RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

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Information conserves other resources through better decisions. . . .John Richardson

ANS/RP&S HONORS CAPO AND RHOADES

At its June 1981 meeting in Miami the American Nuclear Society Radiation Protection and Shielding Division presented awards for outstanding technical achievement to Mary Ann Capo of Offshore Power Systems and Wayne A. Rhoades of Oak Ridge National Laboratory.

The citations were presented by Gerald P. Lahti, Chairman of the ANS Radiation Protection and Shielding Division, and read as follows:

On behalf of the American Nuclear Society, the Radiation Protection and Shielding Division is pleased to present to

Mary Ann Capo

its Award for Outstanding Service to the Society, to the Division, and to the radiation transport and shielding community worldwide.

The award is made in recognition of her achievements in radiation protection and radiation shielding, particularly in regards to her achievements in reducing Monte Carlo transport and point kernel methodologies to routine practice for a wide spectrum of radiation shielding problems. Since her initial involvement in the development and application of numerous transport methods and data bases useful in radiation transport analyses for the aircraft nuclear propulsion, she has been instrumental in the development of radiation shielding analysis methodologies for nuclear rocket propulsion applications, floating nuclear power plants, and numerous other nuclear energy applications. Her ability to recognize the practicality of an analysis approach and the interpretation of shielding experiment to provide qualified design methods has been an outstanding contribution to the radiation shielding community.

Ms. Capo's involvement in the engineering applications of computer programs and nuclear data was developed with an insight of user requirements that proved to withstand the passage of time. Nuclear data and methods developed under her cognizance have been passed to the next generation of radiation shielding analysts.

Highlights of her work over the years in advancing the technology of radiation protection and shielding are as follows:

Development and validation of engineering applications of Monte Carlo radiation transport methods for radiation shielding and environment studies;
Development of simplified data bases, e.g., buildup factors, gamma ray cross sections, applicable to engineering

applications using computer methods;

Sound assessment of radiation transport methods for the diverse set of radiation shielding problems encountered in nuclear powered aircraft, nuclear space propulsion, floating central station nuclear power;

Pioneering the practical application of discrete ordinates transport methods for radiation streaming in a PWR cavity with direct involvement in the validation of the methodology using experimental data from operating commercial nuclear power plants;

Development of the application and validation of assymetric (highly biased) angular quadrature methods in discrete ordinate transport to complex radiation transport analyses for nuclear rocket propulsion.

Development of the source terms for consequence analysis for the first Class 9 accident liquid pathway transport study.

Ms. Capo's work in performance and management of the development of applications for radiation transport methods and data bases for radiation shielding design analysis has always involved new and complex nuclear energy applications. Her contributions have provided a means to use computer methods to routinely solve complex radiation transport problems where weight, space, and/or cost are primary design objectives.

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On behalf of the American Nuclear Society, the Radiation Protection and Shielding Division is pleased to present to

Wayne A. Rhoades

its award for Technical Achievement by virtue of his leadership in radiation transport methods development.

His leadership in the development of two-dimensional discrete ordinates methods for solving radiation-shielding problems has been outstanding. DOT-IV, the two-dimensional discrete ordinates radiation transport code which was developed under Rhoades' leadership, is an exceptionally efficient multi-dimensional code as evidenced by the demand for DOT-IV in the shielding community throughout the world.

He has extended existing techniques and developed new techniques which have proven to be powerful tools used in the acceleration of the convergence of the iteration process in the discrete ordinates method. He has developed modified flux model equations and techniques for effective removal of negative source terms which improve the accuracy and usability of the discrete ordinates method. He has led the investigation, development, and application of very efficient input/output methods used in the DOT-IV code. His continuing quest for the most efficient style of programming consistent with the traditional versatility of the DOT program has resulted in the most efficient code in that series.

In addition to his direct contributions, he continues to have an important influence on the work of others through his consultations on methods development, particular applications of the DOT-IV program, and the efficient, innovative use of current computing machinery.

ANS Best Paper Award

Wilber Bunch of HEDL, Chairman of the ANS Radiation Protection and Shielding Division Honors and Awards Committee, has announced the winner of the Best Paper Award following presentation at the June 1981 meeting at Miami, Florida. The winning paper, prepared by M. E. Sawan, G. A. Moses, and G. L. Kulcinski of the University of Wisconsin, Madison, was titled "Time-Dependent Radiation Damage to the First Wall of a Heavy Ion Beam Fusion Reactor with Porous Tube Protection." Congratulations to the winning authors who share a cash prize.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made to the codes collection during July.

CCC-400/DOSFACTER II

DOSFACTER II, based on DOSFACTER (CCC-337), a calculation of dose-rate conversion factors for exposure to photons and electrons, was contributed by Oak Ridge National Laboratory. In addition to the DOSFACTER code package (CCC-337) capabilities, DOSFACTER II includes (a) calculation of electron dose-rate factors for radiosensitive portions of the skin; (b) incorporation of improved estimates of organ

dose-rate factors for photons; and (c) calculation of dose-rate factors for additional radionuclides and incorporation of updated radioactive decay data for all radionuclides. External dose-rate factors for photons and electrons have been calculated for approximately 500 radionuclides, and those results are packaged separately as DLC-79/DOSDAT II-81. References: Trans. Am. Nucl. Soc., 34, 84 (1980) and ORNL/NUREG-79 (NUREG/CR-1918). FORTRAN IV; IBM 360/370.

SCA-2/KENO-IV

The authors of the KENO-IV Monte Carlo criticality code have notified RSIC of changes made to SCA-2/KENO-IV. SCA-2/KENO-IV has not been distributed since October 16, 1980 when it was superceded by the KENO-IV which is included in the SCA-0/SCALE code package. This announcement is to inform persons who are using the SCA-2 version of KENO-IV that they may request from RSIC details of these recent changes.

CHANGES IN THE DATA LIBRARY COLLECTION

The following changes were made in the data collection in July.

DLC-84/MENSLIB

The 60-neutron-group cross-section library was contributed by Los Alamos National Laboratory and Texas A&M University. The data are for H, B, C, N, O, Si, Fe, and W in P_5 expansion in the "DTF-IV" format, i.e., the user must multiply the cross sections by $(2l+1)$ if used in codes that accept "ANISN" format. Data below 20 MeV were processed from ENDF/B-IV using MINX and at higher energies using DANA5. The library was used in the design of a shield-collimator unit for fast neutron radiotherapy. Reference: LA-7159-T (Thesis).

DLC-86/FLUNG

The 35-neutron, 21-gamma-ray group library was derived from DLC-41/VITAMIN-C and utilized in a variety of fusion neutronics applications in the Engineering Physics Division at ORNL. Data are provided for the 61 materials available from VITAMIN-C (ENDF/B-IV). A retrieval code for BCD-to-binary conversion is provided. IBM-370/3033. Reference: ORNL/TM-7828.

DLC-87/HILO

The 66-neutron, 21-gamma-ray-group cross-section library for neutron transport up to 400MeV was contributed by Engineering Physics Division, Oak Ridge National Laboratory. Below 15 MeV the library consists of data derived from DLC-41/VITAMIN-C. Above that energy, differential elastic cross-section data from optical model calculations and nonelastic data from intranuclear-cascade-evaporation model are used. The library is P_5 above 15 MeV, P_3 below, in ANISN format, with a retrieval code for BCD to binary conversion. Data are provided for H, ^{10}B, ^{11}B, C, N, O, Na, Mg, Al, Si, S, K, Ca, Cr, Fe, Ni, W, and Pb. IBM-360/370. Reference: ORNL/TM-7818.

WHAT HATH ICRU WROUGHT?

We have had a copy of ICRU Report 33, "Radiation Quantities and Units" for several months, but we did not notice what the ICRU had done with the word *flux* until we read the book review of F. H. Attix in the July issue of *Health Physics*. He calls our attention to the new ICRU definitions of *particle number, N* (the number of particles emitted, transferred, or received) and *particle flux,* dN/dt (the quotient of the increment of particle number, dN, in time interval dt). This *flux* is quite different from the similar term *flux density*, or the ICRU-preferred term *fluence rate*. We believe that the new definition will lead to considerable confusion in the literature since, quoting the ANS-9/ANSI N1.1-1976 glossary, the *particle flux density* "is also commonly, but incorrectly, called *flux*." We refer the reader to the Attix review for additional commentary on the new ICRU pronouncements.

DEATH OF ED CASHWELL NOTED

It is with profound regret that we note the death of Edmond D. Cashwell on July 11, 1981 at age 61. His scientific contributions, however, will continue to live on indefinitely.

After receiving his Ph.D. in mathematics from the University of Wisconsin in 1949, Cashwell came to Los Alamos in 1951. He followed the early pioneers at Los Alamos, von Neumann, Ulam, Metropolis, and Richtmyer, in being responsible for development of the theoretical Monte Carlo method for computing radiation transport which further enhanced Los Alamos as a leading center for such work.

Ed was singularly outstanding for his publications which have provided much of his knowledge to the rest of us who are today solving problems using the Monte Carlo method. His publications include:

1. E. D. Cashwell and C. J. Everett, "A Practical Manual on the Monte Carlo Method for Random Walk Problems," Pergamon Press, Inc., New York (1959). [Also LA-2120 (1957)].
2. E. D. Cashwell and C. J. Everett, "A Monte Carlo Sampler," LA-5061-MS (1972).
3. E. D. Cashwell and C. J. Everett, "A Second Monte Carlo Sampler," LA-5723-MS (1974).
4. L. L. Carter and E. D. Cashwell, "Particle-Transport Simulation with the Monte Carlo Method," *ERDA Critical Review Series,* TID-26607 (1975).
5. C. J. Everett and E. D. Cashwell, "A Relativity Primer for Particle Transport, A LASL Monograph," LA-7792-MS (1979).
6. LASL Group X-6, "MCNP—A General Monte Carlo Code for Neutron and Photon Transport," LA-7396-M, Revised (1979).

Cashwell was Group Leader of the Los Alamos Monte Carlo Group from 1971 through 1974. In April 1980, he was given a Los Alamos Distinguished Performance Award for his outstanding contributions in the field of Monte Carlo. In February 1981, he became a Fellow at the Laboratory.

We will long remember Ed, not only for his technical expertise, but for his integrity and graciousness.

STANDARD ON LWR AREA MONITORING SYSTEMS PUBLISHED

A new standard, written by Working Group ANS-HPSSC-6.8 led by Delbert J. Schuh, II, Fabricated Systems, Inc. and titled "Location and Design Criteria for Area Radiation Monitoring Systems for Light Water Reactors." This has been a joint project of the American Nuclear Society and Health Physics Society standards committees.

The scope reads as follows:

This standard provides criteria for the establishment of locations for fixed continuous area gamma radiation monitoring instrumentation for use in light water reactors. It also provides criteria for design features and ranges of measurement for such instrumentation which are consistent with current and anticipated plant designs.

This standard applies only to area gamma radiation monitoring during routine operations, including anticipated operational occurrences. The following are not within the scope of this standard:

(1) Monitoring during accident and post accident conditions;
(2) The detection of ambient levels of other than gamma radiation;
(3) Control and operator actions, if any, resulting from the area radiation measurement;
(4) Portable health physics survey instruments;
(5) Personnel monitoring devices;
(6) Instrumentation used solely for the monitoring of various plant processes; and
(7) The determination of alarm setpoints.

The standard, designated ANSI/ANS-HPSSC-6.8.1-1981, is available from the American Nuclear Society, 555 N. Kensington Ave., LaGrange Park, IL 60525 for $20 per copy.

The working group is now proceeding to develop a similar standard on process monitors.

BNL Seminar/Workshop Postponed

The BNL seminar/workshop on *Thermal Reactor Benchmark Calculations, Techniques, Results, and Applications* announced in July newsletter has been postponed to May 17–18, 1982 from October 19–20, 1981.

THOMAS A. JAEGER PRIZE ANNOUNCED

The Commission of the European Communities and the International Association for Structural Mechanics in Reactor Technology e.V., Berlin (Germany), announce the establishment of a prize to encourage and stimulate research in structural mechanics applied to reactor technology. The underlying purpose is to promote the technological bases for safe and economic operation of nuclear fission reactors and bring nearer the advent of nuclear fusion energy.

This prize is created in honour of Professor Thomas A. Jaeger and will bear his name. He was the founding Director of the International Association for Structural Mechanics in Reactor Technology e.V. The prize shall be awarded every two years on the occasion of the SMiRT Conferences, the first such award being made during the sixth Conference, which will be held in Paris in 1981. The authors of communications at this conference are qualified to enter the contest for the Thomas A. Jaeger Prize.

This SMiRT-6 Conference is dedicated to the memory of Professor Th. A. Jaeger, who died on August 21, 1980. Thomas A. Jaeger founded the SMiRT Conferences and ensured the success of all of them up to the SMiRT-5 Conference in Berlin. He convinced everyone concerned of the importance of the cross-fertilization of ideas in structural mechanics, for the safety, reliability and good performance of nuclear reactors, and the organizers are doing their utmost to organise SMiRT-6 the way that the founder would have wanted it. By the value of the exchanges that it will initiate, this conference is their best tribute to the memory of this exceptional man, a greatly missed friend.

Although primarily a structural engineer, Tom had a keen interest in shielding. He was one of the leaders and an editor of the largest work ever published on shielding: the *Engineering Compendium on Radiation Shielding,* published by Springer-Verlag in three volumes under sponsorship of the International Atomic Energy Agency (IAEA). The board of editors was comprised of R. G. Jaeger (editor-in-chief), E. P. Blizard, A. B. Chilton, M. Grotenhuis, A. Hönig, T. A. Jaeger, and H. H. Eisenlohr.

As co-editor of *Nuclear Engineering and Design,* an international journal devoted to the thermal, mechanical and structural problems of nuclear energy, Tom worked diligently in the early years to promote that journal as a vehicle for shielding literature, but a few years ago the decision was made for the journal to concentrate on other topics.

PERSONAL ITEMS

Nancy C. Smith has joined the Engineering Physics Information Center (EPIC) staff to head the preparation of publications, and this newsletter is one of her first products. She replaces Pam Young who has left ORNL employment. Nancy transferred from the Technical Publications department of the ORNL Information Division where she has been involved in publications work for a number of years.

Professional Divisions Name New Officers

The ANS professional divisions below have announced the names of their new officers for 1981–82. In the following list, the names of those officers designated chair-elect last year are given in parentheses.

Radiation Protection and Shielding—(Chair, Michael J. Kolar); vice chair/chair-elect, David E. Bartine; secretary, E. Thomas Boulette; treasurer, Joseph M. Cardito; executive committee I, Robert T. Santoro; executive committee II, Leland L. Carter; executive committee III, Victor J. Orphan.

Reactor Physics (Chair, Burt A. Zolotar); vice chair/chair-elect, Michael J. Lineberry; secretary, Rudolph Sher; treasurer, Surendra N. Purohit; executive committee, Roger Rydin, Odelli Ozer, and David C. Wade.

Mathematics and Computation—(Chair, John E. Meyer); vice chair/chair-elect, Richard J. Pryor; secretary, Lawrence L. Barinka; treasurer, I. K. Abu-Shumays; executive committee, Patrick C. Bailey, George H. Miley, and R. Douglas O'Dell.

Isotopes and Radiation—(Chair, Donald E. Wood); vice chair/chair-elect, Michael C. Stauber; secretary, W. A. Jester; treasurer, Eric T. Clark; executive committee, Richard C. Ragaini, Charles C. Thomas, Jr., and William E. Kreger.

VISITORS TO EPIC

The following persons came for an orientation visit and/or to use EPIC facilities during the month of July: **Shiaw-Der Su,** General Atomic Co., (currently on contract at TVA, Knoxville); **Hans-Peter Weise,** Bundesanstalt für Materialprüfung (BAM), Berlin, Germany; **Kenneth Kite,** Nuclear Assurance Corporation, Atlanta, Georgia; **M. Moghari,** Control Data Corporation, Rockville, Maryland; **Lowell K. Reed,** Boeing, Oak Ridge, Tenn.; and **Dermott E. Cullen,** IAEA, Vienna, Austria.

JULY 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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