RSIC Newsletter

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The real problem in the years ahead is one of making the most efficient use of all our national resources—and not the least of these resources is our intelligent youth.—George A. Sloan

NEW RSIC REGISTRATION FORM IN USE

A new version of the RSIC registration form is appended as the last page of this newsletter. Most of you reading this will have already completed and sent an earlier version but you should complete and return the new one to provide additional detail to your funding profile. First we have greatly expanded and refined the funding categories of various sponsor groups to reflect the current composition of the various organizations. Second, at the request of several sponsors, we have been asked to collect agency project category numbers and agency personal contacts. A section at the bottom of page 1 of the registration form is provided for this additional information. Please examine the new form to determine what additional information would be required to bring your current profile up to date. The importance of this information is discussed in the following section. Your cooperation will be appreciated.

NEW RSIC OPERATING PROCEDURES

Those of you who have contacted RSIC directly in recent times have noticed that our operating procedures have changed slightly. In general, we now require that all potential users of RSIC register with the Center before receiving our products and services. In some cases, where a particular requester is not doing work for one of our current sponsors, we collect a fee to cover our cost for performing a particular service. It is a modest charge for a given transaction and RSIC has been authorized to collect such fees, which require no formal paperwork, for many years. Some sponsors have required this action in the interest of promoting an equitable sharing the responsibility for supporting RSIC. It is expected that this mode of operation is temporary and will be terminated when adequate and equitable funding sources are obtained.

Our campaign to locate these funding sources is aided significantly by our program to register all potential users. The registration form we are now using (see form attached as the last page of this Newsletter) allows us to collect information about addresses, sources of funding for your work, organization types, and project areas. This provides us with a profile of our user community which can be used to approach potential sponsors to request support for technical areas where current

funding coverage is inadequate. Your cooperation in this effort has been excellent. We have been able to use this information to seek additional sponsorship and feel that it is an important component in our continuous quest to obtain funding resources adequate to the goal of operating RSIC at its full potential. This is an ongoing effort and we have some catching up to do to reach this goal.

The new policy serves another useful purpose. In the past, such registration forms were used as the source of mailing addresses for the *RSIC Newsletter*. However, we were aware that many used RSIC products and services without having access to the Newsletter. The current policy assures that all users of RSIC products and services have access to the Newsletter so they can be aware of the status of changes to the data library and computer code collections and other information important to the RSIC user community.

R. W. Roussin
RSIC Director

CHANGES TO THE COMPUTER CODE COLLECTION

Thirteen additions or changes were made to the computer code collection during the month. Eight new code systems were packaged and added to the collection, two existing code packages were extended with additional hardware versions, an existing code package was replaced with a newly frozen version, and two code packages were corrected. Eight changes resulted from foreign contributions.

CCC-300/RADHEAT-V4

Japan Atomic Energy Research Institute (JAERI), Ibaraki-ken, Japan, contributed a newly frozen version of RADHEAT which replaces RADHEAT-V3. Several modules were renamed, added or re-written. RADHEAT-V4 is a modular code system for analyzing the neutron and gamma-ray transport and calculating the energy deposition and atomic displacements due to radiation effects in a nuclear reactor or shield. Multigroup cross sections for neutrons and photons are generated by using the evaluated nuclear data ENDF/B, JENDL, and DLC-15/STORM-ISRAEL (photon interaction data). FAIR-CROSS generates coupled neutron and gamma-ray cross sections for multigroup transport calculations. TWOWAY converts secondary gamma-ray production to the arbitrary neutron and gamma-ray energy group structure for coupled neutron-gamma transport calculations. FDEM generates cell-averaged few-group cross sections and collapsed response functions. DIAC is a one-dimensional discrete ordinates transport code. ESPRIT is a two-dimensional discrete ordinates transport code. MCACE is a three-dimensional Monte Carlo transport code. BREM computes secondary gamma-ray production by the Bremsstrahlung effect. RADHEAT-V4 is written in FORTRAN 77 for the FACOM M-380 under the FACOM MST operating system. The code is transmitted on 2 DS/HD 5.25-inch diskettes (1.2mb). Reference: JAERI 1316. FORTRAN 77, FACOM M-380.

CCC-421/TPHEX

The Technical Research Centre of Finland, Helsinki, contributed the original version of TPHEX for the CDC Cyber computers. Argonne National Laboratory, Illinois, has adapted the CDC version to run on Cray computers under the UNICOS operating system. TPHEX calculates the multigroup neutron flux distribution in an assembly of hexagonal cells using a transmission probability (interface current) method. It is primarily intended for calculations on hexagonal LWR fuel assemblies but can be used for other purposes. FORTRAN IV and 77 compilers are required to operate TPHEX on the CDC CYBER 170 series computers and the Cray XMP computers. On the

Cray XMP, the CFT77 compiler is used under the UNICOS operating system. The CDC version is transmitted on one 1600- or 6250-bpi tape; the Cray version is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: Report 47 (1980); REP 5/82 (March 1982). REP-17/85 (August 1985); Report 149 (October 1982); REP-22/85 (November 1985); *Nucl. Sci. Eng.*: 72, 9-18 (1979). Report 46, March (1980). FORTRAN IV, FORTRAN 77; CDC Cyber (A); Cray (B).

CCC-463/GASPAR II

The contributors at Battelle Pacific Northwest Laboratory, Richland, Washington, have alerted RSIC of problems in the GASPAR II package for VAX computers. GASPAR II calculates radiation exposure to man from routine air releases of nuclear reactor effluents. An error was corrected in the BLOCK DATA subprogram. The error affects the numerical value of the beta air dose factor for Xenon-137. The corrected package is available on one DS/DD 5.25 inch diskette. Reference: NUREG-0597 (June 1980) and NUREG/CR-4653, PNL-5907 (March 1987). FORTRAN; GASPAR IBM 3033 (A) and GASPAR II VAX (B).

CCC-467/ITS 2.1

The July 1988 *RSIC Newsletter* noted two corrections in SUBROUTINE ESCORE of the ITS program library. To date, the changes were not physically inserted in the package as distributed by RSIC. The statement in SUBROUTINE ESCORE: FLAMB=(CCLAN*EARLBX +CBLAN)*EARLBX+CALAN must be replaced by: FLAMB=CBLAN*EARLBX+ CALAN.

If you obtained ITS prior to this newsletter announcement, please note the changes. The above FORTRAN statement must be replaced twice by the corresponding correction in the same subroutine. The current version 2.1 of ITS with the above corrections is available on one DS/HD 5.25-inch diskette (1.2mb). The update emulator UPEML (PSR-245) will accompany this release of ITS and is available on one DS/HD 5.25-inch diskette (1.2mb). References: Sandia National Laboratories Memo (December 1987 and April 1987), SAND 84-0573 (November 1984), Informal Report (1988), and Informal README (Sept. 1990). FORTRAN-77; CRAY, CYBER-76, IBM, CRAY-1, VAX (A); PC (B).

CCC-579/MARMER

Delft University of Technology, The Netherlands, contributed MARMER, a flexible point-kernel shielding code. MARMER is a point kernel shielding code used to calculate the dose rate, energy absorption rate, energy flux or gamma flux due to several sources at any point in a complex geometry. The source volume is divided into volume-elements and the source energy distribution is divided into energy groups. The unscattered gamma-ray flux is calculated by an exponential attenuation kernel integrated over all source volume-elements and energy groups by using a Monte-Carlo integration method. The flux is then converted to the requested detector response using conversion factors read from a binary file. Scattered gamma-rays are accounted for by buildup factors, which are tabulated in another binary file containing dose rate equivalent and energy absorption buildup factors. Buildup factors for each shield are calculated by interpolating for the effective atomic number of the shield. For multilayered shields the buildup factor of one shield or the Kitazume or Broder methods may be used. Although necessary data is read from binary files, attenuation coefficients, detector response functions, and buildup factors may also be given.

The MARMER code system consists of the following: PICTURE, a two-dimensional geometry plotting code; PREORI, a pre-processor for the ORIGEN-S code; ORIGEN-S, a fission products inventory code; and BINBCD, a program to convert BCD data to binary form. The following data libraries are also supplied: buildup factors based on ANSI 6.4.3; gamma interaction coefficients based on JEF-1.1; and gamma decay data based on JEF-1.1. The code will run on the VAX family of computers and is written in FORTRAN 77. On the VAX 6000, the compiler used was VAX FORTRAN under the VAX/VMS operating system. MARMER is

transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: IRI-131-89-03/2. FORTRAN 77, VAX family.

CCC-580/DPCT

The U.S. Nuclear Regulatory Commission (NRC), Washington, contributed DPCT, a deterministic-probabilistic model for contaminant transport. DPCT is designed to simulate mass transfer by ground water movement in a vertical section of the earth's mass. The model accounts for convection, dispersion, radioactive decay, and cation exchange for a single component using the hybrid deterministic-probabilistic model. The hybrid method addresses the fundamental problem of describing the spread of a large number of moving reference particles within a region. The actual pattern of ground water flow is described by the ground water velocity field. A velocity is calculated for each reference particle in the region by interpolating values from the two-dimensional grid of velocities. Dispersion is accounted for in the particle motion by adding a random component to the deterministic motion. By summing the mass carried by each particle in a given cell and by determining the volume of water in the cell, it is possible to calculate contaminant concentrations within the region. When only convective and dispersive processes act, the quantity of mass is constant. However, when there is radioactive decay or cation exchange, the quantity of mass is decreased. The solution of the ground water flow equation and the dispersion-convection equation is subject to boundary conditions. On the Cray, the compiler used was CFT77 under the UNICOS operating system. The code is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: NUREG/CR-1609. FORTRAN 77, CDC Cyber computers and Cray XMP.

CCC-581/FOTELP

Vojnotehnički Institut, Beograd, Yugoslavia, contributed FOTELP, a Monte Carlo simulation program which computes the transport of photons, electrons and positrons in three-dimensional geometry. For photon history the trajectory is generated by following it from scattering to scattering using corresponding probability distributions to find distances between collisions, types of collisions, types of secondaries, their energies and scattering angles. Photon interactions are photoelectric absorption, incoherent scattering, and pair production. The secondary photons which are followed include bremsstrahlung and positron-electron annihilation radiation. The condensed-history Monte Carlo method is used for the electron/positron transport. During a history the spatial steps taken by an electron/positron are precomputed and may include the effects of a number of collisions. The corresponding scattering energy loss and angle are found from the multiple scattering distributions. The secondary particles are generated on the step according to the probabilities for their occurrence. Electron/positron energy loss is through inelastic electron-electron/positron-electron collisions, bremsstrahlung generation, and polarization of the medium (density effect). The fluctuation due to the variation in the number of energy-loss collisions in a given Monte Carlo step (straggling) is included in the energy loss. Scattering angular distributions are determined from corresponding interactions. The secondary electrons which are followed, include knock-on, pair, Compton and photoelectric electrons. The secondary positrons which follow pair production are also included. Typically 8 MB of fast memory or virtual memory is required. FOTELP and its auxiliary routines are FORTRAN 77 computer programs coded to run on the VAX family under the VAX VMS operating system. The IMSL (Internal Mathematics and Statistics Library) double precision library is required. The code is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: Informal Notes; XXXII Jugoslovenska Konferencija ETAN, Sarajevo, Yugoslavia, June 6-10, 1988. Pp. IX.45-IX.52. FORTRAN 77, VAX 11/780.

CCC-582/NITRAN

Osaka University, Japan, contributed NITRAN, a neutron transport code system based on anisotropic scattering. The codes in the NITRAN system are the following: DDXS—a double differential cross section generation program; NITRAN-1—a one-dimensional

transport code for spherical and slab geometries; NITRAN-2—a two-dimensional transport for slab (x-y) geometry; and NITRAN-TD—a one-dimensional transport code for spherical geometry for time dependent problems. The input to DDXS can be ENDF/B-IV, ENDF/B-VI or JENDL-3 cross sections. In the NITRAN calculation, angular dependent transfer cross sections (kernels) are used as scattering cross sections. They are obtained from integrating the product of the double differential neutron emission cross sections and the angular transfer probabilities. The transport codes are based on discrete ordinates. With minor modifications the codes can run on the IBM mainframes. Related to NITRAN are DLC-123/DDXLIB, a double differential cross section library, and CCC-583/DDXCODES, a one-, two-, and three-dimensional transport code system using the double differential form of the cross sections. Reference: OKTAVIAN Report A-90-01; KfK 2832/II. FORTRAN 77, FACOM M-380.

CCC-583/DDXCODES

DDXCODES is a code system consisting of one-, two- and three-dimensional transport codes using multigroup double-differential form cross sections. Japan Atomic Energy Research Institute, Ibaraki-ken, Japan, contributed the programs in the system. The DDXCODES were written to accurately predict the transport of neutrons by using the multigroup double-differential form cross sections. These types of cross sections can correctly take into account the energy-angle correlated reaction kinematics (available as RSIC package DLC-123/DDXLIB). Hence, the transport phenomenon in materials with highly anisotropic scattering is accurately calculated. The MCFILEF code prepares a control file for input to SPINPTF, which then prepares input for PROF-DD by combining the control file and other input data. The PROF-DD code calculates the multigroup cross sections and angle-energy distributions (DDX). The program DDXLIBMK then reads the DDX formatted library and edits it into a specified format for input to ANISN-DD or MORSE-DD. DDXCODES will run on the FACOM M-380. With minor modifications, the codes can run on the IBM mainframes. DDXCODES are written in FORTRAN 77. The package is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: JAERI 1314, JAERI-M 84-126. FORTRAN 77, FACOM M-380, IBM mainframes.

PSR-233/LSL-M2

A VAX version of LSL-M2 has been contributed by Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee. LSL-M2 stands for Least-Squares Logarithmic Adjustment of Neutron Spectra. In the LSL-M2 code system, LSL-M2 is the major program; there are three others. ACT converts from dosimeter activities to reaction rates. CALACT determines calculated reaction rates from fluences and cross sections. FLXPRO converts fluences, cross sections, and covariances from one group structure to another. The original version was written on the IBM PC, which requires the IBM Personal Computer Professional Fortran, Version 1.0 compiler. The VAX version runs under the VMS operating system, using the VAX FORTRAN compiler. The PC version is distributed on two DS/HD 5.25-inch diskettes (1.2mb). The VAX version is distributed on one DS/HD 5.25-inch diskette (1.2mb). Reference: NUREG/CR-4349, ORNL/TM-9933, Informal Notes (September 1986). FORTRAN 77, IBM PC and PC/AT (A); VAX family (B).

PSR-298/TNG1

Oak Ridge National Laboratory, contributed a nuclear model code TNG1, written in FORTRAN 77 for the VAX family under the VAX/VMS operating system. The TNG1 code is a multistep statistical model based on the Hauser-Feshbach (H-F) theory including width-fluctuation corrections and pre-compound effects. Statistical model calculations are frequently performed for medium and heavy nuclei. The H-F part of the TNG1 code is multi-step, but angular distribution can be calculated only for the binary step. The pre-compound portion is single step, in this case angular distribution is calculated on the basis of partial wave interference (partial relaxation of the random phase approximation in the H-F formalism). Quanti-

ties calculated include: elastic, total, inelastic, (n,g), (n,n'), (n,p), (n,a), (n,f), (n,2n), (n,np), (n,na), (n,nf),..., (n,4n),....., secondary particle and gamma ray production spectra, angular distributions of the first outgoing particles, and the production cross sections of isomeric states. The TNG1 code was tested at RSIC on the VAX 6000, using VAX/FORTRAN under the VAX/VMS operating system. The code is transmitted on one DS/DD 5.25-inch diskette. Reference: ORNL/TM-10093. FORTRAN 77, VAX family under VAX/VMS.

PSR-300/UPEAK

The Joint Institute of Nuclear Research, Dubna, USSR through the Nuclear Energy Agency (NEA) Data Bank, France, contributed UPEAK for the purpose of decomposing a one-dimensional spectrum into its components. The spectrum of nuclear reactions may be formally considered as a linear combination: s(x) = SUM((fi(x),i=1,n) + b(x) + e(x); where fi(x) is the i-th component of interest, b(x) is the background and e(x) is the statistical error with zero-valued mean and variance d(x); s(x) is the spectrum. Each measured component is regarded as a result of a transformation of its model m(x). Regression analysis is used to determine the least squares estimates of some of the parameters. UPEAK runs on the IBM PC and compatibles with math co-processor. The code was written in FORTRAN 77 and uses RM FORTRAN Version 2.42 or higher compiler. The PLINK86 overlay linker is also necessary. The code is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: Informal Notes by V. B. Zlokazov; FORTRAN 77, IBM PC/XT, IBM PC/AT.

PSR-301/DOMUS

The Joint Institute of Nuclear Research, Dubna, USSR through NEA Data Bank, France, contributed a spectral analysis program written for the purpose of decomposing a two-dimensional spectrum into its components. DOMUS is a two-dimensional version of UPEAK (PSR-300). The spectrum of nuclear reactions may be formally considered as a linear combination: s(x,y) = SUM((fi(x,y),i=1,n) + b(x,y) + e(x,y); where fi(x,y) is the i-th component of interest, b(x,y) is the background and e(x,y) is the statistical error with zero-valued mean and variance d(x,y); s(x,y) is the spectrum in two dimensions. Each measured component is regarded as a result of a transformation of its model m(x,y). The background is described by a second order surface. The method of least squares is used to determine the parameters in the equation. The executable program as packaged runs on the IBM PC and compatibles with a math co-processor. The code was written in FORTRAN 77 and uses RM FORTRAN Version 2.42 or higher compiler. The PLINK86 overlay linker is also necessary. The code is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: Informal Notes by V. B. Zlokazov; FORTRAN 77, IBM PC/XT, IBM PC/AT.

CHANGES TO THE DATA LIBRARY COLLECTION

Five changes were made to the collection this month. Four new data libraries were added and an existing data library was updated. Four resulted from foreign contributions.

DLC-123/DDXLIB

DDXLIB is a 125-neutron group double differential cross section Library. The contributor, JAERI, recently updated the data. The use of the double-differential form scattering cross sections was proposed for the accurate treatment of the energy-angle correlated kinematics. The multigroup neutron library can be used in discrete ordinates codes such as ANISN-DD (CCC-583/DDXCODES) and DOT-DD (available at JAERI) and the Monte Carlo code MORSE-DD (CCC-583/DDXCODES). The DDXLIB data were produced from the ENDF/B-IV data with the use of the PROF-DD computer code (CCC-

583/DDXCODES). The number of energy groups is 125, and 20 equi-cosine bins are used for the angular mesh. In the production of the library, a 1/E spectrum above 0.32eV and the Maxwellian below this energy are used for the weighting function. The library contains production, fission, capture, total cross sections, and the energy-angle distributions of secondary neutrons for each nuclide. A program is provided in the package to convert the data from BCD to binary form and vice versa. The DDXLIB data were tested on a FACOM M-780 computer. The retrieval programs are in FORTRAN 77. Reference: JAERI-1314. FORTRAN 77, FACOM M-780.

DLC-152/FIS-PROD

The Institute of Atomic Energy, Beijing, China, contributed a new fission product yield data library. Since the 1950's, with the development and uses of nuclear energy, many fission product nuclear data libraries have emerged, and many measurements and evaluations on fission product nuclear data have been actively carried out. The Institute of Atomic Energy in Beijing has been working on a fission product yield library since 1985. Top priority was given to 10 fissioning systems in the first phase of the project. The 10 sets of yield are compiled in ENDF/B-V format and also in legible form. The project was carried out under the auspices of the IAEA Nuclear Data Section. The sources of experimental fission yield data are the Rider library up to 1980, and the EXFOR library of IAEA. The 10 fissioning systems are: U-235T, U-235F, U-235HE, U-238F, U-238HE, Pu-239T, Pu-239F, Pu-241T, U-233T and Th-232F. Each of these involves 1170 fission product nuclides. For each of the nuclides, both independent and cumulative yields together with their uncertainties are given. The data library can be used on most computers and processed with computer codes which can read ENDF/B-V format. FIS-PROD is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: IAEA-NDS-91.

DLC-153/LIB123

LIB123 is a 123-group neutron cross section library in AMPX Master Interface Format. The Comitato Nazionale Energia Nucleare, Rome, Italy, through the NEA Data Bank, France, contributed the data library. The program AMPX-II (PSR-63) was used to generate the data. The P3 123-group neutron cross section library of various nuclides used in criticality calculations was generated from ENDF/B-IV data. The XLACS-2 module of AMPX-II generated the fine group cross section data in AMPX Master Interface Format. Subsequent runs by the NITAWL module produced cross section libraries in AMPX working format and/or ANISN format to be used by Monte Carlo codes such as KENO-IV and MORSE or discrete ordinates codes such as ANISN and DOT. The 123-neutron energy group structure consists of the GAM-II boundaries with a 30-group THERMOS structure below 1.86 eV. Assuming 3.05 eV as a cutoff between fast and thermal hydrogen ENDF/B data, there are 91 epithermal groups with an upper cutoff of 14.9183 MeV. The fission-neutron energy range is covered by 60 groups ranging from 14.9183 MeV to 7.1 KeV. This grouping covers most of the cross section structure for light and intermediate nuclides and also takes into account inelastic scattering and fission thresholds for some heavy nuclides. The remaining 31 groups ranging between 7.1 KeV to 3.05 eV account for the resonance levels of various intermediate and heavy nuclides. The thermal range is covered by 32 groups. The AIM module of PSR-63/AMPX-II can be used for mode conversion of the data. The data were tested at NEA Data Bank on a VAX 8810. Reference: CNEN-RT/ING(80)17, CNEN-RT/ING(80)18, CNEN-RT/ING(82)10, CNEN-RT/ING(80)20. VAX 8810.

DLC-155/ACTV-F/H

ACTV-F/H is a neutron activation cross section library for fusion reactor design, contributed by the International Atomic Energy Agency (IAEA), Vienna, Austria. At the IAEA Specialists' Meeting on "Fusion Evaluated Nuclear Data Library and Benchmark Calculations" (May 1989), the working group initiated an intercomparison of activation cross sections important for fusion reactor design. It was agreed that the national nuclear data centers will send to IAEA

Nuclear Data Section their contributions to the list of reactions issued by Harwell Laboratory (UK) selected on the basis of inventory calculations. The activation data library described is part of the library REAC*2 of Hanford National Laboratory, Richland, Washington. The library contains 284 reaction and capture cross sections for isotopes or 58 elements. The data were converted to ENDF-VI format at IAEA Nuclear Data Section using the code THRESH. The codes in PSR-299/ENDFUTIL6 can be used for retrieval of the data library. ACTV-F/H is transmitted on one DS/HD 5.25-inch diskette (1.2mb). Reference: IAEA-NDS-114.

DLC-156/GROUPSTRUCTURES

The NEA Data Bank, France, contributed a data library of four group structures. These group structures were the result of the work of the International Evaluation Cooperation. The main purpose is to facilitate the inter-laboratory benchmarking of the evaluated files: ENDF/B-VI, JEF-2, and JENDL-3. The four group structures are described herein. The VITAMIN-J group structure was defined in the framework of the JEF-1 benchmarking for use in reactor shielding and fusion neutronics application. It is based on the group structures of VITAMIN-C (DLC-41) and VITAMIN-E (DLC-113). VITAMIN-J has 175 neutron groups and 42 gamma groups. ECCO-33 is a 33-group structure containing a subset of the VITAMIN-J energy group boundaries. It is aimed at benchmark studies of fast critical experiments. XMAS is a 172-group neutron structure designed for thermal and intermediate energy reactor cell calculations. ECCO-2000 is a 1968-group neutron structure containing a subset of both the VITAMIN-J and XMAS energy group boundaries. It is aimed at fine group reactor cell calculations for fast, intermediate, and thermal reactor applications. A computer code for producing the weighting function in tabular form is provided. The data were tested on a VAX 8810, under the VAX/VMS operating system, using the VAX FORTRAN compiler. The library is transmitted on one DS/DD 5.25-inch diskette. Reference: JEF/DOC-315, Revision 3. FORTRAN IV, IBM 3090, VAX 8810.

Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Stan Jones* and *Jeffrey C. Gross*, Martin Marietta Energy Systems, Inc., Portsmouth, Ohio.

Published Standards

The following standards are available from ASTM, 1916 Race St., Philadelphia, PA 19103-1187, for $8 each.

C 709-90, *Terminology of Manufactured Carbon and Graphite*, (revision).

C 998-90, *Practice for Sampling Surface Soil for Radionuclides*, (revision).

C 999-90, *Practice for Soil Sample Preparation for the Determination of Radionuclides*, (revision).

C 1022-84(1990), *Method for Chemical and Atomic Absorption Analyses of Uranium Ore Concentrate*, (reaffirmation).

D 1890-90, *Test Method for Beta Particle Radioactivity of Water*, (revision).

D 1943-90, *Test Method for Alpha Particle Radioactivity of Water*, (revision).

D 2460-90, *Test Method for Radionuclides of Radium in Water*, (revision).

D 4286-90, *Practice for Determining Coating Contractor Qualification for Nuclear Powered Electric Generation Facilities*, (revision).

E 170-90, *Terminology Relating to Radiation Measurements and Dosimetry*, (revision).

E 219-80(1990), *Test Method for Atom Percent Fission in Uranium Fuel (Radiochemical Method)*, (reaffirmation).

E 244-80(1990), *Test Method for Atom Percent Fission in Uranium and Plutonium Fuel (Mass Spectrometric Method)*, (reaffirmation with editorial change).

E 261-90, *Practice for Measuring Neutron Fluence Rate, Fluence and Spectra by Radioactivation Techniques*, (revision).

E 453-79(1990), *Recommended Practice for Examination of Fuel Element Cladding Including the Determination of the Mechanical Properties*, (reaffirmation).

E 531-76(1990), *Recommended Practice for Surveillance Testing of High-Temperature Nuclear Component Materials*, (reaffirmation).

E 901-82(1990), *Classification System for Uranium Resources*, (reaffirmation).

CONFERENCES, COURSES, SYMPOSIA

RSIC attempts to keep its users/contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers to RSIC.

New Horizons in Radiation Protection and Shielding

The call for papers has been issued for the ANS Radiation Protection and Shielding Division Topical Meeting entitled "New Horizons in Radiation Protection and Shielding." The meeting will be held April 26–May 1, 1992, in Pasco, Washington. Participants are invited to submit summaries describing work related to shielding and radiation protection for space, fusion, fission, accelerator, medical, waste, storage, and shipping facilities; nuclear data for shielding and radiation protection applications; dosimetry, instrumentation, and associated analyses; methodology, optimization, uncertainty, and computer applications; impact of regulations and standards associated with radiation protection; offsite releases, epidemiological studies; and radiation remediation. The original and three copies of a 450–900-word summary must be submitted by **August 20, 1991**. Send summaries to Wilbur Bunch, Technical Program Chair, ANS Topical Meeting, P.O. Box 941, Richland, WA 99352. For further information contact Hans Toffer, HO-38, Westinghouse Hanford Co., P.O. Box 1970, Richland, WA 99352 (phone 509-376-2894).

Calendar

Your attention is directed to the following events of interest.

April 1991

27th Annual Meeting of the National Council on Radiation Protection and Measurements, Apr. 2–4, 1991, Washington, D.C. Contact: NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814 (phone 301-657-2652).

Workshop on Welding Criteria for Shipping Containers, April 3–4, 1991, San Francisco, sponsored by the U.S. Department of Energy. Contact: Merry Carter, Lawrence Livermore National Laboratory, Welding Criteria Workshop, P.O. Box 808, L-196, Livermore, CA 94551.

35th International Conference on Transport and Diffusion in Turbulent Fields: Modelling and Measurement Techniques, Apr. 22–26, 1991, Eilat, Israel, sponsored by the Israel Inst. for Biological Research. Contact: Israel Inst. for Biological Research, P.O. Box 19, 70450 Ness-Ziona, Israel.

Advances in Mathematics, Computations, and Reactor Physics, Apr. 28–May 1, 1991, Pittsburgh, Pennsylvania, an international topical meeting sponsored by the ANS, Mathematics & Computation Division and the Reactor Physics Division. Contact: J. E. Olhoeft, Westinghouse Electric Corp., P.O. Box 355, WEC-E205, Pittsburgh, PA 15230-0355 USA (phone 412-374-5704).

1991 International High-Level Radioactive Waste Management Conference, Apr. 28–May 3, 1991, Las Vegas, Nevada, sponsored by the ANS and the American Society of Civil Engineers. Contact: Dillard B. Shipler, Technical Program Chair, American Nuclear Society, 555 N. Kensington Ave., La Grange Park, IL 60525 USA.

Conference on Occupational Radiation Protection, Apr. 29–May 3, 1991, Guernsey, United Kingdom, sponsored by the British Nuclear Energy Society.

Contact: British Nuclear Energy Society, Secretariat, 1-7, Great George St., London SW1P 3AA U.K.

May 1991

Radiopharmaceutical Dosimetry Symposium, May 7-10, 1991, in Oak Ridge, Tennessee, sponsored by the Radiopharmaceutical Internal Dose Information Center. Contact: Audrey T. Schlafke-Stelson, Program Committee, 5th International Dosimetry Symposium, Radiopharmaceutical Internal Dose Information Center, Medical Sciences Division, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37831-0117 USA (phone 615-576-3450).

Practical Radiation Shielding, May 13-17, 1991, Atlanta, Georgia, a course sponsored by Shonka Research Associates, Inc., and the Georgia Institute of Technology. Contact: Georgia Tech Continuing Education, Georgia Institute of Technology, Atlanta, GA 30332-0385 (phone 404-894-2400, 800-325-5007).

Advanced Occupational and Environmental Radiation Protection, May 13-17, 1991, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

Workshop on SCANS, Version 2 (Shipping Cask Analysis System), May 21-23, 1991, Gaithersburg, Maryland, sponsored by the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. Contact: Merry Carter, Lawrence Livermore National Laboratory, SCANS Workshop, P.O. Box 808, L-196, Livermore, CA 94551.

ICRM '91, May 27-31, 1991, Madrid, Spain, sponsored by CIEMAT. Contact: J. M. Los Arcos, ICRM'91 Secretariat, CIEMAT, Investigasción Básica, Avenida Complutense, 22, 28040-Madrid, Spain (phone 34-1-3466225, Fax 34-1-3466005).

June 1991

ANS Annual Meeting, June 2-6, 1991, Orlando, Florida. Contact: General Chair John A. DeMastry, Florida Power & Light Co., P.O. Box 14000, Juno Beach, FL 33408 (phone 407-694-3613).

5th International Symposium on Radiation Physics, June 10-14, 1991, Dubrovnik, Yugoslavia. Contact: Dr. Ante Ljubičić, ISRP-5 Chairman, Ruder Bošković Inst., P.O. Box 1016, 41001 Zagreb, Yugoslavia (phone 41 425-563 or 41 434-467, Telex 21383 irbzg yu, Fax 41 425-497).

Planning for Nuclear Emergencies, June 10-14, 1991, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

38th Annual Meeting of the Society of Nuclear Medicine, June 11-14, 1991, Cincinnati, Ohio. Contact: Society of Nuclear Medicine, 136 Madison Ave., 8th Floor, New York, NY 10016 (phone 212-889-0717).

International Conference on Emerging Nuclear Energy Systems (ICENES'91), June 16-21, 1991, Monterey, California. Contact: C. D. Henning, LLNL L-644, P.O. Box 808, Livermore, CA 94551.

A Joint Symposium on Radiation Protection, June 16-23, 1991, in Winnipeg, Canada. Contact: Danny Buksak, Conference Chairman, The University of Manitoba, 191 Frank Kennedy Bldg., Winnipeg, Manitoba, R3J 2N2, Canada (phone 204-474-6633).

Techniques in Nuclear Radiation Shield Analysis, June 24-28, 1991, Ft. Worth, Texas, a short course offered by the University of Texas at Austin. Contact: Continuing Engineering Studies, College of Engineering, ECJ 10.324, The Univ. of Texas at Austin, Austin, TX 78712 (phone 512-471-3506; Fax 512-471-0831).

In-Place Filter Testing Workshop, June 24-28, 1991, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

July 1991

2nd International Symposium on Biophysical Aspects of Auger Processes, July 5-6, 1991, University of Massachusetts, Amherst, Massachusetts, sponsored by the American Association of Physicists in Medicine. Contact: Roger W. Howell, Dept. of Radiology, Div. of Radiation Research, M.S.B. F-451, Univ. of Medicine & Dentistry of NJ, 185 South Orange Ave., Newark, NJ 07103 USA (phone 201-456-5067).

28th Annual International Nuclear and Space Radiation Effects Conference and Short Course, July 15-19, 1991, San Diego, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: Ronald L. Pease, Mission Research Corp., 1720 Randolph Rd., SE, Albuquerque, NM 87106 (phone 505-768-7639).

Management and Disposal of Radioactive Wastes, July 15-19, 1991, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for

Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

Health Physics Society Annual Meeting, July 21-26, 1991, Washington, D.C. Contact: Nancy E. Newman, NIH Bldg. 21, Rm. 236, 9000 Rockville Pike, Bethesda, MD 20892 (phone 301-496-5774).

International Illinois Low Level Radioactive Waste (LLWM) Symposium: The Quiet Revolution–Innovations in Low-Level Waste Management, July 29-Aug. 1, 1991, Chicago, Illinois, sponsored by the Illinois Dept. of Nuclear Safety. Contact: Ms. P. Burnett, Illinois Dept. of Nucl. Safety, 1035 Outer Park Drive, Springfield, IL 62704 USA.

August 1991

Occupational and Environmental Radiation Protection, Aug. 12-16, 1991, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

September 1991

ICNC '91, Sept. 9-13, 1991, Christ Church, Oxford, England, sponsored by AEA Technology, the OECD Nuclear Energy Agency, with cooperation from IAEA. Contact: John Bentley, 062/A32, AEA Technology Winfrith, Dorchester, Dorset DT2 8DH, England (phone 0305 203316; Fax 0305 202122).

INEL Computing Symposium, Sept. 10-12, 1991, Idaho Falls, Idaho, sponsored by the Idaho National Engineering Laboratory. Contact: Teri Williams, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415-2602 (phone 208-526-9728, FTS 583-9728).

Brazilian Meeting on Reactor Physics and Thermal Hydraulics, Sept. 17-20, 1991, São Paulo, Brazil. Contact: José Rubens Maiorino, IPEN-CNEN/SP, Caixa Postal 11049 (Pinheiros), 05499-São Paulo-SP-Brazil (phone 011 211-6011 Ext. 270; Telex 11 83592-IPEN-BR).

October 1991

7th Symposium on Neutron Dosimetry, Oct. 14-18, 1991, Berlin, Fed. Rep. of Germany, sponsored by the Commission of the European Communities. Contact: Dr. R. Jarh, Physikalisch-Technische Bundesanstalt, Abt. 7, Bundesallee 100, 3300 Braunschweig, FRG.

1991 Joint International Waste Management Conference, Oct. 21-26, 1991, Seoul, Korea. Contact: Mr. Larry C. Oyen, Sargent & Lundy, 55 East Monroe St., Chicago, IL 60603 (phone 312-269-6750, Fax 312-269-3475, Telex 280603).

November 1991

Nuclear Energy Forum, Nov. 10-13, 1991, San Francisco, California. Contact: Conference Office, U.S. Council for Energy Awareness, 1776 I Street, N. W., Suite 400, Washington, DC 20006-2495 USA.

International Conference on Fusion Reactor Materials, Nov. 17-22, 1991, Clearwater, Florida. Contact: P. J. Maziasz, Metals and Ceramics Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6376.

April 1992

New Horizons in Radiation Protection and Shielding, Apr. 26-May 1, 1992, Pasco, Washington, a topical meeting of the ANS Radiation Protection and Shielding Division. Contact: Wilbur Bunch, HO-36, Westinghouse Hanford Co., P.O. Box 1970, Richland, WA 99352 (phone 509-376-6313).

May 1992

8th International Radiation Protection Association Conference, May 17-22, 1992, Montreal, Canada. Contact: G. Webb, NRPB, IRPA 8 Secretariat, Chilton, Didcot, Oxon OX11 ORQ, United Kingdom.

June 1992

American Nuclear Society Annual Meeting, June 7-12, 1992, Boston, Massachusetts. Contact: Mary Keenan, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 708-352-6611).

August 1992

Nuclear Technologies for Space Exploration, Aug. 14-17, 1992, Jackson Hole, Wyoming. Contact: Dr. David Woodall, INEL EG&G Idaho, P.O. Box 1625, Idaho Falls, ID 83415-2516.

FEBRUARY 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 22161.

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

Adv. Nucl. Sci. Technol., 21, 1-119. . *Nodal Methods in Transport Theory.* . Badruzzaman, A. . 1990

Transp. Theory Stat. Phys., 19, 419-458. . *Adaptive Characteristic Spatial Quadratures for Discrete Ordinates Neutral Particle Transport - The Slab Geometry Case.* . Mathews, K.A. . 1990

Transp. Theory Stat. Phys., 19, 489-514. . *The Boltzmann Equation with Weakly Inhomogeneous Data and a Source Term.* . Palczewski, A.; Wennberg, B. . 1990

Transp. Theory Stat. Phys., 19, 515-544. . *A Variational Treatment of the Asymptotic Flux Behavior in a Halfspace.* . Pomraning, G.C. . 1990

Transp. Theory Stat. Phys., 19, 545-562. . *Convergence of a Numerical Approximation to the One-Dimensional Vlasov-Poisson System.* . Wollman, S. . 1990

Transp. Theory Stat. Phys., 9, 459-488. . *A Constructive Solution Method for Linear Transport Problems.* . Dressler, K.; Moock, H. . 1990

DOE/RW-0006, Rev. 6; ORNL/M-1320. . *Integrated Data Base for 1990: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics.* . Oct. 1990. . NTIS

ORNL/TM-11742. . *56Fe Resonance Parameters for Neutron Energies up to 850 keV.* . Perey, C.M.; Perey, F.G.; Harvey, J.A.; Hill, N.W.; Larson, N.M. . Dec. 1990

PNL-7453. . *Laboratory Setup and Results of Experiments on Two-Dimensional Multiphase Flow in Porous Media.* . Schiegg, H.O. . Oct. 1990. . Radiation methods to determine saturation are described in Chapter 6.

RADIATION SHIELDING INFORMATION CENTER **USER REGISTRATION FORM**
PART I: USER PROFILE

To receive products and services from RSIC, you must complete (print or type) this form and return it promptly. Users should read the monthly *RSIC Newsletter* which details all RSIC activity.
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B. **U.S. respondents** indicate your source of financial support; if more than one sponsor, indicate percentage of time spent on each. In addition, please provide, for each sponsor, the **agency project category** (e.g., for DOE, the B&R number; for NRC, the FIN number, etc.) and the **agency personal contact** for that project at the bottom of this page. **Foreign respondents** should indicate the U.S. agencies with which you have exchange agreements, and provide the name of the U.S. contact at the bottom of this page.

Limit to 5 sources, should total 100%

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D. What are the project areas in which you are engaged?

Breeder/LM Reactor	1 ____%	Gas Cooled Reactor	13 ____%
Light Water Reactor	2 ____%	Heavy Water Reactor	14 ____%
Fusion - Magnetic	3 ____%	Fusion - Inertial	15 ____%
Fusion - Hybrid	4 ____%	Weapons	16 ____%
Accelerators	5 ____%	Space Shielding/Nucl. Systems	17 ____%
Well Logging	6 ____%	High Level Waste Management	18 ____%
Low Level Waste Management	7 ____%	Remedial Action	19 ____%
Reactor Safety	8 ____%	Criticality Safety	20 ____%
Shipping Casks	9 ____%	Fuel Cycle/Processing	21 ____%
Health Physics Research	10 ____%	Occup./Envirn. Exposure	22 ____%
Radiation Damage	11 ____%	Activation/Heating	23 ____%
Other _____	12 ____%		

PART II: TECHNOLOGY SURVEY

(Please answer each question, using additional paper as needed.)

1. What computing technology/data libraries should RSIC acquire (give name and contact if known)?

2. Describe your computer environment. What computers do you use (compilers, operating system)?

3. Have you developed computer codes or data libraries that you are willing to share through RSIC? Please list and cite documentation. Have you already placed your work in RSIC? ____. If so, please list. Is it time for an update of your contribution? ____ If you have publications which you wish to contribute, please do so.

PLEASE RETURN TO: Radiation Shielding Information Center
Oak Ridge National Laboratory
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February 1991