RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE DEPARTMENT OF ENERGY

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Minds are like parachutes—they only function when they open. . . . Lord Thomas Dewar

RSIC ANNUAL REPORT TO SPONSORS/CONTRIBUTORS/USERS

October 1, 1980–September 30, 1981

We are pleased that, due to the development of the Automatic Data Entry System (ADES) for the RSIC Data General ECLIPSE computer, we are enabled to report contributor/user statistics for the past fiscal year at the close of business on September 30th.

FY 1981 User Statistics

Information dissemination activities for fiscal year 1981 were as follows:

A total of 3044 separate letters/telephone calls (about 12.1 each working day) requesting a variety of products and services (8818 total) were processed during FY 1981.

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

Activities/Working Day

4.5 Code/data packages were shipped to requesters.

7.9 Shielding documents (RSIC reports, handbooks, code and data documentation in addition to those included in above packages) were mailed.

22.6 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 advising services.

0.1 Special retrospective searches.

35.1 Total of separate activities required daily to satisfy the 3044 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 a peak of 1500 people. Maintenance of the RSIC-user directory resulted in 448 changes during the year.

A total of 97 people (54 foreign, 43 domestic) came for an orientation visit and/or to use the Center's facilities during the year.

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

Increase/Decrease in Demand for Services by User Community

	FY 79	FY 80	FY 81
Total Requests Received	3452	3505	3044
Average/Working Day	13.8	14.0	12.1
Activities Performed to SatisfyRequests	8623	9362	8818
Average Activities/WorkingDay	34.5	37.3	35.1
Increase/Decrease Over Prior Year'sActivities	+13.0%	+9.0%	−6.0%

FY 1981 Information Inflow

Information collection, analysis and processing activities continued routinely. Staff members reviewed 1,005 reports and other documents, bringing the shielding data base to 10,865 bibliographic citations with abstracts and more than 5,000 computer code data 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 187 separate transmissions of technology during the twelve months as follows:

98 New computer programs and data libraries—68 from USA participants and 30, foreign (8 from Japan; 7 each from England and France; 2 from Bulgaria; and 1 each from Argentina, Austria, West Germany, the Netherlands, Hungary and Italy).

24 New hardware versions to extend existing code or data packages—16, domestic and 8, foreign (5 from Taiwan; and 1 each from Australia, France, and Japan).

32 Updates for error corrections discovered in using existing code/data packages—20, domestic and 12, foreign (4 from Taiwan, 3 from West Germany; 2 from Japan; and 1 each from England, Italy, and South Africa).

33 Updates to existing code/data packages (to replace older routines or modules with improved versions or complete new frozen versions and/or extend capabilities by additional programming)—29, domestic and 4, foreign (1 each from England, France, Japan, and South Africa).

Technology Processed

We worked steadily to evaluate and process the technology but we ended the year with a significant backlog of work.

Our efforts resulted in the announcement of availability of 84 transportable, tested packages of computer programs and data libraries. Included is some technology contributed in the prior fiscal year. The details are as follows:

33 New code packages—16, domestic and 17, foreign (6 from Japan; 4 from England; 2 from the Netherlands; and 1 each from Bulgaria, India, Israel, Denmark and Spain).

11 New data packages—8, domestic and 3, foreign (1 each from India, the Netherlands, and West Germany).

12 Updates to include conversions of RSIC code packages to run on other hardware—5, domestic and 7, foreign (5, from Taiwan and 1 each from France and Japan).

11 Newly frozen computer program versions including improvements made over that originally packaged—7, domestic and 4, foreign (1 each from Canada, England, Japan, and South Africa).

2 Newly frozen data libraries replacing older packages, both from England.

4 Updates to data packages (2 to correct errors, 2 to add data): 3, domestic and 1 from Israel.

11 Updates to code packages (2 to replace older routines or modules, 6 to correct errors, 3 to add new extensions)—10, domestic and 1 from England.

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.

The above numbers indicate the magnitude of the RSIC backlog of information processing work. We regret that critical staffing due to insufficient funding has slowed down the process of "stocking the store" with the new technology coming into RSIC. The loss through retirement of four experienced staff members and time required to provide the essential "RSIC-type" evaluation orientation for their replacements were also contributing factors.

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 "competence" in shielding design and radiation protection for all.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made during the month.

CCC-357/AIRDOS-EPA

The code package for estimation of radiation doses caused by airborne radionuclides in areas surrounding nuclear facilities was updated to correct two errors in subroutine CONCEN. These corrections will change model output only for special combinations of model parameters.

On two lines, CONC2315 and CONC2325, the string was changed

from

(((VG(I)*X)/UD)+H),

to

(((VG(I)*X)/UD)−H).

These errors were called to RSIC attention by Kou-John Hong of Los Alamos Technical Associates, Inc., Los Alamos, NM and David Fields of the Oak Ridge National Laboratory.

CCC-364/SANDOR

This isotope generation and depletion code package (matrix exponential method), a contribution from Sandia Laboratory, was extended to include sample problem output. Microfiche copies of output for all sample problems in the package will now be distributed with the documentation.

CCC-368/MORSE-B

The general purpose Monte Carlo neutron and gamma-ray transport code system, a modified version of CCC-203/MORSE-CG, was updated to make corrections suggested by the contributor, Neill P. Taylor of the University of Birmingham, Birmingham, England. Details of the corrections may be requested from RSIC. FORTRAN IV; IBM 370/3033.

CCC-410/THIDA

THIDA, a dose calculation system for a nuclear fusion facility, was contributed by the Japan Atomic Energy Research Institute (JAERI), Tokai-mura, Ibaraki-ken, Japan. Developed for calculating dose distributions around a nuclear fusion facility while the facility is not operating, THIDA consists of one- and two-dimensional discrete ordinates transport codes, induced radioactivity calculation codes, activation chain data files, activation cross-section data files, gamma-ray activity data files, gamma radiation group constant files and gamma-ray flux-dose conversion coefficient files. Reference: JAERI-M 8019 (ORNL-tr-4713). FORTRAN IV; FACOM M-200.

CCC-411/EFDOS

EFDOS, a code system designed to compute effective committed dose equivalent by inhalation of radioactive materials occurring in routine atmospheric releases from nuclear fuel cycle facilities, was contributed by Power Reactor & Nuclear Fuel Development Corporation, Tokai Works, Tokai-mura, Ibaraki-ken, Japan. Reference: PNC-N843-81-04. FORTRAN IV; IBM 370/3033.

CCC-412/DTF-TRACA

A one-dimensional multigroup discrete ordinates neutron transport code system was contributed by Junta de Energia Nuclear, Madrid, Spain through the NEA Data Bank, Gif-sur-Yvette, France. Based on DTF-IV (CCC-42), DTF-TRACA performs the original DTF-IV calculations of independent source, effective multiplication factor by fission, time absorption and criticality searches on material concentrations, zone widths and total dimensions of the

system. In addition, TRACA has been added for two new eigenvalue calculations, the effective multiplication factor per collision and the criticality search on the buckling value. This new version permits the input of density factors by interval and bucklings by zone and group and also calculates and writes on tape the sets of collapsed cross sections weighted with the calculated fluxes, in the structure of zones and groups asked by the user. Reference: J.E.N.448. FORTRAN IV; UNIVAC 1100.

PSR-151/CHENDF

CHENDF, a code package for checking ENDF data, was updated to replace the STANDARD routine. This replacement makes available more options for the IBM computer system. FORTRAN IV; IBM 360/370.

PSR-157/PUFF2

PUFF2, a code to compute multigroup covariance matrices from ENDF/B-V uncertainty files, has been extended to include a CDC Cyber-176 version (B) which was contributed by EG&G, Idaho. FORTRAN.

PSR-166/PREANG

A calculation of preequilibrium angular distributions with the exciton model was contributed by The Netherlands Energy Research Foundation at Petten. PREANG is useful for calculating spectra of light particles emitted in nuclear reactions at energies ranging from 10 up to about 100 MeV. Reference: ECN-60. FORTRAN IV; CDC CYBER 175.

PSR-167/FAMREC

FAMREC, a fuel assembly mechanical response code system, was contributed by EG&G Idaho and the U.S. Nuclear Regulatory Commission, Washington, D.C. The code is designed to determine PWR core region mechanical response to lateral excitation. The main structural element considered is the fuel assembly which is modeled as behaving in a linear fashion. Reference: NUREG/CR-1019. FORTRAN IV; CDC 7600.

ORNL/RSIC-45 Published

ORNL/RSIC-45, "Specific Gamma-Ray Dose Constants for Nuclides Important to Dosimetry and Radiological Assessment", by Laurie M. Unger and D. K. Trubey is now available. Tables of specific gamma-ray dose constants (the unshielded gamma-ray dose equivalent rate at 1 m from a point source) have been computed for ~500 nuclides. The half life, the mean attenuation coefficient, and thickness for a lead shield providing 95% dose equivalent attenuation are also listed.

A mailing has been made to those people who ordered prior to publication. Remaining hard copies will be distributed as requested until the supply is exhausted.

ORNL/RSIC-13 Revision to be Published

In direct response to user community requests RSIC staff members are revising ORNL/RSIC-13, Volumes I, II, and III, "Abstracts of Digital Computer Code Packages Assembled by the Radiation Shielding Information Center" and will publish the results in one bound report. Covering technology which has been continually maintained and updated to reflect advances in the state-of-the-art, the report will include abstracts of code packages retained following an internal audit between numbers CCC-1 and CCC-168.

Volume IV, abstracts of code packages CCC-169 through CCC-263 will be revised in FY 1982. Volume V, CCC-264 and beyond (last package to date, CCC-406) will also be published as soon as feasible.

Persons wishing to reserve a copy of the revised ORNL/RSIC-13, Volumes I–III may do so by writing or calling RSIC. The reservation list will determine the number of copies to be printed.

PERSONAL ITEMS

The following address changes have been noted: **James A. Flanigan,** *from* New Brunswick Electric Power Commission of Canada *to* Radiological Engineering Manager of the General Public Utilities Service Corporation of Middletown, Pennsylvania; **Dr. P. S. Nagarajan** *from* Inst. für Strahlenschutz, Fed. Rep. Germany *to* Bhabha Atomic Research Centre, Bombay, India; **Richard Johnson** *from* School of Nuclear Eng., West Lafayette, Indiana *to* Commonwealth Edison, Chicago, Illinois; **Claudio Fernandez** *from* Catalytic, Inc., Philadelphia, Pennsylvania *to* Franklin Research Center; **Michael Evans** *from* Los Alamos National Lab., Los Alamos, New Mexico *to* Schlumberger Well Services, Houston, Texas; **Andrzij T. Luksic** *from* Westinghouse Hanford/HEDL, Richland, Washington *to* Burns & Roe; **A. Z. Livolsi** *from* Babcock and Wilcox Co., Lynchburg, Virginia *to* Nuclear Analysis Section, Northeast Utilities of Hartford, Connecticut.

Gene L. Woodruff has been named the new chairman of the Department of Nuclear Engineering at the University of Washington in Seattle. Woodruff succeeds **Albert L. Babb,** who will return to teaching and research on a full-time basis. Babb has been head of the University's nuclear engineering program since its inception in 1958 and chairman of the Department of Nuclear Engineering since its formation in 1965.

William A. Reupke, contributor to the sensitivity and consistency analysis code ALVIN, and formerly an Associated Western Universities Fellow at Los Alamos, is currently a staff member performing nuclear analysis of inertial fusion systems with the Defense Technology Group of the Analysis and Assessment Division.

SINCLAIR JOINS NCRP ON FULL-TIME BASIS

The National Council on Radiation Protection and Measurements (NCRP) announced its decision to change from a part-time to a full-time Presidency and acceptance of the full-time post by Warren K. Sinclair. NCRP, a non-profit, Congressionally-chartered, scientific organization has long operated with a part-time President who divides his time between the NCRP and another organization. Most recently, this part-time position was occupied by Sinclair, who, in addition to serving in this capacity, also served as Associate Laboratory Director for Biomedical and Environmental Research at the Argonne National Laboratory in Argonne, Illinois.

Sinclair's research interests encompass medical physics, nuclear medicine, and biophysics and his work on the response of synchronized mammalian cells to radiation is particularly noteworthy. He is the author of more than 100 open literature publications, the recipient of numerous awards and honors, and serves on many distinguished national and international committees, commissions and advisory bodies. In addition, he served as President of the American Association of Physicists in Medicine and the Radiation Research Society.

NRPB TO HAVE NEW DIRECTOR

The National Radiological Protection Board of the United Kingdom has appointed H. J. Dunster to be its next Director. At present Deputy Director-General of the Health and Safety Executive and Director of Nuclear Safety, Dunster takes up his new appointment on 27 July 1982.

Before joining the NRPB Dunster had substantial experience in the radiological protection aspects of nuclear energy and from 1967–71 was Deputy Head of the UKAEA's radiological Protection Division. He is a Member of the International Commission on Radiological Protection (ICRP) and was formerly a Member of the International Commission on Radiation Units and Measurements (ICRU). His international advisory work has included membership of a number of IAEA panels and he is a member of the EC Group of Experts responsible for advising on Basic Safety Standards. He is a member of the Royal Society Study Group on the Assessment and Perception of Risk.

CONFERENCES AND COURSES

The Georgia Institute of Technology has announced a 10-day short course on *Radiation Protection* to be held November 30–December 11, 1981 on the Atlanta Campus. The course places emphasis on radiation protection, interaction of radiation with matter, measurement techniques for specific radionuclides, biological effects of radiation, personnel monitoring, operation of field and laboratory instruments, public health and environmental considerations, appropriate standards, and rules and regulations. It is designed for those in industry, government (federal, state and local) and academic institutions having an interest in and need for basic radiological health training. Completion of this course will satisfy most radionuclide-use requirements of federal and state regulatory agencies.

Georgia Tech's School of Nuclear Engineering is the sponsor of the course, which will be conducted by the Department of Continuing Education.

NDST International Conference

Announcement has been made of the International Conference on Nuclear Data for Science and Technology to be held September 6–10, 1982 in Antwerp, Belgium. This meeting is intended to continue the cycle of conferences held at Harwell (U.K., 1978), Knoxville (USA, 1979) and Kiev (USSR, 1980).

The scope of the conference is similar to that of its predecessors and is intended to be application oriented, emphasizing nuclear data and neutron physics which pertain to the fission and fusion energy programs. The program is open for contributions dealing with nuclear data in bio-medicine, astro-physics, material research and industrial applications and with the basic understanding of neutron induced nuclear reactions.

International advisors include from the USA R. Chrien of BNL, F. Percy of ORNL, A. Smith of ANL, and S. Whetstone of DOE. Europeans may secure information from the Chairman, K. H. Bockhoff of C.E.C., or from J. Schmidt of the IAEA.

OCTOBER 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.

REACTOR AND WEAPONS RADIATION SHIELDING LITERATURE

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