RSIC Newsletter

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We work day after day, not to finish things; but to make the future better. . . because we will spend the rest of our lives there — Charles F. Kettering

RSIC Newsletter Anniversary Issue

How It All Began

The first *RSIC Newsletter*, outlining the program of the newly-launched information center, was issued in June of 1963. It was timed to enlist the support of the shielding community by announcing the center's mission to attendees of the June 1963 American Nuclear Society meeting. To commemorate that event, we will take this occasion to recount how it all began and list a few of the developments along the way.

In the autumn of 1962 (USA FY-1963), announcement was made to the news media[1-3] by the U. S. Atomic Energy Commission (AEC) and the Oak Ridge National Laboratory (ORNL) of the establishment of a shielding center "to assist in solving radiation problems related to reactors, nuclear weapons, and space." This Radiation Shielding Information Center (RSIC) located at ORNL was to "collect, evaluate, and disseminate shielding information."

Ira Zartman, Chief of the AEC Reactor Physics Branch of the Reactor Division, **Philip Hemmig**, a physicist of that branch and Acting Chief at the time, and **Everitt P. Blizard**, then Director of the ORNL Neutron Physics (now Engineering Physics) Division, were the principal figures involved in forming the new center. At the time there was concern for the preservation of the technology which had been developed in recently-cancelled programs and a recognition of the need to share technology across government programs. These concerns led to the establishment of an activity which would collect, preserve, and distribute government-developed information and technology.

Blizard was well known as the editor of *Nuclear Science and Engineering* (NSE) and the author of many works on shielding. A special issue of NSE, containing many shielding articles, was published in February 1967, as a memorial to him.

Hemmig has continued all these years to be a principal supporter of RSIC in Washington through all the transitions from Atomic Energy Commission (AEC) to Energy Research and Development Administration (ERDA) to Department of Energy (DOE). He is now Assistent Director, Reactor Physics Technology, Safety and Physics Division, Office of Breeder Reactor Technology Projects, U.S. Dept. of Energy.

Keith Penny, **David Trubey**, and **Betty Maskewitz** were asked to lead the new efforts. While Betty and Dave have continued with RSIC, Keith is now in charge of computer security for Union Carbide Nuclear Division at Oak Ridge.

RSIC was born at a time of increasing concern with the so-called "information explosion." **Alvin Weinberg**, ORNL Director, spent the summer of 1962 in the Executive Office of the President of the United States as chairman of a committee of distinguished scientists considering "The Responsi-

bilities of the Technical Community and the Government in the Transfer of Information." The resulting document[4] theme was "Information is an integral part of science; without proper handling of information, science cannot function."[5] It recommended the establishment of specialized information centers — "to digest and evaluate — to make condensations and reviews — thus saving the time of the individual research scientist and engineer." ORNL led in developing prototypes — few of which have survived to this day.

The commercial database management systems for storing and retrieving information did not exist 20 years ago. The first task of RSIC founding members, Penny and Trubey, was to design and develop the Storage and Retrieval Information System (SARIS), which has evolved into a data base which is part of an information system with on-line access from anywhere in the nation.

The programming for the IBM 7090 computer was done by **Margaret (Peggy) Emmett** who later became well known as one of the principal developers of the MORSE code. A description of the original SARIS system was first published in 1963.[6]

The RSIC treatment of computing technology (codes and data) as *bona fide* scientific information, subject to continuing critical examination, modification, and improvement through interaction between developer, center, and user has perhaps attracted the most attention. The implementation of the "open code or data package" concept was said to have "materially advanced the state of the art" in a 1975 citation by the Shielding Division of the American Nuclear Society (ANS) and by an ANS Fellow Citation in 1982 presented to the RSIC Director.

The RSIC codes collection began in 1963 with technology developed in the Aircraft Nuclear Propulsion Program which ended in 1961. Kernel integration codes from the General Electric Nuclear Materials Production Operation (NMPO) in Cincinnati, Ohio, Monte Carlo codes from the Nuclear Aerospace Research Facility of General Dynamics, Fort Worth, Texas, and moments method, discrete ordinates, and Monte Carlo codes from the United Nuclear Corporation, White Plains, New York were the first contributions. This technology, merging with developments and contributions from many other domestic and foreign laboratories, has matured into the sophisticated computing technology that is in common use today.

We reported the availability of 39 code packages in early 1965; 60 in 1966. Today, the shielding code collection includes 431 complex code systems, 332 contributed by U.S. developers, and 99 contributions from 20 other nations. The Japanese shielding community leads in non-USA contributions with 21% of the total, the French with 19%, and the British with 15%. The remaining 37% came from institutions in Argentina, Austria (IAEA), Canada, Denmark, Federal Republic of Germany, Finland, German Democratic Republic, Hungary, India, Israel, Italy, Norway, Poland, South Africa, Spain, Sweden, Switzerland, and Taiwan (ROC).

Essential peripheral (to shielding) codes are also included among RSIC products: 190 packages to date, 27% of which were contributed by 16 non-USA sources. Of these, Japanese contributions again lead (27%), followed by the United Kingdom (25%), and France (10%). Other contributions were received from Australia, Austria (IAEA), Bulgaria, Canada, Federal Republic of Germany, German Democratic Republic, Hungary, India, Israel, Italy, South Africa, Sweden, Switzerland, and Yugoslavia.

An early decision was made by RSIC to avoid efforts at code comparison in the evaluation process knowing that each code developer had different goals and requirements which tended to make seemingly similar codes vary in their applicability. Rather than compare all codes representing a given methodology, our concept was to do method comparison using a code selected to represent a given calculational method and compare results. This latter philosophy has proven useful, made apparent by interest in the RSIC seminar-workshops on methodology. A dozen have been held, beginning with Monte Carlo (O5R, 1965 at ORNL; repeated in 1966 under OECD-NEA auspices at Ispra, Italy). The proceedings of each seminar were published as an ORNL/RSIC report, representing at the time the equivalent of a state-of-the-art review by the leading experts in the specific methodology.

Early evaluation efforts were hampered by the inseparable nature of codes and data. Code developers tended to build constants and data compilations into code systems such that it was difficult to review each independently and more difficult to modify either. RSIC's solution was to separate the two, and to encourage all code developers and data generators to do likewise from the initial design

stage. At first, we packaged codes and compatible data libraries together, which was neither efficient nor cost effective. In 1968, the data library collection (DLC) was initiated and the "open data package" concept was born. Through this operating philosophy, 100 data compilations have been packaged, 16 of which are non-USA contributions [Japan and United Kingdom, 4 each; IAEA, 2; one each from France, Germany (FRG), India, the Netherlands, Sweden, and Switzerland].

We realized during the first year of operation that evaluated cross-section data which had some degree of credibility was needed, as well as standardized formats to facilitate transportability and use. An RSIC staff member shared a memorable 3-day journey by train, enroute to the 1963 ANS annual meeting (Chicago to San Francisco) with **Henry Honeck**, a reactor physicist at Brookhaven National Laboratory (BNL), who became the driving force in the U.S. Atomic Energy Commission for the formation of a national effort to create an evaluated nuclear data file. Once the National Nuclear Data Center was formed at BNL under **Sol Pearlstein** and the Cross Section Evaluation Working Group (CSEWG) became functional, Honeck retreated to the ranks at Savannah River Laboratory.

RSIC supported the ENDF concept, and an RSIC staff member has served on CSEWG from the beginning, usually as chairman of the Shielding Subcommittee. ENDF data has been placed in the international public domain through four CSEWG releases, the latest being ENDF/B-IV. The work continues, but at a reduced level.

What of the future for shielding information needs? We can comment from a unique perspective.

More than 1600 responses have been received from the ongoing RSIC survey of the shielding community. Each states a source of funding for some level of R&D in radiation protection, radiation transport, shielding, and related areas. Many of the respondents make strong statements of need for nonexistent information and data, and for improved methods. Obviously, not all shielding problems have been solved. We regret that we have not yet had time to make a complete analysis of your response to the survey. Please watch the *RSIC Newsletter* for an announcement of the availability of the results.

Someone continues to do shielding work. RSIC logged 1631 letters of request received in the last six months. Many of these requested technical guidance (45%) and 489 code and data packages were shipped.

We conclude that many engineers and scientists will continue to be faced with radiation analysis problems and will continue to need state-of-the-art computing technology and data. Indeed, the state of the art will have to be improved in many areas, and we hope to be a participant and collaborator with you in bringing about those improvements.

References

1. The *Oak Ridger*, local newspaper, Oak Ridge, Tenn., October 5, 1962.
2. *ORNL News*, publication for the ORNL employees of Union Carbide Corporation-Nuclear Division, October 5, 1962.
3. *Nuclear News*, American Nuclear Society publication, November 1962.
4. U.S. President's Science Advisory Committee (PSAC), *Science, Government, and Information: The Responsibilities of the Technical Community and the Government in the Transfer of Information*, (commonly known as the Weinberg Report), U.S. Government Printing Office, Jan. 10, 1963, 55p.
5. A. M. Weinberg, private communication in recognition of RSIC's 20th Anniversary, May 2, 1983.
6. S. K. Penny, D. K. Trubey, and M. B. Emmett, "Radiation Shielding Information Center Information Retrieval System, *Automation and Scientific Communication*, H. P. Luhn, Ed., short papers contributed to the Theme Sessions of the 26th Annual Meeting of the American Documentation Institute, Part 2, p. 251-52, 1963.

Friends Congratulate RSIC on Anniversary

NEA Data Bank

Like all scattered communities, the Radiation Shielding fraternity needs a focal point and a means of recognizing its identity. RSIC and its Newsletter, which has reached shielders with impressive regularity over the last 20 years, have provided this in the intervals between the equally well-organized International Conferences on Radiation Shielding.

We at NEA Data Bank and the earlier NEA centres have appreciated over our own 20 years' existence this prompt and regular flow of information from RSIC, and have on many occasions seen how much the shielding practitioners among our customers value RSIC services and the easy contact on a very personal level with Betty and her staff.

As for the programs RSIC has made available and publicized in its newsletters, a few figures speak for themselves: we have distributed over the last ten years 111 copies of ANISN-ORNL, 64 copies of DOT-3.5 and 50 of MORSE-CG. Thirty-one users have requested the DLC data libraries and 15 VITAMIN-C. We wish you many more years of equal success.

Johnny Rosén, Director, NEA Data Bank, Gif-sur-Yvette, France

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ESIS

From Europe, and in particular from the Joint Research Centre of the European Community, Ispra Establishment, Italy, congratulations on the twentieth anniversary of the RSIC Newsletter.

In 1963 the first RSIC Newsletter *announced the mission of RSIC. Nine years later, stimulated by the RSIC example, the first* ESIS Newsletter *appeared. ESIS and its newsletter have enjoyed productive scientific contacts and friendly relations with RSIC.*

(1) The prompt publication of new methods and recommendations for shielding analysis.

(2) The prompt distribution of shielding codes and data files. (In this way, even small groups active in these fields can have access to the most recent information.)

(3) The free provision of information without financial obligation of the recipient.

We sincerely wish Betty F. Maskewitz and her collaborators, after two decades of successful activity, an equally successful and productive future.

For the editorial board of *ESIS Newsletter,*

H. W. M. Braun, editor, European Shielding Information Service, Ispra, Italy.

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Alvin Weinberg

This year marks the twentieth anniversary both of the Radiation Shielding Information Center and of publication of Science, Goverment, and Information, *by the President's Science Advisory Committee (PSAC). In many ways the two events were related: an important focus of the PSAC report was the role of the specialized information center; and RSIC has, over the years, been a very successful example of the sort of center envisaged in the PSAC study.*

I have been mostly a bystander in information matters since Science, Government, and Information *appeared. Yet, as a user of information, I continue to be impressed with its importance in the scientific endeavor. Information is an integral part of science; without proper handling of information, science cannot function. This was the main theme of our 1963 report. I hope that the newer generation of government administrators continue to heed this central message. In these days of government austerity, information is all too easily neglected. I should think the success of RSIC will continue to demonstrate the validity of the 1963 report's emphasis on information centers, as well as encourage our government to recognize, and therefore support, information as an integral part of science.*

Alvin M. Weinberg, Institute for Energy Analysis, Oak Ridge Associated Universities, Oak Ridge, Tennessee

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François Kertesz

RSIC was started during the heady days following the publication of the Weinberg Report (W.R.). Since the chairman of that illustrious panel of the President's Science Advisory Committee at the time was also the director of the Oak Ridge National Laboratory, he practiced what he preached — namely that multidisciplinary national laboratories should serve as the host institutions for information analysis centers. Several of the now well-known centers started operating around that time.

A little anecdote might be of interest. As the coordinator of the ORNL centers, I was asked by management, why RSIC started using a computerized system — after all, the volume of the literature they handled was still rather small and the other centers were satisfied with their manual 5 in. × 5 in. file cards or optical coincidence system. It turned out that there was a simple but sufficiently convincing reason for this: both "founding fathers" of RSIC — Dave Trubey and Keith Penny — were active radiation shielding scientists (as strongly suggested in the W.R.); Betty Maskewitz had a considerable experience as computer programmer when such individuals were a rarity. They all used the computer in their daily work for years and had routine

access to the machine. This was an important factor during those days before the advent of micro- and mini-computers, when most researchers' direct contact with those mysterious machines was limited to dropping off their decks of cards at the office and picking up the results two days later. Thus, Betty, Dave, and Keith were among the first to use computers routinely in the operation of an information analysis center at a time when very few people were aware of the computer's usefulness for data storage and retrieval and on-line search was a gleam in the eye of the future.

They led the way and many others followed them...

François Kertesz, former coordinator of ORNL Information Centers, Oak Ridge, Tenneessee

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RSIC Anniversary Celebrated at 6ICRS

At the 6th International Conference on Radiation Shielding held in Tokyo, the 20th Anniversary of RSIC was celebrated at a special luncheon. The speaker was **Betty Maskewitz**, RSIC Director, whose title was "RSIC After 20 Years — A Look Back and A Look Ahead," She was introduced by **Herbert Rief**, Director of the European Shielding Information Service at Ispra, Italy. The text of his introduction follows.

It is a pleasure for me to welcome you to this luncheon dedicated to the 20th anniversary of the Oak Ridge National Laboratory Radiation Shielding Information Center, known throughout the world as RSIC.

As the head of the European Shielding Information Service (ESIS), which is the 9-years-younger counterpart of RSIC, I enjoy the great honor of being the chairman of this birthday party.

Already in the early sixties some reactor physicists realized that shielding constitutes another discipline requiring its own methodology. They also concluded that, contrary to core physics which is usually linked to specific projects, shielding methods have a considerable potential of portability. This fact made shielding one of the first candidates for a project of world-wide information exchange.

It was actually, Keith Penny, David Trubey, and Betty Maskewitz who realized this fact in these early days of nuclear energy and in an almost prophetic vision convinced the authorities to fund one of the first information centers.

RSIC, as it was called, still carries its original name, and one of its links to the world is the newsletter which we all know, and which crosses every month our desk.

This newsletter has become an indispensible source for veterans and information to everybody working in the field of shielding. Practically all publications, reports and codes on shielding or related works are referenced in it with the shortest possible delay.

But his newsletter is only the top of the iceberg. RSIC's real strength lies in the fact that it is a focal point for all shielding information, ranging from the distribution of shielding codes to competent user advice and individual consulting.

And again this is not the whole story! RSIC, and in particular Betty Maskewitz, has already been a very active promoter of the free and unrestricted exchange of information. Visual signs for this activity were preparatory and coordination efforts for three international meetings in Paris, Knoxville and now in Tokyo.

In this sense RSIC has substantially served to unify the community of shielders and to define her identity. Therefore, I think it was a nice gesture of the organizers of this conference, in particular our friends from JAERI, to give us the opportunity to celebrate RSIC's anniversary at this official lunch.

Acting for the international shielding community, ESIS takes the liberty to add to its verbal congratulations a visible sign of its appreciation. For one the RSIC offices we prepared as a commemoration of this event an image of ESIS taken by U.S. satellite LANDSAT. The picture was retrieved and processed by colleagues from our laboratory. But this is not all. My coworker H. Braun, Editor of the ESIS Newsletter, *thought nothing less than gold would do for Betty. Before leaving he gave me a book on goldsmith work in Lombardia, the region where ESIS is located.*

Before giving the floor to the waiters, I want to tell you that the luncheon speech will be given at the end of the lunch. Its title is "RSIC After 20 Years — A Look Back and a Look Ahead." The speech will be given by Betty Maskewitz. Have a good meal and enjoy this fine Japanese kitchen.

KNOW YOUR RSIC STAFF MEMBERS

Staff changes occur only occasionally, and it usually is not necessary to address your communication to a particular individual, so we seldom publish a complete listing. The last "Introduction to the Staff," was printed in *RSIC Newletter* issue No. 132, November 1975. A current description by job function is included here for your information. It should be noted that mainly due to critical staffing and a heavy workload, several staff members carry multiple responsibility.

All requests for information and incoming contributions to RSIC are channelled through the Information Processing Unit led by **Nancy**

Hatmaker. She analyzes the incoming communications and initiates the processes required to fill requests and/or perform other activities as indicated by the material received. Upon completion of the activities required to fill a request, she insures completeness and the maintenance of all records related to the activity. She is assisted in these functions by **C. Marie Anthony**, who performs the additional functions of the supervision and maintenance of records on incoming computing technology, places it in the processing queue, works with the contributor in the preparation of a code package abstract, and in the assembly and maintenance of documentation of the codes and/or data packages. **Carol P. Coker**, as a member of the Request/Response Team, does the necessary computer processing for filling requests for code and/or data packages, and is responsible for the generation, inventory, and maintenance of the code and data collection. She also maintains the computerized data base from which the inventory of the packaged products is prepared for distribution.

Betty L. McGill, working closely with Anthony and the computer specialist staff members, coordinates the flow of the testing and packaging process and responds to trouble-shooting inquiries related to packaged computing technology. **Jenny L. Bartley** and **Henrietta R. Hendrickson** spend full time testing and packaging incoming code systems and data libraries. They are assisted part-time by **John E. White**, whose major responsibility is code development associated with the Technical Data Management Center (TDMC) which operates as a companion to RSIC under the umbrella of the Engineering Physics Information Centers (EPIC). Henrietta is also responsible for checking and modifying evaluated data as it comes from the National Nuclear Data Center (NNDC) as part of ENDF/B or is channelled to NNDC for inclusion in the master file. Jenny is also responsible for generating data for the VITAMIN-E general purpose fine-group library with the technical assistance of John White. **Bernadette L. Kirk**, the latest addition to the EPIC staff, performs some codes testing in addition to her responsibilities as overall systems and applications programming specialist. Kirk is currently involved in the modification and enhancement of the RSIC records-keeping system (ADES), the EPIC statistical analysis management tool.

Ann B. Gustin is responsible for the coordination of the review and processing of published shielding literature for the accession list of the newsletter and for the Storage and Retrieval Information System (SARIS) on DOE/RECON. **Joyce Jacobs** maintains the computerized data base of code and data package abstracts and performs various information specialist activities as required. She also provides special assistance to the Carbon Dioxide Information Center (CDIC) which shares EPIC facilities.

Alice F. Rice is in charge of EPIC publications, including technical reports, progress reports, the *RSIC Newsletter*, and she maintains the computer-based RSIC Directory. **Elaine Plemons**, EPIC Secretary, is responsible for administrative activities.

Robert W. Roussin coordinates RSIC's data activities, serves as shielding consultant, and gives personal support to all RSIC technical activities. **David K. Trubey** also gives technical support in all activities, especially those requiring computer systems development. He and Roussin review the shielding literature and respond to inquiries for technical information. **Betty F. Maskewitz** is responsible for the entire operation as Director of the ORNL Engineering Physics Information Centers (EPIC) which includes RSIC.

We consider that each member of the international shielding community who interacts with RSIC and its staff members is an integral part of everything we do. We would like you to feel that RSIC is an extension of your working desk or laboratory and that you consider yourself an extension of RSIC imbued with the fervor to advance the state of the art of radiation protection, radiation transport and shielding.

S. K. Penny,* E. P. Blizard, M. D. Clark (United Power Company, London), and D. K. Trubey, Dec. 1962.

David Trubey, Mildred Landay,* Charles O. Slater (now ORNL, Eng. Physics Div.), Betty Maskewitz, Hemma Comolander,* Henrietta Hendrickson, and Juanita Wright,* Aug. 1967.

D. Trubey, Chairman, B. Maskewitz, Deputy Chairman, and S. A. W. (Sig) Gerstl, Technical Program Chairman, Fifth International Conference on Reactor Shielding, April 1977.

B. Maskewitz, M. B. Emmett,* D. Trubey, S. K. Penny,* and Lincoln Jung,* May 1983.

*Former RSIC staff members.

D. K. Trubey, W. E. (Bill) Kreger* (formerly NRC, now retired), B. F. Maskewitz, and A. E. (Ed) Profio (Univ. Calif.-Santa Barbara, California), Dec. 1964.

H. R. Hendrickson, J. Wright,* B. Maskewitz, Patty Gray,* D. Trubey, Vivian Jacobs,* H. Comolander,* M. Landay,* J. Wallace (Wally) Webster,* Jane Gurney,* and Fritz Schmidt (Stuttgart Tech. Univ., Fed. Rep. Germany), Oct. 1968.

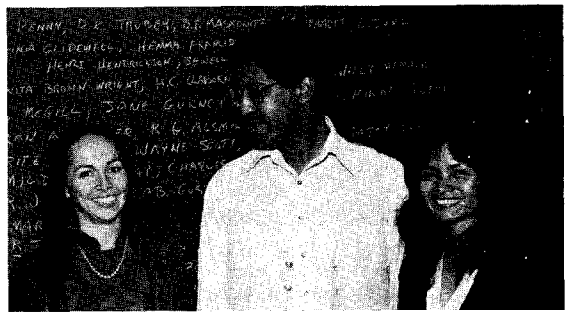
Francois Kertesz, Margaret B. (Peggy) Emmett,* Robert W. Roussin, S. K. Penny,* and B. F. Maskewitz, May 1983.

Fred C. Maienschein (Engineering Physics Division Director), D. Trubey, B. Maskewitz, S. K. Penny,* and Rebecca (Becky) Rickman (Division Secretary) May 1983.

Walter Zobel,* F. Kertesz, and Joseph Lewin, May 1983.

Frances (Fran) Alsmiller,* Richard (Dick) Q. Wright, C. O. Slater, and R. W. Roussin, May 1983.

Alice F. Rice and Elaine Plemons, May 1983.



Jennifer L. (Jenny) Bartley, John E. White, and Bernadette L. Kirk, May 1983.

Miriam P. Guthrie,* Fran Alsmiller,* and R. G. (Tut) Alsmiller, May 1983.

C. Marie Anthony and Carol Coker, May 1983.

Nancy A. Hatmaker, Betty L. McGill, and Marie Anthony, May 1983.

H. Hendrickson, Betty McGill, and Vivian Jacobs, May 1983.

*Former RSIC staff members.

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CHANGES TO THE RSIC COMPUTER CODES COLLECTION

During the month of May there were five changes made to the RSIC Codes Collection. Of those changes, three were new contributions with one contribution from the German Democratic Republic, one existing code package was extended to include a new hardware version, and corrections were made to one code system.

CCC-307/QAD-CG

This combinatorial geometry version of QAD-P5A was extended to include a PRIME 400 version contributed by the Tennessee Valley Authority, Chattanooga, Tennessee. This new version, designated (D) includes PICTURE, a program which provides a printed view of arbitrary two-dimensional slices through the geometry. QAD-P5A is a point kernel code for neutron and gamma-ray shielding calculations. Reference: NE007. FORTRAN IV; UNIVAC(A), CDC(B), IBM 3033 and IBM 360/370(C), and PRIME 400(D).

CCC-424/SCALE 1

The necessity for corrections to KENO-V, the Monte Carlo criticality program with supergrouping, of the SCALE-1 code package was called to RSIC attention by the code contributors, Oak Ridge National Laboratory. Corrections were made in subroutines FILLSG and TRACK. Details may be requested from RSIC.

The error in FILLSG was such that it was encountered only if the calculated data exactly filled a block, thus skipping a block on the direct access file. This caused the data reading to get out of phase when the calculated data was reloaded from the direct access file.

The error in TRACK caused incorrect results for the average fission group and self multiplication of the unit if the problem was supergrouped. Reference: NUREG/CR-0200; ORNL/CSD-2, VOLS. I, II, III. FORTRAN IV, IBM Assembler, IBM 3033.

CCC-433/OMEGA

This three-dimensional Monte Carlo criticality code system was contributed by Zentralinsitut für Kernforschung Rossendorf bei Dresden, German Democratic Republic, through the OECD NEA Data Bank, Gif-sur-Yvette, France. The system solves the time-independent neutron transport equation for three-dimensional geometry. The cross sections are calculated using built-in data libraries. Intended mainly for calculation of the criticality of complicated arrangements of fissionable materials, the code also evaluates the multiplication factor, the flux distribution and reaction rates. Reference: ZfK-364. ALGOL; BESM-6.

CCC-443/REAC

This code system for computing activation and transmutation of alloys in MFE facilities was contributed by Hanford Engineering Development Laboratory, Richland, Washington. The system consists of a driver code, cross-section libraries, flux libraries, a material library, and a decay library. Reference: HEDL-TME 81-37, UC-20c. FORTRAN IV; CDC 7600.

PSR-196/FLYSPEC-SHORTSPEC

This neutron energy spectrum unfolding code system for reducing proton-recoil pulse-height data obtained with NE-213 liquid scintillators was contributed by Lawrence Livermore National Laboratory, Livermore, California. The system includes SHORTSPEC which is an extended version of FLYSPEC and includes interactive capability and on-line graphics. FLYSPEC and SHORTSPEC read the pulse-height data file obtained using a NE-213 or stilbene spectrometer. Then, using the energy calibration data and detector dimensions contained in the data file and the parameters set by the user during execution, the codes unfold the incident neutron spectrum from the pulse-height data. Reference: *Nucl. Inst. Meth.* 198: 349-55 (1982). FORTRAN-IV; CDC 7600 and LSI-11.

VISITORS TO RSIC

During the month of May the following six persons came to visit/use RSIC facilities: *Jussi Vanne*, OECD/NEA Data Bank, Paris, France; *M. Doucet*, Belgonucleaire, Brussels, Belgium; *Yasushi Nomura*, Japan Institute of Nuclear Safety, Tokyo, Japan; *I-Ling Wang*, Taiwan Power Company, Taipei, and *C. L. Shih*, Institute of Nuclear Energy Research, Lung-Tan, Republic of China; and *Annemarie Katter*, IAEA, Toronto, Canada.

UPCOMING MEETINGS, COURSES, AND CONFERENCES

We call attention to the following courses and conferences of interest to the shielding community.

Radiation Transport and Reactor Analysis Short Courses

The Department of Nuclear Engineering of the University of Tennessee-Knoxville, is offering two five-day short courses of interest to radiation transport specialists during Tennessee Industries Week (TIW-18), September 12–16, 1983. The registration fee is $695 per person for each course. The deadline for registration in these two courses is September 6, 1983. For additional information contact P. F. Pasqua, Head of the Department of Nuclear Engineering, University of Tennessee, Knoxville, TN 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 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.

Israel Nuclear Societies Call for Papers

The Israel Nuclear Societies have issued a call for papers for the *11th Annual Meeting*, to be held on December 20–21, 1983, at Technion, Haifa, Israel. The theme of the meeting will be "Safety and Siting Problems for Light Water Power Reactors in a Small Country," with tentative sessions titled, "Reliability and Quality Control," "Thermal-Hydraulic and Material Problems in Reactor Safety," and "Education and Training." Abstracts of no more than 200 words should be sent by June 30, 1983, to the Review Committee, in care of Lawrence Ruby, Department of Nuclear Engineering, University of California, Berkeley, California 94720 USA.

Calendar

Your attention is called to the following addtional events.

July 1983

7th International Congress of Radiation Research, July 3–8, Amsterdam, The Netherlands. Contact: J. J. Broerese, Secretary General, 7th Inter. Congress of Radiation Research, c/o Radiobiological Institute TNO, P.O. Box 5815, 2280 HV Rijswijk, Netherlands.

Institute of Nuclear Materials Management, annual meeting, July 10–13, 1983, Denver, Colorado, USA. Contact: M. Yadron, Institute of Nuclear Materials Management, 2400 E. Devon Ave., Des Plaines, IL 60018 USA.

Nuclear and Space Radiation Effects, (20th Annual IEEE Conference), July 18–21, Gatlinburg, Tennessee, USA. Contact: E. F. Hartman, Div. 9336, 1983 NSRE Publicity Chairman, Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185, USA, phone 505-846-1749.

August 1983

Nuclear Accident Dosimetry, Technical Committee workshop, August 8–19, 1983, Oak Ridge, Tennessee, sponsored by the International Atomic Energy Agency. Contact: F. N. Flakus, Div. of Nuclear Safety, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

PATH Gamma Shielding Code Training Course/ Workshop, August 9–11, 1983, San Diego, California. Contact: S. Su, GA Technologies, Inc., P.O. Box 85608, San Diego, CA 92138 USA; phone 619-455-2195.

8th Annual Conference of the Australian Radiation Protection Society, August 15–18, 1983, Adelaide, Australia. Contact: J. Fitch, Convenor, 1983 ARPS Conf., Private Bag 97, Glenside, S. A. 5065, Australia.

Effects of Heat From Radioactive Waste in Deep Geological Repositories, August 29–September 2, 1983, Sweden. Contact: V. Tsyplenkov, Div. of Nuclear Fuel Cycle, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

September 1983

International Conference on Numerical Methods in Nuclear Engineering, September 6–9, 1983, Montreal, Quebec, Canada, sponsored by the Nuclear Science and Engineering Division, Canadian Nuclear Society. Contact: Riccardo A. Bonalumi, Nuclear Studies & Safety Dept., H16 H17, Ontario Hydro, 700 University Ave., Toronto, Ontario, Canada M5G 1X6.

3rd Topical Meeting on Fusion Reactor Materials, September 19–22, 1983, Albuquerque, New Mexico, sponsored by Department of Energy, the American Nuclear Society, and the Nuclear Metallurgy Committee of the TMS/AIME. Contact: M. J. Davis, Sandia National Laboratory, Dept. 1830, P.O. Box 5800, Albuquerque, New Mexico 87185, phone 505-844-4164.

11th Regional Congress of the International Radiation Protection Association: Recent Developments and Trends in Radiation Protection, September 20–24, 1983, Vienna, Austria, co-sponsored by the Austrian Association for Radiation Protection. Contact: A. Hefner, Congress Secretary, c/o Österreichischer Verband für Strahlenschutz, Lenaugasse 10, A-1082 Vienna, Austria.

Fall Meeting of the Atomic Energy Society of Japan, September 28–30, 1983, Hokkaido, Japan. Contact: M. Masamoto, Secretary General, Atomic Energy Society of Japan, No. 1-5-4 Ohte-machi, Chiyoda-ku, Tokyo, 100 Japan.

October 1983

Environmental Transfer to Man of Radionuclides Released from Nuclear Installations, a seminar October 17–21, 1983, Brussels, Belgium, sponsored by the International Atomic Energy Agency, Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Transport of Radioactive Materials by Post, a seminar October 24–27, 1983, in Vienna, Austria, sponsored by the International Atomic Energy Agency. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

November 1983

Radiation Protection in Exploration, Mining and Milling of Radioactive Ores for Developing Countries in Africa, a seminar, November 14–25, 1983, in Gabon, sponsored by the International Atomic Energy Agency. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

Fifth National Symposium on Radiation Physics, November 21–24, 1983, Calcutta, India, sponsored by the Indian Society for Radiation Physics in collaboration with different universities and national laboratories. Contact: G. Muthukrishnan, Variable Energy Cyclotron Centre, 1/AF, Bibhan Nagar, Calcutta-700064.

Technical Committee on Decontamination of Nuclear Facilities to Permit Plant Decommissioning, Modification or Maintenance, November 28–December 2, 1983, Vienna, Austria, sponsored by the International Atomic Energy Agency. Contact: S. Mukai, Div. of Nuclear Fuel Cycle, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

October 1984

Clinical Radiophysics, a symposium sponsored by the Clinical Radiophysics Section of the Society for Medical Radiology of the German Democratic Republic, October 28–November 1, 1984, Binz (island Rügen, German Democratic Republic). Contact: Dr. sc. techn. Manfred Tautz, 1115 Berlin-Buch, Wiltbergrstrasse 50, Städtisches Klinikum Buch, Spezialabteilung Strahlenphpysik, German Democratic Republic.

November 1984

National Conference on Biomedical Physics and Engineering November 3–4, 1984, in Sofia, Bulgaria, sponsored by the Bulgarian National Society of Biomedical Physics and Engineering. Contact: Chair of Physics and Biophysics, c/o eng. Peter Trindev, Medical Academy - Base No. 1, 1431 Sofia / 1 Boul.G.Sofiiski, Bulgaria.

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