RSIC Newsletter

No. 278   *January 1988*

It is well when the wise and the learned discover new truths; but how much better to diffuse the truths already discovered amongst the multitudes. Every addition to true knowledge is an addition to human power; and while a philospher is discovering one new truth, millions of truths may be propagated amongst the people .... The whole land must be watered with the streams of knowledge.—Horace Mann

CHANGES TO THE COMPUTER CODE COLLECTION

Eight changes were made to the computer code collection during the month. Four new code systems were packaged and added to the collection, an existing code package was replaced with a newly-frozen version, additions were made to the documentation of one code package, and two code packages were updated to improve or correct code performance. Four changes resulted from foreign contributions.

CCC-323/DKR

A newly-frozen version of this radioactivity and dose rate calculation code system for fusion reactors was contributed by the Fusion Technology Institute, University of Wisconsin, Madison, Wisconsin. This version extends the original DKR with a more realistic pulse sequence scheme to simulate inertial confinement fusion and a capability to treat two-dimensional r-z and x-y geometries. Included in the package are programs DOSE and CONVERT and transmutation and decay library ACTLLIB. The neutron flux from a transport calculation with a neutral particle transport code such as CCC-254/ANISN-ORNL, CCC-428/ONEDANT, or CCC-456/TWODANT, and the data from ACTLLIB are essential inputs. Decay gamma-ray sources generated by DKR can be used in the DOSE code to calculate either spatially-dependent dose rates at a specific time after shutdown or time-dependent dose rates at a specific position. The CONVERT program can be used to transfer DKR decay gamma-ray sources to DOSE or another transport code. Forward and adjoint schemes can be utilized in the calculations. Neutron transmutation data and decay gamma-ray sources from DKR are in 46 group and 21 group structure, respectively. References: UWFDM-714, Vol. 1 & 2 (April 1987). FORTRAN 77; CRAY XMP/48.

CCC-379/SHIELDOSE

The documentation for this code system for space shielding radiation dose calculations was updated at the suggestion of the original contributor, the National Bureau of Standards, Gaithersburg, Maryland. Tables of depth dose data were added and sample problem input/output was removed from the document. Reference: NBS Technical Note 1116 (1980) and informal notes (1984). FORTRAN 77; IBM 3084Q, VAX-11/780, and CDC CYBER-740.

CCC-493/QAD-CGGP

All versions of this point kernel code for neutron and gamma-ray shielding calculations were updated to handle calls for geometric progression (GP) buildup factors for energies above 10 MeV, to refine the extrapolation procedures beyond 40 mean free paths, and to print buildup factor data up to 60 mean free paths. We thank Grove Engineering, Rockville, Maryland, for pointing out the first problem. Coding changes were provided by the contributors at Oak Ridge National Laboratory and the Japan Atomic Energy Research Institute (JAERI), Tokai Research Establishment. **Those who received CCC-493B for the IBM PC after July 27, 1987, have the corrected version and need not request this update.** Reference: Bechtel Report NE007 and informal notes. FORTRAN 77;IBM 3033 and Data General MV/4000 (A), IBM PC MICRO (B) (2 diskettes required) and CRAY XMP (C).

CCC-499 MICRO/PART61

Minor corrections were made to this low-level radioactive waste impacts analysis system at the suggestion of Weston, Edison, New Jersey. The INTRUDE FORTRAN and executable programs and the output file from ECONOMY were updated to be consistent with the NUREG document. The INTRUDE output is not affected by this change. The package was contributed by Envirosphere Company, New York, and the U.S. Nuclear Regulatory Commission, Washington, D.C. References: NUREG/CR-4370, Vol. 1 and 2 (Jan. 1986). Microsoft FORTRAN 77 Version 3.30 (tested at RSIC with version 3.31) under PC DOS; IBM PC (or compatible). Eight 5.25-in. DS/DD diskettes are required to obtain the entire package. A single DS/DD diskette can be used to obtain the corrected files.

CCC-519/AUS87

This modular system for neutronics calculations of fission reactors, fusion blankets, and other systems was contributed by the Australian Atomic Energy Commission Research Establishment, Lucas Heights Research Laboratories, Sutherland, Australia. The system modules can be used for lattice calculations, one-dimensional transport calculations, one-, two-, and three-dimensional diffu-

sion calculations, burnup calculations, and flexible editing of results. AUS87 is a modular system that is executed in paths, or sequences, in which modules are linked to perform the required calculations. A module is self contained apart from user supplied input and input/output of data via data pools. The AUSYS program supervises and supports the execution of a path. Extensive use of assembler language in the supervisor program makes it machine-dependent. Also included, in binary form, are ENDF/B-IV based neutron (128 group) and coupled (200 neutron, 37 photon group) cross-section libraries. Developed for IBM 360/50, the system is now operational on IBM 4381. It compiles on the IBM FORTRAN 77 compiler FORTVS, but is not completely FORTRAN 77. References: Informal Notes (1987), AAEC/E645 (April 1987), AAEC/E621 (March 1986), AAEC/E620 (October 1985), AAEC/E624 (March 1986), AAEC/E626 (December 1985), AAEC/E583 (March 1984), AAEC/E539 (May 1982), and AAEC/E389 (May 1976).

CCC-522 MICRO/VARSKIN

This code system, contributed by Pacific Northwest Laboratory, Richland, Washington, computes the radiation dose to the skin from radioactive contamination of the skin. The dose is computed at a specified depth from a source, ranging in size from a point to a disk having a 100-cm^2 area. The method is based on the tables of absorbed energy distributions around point sources in water developed by M. J. Berger and published in 1971 in Pamphlet No. 7 of the *Journal of Nuclear Medicine*. The computation algorithm is a point kernel integrated over the exposed skin to yield the average dose. A data library for 83 radioactive isotopes is included. VARSKIN was tested on an IBM PC with a 640K Random Access Memory using Microsoft Version 3.31 FORTRAN to compile the programs under PC/DOS 3.1. There are two executable files included in the package; one (106K bytes) requires the 8087 math coprocessor and the other (113K bytes) does not. Reference: NUREG/CR-4418 (PNL-5610) (Aug. 1987). FORTRAN 77, IBM PC. A single 5.25-in. DS/DD diskette is required to obtain the package.

PSR-249/REFERDOU

This three-part code system for NE-213 unfold-

ing of neutron spectra up to 100 MeV with response function error propogation was contributed by the Institute for Nuclear Study, University of Tokyo, Japan. The RESU Monte Carlo code calculates response functions for energies up to 100 MeV. The code uses measured light output data, new cross-section data based on ENDF/B-IV, PSR-14/O5S, and other sources, and two-body reaction models (rather than evaporation) for carbon reaction processes. Interpolation and Gaussian spreading is done with the INTER program. The unfolding with propogation of errors (uncertainties) is accomplished with FERDOU, a modified version of the PSR-102/FERDO code system. References: *Nuclear Instruments and Methods* **204**(1), 179–89 (December 1982); *Nuclear Technology,* **53**, 78–85 (April 1981); and Informal Notes (June, January 1984). FORTRAN IV; FACOM M380.

PSR-250/CRECTJ5

This code system for compiling evaluated nuclear data in ENDF/B format was contributed by JAERI, Tokai-mura, Naka-gun, Ibaraki-ken, Japan, through the NEA Data Bank, Gif-sur-Yvette, France. CRECTJ5 can be used to compile evaluated nuclear data in ENDF/B-IV and ENDF/B-V formats. Its main function is in reading evaluated nuclear data and making a complete and consistent file that conforms to the format rules. In addition, it can be used for performing arithmetic operations, averaging, and correcting cross sections, and constructing natural element data from isotopic data. Reference: Informal Document (1986). FORTRAN-IV; VAX-11/780.

CHANGE TO THE DATA LIBRARY COLLECTION

A new data library was added to the collection during the month.

DLC-134 MICRO/RADDECAY

This library of radioactive decay data for radiological assessments was contributed by Grove Engineering, Inc., Rockville, Maryland. RADDECAY is an interactive TrueBasic program for the IBM PC, or compatible, for retrieving and displaying decay information for 497 radionuclides. The data are derived from DLC-80/DRALIST, a data set giving radioactive decay energies, spectra, half lives, and other information. Data provided include the half life, radioactive daughter nuclides, probabilities per decay, and decay product energies for alpha particles, beta rays, positrons, electrons, x-rays, and gamma rays. The radioactive decay data in the library were published in DOE/TIC-11026 and made available as DLC-80/DRALIST in the MEDLIST format. References: Informal Notes (Oct. 1987). IBM PC; TrueBasic. Two 5.25-in. DS/DD diskettes are required.

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.

Calendar

Your attention is directed to the following events of interest.

February 1988

Radioative Waste Management Conference, Feb. 25–26, 1988, London. Contact: Louise Marriott, IBC Technical Services Ltd., 3rd Floor, Bath House, 56 Holborn Viaduct, London EC1A 2EX, U.K. (phone 01-236-4080).

Waste Management '88: Symposium on Radioactive Waste Management, Feb. 26–Mar. 3, 1988, Tucson, Arizona, sponsored by the University of Arizona. Contact: M. Wacks, Dept. of Nuclear and Energy Engineering, University of Arizona, Tucson, AZ 85721 (phone 602-621-2475).

March 1988

24th Annual Meeting of the National Council on Radiation Protection and Measurements, Mar. 30–31, 1988, Washington, D.C. The principal session is "Radon." Contact: NCRP, 7910 Woodmont Ave., Suite 1016, Bethesda, MD 20814.

April 1988

Annual Meeting of the Atomic Energy Society of Japan, Apr. 4–6, 1988, Tokyo. Contact: Minoru Masamoto, Secretary General, AESJ, No. 1-13, 1-chome, Shimbashi, Minato-ku, Tokyo 105, Japan.

Workshop on Non-ionising Radiation Biological Effects, Protection and Standards, Apr. 5 8, 1988, Melbourne, Australia. Contact: J. C. Button, Scientific Secretary, IRPA 7, Health and Safety Div., Australian Atomic Energy Commission, Private Mail Bag, Sutherland, NSW 2232 Australia.

Seventh International Congress of the International Radiation Protection Association (IRPA 7), Apr. 10–17, 1988, Sydney, Australia. Contact: J.C.E. Button, Scientific Secretary, IRPA 7, Health & Safety Div., Australian Atomic Energy Commission, Private Mail Bag, Sutherland, N.S.W. 2232, Australia (phone 61-2-543-3295) (Telex: AA.24562).

International Symposium on Fusion Nuclear Technology, Apr. 10–19, 1988, Tokyo. Contact: Kenzo Miya, Nuclear Engineering Research Lab., University of Tokyo, Tokai-mura, Ibaraki Prefecture, 319-1 Japan (phone 011-813-812-211 ext 7421) or Mohamed Abdou, University of California-Los Angeles (phone 213-206-1228).

International Conference on Radiation Protection Principles in Nuclear Energy, Apr. 18–22, 1988, Sydney, Australia, sponsored by the IAEA. Contact: W. Porter, IE-13, U.S. Dept. of Energy, Forrestal, Washington, DC 20585 (phone 202-252-4573).

May 1988

Safety of Next Generation Power Reactors, May 1–6, 1988, Seattle, Washington, sponsored by the ANS Reactor Physics, Reactor Operations, Human Factors, and Fuel Cycle and Waste Management Divisions, and the U.S. DOE. Contact: Robert Ferguson, Ferguson & Assoc., 7601 W. Clearwater, Suite 450, Kennewick, WA 99336 (phone 509-783-1446).

3rd Topical Meeting on Tritium Technology in Fission, Fusion, and Isotopic Applications, May 1–6, 1988, Toronto, Canada, sponsored by the Canadian Nuclear Society and the American Nuclear Society. Contact: C. D. Burnham, CFFTP, 2700 Lakeshore Road, West, Mississauga, Ontario, Canada, L5J 1X3 (phone 416-823-6364) or Harold Anderson, Monsanto Research Corp., P.O. Box 32, Miamisburg, OH 45342 (phone 513-865-3062).

International Conference on Incineration of Hazardous and Radioactive Waste, May 3–6, 1988, San Francisco, sponsored by the American Nuclear Society. Contact: Jim Tripodes, Univ. of California, EG&S Trailor Complex 407, Irvin, CA 92717 USA (phone 714-856-6200).

International Symposium on the Management of Low and Intermediate Level Radioactive Wastes, May 16–20, 1988, Stockholm, Sweden, sponsored by the International Atomic Energy Agency. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

International Conference on Nuclear Data for Science and Technology, May 30–June 3, 1988, Mito, Japan, sponsored by the Japan Atomic Energy Research Institute. Contact: Sin-iti Igarasi, Conference Secretariat, Nuclear Data Center, JAERI, Tokai-mura, Naka-gun, Ibaraki-ken 319-11 Japan (phone 0292-82-5480).

June 1988

International Conference on Computational Physics (ICCP), June 1–5, 1988, Beijing, sponsored by the Institute of Applied Physics and Mathematics, Beijing, and Drexel University, Pennsylvania. Contact: Zhang Tianyuan, IAPCM, P.O. Box 8009, Beijing, China (PRC) or D. H. Feng, Department of Physics and Atmospheric Science, Drexel University, Philadelphia, PA 19104 USA.

American Nuclear Society Annual Meeting, June 12–17, 1988, San Diego, California. Contact: ANS, Meetings Dept., 555 North Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

September 1988

Industrial Radiation and Radioisotope Measurement Applications, Sept. 6–8, 1988, Pinehurst, North Carolina, a topical meeting sponsored by the Isotopes and Radiation Division of the ANS. Contact: Robin P. Gardner, General Chairman, or Kuruvilla Verghese, Tech. Program Chairman, North Carolina State Univ., School of Engineering, Box 7909, Raleigh, NC 27695-7909.

International Topical Meeting on Waste Management, Sept. 11–15, 1988, Pasco, Washington. Contact: Bill Bonner, Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352 (phone 509-376-5451 or FTS 444-5451).

7th International Conference on Radiation Shielding (ICRS), Sept. 12–16, 1988, Bournemouth, United Kingdom, sponsored by the OECD Nuclear Energy Agency and the UK Atomic Energy Agency. Contact: A. K. McCracken, UKAEA Winfrith, Dorchester, Dorset, DT2 8DH, UK or Leo LeSage, Argonne National Laboratory, Argonne, IL 60439 (phone 312-972-6048).

11th International CODATA Conference, "Scientific and Technical Data in a New Era," Sept. 26–29, 1988, Karlsruhe, Fed. Rep. of Germany. Contact: DECHEMA, ATTN: CODATA Conference, P.O. Box 97 01 46, D-6000 Frankfurt/M. 97, Fed. Rep. of Germany (phone 069 7564 241/242/243; Telex: 412490 dcha d.).

October 1988

4th International Symposium on Radiation Physics (ISRP-4), Oct. 3–7, 1988, São Paulo, Brazil. Contact: Prof. Ivan Cunha Nascimento, ISRP-4 Chairman of the Organizing Committee, Inst. de Fisica-Universidade de São Paulo, Caixa Postal 20516 (TELEX: 011-37920 IF

SP -1498-São Paulo-SP-Brazil).

5th National Conference on Biomedical Physics and Engineering, Oct. 15–17, 1988, Sofia, Bulgaria. Contact: M. Markov, Department of Biophysics, Biological Faculty, Sofia University, 8, Dragan Tzankov Blvd., Sofia 1000, Bulgaria.

JANUARY 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

ANL/FPP-87-3, . . *TIBER II/ETR—Nuclear Performance Analysis Group Report.,* . . Baker, C.; Abdou, M.; Cha, Y.; et al., . . September 1987, . . NTIS, PC A15/MF A01

ANL/NDM-96, . . *Nuclear Data and Measurements Series: Ratio of the Prompt-Fission-Neutron Spectrum of Plutonium 239 to that of Uranium 235.,* . . Sugimoto, M.; Smith, A.B.; Guenther, P.T., . . September 1986, . . NTIS, PC A02/MF A01; MF available from INIS.

BARC-1231, . . *Measurement of Fast Neutron Flux Profile Across the Inner Face of the MAPP-1 End-Shield During Reactor Commissioning.,* . . Dravid, H.K.; Mehta, S.L.; Potti, T.; Jindal, R.N.; Deniz, V.C., . . 1984, . . MF available from INIS.

BHR-36, . . *On the Interaction Between Gamma-Quanta and Matter.,* . . Oelgaard, P.L., . . November 1986, . . MF available from INIS.

BNL-19302-Vol.2-Suppl., . . *Cross Section Evaluation Working Group Benchmark Specifications. Volume 2. Supplement.,* . . National Nuclear Data Center, Upton, NY, . . September 1986, . . NTIS, PC A04/MF A01; MF available from INIS.

CLM-R-275, . . *On the Radiological Behavior of First Wall Fusion Structural Materials.,* . . Giancarli, L., . . February 1987, . . UKAEA Culham Lab., Abingdon

CONF-840257-Vol.2, pp.323-328, . . *Guide to Radiological Accident Analysis.,* . . Graf, J., . . 1984, . . NTIS, PC A13/MF A01; MF available from INIS.

CONF-840257-Vol.2, pp.329-340, . . *Review of Specific Radiological Accident Considerations.,* . . Elder, J., . . 1984, . . NTIS, PC A13/MF A01; MF available from INIS.

CONF-8403123, p.46, . . *Absorbed Dose and Collision Kerma Relationship for High Energy X-Rays.,* . . Sibata, C.H.; Attix, F.H.; Palival, B.R., . . In: Anon. Abstracts of Papers for the 32nd Annual Meeting of the Radiation Research Society, Orlando, Fla., 1 March 1984., . . 1984

CONF-8606146-4, . . *Shielding Analysis Methods Available in the SCALE Computational System.,* . . Parks, C.V.; Tang, J.S.; Hermann, O.W.; Bucholz, J.A.; Emmett, M.B., . . In: SCALE Workshop. Paris(France), 24-26 June 1986., . . 1986, . . NTIS, PC A02/MF A01; MF available from INIS.

CONF-8606146-6, . . *Cross-Section Library and Processing Techniques Within the SCALE System.,* . . Westfall, R.M., . . 1986, . . NTIS, PC A02/MF A01; MF available from INIS.

CONF-8606139-2, . . *Calculation of External Dose from Distributed Source.,* . . Kocher, D.C., . . 1986, . . NTIS, PC A03/MF A01; MF available from INIS.

DEMO-85/4, . . *An Exact Formalism for Doppler-Broadened Neutron Cross-Sections.,* . . Catsaros, N., . . 1985, . . MF available from INIS; Also available from Library, National Research Centre for the Physical Sciences Democritos, Athens(Greece)

EGG-PBS-6441, . . *Calibration of Fission Product Detection Systems by Means of Monte Carlo Gamma*

Ray Transport., . . Grimesy, R.A.; Wheeler, F.J., . . October 1983, . . NTIS, PC A02/MF A01; MF available from INIS.

FNAL/C-86/156; CONF-870219-6, . . *Shielding Design at Fermilab: Calculations and Measurements.,* . . Cossairt, J.D., . . November 1986, . . NTIS, PC A02/MF A01; MF available from INIS.

INDC(BZL)-021/G, . . *Procedure for Calculating Sensitivity Profiles by Transport Theory—The FORSS System.,* . . Claro, L.H.; Caldeira, A.D.; Borges, A.A., . . September 1986, . . IAEA Nuclear Data Section, Wagramerstrasse 5, A-1400 Vienna

INDC(CCP)-264/C, . . *Measurement of 14 MeV Neutron Multiplication Factor in Spherical Lead and Bismuth Assemblies by the Total Absorption Method.,* . . Novikuv, V.M.; Chuvilin, D.Yu.; Zagryadskij, V.A.; Krajnev, M.I.; Markovskij, D.V.; Shatalov, G.E., . . February 1987, . . IAEA Nuclear Data Section, Wagramerstrasse 5, A-1400 Vienna

INDC(CCP)-266/G, . . *The Total Absorption Method in Measurements of 14 MeV Neutron Multiplication Factors.,* . . Zagryadskij, V.A.; Markovskij, D.V.; Nourkov, V.M.; Chuvilin, D.Yu.; Shatalov, G.E., . . March 1987, . . MF available from INIS.

JAERI-M-86-153 (In Japanese), . . *Numerical Evaluation of Shielding Analysing Procedures for Upgraded JRR-3 Research Reactors. Number of Energy Groups, Number of Spatial Meshes, Number of Angular Quadratures, Bootstraps' Width, Attenuation Curve of Shielding Materials, Radiation Source.,* . . Ise, M.; Takeshi, M., . . November 1986, . . MF available from INIS.

JAERI-M-86-071, . . *Applicability of Geometrical Progression Approximation (G-P Method) of Gamma-Ray Buildup Factors.,* . . Harima, Y.; Sakamoto, Y.; Tanaka, S.; et al., . . March 1986, . . MF available from INIS.

JAERI-M-87-025, pp.96-111, . . *Uncertainty Analysis of Neutron Transport Calculation.,* . . Oka, Y.; Furuta, K.; Kondo, S., . . 1987, . . Information Division, Dept. of Technical Information, Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki-ken 319-11, Japan

KFK Preprint 87-6, . . *Measurement of Absorbed Dose in Water Irradiated by 2.5-GeV Bremsstrahlung.,* . . Ban, S.; Hirayama, H.; Miura, S., . . April 1987, . . National Laboratory for High Energy Physics, Oho-machi Tsukuba-gun, Ibaraki-ken, 305, Japan

LA-10983-MS, . . *Transport Calculation for Nuclear Analyses: Theory and Guidelines for Effective Use of Transport Codes.,* . . O'Dell, R.D.; Alcouffe, R.E., . . September 1987, . . NTIS, PC A09/MF A01

NUREG/CR-4722, . . *Source Term Estimation Using MENU-TACT.,* . . Sjoreen, A.; McKenna, T.; Julius, J., . . October 1987, . . NRC

NUREG/CR-4986, . . *Radiation Dose Estimates and Hazard Evaluations for Inhaled Airborne Ra-*

dionuclides. Final Report., . . Mewhinney, J.A., . . September 1987, . . NRC

PB-87-115531/XAB, . . *Multidimensional Radiation Transport Calculations. Final Report.,* . . Dunn, W.L., . . July 1984, . . NTIS, PC A04/MF A01

RFP-4029, . . *Low-Cost Teleoperator-Controlled Vehicle for Damage Assessment and Dose Measurement.,* . . Tyree, W.H., . . August 1987, . . Rockwell International Corp., Golden, CO, Rocky Flats Plant, North American Space Operations.

ZfK-585 (In German), . . *Neutron Point-Flux Calculation by Monte Carlo.,* . . Eichhorn, M., . . April 1986, . . MF available from INIS.

Appl. Radiat. Isot., 37(12), 1244-1246, . . *Use of the ZZFEWIG 1/31-1-F Data Set for Spherical Calculations.,* . . Bashter, I.I.; Cooper, P.N., . . 1986

Ann. Nucl. Energy, 11(10), 535-537, . . *Generation of Leading Coefficients of Orthogonal Polynomials with an Application to Anisotropic Scattering of Neutrons.,* . . Ofek, R., . . 1984

Ann. Nucl. Energy, 11(12), 647-648, . . *A New Method for the Evaluation of Neutron Elastic Transformation Matrices.,* . . Ofek, R.; Segev, M.; Shani, G., . . 1984

Ann. Nucl. Energy, 12(2), 53-64, . . *Shielding Calculations for Ships Carrying Irradiated Nuclear Fuel.,* . . Dean, M.H., . . 1985

Ann. Nucl. Energy, 13(6), 337-340, . . *Analytical Solution to the Hybrid Diffusion-Transport Equation.,* . . Nanneh, M.M.; Williams, M.M.R., . . 1986

Ann. Nucl. Energy, 13(7), 391-397, . . *A Method for Accurate Computation of Elastic Scattering Transfer Matrices.,* . . Garcia, R.D.M.; Santina, M.D., . . 1986

Ann. Nucl. Energy, 14(10), 543-553, . . *Measurement and Analysis of Reaction Rates in a Large Spherical Depleted Uranium Pile Surrounding a 14-MeV Neutron Source.,* . . Akiyama, M.; Oka, Y.; Kanasugi, K.; Hashikura, H.; Kondo, S., . . 1987

Atomic Data and Nucl. Data Tables, 29(2), 193-406, . . *Catalog of Gamma Rays from Radioactive Decay: Part II.,* . . Reus, U.; Westmeier, W., . . September 1983

Atomkernenergie, 49(4), 204-207, . . *Neutron Leakage Spectra from Lead Slabs Bombarded with 14-MeV Neutrons.,* . . Jordanova, J.; Christov, V., . . February 1987

Australas. Phys. Eng. Sci. Med., 8(1), 22-31, . . *Application of the Monte Carlo Technique to the Study of Radiation Transport in a Prompt Gamma in IVVO Neutron Activation System.,* . . Chan, A.A.; Beddoe, A.H., . . January-March 1985

Australas. Radiol., 31(1), 90-92, . . *Barytes Board: A Cost Effective Radiation Barrier Material for Use in Diagnostic X-Ray Suites.,* . . Coalter, G.C.; Metcalfe, P.E., . . February 1987

Biologist (London), 33(4), 195-197, . . *The Measures and Risks of Radiation.,* . . Dennis, J.A., . . September 1986

C.R. Seances Acad. Sci., Ser.1, 303(13), 617-619 (In French), . . *The Compactness in Neutron Transport Theory.,* . . Mokhtar-Kharroubi, M., . . October 30, 1986

Energ. Nucl. (Buenos Aires), 12, 72-77 (In Spanish), . . *Quality Control in High Thickness Concrete Walls for Shielding.,* . . Arcama, J.A.; Cannistracci, C.A., . . 1983

Fusion Technology, 10(3), Pt.2B, 1123-1129; CONF-860652, pp.1123-1129, . . *Issues and Test Requirements in Radiation Shielding of Fusion Reactors.,* . . Nakagawa, M.; Abdou, M.A., . . November 1986

Health Phys., 53(5), 509-517, . . *Altitude Variation of Cosmic-Ray Neutrons.,* . . Nakamura, T.; Uwamino, Y.; Ohkubo, T.; Hara, A., . . November 1987

Health Phys., 53(5), 531-532, . . *A Simple Parameterization for Quality Factor as a Function of Linear Energy Transfer. (Notes),* . . Townsend, L.W.; Wilson, J.; Cucinotta, F.A., . . November 1987

Health Phys., 53(6), 613-622, . . *Forecasting Radiation Rates and Exposure from Multi-Aged Fallout.,* . . Haaland, C.M., . . December 1987

Isotopenpraxis, 21(8), 287-290, . . *Study of Filtration of Reactor Beam of Neutrons with Cadmium in a Multilayer Shield Containing Boron Carbide.,* . . Megahid, R.H.; El-Kalla, El-S.H.; Esmaiel, M.W., . . August 1985

Isotopenpraxis, 23(3), 91-94, . . *Spectral Distribution Measurements of Neutrons in Paraffin Borax Mixtures.,* . . El-Khatib, A.M.; Gaber, M.; Abou El-Khier, M.A.; Abou-Taleb, W.M., . . March 1987

Isotopenpraxis, 23(4), 122-124, . . *Study of Backscattered Neutrons from Paraffin Slabs.,* . . El-Khatib, A.M.; About-Taleb, W.M.; El-Sayed, A.A.; Koshk, Y.H., . . April 1987

J. Comput. Phys., 69(2), 283-324, . . *Asymptotic Solutions of Numerical Transport Problems in Optically Thick, Diffusive Regimes.,* . . Larsen, E.W.; Morel, J.E.; Miller, W.F.,Jr., . . April 1987

J. Math. Phys. Sci., 20(2), 193-201, . . *On a Nonlinear Neutron Transport Equation.,* . . Pachpatte, B.G., . . 1986

J. Nucl. Sci. Technol., 23(6), 477-486, . . *Measurement and Analysis of Neutron Leakage Spectrum from Nickel Sphere for 14 MeV Neutron Source.,* . . Hashikura, H.; Kasahara, T.; Oka, Y.; Kondo, S.; Takahashi, A.; Yamamoto, J., . . June 1986

J. Phys., D, Appl. Phys., 18(5), 765-771, . . *Pade Approximant Calculations for Neutron Escape Probability.,* . . Wakil, S.A.El.; Saad, E.A.; Hendi, A.A., . . May 14, 1985

J. Soc. Radiol. Prot., 6(4), 185-192, . . *Issues Raised by the Dose Equivalent Concepts.,* . . Dennis, J.A., . . Winter 1986

J. Stat. Phys., 45(3/4), 753-763, . . *Study on Correlated Exponential Random Walks.,* . . John, T.M.; Murthy, K.P.N., . . November 1986

Med. Phys., 10(6), 778-785, . . *Reconstruction of 4-MV Bremsstrahlung Spectra from Measured Transmission Data.,* . . Huang, P.; Kase, K.R.; Bjaerngard, B.E., . . November 1983

Nucl. Instrum. Methods, A254(2), 406-412, . . *Compton-Sampling Surface for Monte Carlo Calculations in the Energy Range 0.1 to 100 MeV.,* . . Wielopolski, L.; Arinc, F., . . February 15, 1987

Nucl. Sci. Eng., 97(4), 362-373, . . *Gamma-Ray Transport in a Shield-Tissue Composite System and the Buildup Factor Implications.,* . . Gopinath, D.V.; Subbaiah, K.V.; Trubey, D.K., . . December 1987

Nucl. Technology, 79(2), 228-240, . . *Probabilistic Fracture Evaluation of a Fast Breeder Reactor Cover.,* . . Hattori, S.; Handa, N., . . November 1987

Nucl. Technology, 79(3), 322-327, . . *Calculation Assessment of the Measurability of Key Radionuclides for Severely Failed Nuclear Power Plant Fuel.,* . . Binney, S.E.; Harris, R.D., . . December 1987

Nuovo Cim., A, 91(4), 339-351, . . *Fluctuations in Neutron Absorption by an Absorbing and Multiplying Medium.,* . . Dellagi, M., . . February 21, 1986

Prog. Nucl. Energy, 17(3), 271-301, . . *Progress in Nodal Methods for the Solution of the Neutron Diffusion and Transport Equations.,* . . Lawrence, R.D., . . 1986

Prog. Nucl. Energy, 19(2), 137-172, . . *A Least Squares Principle Unifying Finite Element. Finite Difference and Nodal Methods for Diffusion Theory.,* . . Ackroyd, R.T., . . 1987

R and D, Kobe Seiko Giho, 33(1), 57-60 (In Japanese), . . *Neutron Shielding Calculation Model for a Spent Fuel Shipping Package.,* . . Matsuda, F.; Taniuchi, H., . . January 1983

R and D, Kobe Seiko Giho, 36(1), 82-85 (In Japanese), . . *Application of Monte Carlo Method to Shielding Analysis.,* . . Matsuda, F.; Taniuchi, H., . . January 1986

Radiation Protection, 11(1), 3-14 (In Korean), . . *Analysis of Gamma-Ray Spectrum and Assessment of Corresponding Exposure Rate by Means of Response Matrix Method.,* . . Kim, S.K.; Jun, J.S., . . June 1986

Radiation Protection, 11(1), 37-43, . . *Dosimetric Quantities for 300 KeV Neutrons.,* . . Lee, S.Y., . . June 1986

Radiation Protection, 11(1), 77-82 (In Korean), . . *A Measurement of Kerma and Absorbed Dose in Photon Fields.,* . . Kim, S.H.; Shin, S.A.; Chu, S.S., . . June 1986

Radiat. Prot. Dosim., 11(1), 41-48, . . *Evaluation of Doses and Protection Afforded by Dwellings Against Atmospheric Releases.,* . . Grand, J.le; Roux, Y.; Patau, J.P., . . 1985

Radiat. Prot. Dosim., 15(4), 245-252, .. *Dose Reduction Factors from a Radioactive Cloud for Large Buildings., ..* Grand, J.le; Roux, Y., .. 1986

Radiat. Prot. Dosim., 15(4), 273-278, .. *Dose Equivalent Conversion Coefficients, Instrument and Dosemeter Responses for a Set of Neutron Radiation Fields., ..* Bartlett, D.T., .. 1986

Radiat. Prot. Dosim., 16(3), 257-258, .. *The Definition of the Individual Dose Equivalent., ..* Ehrlich, M., .. 1986

Siam J. Math. Anal., 12(2), 282-292, .. *Bounds and Maximum Principles for the Solution of Linear Transport Equation., ..* Larsen, E.W., .. March 1981

Soviet J. At. Energy(English Transl.), 60(3), 215-222, .. *Spectral Investigations of the Neutron Radiation of ^{232}Cf in a Three-Section Labyrinth., ..* Belogorlov, E.A.; Briturch, G.I.; Dronov, A.I.; Getmanov, V.B.; Krupnyi, G.I.; Kuznetsov, A.A., .. September 1986

Soviet J. At. Energy(English Transl.), 60(3), 260-264, .. *Characteristic Features of the Gamma-Radiation Field from a Gamma-Ray Source Located Near the Interface Between Two Media with Markedly Different Densities., ..* Zhemerev, A.V., .. September 1986

Soviet J. At. Energy(English Transl.), 60(3), 272-275, .. *Absorbed Dose in Plane Two-Layer Samples Irradiated with Fast Neutrons., ..* Bakaev, V.A.; Berdnikov, Y.A.; Ostroumov, V.I.; Tkachev, O.B.; Zhukov, N.N., .. September 1986

Soviet J. At. Energy(English Transl.), 60(4), 347-350, .. *Using Symmetry Properties to Modify Estimates in Calculations of Radiation Fields by the Monte Carlo Method., ..* Kol'chuzhkin, A.M.; Vasilev, O.N., .. October 1986

Soviet J. At. Energy(English Transl.), 60(5), 383-389, .. *Analysis of the Errors in the Reconstruction of Neutron Spectra Measured by an Activation Method., ..* Voitov, A.I.; Poyarkov, V.A.; Sadovnikova, T.S., .. November 1986

Soviet J. At. Energy(English Transl.), 60(5), 406-417, .. *State and Future of the Development of Radiation Shielding Physics., ..* Mashkovich, V.P., .. November 1986

Tech. Chron., Sect.B, 2(1-2), 37-40, .. *Contribution to the Evaluation of the External Gamma-Dose from a Radioactive Cloud., ..* Maraziotis, E.A., .. January-June 1982

Z. Phys., A: At. Nuclei, 327(1), 1-4, .. *Critical Remarks on the Paper 'New Projected Range Algorithm as Derived from Transport Equations' by J.P. Biersack., ..* Krause, U.; Wedell, R., .. March 1987

Thesis, .. *Generalized Approach to the Biased Adjoint Monte Carlo Calculation., ..* Chen, H.T., .. University of Tennessee, Knoxville, TN, .. 1986, .. University Microfilms Order No.86-23,234

Thesis, .. *Neutron Energy Spectrum Determination in the Purdue Fast Breeder Blanket Facility., ..* Couto, R.T., .. Purdue University, Lafayette, IN, .. 1985, .. University Microfilms Order No.86-06,529

Thesis, .. *New Technique for Determining the Backscatter Factor and Coefficient (BSF and BSC) of High-Energy Photons and Electrons., ..* Kao, M.B.M., .. Chicago Medical School, Chicago, IL, .. 1982, .. University Microfilms Order No.83-05,038

Thesis, .. *Experimental and Calculational Investigations on High Energy Neutron Fluxes and Reaction Rates in the Purdue Fast Breeder Blanket Facility., ..* Vital, H.d.C., .. Purdue University, Lafayette, IN, .. 1985, .. University Microfilms Order No.86-06,636

BOOK, .. *HANDBOOK ON NUCLEAR ACTIVATION DATA., ..* IAEA, .. 1987, .. International Atomic Energy Agency, Vienna

COMPUTER CODES LITERATURE

BOOK .... NEUTRON TRANSPORT Computational Methods of Neutron Transport., .. Lewis, E.E.; Miller, W.F., .. John Wiley and Sons, Inc., .. 1984

CONF-850411, I, 5-11 .... FEM BABEL; FINELM; NEPTUNE; DIFGEN Acceleration and Vectorization Techniques for Finite Element Diffusion Calculations., .. Kavenoky, A.; Lautard, J.J., .. CEN de Saclay, Gif-sur-Yvette, France, .. 1985

CONF-850411, I, 33-56 .... VECTORIZATION Vectorization of Transport and Diffusion Computations on the CDC Cyber 205., .. Abu-Shumays, I.K., .. Bettis Atomic Power Lab., West Mifflin, PA, .. 1985

CONF-850411, I, 142-146 . DISCRETE ORDINATES The Discrete Ordinates Method of Solution of Nonlinear Partial Differential Equations: Burger's Equation., .. Blackmore, R.; Shizgal, B., .. Univ. of British Columbia, Vancouver, British Columbia, .. 1985

CONF-850411, I, 177-178 .... SABRINA SABRINA Program., .. West, J.T., .. Los Alamos National Lab., NM, .. 1985

CONF-850411, I, 182-185 .... TRIPOLI-2 TRIPOLI-2: A Three Dimensional, Monte Carlo System Presentation of a Large Set of Problems., . . Vergnaud, T.; Baur, A.; Dejonghe, G.; Gonnord, J.; Nimal, J.C., . . CEA/SACLAY-DEMT/SERMA/ LEPF, Gif-sur-Yvette, France, .. 1985

CONF-850411, I, 186-188 .... ITS
ITS—The Integrated TIGER Series of Coupled
Electron/Photon Monte Carlo Transport Codes., .
. Halbleib, J.A.; Mehlhorn, T.A., . . Sandia National
Labs., NM, . . 1985

CONF-850411, II, 412 ..... NODAL TRANSPORT
Nodal Transport Methods After Years., . . Dorning,
J., . . Univ. of Virginia, Charlottesville, VA, . . 1985

CONF-850411, II, 413-425 ....PDO
Projected Discrete-Ordinates Methods for
Numerical Transport Problems., . . Larsen, E.W., .
. Los Alamos National Lab., NM, . . 1985

CONF-850411, II, 440-451 .... DNTM
Diffusion Synthetic Acceleration of the Multi-
Dimensional Discrete Nodal Transport Method., .
. Azmy, Y.Y.; Dorning, J.J., . . Univ. of Illinois,
Urbana, . . 1985

CONF-850411, II, 473-488 .....NODAL SCHEMES
Finite Element Formulations of Nodal Schemes for
Neutron Diffusion and Transport Problems., . .
DelValle, E.; Hennart, J.P.; Meade, D., . . National
Polytechnic Inst., Mexico City, . . 1985

CONF-850411, II, 489-500 ......2-D TRANSPORT
The DC_n-S_{nn} Hybrid Method for Neutron
Transport Calculations in R-Z Geometry., . .
Watanabe, Y.; Maynard, C.W., . . Univ. of
Wisconsin, Madison, . . 1985

CONF-850411, II, 812-826 ....DXANG
Monte Carlo Techniques for Analyzing Deep
Penetration Problems., . . Cramer, S.N.; Gonnord,
J.; Hendricks, J.S., . . Oak Ridge National Lab., TN,
. . 1985

CONF-850411, II, 891 .... TRIPOLI-2
Biasing Techniques in TRIPOLI-2 System Using
the Monte Carlo Method in Three-Dimensional
Geometries., . . Vergnaud, T.; Dejonghe, G.;
Gonnord, J.; Nimal, J.C., . . CEA/SACLAY-DEMT/
SERMA/LEPF, Gif-sur-Yvette, France, . . 1985

DEMO-85/3 .... ADREA-I
ADREA-I: A Transient Three Dimensional
Transport Code for Atmospheric and Other
Applications—Some Preliminary Results., . .
Bartzis, G., . . National Research Centre for the
Physical Sciences Democritos, Athens, Greece, . .
February 1985, . . AVAIL: INIS (microfiche only)

NUREG/CR-3925 ....SWIFT II
SWIFT II Self-Teaching Curriculum. Illustrative
Problems for the Sandia Waste-Isolation Flow and
Transport Model for Fractured Media., . . Reeves,
M.; Ward, D.S.; Davis, P.A.; Bonano, E.J., . . Sandia
National Labs., Albuquerque, NM; GeoTrans, Inc.,
Herndon, VA, . . August 1986, . . AVAIL: NTIS;
INIS (microfiche only)

ORNL/CSD/TM-239 ....HEATING6
HEATING6 Analysis of International Thermal
Benchmark Problem Sets 1 and 2., . . Childs, K.W.;
Bryan, C.B., . . Oak Ridge National Laboratory, TN,
. . October 1986, . . AVAIL: NTIS; INIS (microfiche
only)

Radiation Prot. BBHCD, 11(1), 29-36 ....GESS
GESS—A Code for Verification of Shielding
Integrity by Monte Carlo Method., . . Lee, T.Y.; Ha,
C.W.; Lee, J.K., . . Korea Advanced Energy
Research Inst., Daeduk, Republic of Korea, . . June
1986

Happy New Year!