSIONAL TRAINING PROGRAMS OFFER COURSES

The ORAU Professional Training Programs will offer a five-week course in applied health physics in Oak Ridge beginning September 10, 1979. The course emphasizes the fundamentals of health physics, problems and practices in providing radiation protection, the mechanism of radiation damage, and methods for evaluating radiation hazards.

A one-week course designed to teach participants the newer techniques for calculating the radiation dose from internally deposited radionuclides will be presented November 5–9, 1979, by ORAU Professional Training Programs.

Additional information on these courses may be obtained from Jo T. Tipton, Registrar, Professional Training Programs, Oak Ridge Associated Universities, P. O. Box 117, Oak Ridge, TN 37830, or by calling 615-576-3434.

## SYMPOSIUM ON NEUTRON CROSS SECTIONS FROM 10–50 MeV

A prospectus of a Symposium on Neutron Cross Sections from 10 to 50 MeV to be held May 12–14, 1980, has been issued by Brookhaven National Laboratory (BNL). It is planned to review what has been done in the three years since a symposium was held on the subject, May 3–5, 1977, (BNL-NCS-50681). The Symposium will consider long range needs for neutron cross sections as well as data for immediate applications. Topics to be considered include: Source Characteristics; Differential Data Including Dosimetry Reactions; Materials Damage Studies; Integral Experiments, Sensitivity Studies and Data Testing; and Data Evaluation, Nuclear Model Codes, Formats and Related Problems.

The review, contributed papers, and workshop recommendations will be published.

For further information contact: Mulki Bhat or Sol Pearlstein, Brookhaven National Laboratory, Upton, Long Island, NY 11973.

## CALL FOR PAPERS

Papers are currently solicited for the Tenth International Symposium on Effects of Radiation on Materials. The symposium, scheduled for June 3–5, 1980 at Hilton Head Island, South Carolina, is sponsored by the ASTM Committee E-10 on Nuclear Technology and Applications. Needed are papers on radiation induced changes in microstructure, surface structure, and mechanical properties caused by neutrons or charged particles, and may have application to thermal reactors, breeder reactors, or fusion systems. Authors should send a 500-word or less abstract (in English) to Symposium Chairman, D. Kramer, Rockwell International, 8900 De Soto Ave., Canoga Park, California 91304, prior to December 15, 1979. ASTM offer forms to accompany submissions may be obtained upon request from Kramer or Jane B. Wheeler, ASTM Publications Div., 1916 Race St., Philadelphia, PA 19103 (215/299-5414).

## CHANGES OF ADDRESS

We note the following changes of address: **Nolan E. Hertel**, *from* the University of Illinois, *to* University of Texas at Austin; **Kenneth B. Shacter**, *from* the University of Florida, *to* Middle South Services, Inc., New Orleans, LA; and **Joseph Santucci**, *from* Burns & Roe, Inc., *to* S. M. Stoller Corporation in New York, NY.

## VISITORS TO RSIC

The following persons came for an orientation visit and/or to use RSIC facilities during the month of May: Ronald Dierckx, EURATOM, Ispra, Italy; Ron Goans, Industrial Safety and Applied Health Physics Division, ORNL; Alan Justus, Idaho Department of Health, Boise, Idaho; Hermann Krause, Max-Planck-Institut für Plasmaphysik, Garching, F.R. Germany; William H. Power, Engineering Division, ORNL; Paul H. Sager, Jr., General Atomic Company, San Diego, CA; Ulla M. Swaren, Swedish Council of Environmental Information, Stockholm, Sweden; Michael F. Tkacik, South Carolina Bureau of Radiological Health, Columbia; and David A. Zaloudek, Arkansas Department of Health, Little Rock.

## UPCOMING MEETINGS

We call attention to the following upcoming meetings which have not been previously announced.

### July 1979

*24th Annual Meeting of the Health Physics Society*, July 8–13, 1979, Philadelphia Marriot, Philadelphia, Pennsylvania. Contact: Office of Executive Secretary, HPS, 4720 Montgomery Lane, Suite 506, Bethesda, Maryland 20014. Telephone (301) 654-3080.

### September 1979

Short course on *Computational Methods in Nuclear Reactor Analysis—Statics, Kinetics, Depletion,* September 10–14, 1979, University of Tennessee, Knoxville. Contact: Dean F. N. Peebles, Director, Tennessee Industries Week, College of Engineering, University of Tennessee, Knoxville, Tennessee 37916; Telephone (615) 974-5321.

*International Conference on Financing Nuclear Power,* September 23–26, 1979, Hotel Scandinavia, Copenhagen, Denmark. Contact: Atomic Industrial Forum, Inc., 7101 Wisconsin Avenue, Washington, D.C. 20014, USA, Attention: Conference Registrar.

### November 1979

*Federal Computer Conference*, November 6–8, 1979, Sheraton-Park Hotel, Washington, D.C. Contact: Federal Computer Conference, P. O. Box 368, Wayland, MA 01778; Telephone (617) 358-5181.

March 1980

*5th International Congress of the International Radiation Protection Association*, March 9–14, 1980, Jerusalem, Israel. Contact: Mr. A. Eisenberg, General Secretary, 5th International Congress of IRPA, P. O. Box 16271, Tel Aviv, Israel.

## CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in May.

### CCC-79/ISOSHLD III

The kernel integration code system for general purpose isotope shielding analysis was updated to correct errors in the photon production library. Charles Shih, Kaiser Engineers, Oakland, California, notified RSIC of the errors. A. T. Luksic, Westinghouse-Hanford, Richland, Washington, provided a replacement for the library. Both the UNIVAC (A) and IBM 360 (B) versions of the package were updated.

### CCC-307/QAD-CG

The combinatorial geometry version of QAD-P5A, a point kernel code package for neutron and gamma-ray shielding calculations, was updated to add sample problem input supplied by Bechtel Power Corporation, Gaithersburg, Maryland. Credit for code contribution is shared by Bechtel, Los Alamos Scientific Laboratory, NASA Lewis Research Center, Brown Engineering Company, and Oak Ridge National Laboratory. FORTRAN IV; UNIVAC.

### CCC-332/COMRADEX IV

An evaluation of potential radiological doses in the near environment of a radioactive release was contributed by Atomics International Division of Rockwell International, Canoga Park, California, through the National Energy Software Center, Argonne, Illinois. Based on COMRADEX III, COMRADEX IV provides for source depletion by dry deposition and gravitational settling, the use of Briggs' formulas for plume dispersion factors, and changes to isotopic library input to include an index to designate isotope class. Reference: N707TI130047. FORTRAN IV; IBM 360.

### CCC-337/DOSFACTER

A code package for calculation of conversion factors for external exposure for radionuclides of importance in routine releases from nuclear fuel cycle facilities was contributed by the Oak Ridge National Laboratory. For a given radionuclide, the program calculates whole body dose-rate factors for photons and electrons and organ dose-rate factors for photons. Reference: ORNL/NUREG/TM-283. FORTRAN IV; IBM 360.

### CCC-341/AIRSCAT

AIRSCAT, a calculation of air-scattered gamma-rays using the single-scattering approximation with no exponential attenuation or buildup, was contributed by Worcester Polytechnic Institute, Worcester, Massachusetts. Using the once-scattered component of Compton scattering, the program integrates the individual dose rate contributions from various scatter-points within the scattering region. Reference "Gamma-Ray Air Scattering," thesis, by Michael C. Guile, April 1979. FORTRAN IV; PDP-10.

### CCC-342/FEMRZ

A code package, based on finite element method for solving multigroup neutron transport problems in two-dimensional cylindrical (r,z) geometry, contributed by Japan Atomic Energy Research Institute, Tokai, Ibaraki, Japan, can solve eigenvalue problems as well as fixed source and other problems. Reference: JAERI-1253. FORTRAN IV; FACOM 230-75.

## CHANGES IN THE DATA LIBRARY COLLECTION

The following changes were made during May.

## DLC-55/RECOIL

The data package of multigroup primary recoil spectra, displacement rates and gas-production rates for radiation damage studies, was contributed by the Oak Ridge National Laboratory. A heavy charged-particle recoil data base (primary knock-on atom spectra), RECOIL is an analysis program which can assist experimentalists in studying, evaluating, and correlating radiation-damage effects in different neutron environments. Since experimentally obtained controlled-thermonuclear-reactor-type neutron spectra are not presently available, the data base can be extremely useful in relating currently obtainable radiation damage to that which is anticipated in future fusion devices. The data are in card image form and programs are provided for conversion to the binary form used in RECOIL. This version has been designated DLC-55B. Reference: ORNL/TM-5760.

## DLC-63/DOSDAT DATA

The tabulation of calculated external dose-rate conversion factors for 240 radionuclides of potential importance in routine releases from nuclear fuel cycle facilities was contributed by the Oak Ridge National Laboratory. The energies and intensities of the various radiations used to calculate the dose-rate factors for each radionuclide were obtained from a recent compilation of evaluated nuclear decay data (ORNL/NUREG/TM-102). Dose rate conversion factors for immersion in contaminated air and contaminated water and exposure to a contaminated ground surface are included. These dose-rate factors are useful in radiological assessments, since multiplication by a known radionuclide concentration in the environment gives the dose-equivalent rate for a given radiation type, exposure mode, and body organ. A retrieval code for listing the data is included in the package. Reference: ORNL/NUREG/TM-283. IBM 360.

## DLC-64/UKCTRI

UKCTRI, 46-group neutron cross sections for fusion reactor calculations, contributed by the University of Birmingham, Birmingham, England, is designed for calculations of neutron fluxes and reaction rates in controlled thermonuclear reactors. Reaction cross sections, including partial inelastic data, are provided for 25 materials with $1/\Sigma_t$ weighting for Li-6, Li-7, O, Be, Pb, Nb, Fe, Ni, Cr, Zr, V, Ti, H, D, T, C, Al, B-10, B-11, Cu-63, Cu-65, F, Na, K, Mo. The multigroup data were processed with the GALAXY code from evaluated data from the UK Nuclear Data Library. The package contains a retrieval program which allows the use of the cross sections in standard neutron transport codes such as ANISN and MORSE. Reference: Paper No. 79-02. IBM 360.

## 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 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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