RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER • OAK RIDGE, TENN., U.S.A. •

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Phone No. 615-574-6176 or FTS 624-6176
Telex No. 8105721076 USDOE OKRE

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For an idea ever to be fashionable is ominous, since it must afterwards be always old-fashioned — George Santayana

RSIC DATA BASES ON DOE/RECON

Department of Energy staff members and DOE contractors who have access to the DOE/RECON Database System are reminded that RSIC literature data bases (RSI and RSC) are on the system and may be accessed directly. Information on subject coverage and guidelines for use in performing a search of the data bases are available from RSIC. Write for details.

MYNATT RECEIVES AWARD

Among five scientists/engineers selected to receive the 1981 *Ernest Orlando Lawrence Memorial Award* for outstanding contributions in the field of atomic energy is one who is well-known in radiation transport and shielding. **Fred R. Mynatt,** director of the Instrumentation and Controls Division at Oak Ridge National Laboratory (ORNL) and Fellow of the American Nuclear Society (ANS), was recognized "for the development of methods (internationally recognized discrete ordinates methods) and theory (generalized perturbation theory) for radiation shielding analysis and for leadership in the broad application of these methods to create safe and efficient shield designs for reactor plants." Each of the winners received a medal, a citation, and a cash award of $5000. Mynatt, a former member of the ORNL Engineering Physics Division, is a past chairman of the ANS Radiation Protection and Shielding Division.

ANS Professional Divisions Name New Officers

Professional divisions and technical groups of the American Nuclear Society announced new officers for 1982–83 at the Los Angeles Annual Meeting in June. We list those most pertinent to radiation transport and shielding:

Fusion Energy — chairman, Kenneth R. Schultz; vice chairman/chairman-elect, Charles A. Flanagan; secretary/treasurer, Hatice Cullingford; vice program chairman/chairman-elect, James A. Maniscalco; executive committee, Ralph Moir, Douglas Post, and Thomas Shannon.

Isotopes and Radiation — chairman, Michael Stauber; vice chairman,/chairman-elect, William S. Lyon; secretary, William A. Jester; treasurer, Nancy M. Trahey; executive committee, Thomas R. Canada and Russell L. Heath.

Mathematics and Computation — chairman, Richard J. Pryor; vice chairman/chairman-elect, Harold L. Dodds, Jr.; secretary, I. K. Abu-Syumays; treasurer, Laural L. Briggs; executive committee, Lawrence L. Barinka, Robert A. Forster, and Barry D. Ganapol.

Nuclear Reactor Safety — chairman, Joseph Turnage; vice chairman/chairman-elect, Walter Y. Kato; secretary/treasurer, Dirk A. Dahlgren; executive committee, Robert Bari, William E. Kastenberg, and Roger K. Wyrick.

Radiation Protection and Shielding — chairman, David E. Bartine; vice chairman/chairman-elect, E. Thomas Boulette; secretary, Richard K. Disney; treasurer, Joseph M. Cardito; executive committee William C. Hopkins, Thomas D. Murphy, and Gilbert N. Wrights.

Reactor Physics — chairman, Michael J. Lineberry; vice chairman/chairman-elect, Donald R. Harris; secretary, Abraham Weitzberg; treasurer, Darrell F. Newman; executive committee, David E. Bartine, Richard J. Cacciapouti, Stuart G. Carpenter, and Norton L. Shapiro.

NCRP Proceedings Available

The National Council on Radiation Protection and Measurements (NCRP) has announced the availability of the proceedings of a symposium, *The Control of Exposure of the Public to Ionizing Radiation in the Event of Accident or Attack.* This symposium (April 27–28, 1981) was the first that the NCRP sponsored in a technical area. A total of 38 papers were presented by leading scientists and other experts in radiation in the symposium's eight sessions. They are published in the proceedings, along with transcripts of the discussion held at the end of each session, and two appendices. The publication is concerned with radiation emergencies that range from nuclear war to peacetime accidents in which radio-

active materials are involved. The characteristics of these several types of emergencies, and the radiation environment to be expected for each, are described in the "Introductory Session," along with the probable sociological and psychological effects on the population of these nuclear disasters.

Copies of the proceedings can be purchased from NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, Maryland 20814.

BOOK REVIEWS

We are pleased to present two book reviews which are lifted from the *ESIS Newsletter* 41, April 1982, published by the European Shielding Information Service, CEC Joint Research Centre-Ispra Establishment, Italy. The first review was written by H. Penkuhn, author of the RSIC-distributed series "Gamma Shielding Estimates on the Back of an Envelope," and the second by H. W. M. Braun, editor of the newsletter.

Computational Methods in Reactor Shielding, by James Wood

Pergamon Press, London, 1981; 441 pages. $19.50 paperback, $55 hardbound.

Pergamon Press has edited a third shielding textbook.

The first two (Price-Horton-Spinney, *Radiation Shielding*, and H. Goldstein, *Fundamental Aspects of Reactor Shielding*) treated the problem from the point of view of the engineer and theorist. This time the topic is prepared for the shield designers, especially the computer users among them.

After a brief introduction, the chapters 2 and 3 treat "Radiation Quantities and Units," and "Radiation Sources."

Chapter 4 describes "The Attenuation of Gamma-Rays." Until this point the chapters are brief; they comprise only one quarter of the book. The bulk of the contents is contained in the chapters 5, 6, and 7 which treat "Application of the Point Kernel Technique," "Neutron Attenuation," and "Transport Theory Methods." Chapter 7 alone comprises more than one third of the volume. Especially in the Monte Carlo section, the author treats many details: different random number generators and their tests for randomness, different sampling methods, Buffon's and Laplace's needle experiments etc.

Similarly, in Chapter 6 the rarely used term 'neutron buildup factor' is introduced.

At the end of the book, there are four appendices dealing with mathematics and selected physical data and units and also an index.

For whom is the book written? First of all for those advanced shield designers who must write their own computer codes. For them this publication is a nearly-ideal textbook! It gives for 6 computer codes not only the flow charts, but also the FORTRAN listings including subroutines, and the input and output of sample cases. The program BMIX estimates the gamma-ray buildup factors for mixtures. CASK treats spherical gamma-ray shields using point kernel techniques. CADRE describes neutron transport with the removal-diffusion method and includes part of the gamma-rays. MONTERAY is a Monte Carlo (MC) code for gamma-rays, and ELSCAT an MC subroutine for elastic neutron scattering. Finally, there is the moments method routine DBUF. The important calculations by hand are not ignored! Certainly, the book cannot treat all types of possible shielding codes; it discusses neither the discrete ordinates methods (SN type) nor the two- and three-dimensional MC codes. In the MC codes for neutrons, inelastic scattering is not described.

Is the book also a 'good reading' for shielding newcomers? If they are cautious, yes; otherwise there are pitfalls.

The author uses a rather liberal terminology. On page 16 he writes that visible and ultraviolet light are non-ionizing. This statement is realistic for biological tissue, but certainly not for all materials. On page 299 he mentions "decimal bits," a *contradictiom in adjecto* since "bit" is an abbreviation of "binary digit." On page 432f, masses are given in the energy unit MeV — this would be possible only if Einstein's relation — $E = mc^2$ — is used explicitly, with the additional condition that c is regarded as unity, and this is not done in the book. This shielding slang is no danger for senior scientists, but "greenhorns" are cautioned. The author himself is aware of this possibility — he writes on page 7, "This book is not aimed at the complete beginner in nuclear engineering..." Moreover, some of the author's approximations can be interpreted in a misleading way. Following page 86, the Compton scattering cross section μ_c behaves as 1/E (E = photon energy) — this is right in the high MeV-range, but for small energies μ_c is a flat function versus E. On page 248 the two gamma rays emitted by Na^{24} which have energies of 1.38 and 2.76 MeV are replaced by two averaged gamma rays of 2 MeV. This approximation is justified in and near the source. In most shielding materials however, this approximation, when applied to 15-mfp-thick shields leads to underestimates of about one decade! Thus the readers of this book should check whether the approximations are realistic everywhere or only in limited ranges of the important variables, e.g, space or energy.

The publisher, Pergamon Press, has photocopied the author's typescript; therefore some tables photocopied from photocopies are partly illegible (the removal cross section tables on pages 195 and 205, and part of the SI data in Appendix D). Why not reproduce readable copies of the critical pages, to be distributed on request?

Let us summarize: the author tries to bridge over the large gap between the novice's level and the expert's know-how in shielding computations. This is an extremely valuable work since, in this field, textbooks are missing.

On the other hand, some newcomers might get confused by the author's liberalism in language and approximations.

Therefore, let us quote the author himself who writes at the end of the introduction that "above all, the programs should be used intelligently," and one should not "accept blindly" the "results output by the computer." What is said here realistically about the computer programs should be applied also to other parts of the book!

Hans Penkuhn in *ESIS Newsletter* 41 (April 1982).

Applied Thermoluminescence Dosimetry, ed. by M. Oberhofer and A. Scharmann

Lectures of a course held at the Joint Research Centre Ispra, Italy, November 12–16, 1979. Published for the Commission of the European Communities, Directorate-General Information

Market and Innovation, Luxembourg, by Adam Hilger Ltd., Techno House, Redcliffe Way, Bristol, BS16NX, 1981, 414 pages.

Experimental shielding studies are performed which make use of so-called thermoluminescence dosimeters or TLDs. This method is based on the phenomenon that certain materials, mostly ionic crystals, emit luminescence light during heating them up after exposure to radiation. In the last decades the technique has mainly been developed for personnel and environmental dosimetry, but also for medical purposes and age determination. Both, the theoretical aspects of TLD and its various applications have been described in various books and in single articles in different journals with none of them published recently. This was the reason, why the Management of the Education and Training Organization of the European Community at Ispra decided to treat the whole subject in a special course in cooperation the the Justus-Liebig Universität, Giessen, Federal Republic of Germany, I. Physikalisches Institüt (Director: Prof. Dr. A. Scharmann). The course was held for the first time in 1977 at the Joint Research Centre, Ispra and, because of its success, repeated in 1979 with the aim to also publish the material in book form. This book finally was published in 1981 by Adam Hilger Ltd. after a thorough review of the single contributions to the course prepared by the most outstanding experts in the field. The subjects treated range from the history of TLD, through its theory, instrumental and material aspects, handling problems, to practical applications such as personnel and environmental dosimetry, neutron dosimetry, application in the medical field, in reactor engineering (shielding) and for age determination or dating. The editing of the book was done by Dr. M. Oberhofer of the Radiation Protection Division of the Joint Research Centre Ispra, who served as course co-ordinator, and by Prof. Dr. S. Acharmann, Director of the I. Physikalisches Institüt of the Justus-Liebig Universität, Giessen. Both have actively contributed to the field of TLD since its ve

H. W. M. Braun, *ESIS Newsletter* 41 (April 1982).

Report on 2d International Symposium on Radiation Physics Held in Malaysia

Participants from 21 countries presented 99 papers at the Second International Symposium on Radiation Physics (ISRP-2) held at the University of Science of Malaysia (USM) in Penang. This symposium, a sequel to ISRP-1 (Calcutta 1974), was co-sponsored by the USM, the Committee on Science and Technology in Developing Countries (COSTED) and the Asian Physical Society (APSO), and received additional financial assistance from the International Centre for Theoretical Physics (Trieste), the Commonwealth Foundation, the British Council and several other organizations.

The program was divided into eight sessions which covered basic radiation physics data, radiation sources, radiation detectors, radiation transport, applications of radiation physics, radiation and environment, teaching radiation physics, and miscellaneous topics ranging from laser fusion to microwave medical applications.

Plans for International Radiation Physics Society

Following ISRP-1 (Calcutta 1974), interest had been expressed in forming an International Radiation Physics Society (IRPS) which could serve as the primary sponsor for further symposia in this interdisciplinary subject area on a more formal and regular basis. At a meeting, May 28 the ISRP-2 Technical Committee, expanded to include 14 attending participants from 10 countries, elected a *Pro-tem* Committee consisting of: A. M. Ghose (Malaysia); M. A. Gomaa (Egypt); J. H. Hubbell (U.S.A); D. Isabelle (France); P. K. Iyengar (India); D. F. Jackson (U. K.); A. Ljubicic (Yugoslavia); N. Muslim (Malaysia); T. Nakamura (Japan); R. H. Pratt (U.S.A.); N. Rativanich (Thailand); J. Rotblat (U.K.); B. S. Sood (India); and I. B. Whittingham (Australia), to explore and to take the necessary actions to form such a society.

The primary objective of the Society would be the global exchange and integration of scientific information pertaining to the interdisciplinary subject of radiation physics, with emphasis on (1) research, theoretical and experimental, in the field of radiation physics, (2) investigations of the physical aspects of the interactions or radiation with living systems, (3) education in radiation physics and (4) utilization of radiation for peaceful purposes.

The above IRPS *Pro-tem* Committee will undertake the task of organizing ISRP-3, tentatively planned for 1985 in Egypt.

CHANGES TO THE RSIC CODES COLLECTION

Two extensions were made to existing code packages, one each from Israel and the United Kingdom; and three new code packages were added to the collection in July, including contributions from Japan and the United Kingdom.

CCC-257/DELFIC-TES

This multigroup kernel integration code package for calculation of gamma-ray exposure from a radioactive airborne cloud was extended to include an IBM version which was contributed by Israel Atomic Energy Commission, Soreq Nuclear Research Center, Yavne, Israel. FORTRAN IV; UNIVAC 1108 (A) and IBM 3033 (B).

CCC-348/RICE CCC

This reactor nuclide-inventory code package for calculating actinide and fission product buildup was extended to include the RICE data library of actinide cross sections. The library was contributed by Central Electricity Generating Board, Berkeley Nuclear Laboratory, United Kingdom. Data library reference: RD/B/N4582. IBM 360/370.

A code package for the assessment of radiological consequences of airborne effluents from nuclear installations was contributed by the Central Electricity Generating Board (CEGB) Research Department in the Berkeley Nuclear Laboratories, Berkeley, England, through the OECD Nuclear Energy Agency (NEA) Data Bank, Gif-sur-Yvette, France. Devised for guidance in safety and siting aspects of nuclear installations, WEERIE begins with full fission product inventory applicable to the fuel at the time of interest. The amount of fuel involved in the incident may vary as a function of time and either a time decaying or constant fission-product inventory may be used to specify the release. The effluent in the atmosphere is dispersed from an effective stack height and allowance is made for building entrainment. Evaluation is made of the inhalation and the cloud beta-ray doses while integration over the volume of the plume leads to estimates of the cloud gamma-ray exposure. References: RD/B/N2407 and RD/B/N3337. FORTRAN IV; IBM 3033, 370/165.

CCC-427/WRAITH

A code package for calculation of internal and external doses resulting from atmospheric release of radioactive material was contributed by Battelle Pacific Northwest Laboratories, Richland, Washington. The movement of released material through the atmosphere is calculated using a bivariate straight-line Gaussian distribution model with Pasquill values for standard deviations. The quantity of material in the released cloud is modified during its transit time to account for radioactive decay and daughter production. Internal doses to each organ are calculated as sums of cross-organ doses, with each target organ irradiated by radioactive material in a number of source organs. Reference: NUREG/CR-1690 (PNL-3382). FORTRAN IV; UNIVAC 1100/44.

CCC-430/EDMULT

A code package for evaluation of electron depth-dose distributions in multilayer slab absorbers was contributed by Radiation Center of Osaka Prefecture, Osaka, Japan. Based on an algorithm for depth-dose distributions produced by plane-parallel electron beams normally incident on two- and three-layer absorbers, EDMULT is valid for incident energies from 0.1 to 20 MeV and for absorbers consisting of slabs of atomic numbers from about 5.6 (polystyrene) to 82. The algorithm is based on a simple model of electron penetration across the interface, and utilizes empirical equations previously formulated as well as ones newly developed. Each of the empirical equations used is given in the form of a subprogram so that it might be useful also for separate problems related to penetration of electrons. Reference: RCSP Technical Report No. 1. FORTRAN IV; NEAC-300.

CHANGES TO THE PERIPHERAL SHIELDING ROUTINES

Four additions, including two contributions from the Netherlands, were made to the peripheral shielding routines codes collection.

PSR-187/MUXS

A code package for generating multigroup cross sections for charged particle transport problems was contributed by UCCND, Computer Sciences Division, Oak Ridge National Laboratory. Cross sections generated by MUXS can be used in many multigroup transport codes, with minor modifications to these codes, to calculate sputtering yields, reflection coefficients, penetration distances, etc. Reference: ORNL/CSD/TM-185. FORTRAN IV; IBM 3033.

PSR-188/ENTOSAN

A code package for calculating fine-group dosimetry cross section values from ENDF/B data was contributed by Netherlands Energy Research Foundation, Petten, The Netherlands. The main feature of this code package is the direct calculation of the group cross section contribution of the various parts of the ENDF/B data (i.e., resonance parameters and smooth data) without the calculation of point data in a fixed energy pattern for the complete energy range of interest. The output group structure is SAND-II 640 group, with energy range 10^{-10} to 20 MeV. Reference: ECN-93. FORTRAN IV; CDC CYBER 175.

PSR-189/FITOCO

A code package for conversion of fine-group flux density and cross section data to coarse group values was contributed by the Netherlands Energy Research Foundation, Petten, The Netherlands. Often used in neutron activation spectrometry when unfolding procedures are applied, FITOCO requires a representation of the weighting spectrum and a neutron cross section library (both in SAND-II type structure) as input. The output group structure is determined by the input. The program can calculate the effective coarse-group cross section values for a cross section of material inside a detector cover (e.g., ^{10}B or Cd). Reference: ECN-92. FORTRAN IV; CDC-CYBER 175.

PSR-190/ADENA

A code package for calculating fission-product beta- and gamma-ray decay energies spectra from ^{235}U and ^{239}Pu fuels was contributed by Los Alamos National Laboratory, Los Alamos, New Mexico. The calculation uses aggregate, adjusted data derived from a combination of several experiments and summation results based on the ENDF/B-V fission-product file. The calcu-

lation method is approximate and comparisons are made to experimental measurements, to the ANSI/ANS 5.1-1979 standard and to other calculational methods. Reference: LA-9362-MS. FORTRAN IV; IBM 3033 and CDC.

VISITORS TO EPIC

During the month of July seven persons came for an orientation visit and/or to use EPIC facilities: *Michael L. Gritzner,* Scientific Applications, Inc.; *Rudy van Heÿningen,* The Netherlands; *Tomozo Koyama,* and *Tadakumi Matsumoto,* Power Reactor & Nuclear Fuel Development Corporation, Tokai, Ibaraki, Japan; *John Martin,* and *R. T. Primm,* Oak Ridge National Laboratory; *Yoshiaki OKA,* University of Tokyo, Japan; *Manshik Song,* North Carolina State University.

UPCOMING MEETINGS

We call your attention to several meetings scheduled for the following months.

Advances in Reactor Physics and Core Thermal Hydraulics The American Nuclear Society, through the Northeastern New York Section and the Reactor Physics and Thermal Hydraulics Divisions, is sponsoring a topical meeting on Advances in Reactor Physics and Core Thermal Hydraulics, to be held September 22–24, 1982 at the Concord Hotel, Kiamesha Lake, New York. The scope of the meeting includes a review of new developments in the validation of methods and data for both thermal and fast reactors. Several sessions are pertinent to radiation transport research and development.

Registration is to be made at the registration desk at the Concord Hotel, or by preregistration through the ANS Northeastern New York Section to Dr. Thomas Ruane, General Electric Co., Knolls Atomic Power Lab., P.O. Box 1072, Schenectady, New York 12301. Preregistration deadline is August 31, 1982. All registrants will receive proceedings.

For further details, contact: General Chairman Robert C. Block, Nuclear Engineering Department, Rensselaer Polytechnic Institute, Troy, New York 12181, phone 518/270-6398; or Technical Program Chairman M. R. Mendelson, General Electric Corp., KAPL, P.O. Box 1072, Schenectady, New York 12301, phone 518/393-6611, ext. 4408.

Advances in Reactor Computations, A topical meeting on *Advances in Reactor Computations* under the sponsorship of the American Nuclear Society (ANS) Division of Mathematics and Computations and the ANS Idaho Section is planned for March 28–31, 1983, Salt Lake City, Utah. Sessions are planned on the following topics: Advanced Computers and On-line Computing (both invited); Math Methods for PRA and Numerical Solutions of Fluid Flow Problems (invited and contributed); and contributed papers on Radiation Transport, Static and Dynamic Neutronic Analysis, Thermal Hydraulic and Structural Problems, and Nuclear Power Plant Simulation and Optimization.

The M & C Division is, for the first time, sponsoring a poster session on computer codes and is actively encouraging the submission of papers. Papers will be refereed, but the criteria for acceptance will differ somewhat from that of the conventional contributed paper. The basic criteria will be:

a. The codes must be from areas normally covered by M & C contributed paper sessions or must be mathematical routines of interest in such calculations, i.e., transport and diffusion theory, Monte Carlo, static and dynamic neutronics analysis, thermal-hydraulic analysis, and nuclear power plant simulation and optimization. In addition, the referees will accept basic mathematics routines which are applicable to the specific types of calculations listed above.

b. The code must be available for distribution, with documentation, at the time of the meeting. "Available" will be interpreted broadly to include distribution by the authors or by any of the code centers; and codes which are free, distributed for a fee, or subject to international exchange agreements. It is not intended that exchanges take place at the session. One must be able to reference the documentation.

c. The code must offer new or improved methods or options. Since this is the first such M & C session on computer codes it is hoped that it attracts as many as possible of the major analysis codes which are used in the industry and which meet the first two criteria above. Most such codes would qualify, even if they are relatively old, as long as they are still under development, and new options have been added in the last few years.

Contributions for the computer code poster session should be designated as such, and should be in the form of the Computer Code Abstracts published in *Nuclear Science and Engineering.* The abstracts of the papers that are accepted will be published in the proceedings of the meeting; no final paper will be required. The deadline for the abstracts is September 30, 1982. Send them to Elmer E. Lewis, Department of Mechanical and Nuclear Engineering, Northwestern University, Evanston, Illinois 60201. Questions about the poster session should be directed to Cy Adams, Argonne National Laboratory (312-972-4820).

Calendar

Please note the following meetings and courses.

September 1982

International Conference: Nuclear Data for Science and Technology, Antwerp, Belgium, September 6–10, 1982, sponsored by the European Physical Society, Geneva, Switzerland. Contact: Conference Secretariat, Mrs. Faes, CBNM, Steenweg naar Retie, B-2440, Geel, Belgium (COMM 32-0 14-589421). Proceedings to be published.

Eighth International Conference on Very Large Data Bases, Mexico City, Mexico, September 8–10, 1982, at the Maria Isabel-Sheraton Hotel. Contact: VLDB 1982, P.O. Box 2245, Saratoga, California 95070.

Low Level Waste Packaging and Shipping, ANS Workshop to be held in San Diego, California on September 12–15, 1982. Contact: Registrar, American Nuclear Society, 555 North Kensington, La Grange Park, Illinois 60525.

12th Symposium on Fusion Technology, Jülich, Federal Republic of Germany, September 13–17, 1982, sponsored by the Institute of Electrical and Electronics Engineers, Inc., New York, U.S.A. Contact: Dr. Conrads, Inst. für Plasmaphysik, Kernforschungsanlage, Postfach 1913, D-5170, Jülich, F.R. Germany.

October 1982

Radiation Issues for the Nuclear Industry, New Orleans, Louisiana, October 3–6, 1982, sponsored by the Atomic Industrial Forum, Inc. Contact: Robert Szalay, Atomic Industrial Forum, Inc., 7101 Wisconsin Avenue, Washington, D.C. 20014, phone 301-654-9260.

November 1982

ANS Winter Meeting, Washington, D.C., held in conjunction with the AIF Annual Conference. Contact: General Chairman Charles Jones, President, NUS Corporation, 910 Clopper Rd., Gaithersburg, Maryland 20878, phone 301/258-1220; or Technical Program Chairman James S. Tulenko, Babcock & Wilcox, Box 1260, Lynchburg, Virginia 24505, phone 804/384-5111, ext. 3347.

February 1983

International Beta Dosimetry Symposium, Washington, D. C., February 15–17, 1983, jointly sponsored by the Department of Energy, the Health Physics Society, the Institute for Nuclear Power Operations, and the Nuclear Regulatory Commission. Contact: Thomas F. Gesell, Radiological and Environmental Sciences Laboratory - CF-690, U.S. Departmet of Energy, 550 Second Street, Idaho Falls, Idaho 83401.

April 1983

Nineteenth Annual Meeting of the National Council on Radiation Protection and Measurements, Washington, D.C., April 6–7, 1983. Contact: NCRP, 7910 Woodmont Avenue, Suite 1016, Bethesda, Maryland 20814.

May 1983

The Japan Atomic Energy Research Institute will host the *Sixth International Conference on Radiation Shielding* in Tokyo, May 16–20, 1983. See *RSIC Newsletter* 208, April 1982 for "Call for Papers." The deadline for summaries (10 copies in English, less than 500 words, no figures) is September 6, 1982. Mail summaries to: Takumi Asaoka, Reactor Engineering Division, Japan Atomic Energy Research Institute, Tokai, Ibaraki-ken 319-11, JAPAN.

October 1983

Third Topical Meeting on Fusion Reactor Materials, Albuquerque, New Mexico, October 10–13, 1983. For further information contact: General Chariman, Mark J. Davis, Department 5830, Sandia National Laboaratories, Albuquerque, New Mexico 87185; phone (505) 844-4164, TWX: 910-989-1600; or Technical Program Chairman, Donald M. Mattox, Division 5834, Sandia National Laboratories, Albuquerque, New Mexico 87185; phone (505) 844-8777, TWX: 910-989-1600.

JULY 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

ANL/FPP/TM-151 One-Dimensional Gamma Ray Shielding Analysis for EBT-P., . . Gohar, Y., . . November 1981, . . NTIS, PC A03/MF A01

ANL/FPP/TM-152 EBT-P Gamma Ray Shielding System., . . Gohar, Y., . . December 1981, . . NTIS, PC A05/MF A01

ANL/NDM-59 Review of the Neutron Capture Process in Fission Reactors., . . Poenitz, W.P., . . July 1981, . . NTIS, PC A03/MF A01, . . Portions of document are illegible.

CEA-R-5121 (In French) Formalism for the Calculation of the Effect of Sodium Voiding on Neutron Leakages in Fast Reactor., . . Benoist, P., . . September 1981, . . NTIS (U.S. Sales Only), PC A04/MF A01

CNEN-RT/FI-80-18 How to Evaluate the Variance-Covariance Matrix of an Integral Experiment., . . Petilli, M., . . September 1980, . . NTIS (U.S. Sales Only), PC A04/MF A01, . . Portions of document are illegible.

CNEN-RT/FI-81-12 Sensitivity Techniques for Data- and System-Oriented Adjustment Methods., . . Gandini, A., . . 1981, . . NTIS (U.S. Sales Only), PC A03/MF A01

CTOM-29511; Thesis Anistropic Neutron Transport Analysis., . . Attia, E.T.A., . . 1976, . . MF available from Canadian Theses Div., National Library of Canada, McMaster University, Hamilton, Ontario, Canada

DOE/ER-0046/8, Vol. 2 Damage Analysis and Fundamental Studies. Proceedings of a Workshop on Advanced Techniques for Radiation Damage Analysis., . . Wilkes, P.; Nolfi, F.; Spitznagel, J., . . February 1982, . . NTIS, PC A09/MF A01

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mental Data for Some Fast Neutron Reference Spectra., . . Nolthenius, H.J.; Zijp, W.L., . . November 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01, . . Portions of document are illegible.

ECN-104 Damage Cross-Section Library DAMSIG81., . . Zijp, W.L.; Nolthenius, H.J.; Rieffe, H.C., . . November 1981, . . NTIS (MF) (U.S. Sales Only), . . Portions of document are illegible.

EIR-410 SIXTUS: A Two-Dimensional Diffusion-Theory Nodal Code in Hexagonal Geometry., . . Arkuszewski, J.J., . . October 1980, . . NTIS (U.S. Sales Only), PC A05/MF A01, . . Portions of document are illegible.

FEI-1011 (In Russian) Method to Calculate Functionals in a Shield Using Localized Regions with Inherent Geometry., . . Savitskii, V.I.; Usanov, V.I., . . 1980, . . NTIS (U.S. Sales Only), PC A02/MF A01

HEDL-SA-2389-FP; CONF-820321-19 Light Water Reactor - Pressure-Vessel Neutron Spectrometry with Solid State Track Recorders., . . Ruddy, F.H.; Gold, R.; Roberts, J.H., . . 1982, . . NTIS, PC A02/MF A01

HEDL-SA-2660; CONF-811145-11 FERRET Adjustment Code: Status/Use., . . Schmittroth, F.A., . . March 1982, . . NTIS, PC A02/MF A01, . . Portions of document are illegible.

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