RSIC Newsletter

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The best insurance policy for the future of an industry is research, which will help it to foresee future lines of development, to solve its immediate problems, and to improve and cheapen its products.)Sir Harold Hartley

TRUBEY TO RETIRE IN JUNE

We have been notified that David K. Trubey, RSIC co-founder some 29 years ago, plans to retire at the end of June 1991. We will have a retirement party during working hours near the end of June. Contact RSIC if you would like to attend. If not, you may express your comments in a letter to commemorate the occasion. We will collect and bind such contributions in a notebook for presentation to David at the farewell party. Needless to say we will miss David a great deal, but we plan to maintain contact with him after retirement. He and his wife Jean will move to a new home in Florida.

New Chairman of ANS-6

After serving as chairman of ANS-6 for 19 years, David Trubey of RSIC has stepped down. ANS-6 is the subcommittee of the American Nuclear Society Standards Committee which organizes working groups to develop and maintain standards on radiation protection and shielding. It is sponsored by the Radiation Protection and Shielding Division of ANS.

William C. (Bill) Hopkins (Bechtel Power Corp.) has been appointed the new chairman by Tawfik M. Raby (National Institute of Standards and Technology), chairman of N17, Research Reactors, Reactor Physics, Radiation Shielding and Computational Methods. The N17 consensus committee oversees the work of ANS-6, ANS-10, ANS-14, ANS-15, and ANS-19.

Bill has been a member of ANS-6 for many years and has served on a number of working groups. He is also the incoming chairman of the Radiation Protection and Shielding Division. Bill will also become a member of N17 and Dave will retain his membership.

September Deadline for RPSD Topical Papers

September 1, 1991, is the deadline submitting papers to Technical Program Chairman of the April 1992 ANS Radiation Protection and Shielding Division (RPSD) Topical Meeting, New Horizons in Radiation Protection and Shielding. The meeting will be held April 26 ! May 1, 1992, in Pasco, Washington. A session titled, Role of Computers in Shield Design, will be chaired by RSIC staff member, Bernadette L. Kirk. She encourages national and international participants to submit papers for her session in the areas of computer applications using PCs, workstations, advanced supercomputers, and massively parallel computers.

The following additional technical sessions and session organizers are in place:

- Neutron Dosimetry, Instrumentation, & Analysis (Leon West, Nolan Hertel)
- Fusion Reactor Shielding (Don Dudziak)
- Nuclear Data (Bob Little)
- Shielding and Radiation Protection for Space Applications (Gene Normand)
- Radiation Protection in Medical Facilities (Bob Schenter)
- Radiation Protection in Criticality Events (Dick Malenfant)
- Meeting Manpower Needs in RP&S (John Poston)
- Accelerator Shielding (Wiley Davidson)
- Radiological Assessment Models and Methods (Vern Rogers)

Other possible topics suggested by the committee include: Impact of Offsite Releases, Economics of ALARA, Waste Management and Environmental Restoration, Impact of 10CFR20, Uncertainty and Optimization Methods/Applications.

Summaries of 450 ! 900 words are due to the Technical Program Chairman, ANS Topical Meeting, P.O. Box 941, Richland, WA 99352 USA, by **September 1, 1991**. The papers will be reviewed in September 1991 and the authors of those papers accepted will be notified by the end of September. The summaries will not be published; however, complete papers of less than 10 pages will be due by **January 3, 1992**, for publication in the proceedings, which will be available at the topical meeting.

CHANGES TO THE COMPUTER CODE COLLECTION

Four changes were made to the computer code collection during the month. One new code system was packaged and added to the collection, an existing code package was replaced with a newly frozen version, and two code packages were extended with additional hardware versions.

CCC-200/MCNP 4

A newly frozen version of this general purpose Monte Carlo neutron and gamma-ray transport code system was provided by the developer, Los Alamos National Laboratory, New Mexico. Details of the new features are listed in the MCNP4 newsletter, included in the package documentation. The following are among the major enhancements.

Continuous-Energy Electron Transport. Electrons have been added as a third particle type and the code has been restructured for *n* particles.

Thick-Target Bremsstrahlung (TTB) Approximation. Unlike earlier versions of MCNP in which electrons and their photon progeny were assumed to deposit all their energy at the point of electron creation, bremsstrahlung photons are now produced and transported.

Multitasking. Particle histories can be run in parallelon computers with multitasking software that have more than one processor sharing one large memory.

Pulse-Height Tally. A new tally records the energy deposited in a cell and enhances direct comparison with experimental measurements.

Full Unix compatibility including interrupts, *setenv* environment variables, C-shell procedure scripts for installation, upgrading of PRPR to a full update emulator, and a standard code validation procedure.

MCNP 4 is written in FORTRAN 77 and runs on Cray computers, IBM mainframes, Unix workstations, VAX computers, and all computers in general with at least 90 megabytes of hard disk space. The package is available on either one 6250-bpi, 9-track tape or one DC 6150, ¼-inch cartridge tape (150 MB). Versions B, C, and D (MCNP3) are available on diskettes. References: LA-7396-M, Rev. 2 (September 1986), MCNP3B Newsletter (July 1988), MCNP4 Newsletter (April 1991), and informal notes. FORTRAN 77; CRAY, IBM, Unix workstations, VAX (A); IBM PC/AT (B and C); and PC 386 (D).

CCC-254/ANISN-ORNL

Battelle, Columbus, Ohio, contributed a personal computer version of ANISN-ORNL, a one-dimensional discrete ordinates transport code system with anisotropic scattering. It solves the one-dimensional Boltzmann transport equation for neutrons or gamma rays in slab, sphere, or cylindrical geometry. Several ANISN-formatted data libraries (see the DLC announcements) are now available on diskettes for use with this version. The new version runs on 386 (with 387 coprocessor) or 486 personal computers. Faster run time is achieved with 5 or more MB of memory, but the executable module will run in 4 MB with a 20 MB hard disk. The Lahey Fortran compiler F77/EM-32 was used with the virtual memory linker under the Lahey/ERGO OS/386 operating system to create the executable. The program will run under DOS 3.3 or higher. The PC version (H) is available on one DS/HD 5.25-inch (1.2 MB) diskette. Reference: K-1693; ORNL-TM-3049; NAA-SR-10951; *Trans. Am. Nucl. Soc.*, II:1 (June 1968); Informal Notes; (May 1973 and July 1988). FORTRAN IV, IBM 3033 (A), VAX family (C), DEC (G); FORTRAN 77, Cray X-MP (B) and PC 386/486 (H).

CCC-331/EGS4

The Institute of Applied Physiology and Medicine, Seattle, Washington, contributed a personal computer version of this Monte Carlo code system for simulation of the coupled transport of electrons and photons. The package includes source files, batch files, information files, and sample input and output. Fortran system commands in the batch files are specific to the Lahey Fortran compiler F77L-32/EM and A. I. Architect's operating system OS-386 for an 80386 microcomputer. While EGS4 has run using NDP Fortran and Pharlap Operating system, modifications are required. Both of these 32-bit compilers run in protected mode, making use of extended memory to exceed the 640 kB limit of MS-DOS necessary for full support of EGS4; and, therefore, require their respective memory manager operating systems. A minimum of 4! 5 MB of memory (RAM) is recommended for EGS4. The PC version of the code is transmitted on 3 DS/HD diskettes. Reference: Errata, Informal notes; SLAC-265; PRESTA Info, SLAC TN-87-4. FORTRAN IV, FORTRAN 77, IBM 3081, VAX 11/750 (A); PC-386 (B).

CCC-586/REPRISK-PC

Contributed by the Environmental Protection Agency, Las Vegas, Nevada, REPRISK-PC is a PC version of the REPRISK model used in the modelling of long-term radionuclide releases and population health effects resulting from disposal of high levelradioactive wastes in mined geological reposito-

ries. The package consists of a set of computer programs and databases that model the transport of radionuclides from the repository through the environment to exposed human populations and estimates the resulting health impact. REPRISK-PC runs on IBM PC, PC/XT or PC/AT with 640 kB of RAM, parallel communications for printer, math coprocessor, hard disk, and an EGA or VGA monitor. The Turbo C++ compiler and Turbo Link were used to compile and link the C sources under DOS. The Lahey F77L, Version 4.00 and Microsoft 8086 Object Linker were used to compile and link the FORTRAN sources. REPRISK-PC is interactive, and response time is very fast. The package is transmitted on two DS/HD 5.25-inch diskettes (1.2 MB). References: Informal documentation March 1991 and October 1983. FORTRAN 77, IBM PC.

CHANGES TO THE DATA LIBRARY COLLECTION

Five changes or additions were made to the data library collection during the month. One data library was replaced with a newly frozen version and four existing data libraries are now available on another media.

DLC-75/BUGLE-80

BUGLE-80 is an ENDF/B-IV derived, coupled 47-neutron, 20-gamma-ray, P3, ANISN-formatted cross-section library for LWR shielding calculations developed and guided by the ANS-6.1.2 working group on multigroup cross sections. To facilitate use on personal computers, Battelle, Columbus, Ohio, has downloaded the package to diskettes. The data library is available on 2, DS/HD diskettes (1.2 MB). Reference: Informal Notes (June 1980). IBM 3033 (A) and PC (B).

DLC-76/SAILOR

This 47-neutron, 20-gamma-ray group, P3, cross section library developed from DLC-41C/VITAMIN-C was downloaded to diskettes by Battelle, Columbus, Ohio. SAILOR data are customized for concrete slab models and light water reactor shielding problems. The ANISN formatted data are available on two DS/HD (1.2 MB) diskettes. Reference: Informal Notes (June 1980). IBM 3033 (A) and PC (B).

DLC-85/FCXSEC

These 22-neutron, 21-gamma-ray group cross sections for nuclear fuel cycle shielding calculations have been downloaded to diskettes by Battelle, Columbus, Ohio. The FCXSEC library was derived from DLC-41/VITAMIN-C, and both microscopic and macroscopic cross sections are included. The ANISN formatted data are available on two DS/HD (1.2 MB) diskettes. Reference: ORNL/TM-7038 (May 1980). IBM 3033 (A) and PC (B).

DLC-105B/MCNPDAT

This compilation of cross-section data for use in MCNP, Version 4, was contributed by Los Alamos National Laboratory. This version, denoted DLC-105B/MCNPDAT, is a supplement to the CCC-200/MCNP4 package announced in this newsletter. It contains extensive sets of data based on ENDF/B-V. The various libraries are:

RMCCS1: 64 cross-section tables from ENDF/B-V, LANL and ENDL85.
RMCCSA1: 27 cross-section tables from ENDF/B-V, LANL and ENDL85.
ENDF5U1: 31 cross-section tables from ENDF/B-V.
DRMCCS1: 91 cross-section tables from ENDF/B-V, LANL and ENDL85.
These discrete data correspond to RMCCS1 and RMCCSA1.

ENDF5P1: 23 cross-section tables from ENDF/B-V.
ENDF5T1: 43 cross-section tables from ENDF/B-V.
DRE51: 54 cross-section tables from ENDF/B-V.

These discrete data correspond to ENDF5P1 and ENDF5U1.

The new data libraries added in this update include:

MGXSNP1: multigroup neutron and photon cross sections.
EPRIXS1: evaluations at various temperatures for 7 isotopes.
NEWXS1: newly processed evaluations.
NEWXSD1: discrete version of NEWXS1.

A program, MAKXSF, translates the data libraries into binary format. This is recommended because it will cut down on the running time of MCNP. References: Informal notes and LA-7396-M, Rev 2 (September 1986). Two 6250-bpi, 9-track tapes are required for transmittal.

DLC-119/HILO86

This 66-neutron, 22-gamma-ray group cross section library was downloaded to diskette by Battelle, Columbus, Ohio. The neutron and photon energies for these data range up to 400 and 20 MeV, respectively. HILO86 can be used for multigroup transport calculations involving medium-energy neutrons, including accelerator shielding, the use of neutrons in radiotherapy, radiation damage studies, etc. The ANISN formatted data are available on one DS/HD (1.2 MB) diskette. Reference: ORNL/TM-9801 (Feb. 1986). IBM 3033 (A) and PC (B).

Hansen-Roach Cross Sections Clarified for SCALE-4

Previous issues of the *RSIC Newsletter* (October 1990 and November 1990) made reference to a data file in the SCALE-4 code package labeled Hansen-Roach AMPX working library. Our attempt to alert SCALE-4 users that the AMPX working library form of the Hansen-Roach data should only be used for sample problem execution was interpreted by some to be a criticism of the H-R data itself. We regret that this misunderstanding occurred. The integrity of the highly regarded H-R cross section data is intact. These cross sections work as well today as they did some 30 years ago. The important thing to note, for SCALE-4 users, is that the working library format is problem specific and should not be applied to configurations with other specifications.

John E. White

Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Pam Gorman, R. L. Scott, Deborah Cutler, Sue Brummett, Bronie Dison, Joe Edgar,* and *Jim Littlepage*, U.S. Department of Energy, Oak Ridge, Tennessee; *Larry Thorn*, Labat-Anderson, Inc., Oak Ridge, Tennesee; and *Stan Jones*, Martin Marietta Energy Systems, Piketon, Ohio.

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.

Reactor Analysis and Radiation Transport Short Courses

The Department of Nuclear Engineering at the University of Tennessee-Knoxville is offering two five-day short courses of interest to radiation transport specialists during Tennessee Industries Week (TIW-26), August 12!16, 1991.

Computational Methods in Reactor Analysis will familiarize the course participant with computational methods and computer codes currently used to describe the neutronic behavior of nuclear fission reactors. Emphasis will be placed on understanding the neutronic models and associated numerical methods currently employed in codes. A good understanding of the models and methods 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 multi-dimensional diffusion theory methods and perturbation theory methods for applications in reactor statics, space-dependent kinetics, and fuel depletion; transport theory methods including the discrete ordinates method, integral transport theory, and the Monte Carlo method; and cross section generation and processing utilizing the AMPX and SCALE systems developed at ORNL. 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 for 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.

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 will be presented that will lead to a good understanding of the basics of Monte Carlo analysis and the specialized applications of Monte Carlo methods to practical shielding problems. Many advanced topics will be included that will promote the best use of existing computer code systems. 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 system, 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, as well as computational advantages and disadvantages of Monte Carlo versus the other methods. This course will cover, in depth, the theory and mathematics a user must have in order to understand and use the Monte Carlo method effectively to solve difficult problems in radiation transport.

The registration fee is $895 per person for each course. The deadline for registration in these two courses is July 29, 1991. For additional information contact T. W. Kerlin, Head of the Dept. of Nuclear Engineering, University of Tennessee, Knoxville, TN 37996 (phone 615-974-2525).

Calendar

Your attention is directed to the following events of interest.

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 Ljubi‡i*f*, ISRP-5 Chairman, Ruder Bo×kovi*f* 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 617-432-3515; 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 617-432-3515; Fax 617-432-1969).

July 1991

2d 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 617-432-3515; 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 617-432-3515; Fax 617-432-1969).

In-Place Filter Testing Workshop, Aug. 26!30, 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 617-432-3515; Fax 617-432-1969).

September 1991

Risk Assessment In Occupational and Environmental Health, Sept. 4!6, 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 617-432-3515; Fax 617-432-1969).

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.

March 1992

Radiation Transport Calculations Using EGS4, Mar. 9!12, 1992, a four-day, 80386 microcomputer-based course to be held in Seattle, Washington, sponsored by Inst. of Applied Physics and Medicine. Contact: Susan Walker, IAPM, 701 16th Ave., Seattle, WA 98122 (phone 206-553-7330).

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, 1991, Boston, Massachusetts. Contact: Mary Keenan, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 708-352-6611).

10th Topical Meeting on Technology of Fusion Energy, June 7!12, 1992, Boston, Massachusetts, sponsored by the American Nuclear Society and the U.S. Department of Energy. Contact: Stephen O. Dean, Fusion Power Associates, 2 Professional Drive, Suite 248, Gaithersburg, MD 20879 (phone 301-258-0545).

July 1992

15th International Conference on High Energy Accelerators, July 20!24, 1992, Hamburg, Fed. Rep. of Germany. Contact: F. Willeke, Deutsches Elektronen-Synchrotron, Notkestrasse 85, 2000 Hamburg 52, FRG.

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.

APRIL 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

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