RSIC Newsletter

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RSIC ANNUAL REPORT TO SPONSORS/ CONTRIBUTORS/USERS

If the number of requests processed through RSIC during FY 1982 is an indicator of the continuing vitality of the international shielding community, we are pleased to report a 7% increase over the prior year. At the close of business on September 30, the RSIC Automatic Data Entry System (ADES) reported the following information.

A total of 3264 separate letters/telephone calls (about 13.1/working day) requesting a variety of products and services (8427) were processed through the center.

On an average, the following dissemination of activities took place each working day.

- 4.2 Code/data packages shipped to requesters,
- 5.1 Shielding documents (RSIC reports, handbooks, code and data documentation in addition to those included in the above packages) were mailed,
- 24.3 Responses to inquiries for information; citing possible solutions to problems; recommendations of calculational methods, computer codes, nuclear data sets, or literature specimens for study; troubleshooting problems when requester had difficulties using RSIC materials; and miscellaneous consultation and advisary services,
- 0.1 Special retrospective literature searches,
- 33.7 Separate activities required daily to satisfy the 3264 letters of request.

In addition to the above daily activities, the following special products or services were given.

The *RSIC Newsletter* was mailed each month to as many as 1450 people. Maintenance of the RSIC User Directory resulted in 540 changes during the year.

A total of 77 people (34 foreign, 43 domestic) came for an orientation visit and/or to use the Center's facilities during the year.

The workload over the last three years may be seen in the following comparison table.

Demand for services by user community

	FY 80	FY 81	FY 82
Total requests received	3505	3044	3264
Average/working day	14.0	12.1	13.1
Activities performed to satisfy requests	9362	8818	8427
Average activities/ working day	37.3	35.1	33.7
Increase/decrease over prior year	+9.0%	-6.0%	-4.4%

An average of 2.6 separate activities were required to satisfy each letter of request in FY 1982. During the same period the number of contributions of new information to be processed into RSIC increased over that of the previous year.

FY 1982 Information Inflow

Information collection, analysis and processing acitvities continued routinely. Staff members re-

viewed 1278 reports and other documents, bringing the shielding data base to 11,903 bibliographic citations with abstracts and more than 5,240 computer code descriptions. The RSIC data bases on the DOE/RECON system were subsequently updated. New books of special interest were reviewed and added to the reference library.

Technology Contributed

RSIC participants contributed their publications and 198 separate transmissions of technology during the twelve months as follows:

- 99 New computer programs and data libraries — 63 from USA participants and 36 foreign [15 from France; 6 from Japan; 3 each from India and Finland; 2 each from the Federal Republic of Germany (F.R.G.) and The Netherlands; and one each from Austria, England, Italy, Switzerland, and Taiwan].
- 28 New hardware versions to extend existing code or data packages — 23 domestic and 5 foreign [2 from Japan; and one each from the United Kingdom (U.K.), France, and F. R.G.].
- 27 Updates for error corrections discovered in using existing code/data packages — 21 domestic and 6 foreign (3 from Japan; and one each from France, Hungary, and The Netherlands).
- 44 Updates to existing code/data packages (to replace older routines or modules with improved versions or complete new frozen versions and/or to extend capabilities by additional programming) — 38 domestic and 6 foreign (one each from Austria, France, The Netherlands, Israel, Spain, and Switzerland).

Technology Processed

We worked steadily to evaluate and process the technology, completed the processing of the FY 1981 backlog, and made some headway on FY 1982 contributions. Since more new contributions came in than we were able to process we again ended the year with a significant backlog of work.

Our efforts resulted in the announcement of availability of 93 transportable, tested packages of computer programs and data libararies. Included is some technology contributed in the prior fiscal year. The details follow:

- 49 New code packages — 26 domestic and 23 foreign (4 from Japan; 6 from U.K.; 2 from The Netherlands; 3 from Austria; 3 from F. R.G.; 2 from Italy; and 1 each from South Africa, Finland, and Australia).
- 8 New data packages — 5 domestic and 3 foreign (1 each from Japan, Austria, and The Netherlands).
- 7 Updates to include conversions of RSIC code packages to run on other hardware — 3 domestic and 4 foreign (1 each from F.R. G., Japan, Israel, and U.K.).
- 5 Newly-frozen versions of existing code packages, including improvements made over that originally packaged — 3 domestic and 2 foreign (1 each from Japan and Hungary).
- 5 Updates to data packages, all domestic (1 to correct errors, 4 to add data).
- 19 Updates to code packages (13 to correct errors, 6 to add new extensions or replace older routines) — 15 domestic and 4 foreign (2 from South Africa and 1 each from F.R. G. and Japan).

It should be noted that the same evaluation, testing on the computer, and packaging must be followed for updates to existing code packages as for new technology.

We will continue to give first priority to responding to user requests and will process new information into transportable, tested packages as feasible. We will appreciate the continuing cooperation and collaboration of our contributors/users in seeking to keep pace with advances in the state of the art and with the international shielding community's efforts to ensure high standards in shielding design and radiation protection.

COMMENTS ON THE PROPOSED DISCRETE ORDINATES SEMINAR-WORKSHOP

Numerous responses have been received to news of the proposed Seminar-Workshop on Discrete Ordinates which was announced in the July 1982 *RSIC Newsletter*. There appears to be substantial interest and several comments suggest that a change in emphasis might be appropriate.

There is interest in having tutorial sessions on the use of the discrete ordinates methods. Users would like practical guidelines on selection of

quadrature sets, scattering order, convergence criteria, flux fixup models, mesh size, etc. In essence, a means of transferring the experience of veteran users to those just beginning is desired. We will attempt to locate such tutors and plan to include this type of instruction during the Seminar-Workshop. **Volunteers to conduct such tutorials will be welcomed.**

Additional comments and suggestions will be appreciated.

LANL MERGES RADIATION TRANSPORT GROUPS

On October 1, 1982 a merger of the former Transport and Reactor Theory Group (T-1) and the Monte Carlo Group (X-6) at Los Alamos National Laboratory resulted in a new organizational unit, entitled Radiation Transport Group. These groups join forces to use their widely different approaches on problems of neutral particle transport — or how particles such as neutrons distribute themselves in nuclear reactors and weapons. The former T-1 personnel deal with transport problems using discrete ordinates methods and those from X-6 use the statistical or Monte Carlo methodology.

William L. (Buck) Thompson leads the new group (designated X-6), assisted by **Pat Soran, Art Forster** and **Doug O'Dell** as associate group leaders. Although part of the Applied Theoretical Physics Division, the group will serve as a laboratory-wide technology resource in such broad areas of radiation transport as shielding design for new facilities and radiation safety studies.

The LANL Transport and Reactor Theory Group (T-1), now losing its identity in the merger, dated to the early days of Los Alamos Scientific Laboratory. Under distinguished leadership (including *Edward Teller, Rudolph Peierls, Donald Flanders, Fred Reines, Carson Mark, Bengt Carlson, Kaye Lathrop, Warren Miller, and Don Dudziak*) T-1 made many contributions to the worldwide scientific community, including discrete ordinates theory and methods to solve the Boltzmann equation for particle transport.

The radiation transport community, in which RSIC is embedded, will expect continuing and expanded leadership from X-6 in transport computational development in the linkage of discrete ordinates and Monte Carlo methods in which either or both may be used in regions or media where they are most effective.

SIEVERT UNIT CLARIFIED

As many readers are aware, there is a controversy regarding the SI unit of dose equivalent, the sievert, arising from the following statements in ICRU Report 33 (1980):

The special name for the unit of absorbed dose is gray (Gy).

$$1\ \text{Gy} = 1\ \text{J}\cdot\text{kg}^{-1}$$

The special unit of absorbed dose, rad, may be used temporarily.

$$1\ \text{rad} = 10^{-2}\ \text{J}\cdot\text{kg}^{-1}$$

The *dose equivalent, H,* is the product of D, Q, and N at the point of interest in tissue where D is the absorbed dose, Q is the quality factor, and N is the product of all other modifying factors.

$$H = DQN$$

The SI unit for both D and H is joule per kilogram. The special name for the unit of dose equivalent is sievert (Sv).

$$1\ \text{Sv} = 1\ \text{J}\cdot\text{kg}^{-1}$$

The special unit of dose equivalent, rem, may be used temporarily.

$$1\ \text{rem} = 10^{-2}\ \text{J}\cdot\text{kg}^{-1}$$

The problem of using $\text{J}\cdot\text{kg}^{-1}$ for both absorbed dose and dose equivalent is clarified in the letter by *David Goldman,* of the U.S. National Bureau of Standards, and *Pierre Giacomo,* Director Bureau International des Poids et Mesures in France, in the September issue of *Nuclear News* 25(11):22–33. Their discussion amplifies the reasons for the footnote which appears in the English translation of the official French language booklet on SI (NBS SP333, 1981):

> "It should be noted that the quantity dose equivalent, H, is the product of the absorbed dose, D, of ionizing radiation, and the dimensionless factors Q (quality factor) and N (product of any other multiplying factors) stipulated by the International Commission on Radiological Protection. Thus, for a given irradiation, the numerical value in joules per kilogram of these two *quantities* D and H may differ, depending on the values of Q and N. To avoid any risk of confusion, the special names for the respective *units* should be used; i.e., D should be expressed in grays, and H should be expressed in sieverts."

We recommend a reading of the full letter to all those concerned.

NEW *ENERGY DESKBOOK* AVAILABLE

Energy Deskbook, by **Samuel Glasstone,** has just been published by the Technical Information Center, U.S. Department of Energy.

Energy Deskbook contains information on the background and status of energy development. Energy-related terms are defined, and current and potential energy sources and their use are described. Energy sources covered are biomass, coal, geothermal, hydropower, municipal waste, natural gas, nuclear, oil shale, petroleum, solar, tidal, and wind. Combining the features of a dictionary and an encyclopedia, general principles rather than technical details are emphasized. Cross references, which are used freely to minimize duplication, are indicated in the text by words or expressions in boldface type.

The book is available as DE82013996 (DOE/IR/05114-1) for $12.50 from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161 USA.

PERSONAL ITEMS

Campbell Appointed DNA Monitor

Major John G. Campbell, Nuclear Research Officer, Headquarters, Defense Nuclear Agency, is now RSIC's technical monitor with the Defense Nuclear Agency and will be giving us guidance in the future. RSIC remains part of the technical program administered by *David Auton.*

Kreger Retires From NRC

W. E. (Bill) Kreger writes that he has retired from NRC and lives on Bainbridge Island, three miles west of Seattle (6359 Wing Point Road, Bainbridge Island, Washington 98110 USA). He is remodeling an 80-year old house, has his boat moored off his own beach, and, incidentally is consulting for NRC and doing committee work for NCRP.

VISITORS TO EPIC

During the month of September nine persons came for an orientation visit and/or to use EPIC facilities: *Nakamura Tomoo,* JAERI, Japan; *Takashi Maruyama,* National Institute of Radiological Science, Japan; *Dean C. Kaul,* Science Applications, Inc., Illinois; *John G. Campbell,* Defense Nuclear Agency; and *W. Manz,* and *Gunter Ritzka,* Jülich, F.R.G.; *Fritz Schmidt,* University of Stuttgart, F.R.G.; *S. J. Verdu,* Valencia, Spain; and *Raquel Paviotti Corcuera,* Sao Paulo, Brazil.

CHANGES TO THE RSIC COMPUTER CODES COLLECTION

A new code package and two updates to existing code packages were added to the computer codes collection during the month.

CCC-266/ONETRAN

Both the CDC 7600 (A) and the IBM 360/370 (B) versions of this one-dimensional multigroup discrete ordinates finite element transport code package were updated to correct errors where the two-angle plane geometry option did not use the correct number of moments in generating the scattering source. This correction was made by the following changes:

(1) In Subroutine SOURCE replace statement 450 DO 455 L = 1, N with

```
450 LLST = 2*N-1
    DO 455 L = 1, LLST
```

(2) In Subroutine INNER replace statement 165 DO 170 L = 1, N with

```
165 LLST = 2*N-1
    DO 170 L = 1, LLST
```

CCC-419/CRAC2

This code package for calculating reactor accident consequences was contributed by Sandia National Laboratories, Albuquerque, New Mexico. Useful for realistic consequence estimation techniques, CRAC2 is used for purposes such as site evaluation, emergency planning and response, and general risk assessment. Based on the original CRAC code, CRAC2 represents some corrections to the original code as well as modifications of the atmospheric dispersion model and introduction of a new evacuation model and new output capabilities. Reference: SAND81-1994, NUREG/CR-2326 (draft). FORTRAN IV; IBM 3033 and CDC.

PSR-101/HYPERMET

Documentation for this code package for automatic analysis of germanium detector spectra was updated by inserting a revised page 2 and Table A3. Details of the differences reflected by these revised pages may be requested from RSIC.

CHANGES TO THE DATA LIBRARY COLLECTION

An extension of the documentation for an existing data library was added during the month.

DLC-46/MEDLIST

Documentation for the radionuclide radiation data package from ENSDF was extended to include a "Standard Decimal Format for MEDLIST Output," which was contributed by the Oak Ridge National Laboratory. Reference: ORNL-5114.

UPCOMING MEETINGS AND COURSES

We call your attention to the following meetings/courses of interest to the shielding community.

Physics Database Course Planned

Announcement has been made of the 5th Summer School on Computing Techniques in Physics entitled, "Data Bases and Data Structures in Physics," to be held in Bechyne Castle near Tabor, Czechoslovakia, June 21–30, 1983. The school is sponsored and organized by the Computational Physics Group of the European Physical Society, the Union of Czechoslovak Mathematicians and Physicists, and the Institute of Physics of the Czechoslovak Academy of Sciences. The Scientific Committee includes **H. Behrens** and **G. Ebel,** Fachinformationszentrum Energie-Physik-Mathematik, GMBH Karlsruhe, F.R.G.; **F. D. Gault,** Durham University, Durham, U.K.; **B. Gliss,** MPI Stuttgart, F.R.G.; **J. Nadrchal,** CSAV, Praha, Czechoslovakia; **R. S. Peckover,** Culham Laboratory, Abingdon, U.K.; and **P. Van Binst,** University of Brussels, Belgium.

The course should be of interest to physics data compilers, evaluators and data base managers, agents of organizations funding physics data compilation, information brokers, librarians, and computer scientists. The emphasis will focus on the work of existing data compilation and marketing organizations to give the student insight into practical problems of organization as well as technical details of data base management systems and associated software. The lectures will be in English with no parallel translation. The papers presented by invited speakers will be published in *Computer Physics Communications.*

The provisional scientific program includes sessions on the following topics: an Overview; Working Data Bases (Cambridge Crystallographic Data Base, Atomic Data, Solid State Data, Nuclear Physics, Particle Physics, data bases in a major laboratory and others); Theory of Data Base Management Systems; Overview of Data Base Management Systems; and a Summary. The lecturers will be specialists and authors of projects that are functioning in various scientific institutions of the world, including: *H. Behrens* and *G. Ebel,* F.R.G.; *S. Bellard* of Cambridge University, U.K.; *G. Bergerhoff* of the University of Bonn, F.R.G.; *V. V. Ezhela* of the Institute of High Energy Physics, Serpukhov, U.S.S.R.; *J. Fiala* of Skoda Works, Plzen, Czechoslovakia; *F. Gault* of Durham University, Durham, U.K.; *B. Gliss* of MPI Stuttgart, F.R.G.; *K. Helwege* of Landolt-Boernstein, Darmstadt, F.R.G.; *K. Katsonis* of IAEA, Vienna, Austria; *G. LeLann* of Inria, Le Chesnay, France; *B. C. McInnis* of Statistics Canada, Ottawa, Canada; and *A. Savoy-Navarro* of Saclay-Cern, France.

Preliminary applications (informal) may be sent to the address of the chairman of the organizing committee:

J. Nadrchal
Institute of Physics
Czechoslovak Academy of Sciences
NA Slovance 2, 180 40 Praha 8
Czechoslovakia
(Tel. 355500).

Calendar

Please note the following upcoming meetings/courses.

6th International Conference on Radiation Shielding sponsored by Japan Atomic Energy Research Institute, May 16–20, 1983, Japan. Contact: Hiroshi Ishikawa, Tokai Research Establishment, Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki-ken, Japan 319-11.

November 1982

Two ANS Short Courses are planned for Saturday, November 13, 1982, to precede the ANS Winter Meeting in Washington, D. C. at the Sheraton Washington Hotel. They are *Computational Methods for Transient Two-Phase Flow* and *Radiation Effects on Electronics.* For further information contact Donald S. Rowe, Rowe & Associates, 14400 Bellvue Redmond, Suite 208, Bellevue, WA 98007; phone 206-643-1620.

ANS Winter Meeting, November 14–18, 1982, Sheraton-Washington Hotel, Washington, D. C. Contact: Charles F. Jones, NUS Corporation, 910 Clopper Road, Gaithersburg, MD 20878; phone 301-258-6000.

January 1983

2nd ANS/ASME International Topical on "Nuclear Reactor Thermal Hydraulics," January 11–14, 1983, Sheraton, Santa Barbara, California. Contact: Sanjoy Banerjee, University of Calif. -S.B., Dept. of Nuclear & Chem. Eng., Santa Barbara, CA 93106 USA; phone 805-961-3412.

March 1983

Advances in Reactor Computations sponsored by ANS March 28–31, 1982, Little American Hotel, Salt Lake City, Utah. Contact: Vincent Acquino, ANL - P.O. Box 2528, Idaho Falls, ID 83401; phone 208-526-7616.

Radiological Health Courses presented by the Division of Radiological Sciences, Department of Radiology, the University of Texas Health Science Center at San Antonio.

Basic Radiological Health Course will be presented February 21–25, May 16–20, and August 8–12, 1983. Tuition is $450 and duration is 40 hours.

Advanced Radiological Health Course will be presented November 8–12, 1982 and June 6–10, 1983. Tuition is $550 and duration is 36 hours.

Radiation Safety Officer's Course will be presented January 10–14 and June 13–17, 1983. Tuition is $600 and duration is 36 hours.

For further information write Medical School, Continuing Education Services, The University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX 78284; phone 512-691-6295.

February 1984

Health Physics Society 17th Midyear Topical Meeting on *Computer Applications in Health Physics,* to be held in Pasco, Washington during the week of February 5–9, 1984. Contact: Jerome B. Martin, Chairman, Battelle Pacific Northwest Laboratories, P.O. Box 999, Richland, WA 99352 USA; phone 509-375-6836.

SEPTEMBER 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.

RADIATION SHIELDING LITERATURE

ANL/FPP/TM-153 Alternate Applications of Fusion Power: Development of a High-Temperature Blanket for Synthetic-Fuel Production., . . Howard, P.A.; Mattas, R.F.; Krajcinovic, D.; DePaz, J.; Gohar, Y., . . November 1981, . . NTIS, PC A05/MF A01

BMFT-150-436 (In German) Comparison of Neutron-Transport Calculations with NRC Test Results., . . Koban, J.; Hofmann, W., . . February 1981, . . NTIS (U.S. Sales Only), MF A01, . . Portions of document are illegible.

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CNEN-RT/AMB-(81)1 (In Italian) Probability Distributions: Bernoulli, Poisson, and Polya a Formulation of Central Ordinary and Factorial Moments Used for Diagnosis of Numerical Data., . . Pacilio, N.; Dentico, G., . . January 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01, . . Portions of document are illegible.

CONF-820628-6 Comparison of Neutron and Heavy-ion Damage in a Stable Austenite., . . Farrell, K.; Packan, N.H., . . 1982, . . NTIS, PC A02/MF A01

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COO-2280-39 Boundary and Interface Function Method for One Dimensional Neutron Transport., . . Antolak, A.J.; Bareiss, E.H., . . November 1979, . . NTIS, PC A05/MF A01

DNA-4061F; SAI-76-562-LJ Time Dependent Air Transport of Radiation (TDATR)., . . Huszar, L.; Woolson, W.A., . . January 1976, . . Science Applications, Inc., P.O. Box 2351, La Jolla, CA 92038

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DOE/AL/10752-11 Calculated Radiation Doses from Radionuclides Brought to the Surface if Future Drilling Intercepts the WIPP Repository and Pressurized Brine., . . Channell, J.K., . . January 1982, . . NTIS, PC A03/MF A01, . . Portions of document are illegible.

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