

# RSIC Newsletter



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*Sooner or later a busy person learns to write things down. It's the best way to capture things we are apt to forget. "The strongest memory," says an old proverb, "is weaker than the palest ink." ...*

*Anonymous*

## A READER CONTRIBUTES

### Current Problems in Shielding

*The following paper was prepared by G. P. Lahti for inclusion in the Proceedings of the Topical Meeting on Reactor Physics and Shielding, September 17-19, 1984, Chicago, Illinois, but was inadvertently omitted from the final publication (CONF-840901). Since this point of view is deemed to be of continuing interest to the shielding community, it is published in this issue of the RSIC Newsletter. — The Editor*

Dr. Herbert Goldstein, in his plenary address,\* lamented the demise of shielding ("shielding research" in his words).

It is true that the major work in shielding has changed, especially in the last decade. I have been fortunate to have experienced two decades of shielding work, running the course from the scientific excitement of methods development and conducting experiments to the engineering satisfaction of seeing facilities built and tested. The calculation of the transport of radiation through bulk shields is now a routine matter. Attention is paid to fine-tuning the initial design by, for example, providing compensatory shielding in areas of existing facilities where streaming pathways are available as a result of construction practices. Such areas would never be determined in a cycle of preliminary calculations; but once identified by mea-

surement and analyzed by the shielding practitioner, expedient solutions can be provided. Also, the problems in future similar facilities can be anticipated at the design stage.

In other words, shielding is a maturing field. Granted, the pioneering efforts in methods development are presently at their nadir due to lack of funding. But radiation shield engineering, which still requires a firm, basic knowledge of radiation physics, continues and will continue in support of operating fission reactor facilities; radiation protection and shielding work will further continue through the decontamination and decommissioning of these facilities and the ultimate disposal of high-level radioactive wastes. After that, fusion reactor facilities with their own new radiation protection problems will provide new territories for exploration.

One further sign of maturity is the fact that records of radiation exposure are now fodder for attorneys suing for damages due to health effects allegedly caused by radiation exposure. Bill Endres' paper in session 3-C (pp. 434-447) pointed out the need to accurately quantify neutron exposures particularly in operating reactor containments to meet anticipated new legal limits (10 CFR 20) and NCRP guidance as well as to carefully document all radiation exposures for legal reasons.

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I am sorry that Dr. Goldstein is disappointed that shielding and shielding research as he knew it no longer flourishes. But shielding (really radiation protection and shielding, an inseparable pair) as we current practitioners know it is an interesting, challenging field. As noted earlier, the field of "shield engineering" has evolved over the past 20 years.

Is a new specialty, Radiation and the Law, next?

In the proceedings of this meeting you will find some further observations and comments on Sessions I (p. 514) and II (p. 736) of "Current problems

in shielding" made by myself and Lee Simmons, respectively. These reflect our views on the state of "shielding" as it is practiced today.

G. P. Lahti  
Sargent & Lundy

\*Herbert Goldstein, "The Evolution of Reactor Shielding: From the Manhattan Project to the FFTF," Proceedings of the Topical Meeting on Reactor Physics and Shielding, (CONF-840901 Vol. I, pp. 10-21) September 1984.

## CHANGES TO THE COMPUTER CODE COLLECTION

During the month four changes were made to the RSIC Computer Code Collection. Three previously packaged code systems were replaced with new technology, and an existing code package was updated with additional software.

### CCC-142/MERCURE-4 V.5

This kernel-integration straight-line attenuation code system in three-dimensional geometry has been replaced by a newly frozen version, designated MERCURE-4, V.5., contributed by CEA/CEN/Saclay SERMA/Shielding & Reliability Laboratory, Gif-sur-Yvette, France. Version 5 differs from MERCURE-4-82 in several ways: (1) V.5 does not contain half-words, (2) the program BIPVBS allows preparation of a binary library of photon cross sections, and (3) the program prepares a binary library of buildup factors called ZEBU 1 (usable only between 8.654 MeV and 0.507 MeV).

FORTTRAN IV; IBM 3033.

### CCC-203/MORSE-CG

The IBM (C) version of this general purpose Monte Carlo multigroup neutron and gamma-ray transport code package was updated to change some characters to make all files compatible with the newer compilers. BCD characters (026 punch code) were changed to EBCDIC characters (029 code) in routines BANKR and PICTUR. FORTTRAN IV; UNIVAC 1108 (A), CDC 6600 (B), IBM 360 (C) VAX (D) and CRAY (E).

### CCC-428/ONEDANT

The VAX (C) version of this one-dimensional, multigroup, diffusion-accelerated, neutral-particle transport code system was replaced by a newly frozen version supplied by the contributor, Los Alamos National Laboratory, Los Alamos, New Mexico. The new version is a full FORTTRAN 77 code and supports the 4C routines SEEK/REED/RITE-DOPC/DRED/DRIT. It also allows a coarse-mesh balance printout. Only users who wish to combine solver modules of ONEDANT and TWODANT (CCC-456) need to replace the VAX version they now use. Documentation: LA-9184-M. FORTTRAN IV and FORTTRAN 77; CDC 7600 (A), IBM 3033 (B), and VAX (C).

### CCC-456/TWODANT

The VAX (C) version of this two-dimensional, multigroup, diffusion-accelerated, neutral-particle transport code system was replaced by a newly frozen version supplied by the contributor, Los Alamos National Laboratory, Los Alamos, New Mexico. The new version, written in FORTTRAN 77, provides the SEEK/REED/RITE - DOPC/DRED/DRIT routines which meet the requirements of the 4C standard interface format. Extensive changes were made in the coding to bring it into line with FORTTRAN 77 requirements. Wide usage has required algorithmic changes in the code. All present users of TWODANT (C) should send a tape and request the new version from RSIC. Documentation: LA10049-M, REV. 1. FORTTRAN IV and FORTTRAN 77; CDC-6600 (A), IBM-3033 (B), and VAX (C).

### NSSDC Issues Newsletter

The National Space Science Data Center (NSSDC) published the first issue of the *NSSDC Newsletter* April 1985 and sent it to a large distribution. A second issue will follow and will include a survey card aimed at refining the distribution to those interested in its coverage.

NSSDC, which primarily exists to assure continuing accessibility and utility of data produced by NASA spaceflight missions, was founded in early 1967 when James I. Vette was named Director. Currently, NSSDC is one of the principal centers within the Goddard Space Data and Computing Division of the Earth Sciences Directorate, headed by Milton Halem and Frank Martin. James L. Green has been selected as the new NSSDC Director. Jim Vette remains as Chief Scientist and continues as Director of World Data Center (WDC) A for Rockets and Satellites.

The newsletter is a bimonthly publication of NSSDC, NASA/Goddard Space Flight Center, Greenbelt, Maryland. Ellen J. Stemmer is the editor.

### NUCLEAR STANDARDS NEWS

#### NS Achieves Accredited Organization Status

The American Nuclear Society has been accepted by the American National Standards Institute as an accredited organization, effective March 14, 1985. The change in status permits the Society to change the procedures of N16 (Nuclear Criticality Safety), N17 (Research Reactors, Reactor Physics and Radiation Shielding), and N48 (Radioactive Waste Management) from the standards committee method to the accredited organization method. ANS had earlier achieved accredited organization status for its Nuclear Power Plant Standards Committee (NUPPSO).

As a formality, the existing N16, N17, and N48 committees will now be disbanded and reorganized as consensus committees in accordance with the rules for accreditation.

#### Newly Published

ANSI/ANS-18.1-1984, *Radioactive Source Term for Normal Operation of Light Water Reactors* (revision of N237-1976). This standard estab-

lishes typical long-term concentrations of principal radionuclides in fluid streams of light-water-cooled nuclear power plants for use in estimating the expected release of radioactivity from various effluent streams. These fluid streams are BWR and PWR reactor coolant and PWR steam generator fluids. The concentrations in fluid streams of BWRs and PWRs are treated in a similar manner, but have different numerical values because of the differences in design.

The numerical values given in this standard are based on available data from operating plants that use Zircaloy-clad uranium dioxide fuel. The values are given for a set of reference conditions, and guidance is provided for adjusting to other conditions.

ANS-18.1-1984 may be ordered from ANS at \$32 per copy.

### NCRP News

#### Accelerated Output, New Studies Emphasized

The National Council on Radiation Protection and Measurements (NCRP), in its Annual Report released at the 1985 Annual Meeting, emphasized recently published materials, steady progress on ongoing projects and the initiation of new activities. Six NCRP Reports, the Eighth Taylor Lecture, a statement and a letter report were released in 1984. Six new scientific efforts were launched during the year.

Published in 1984 were (1) NCRP Report No. 72, *Radiation Protection and Measurements for Low Voltage Neutron Generators*, (2) NCRP Report No. 73, *Protection in Nuclear Medicine and Ultrasound Diagnostic Procedures in Children*, (3) NCRP Report No. 74, *Biological Effects of Ultrasound: Mechanisms and Implications*, (4) NCRP Report No. 76, *Radiological Assessment: Predicting the Transport, Bioaccumulation and Uptake by Man of Radionuclides Released to the Environment*, (5) NCRP Report No. 77, *Exposures from the Uranium Series With Emphasis on Radon and Its Daughters* and (6) NCRP Report No. 78, *Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States*. The Annual Report also noted that six NCRP documents were in press at the end of 1984: (1) NCRP Report No. 58, *A Handbook of Radioactivity Measurements Pro-*

cedures (2nd ed.), (2) NCRP Report No. 79, *Neutron Contamination for Medical Electron Accelerators*, (3) NCRP Report No. 80, *Induction of Thyroid Cancer by Ionizing Radiation*, (4) NCRP Report No. 81, *Carbon-14 in the Environment*, (5) NCRP Report No. 82, *SI Units in Radiation Protection and Measurements* and (6) NCRP Proceedings No. 6, *Some Issues Important in Developing Basic Radiation Protection Recommendations*.

Each of these reports is important in its own right, however, Reports 77 and 78 emphasize the potential significance of public exposures to indoor radon which might be responsible for a significant fraction of lung cancer deaths. Report 77 discusses levels of radon and draws attention to the need for additional measurements within the United States to determine whether the problem of radon is more or less severe than presently believed. This report is the first NCRP report to propose remedial action levels (at 2 WLM/year for radon and at 0.5 rem/year continuous, including background, for external exposure). Report 78 also deals with radon but concentrates on the scientific information which forms the basis of risk estimates. Both reports emphasize the potential importance of this public exposure problem and the need for appropriate action.

NCRP Report No. 58 was originally issued in 1978. In recognition of the progress which continues to be made in the field of radionuclide metrology, this report has been substantially revised in the second edition. Extensive additions have been made to Decay and Section 4 — Indirect or Comparative Measurements of Activity in Radioactive Decay. The major portion of the new material deals with liquid scintillation counting. A new subsection of Section 4 discusses the use of scintillation counting techniques for efficiency tracing. Another major addition to the text is a greatly expanded Section 8 with the new title of "Measurements Assurance, Standards, Traceability and the Statement of Uncertainty." There is new material on the statement of uncertainty, and expanded material on traceability. Also contained in the report is a complete, up-to-date revision of Appendix A - Nuclear Decay Data. The tables include the latest data from the Oak Ridge data banks.

Report No. 79 is concerned with the potential for neutron exposure that results from the produc-

tion of neutrons when medical equipment used to generate electrons is operated at energies above 10 MeV. The report reviews the source of neutrons generated from medical electron accelerators and provides an examination of the transport of the neutrons in the protective housing of the accelerator, as well as in structural shielding barriers. The report also presents an outline of the hazards to operating personnel and patients, and treats the methods for reducing these hazards. The report includes a description of methods of measuring neutrons from various types of medical accelerators, and includes factors for converting neutron fluence to dose and dose equivalent.

NCRP Report No. 80 assesses the potential for cancer induction in the thyroid gland after exposure to external x- and gamma-radiation or to some internally deposited radionuclides of iodine. Data and assumptions from existing human and animal studies are examined and, where possible, used to develop average risk estimates for combined populations over various ranges of radiation dose to the thyroid. The relative carcinogenicity of various iodine isotopes is examined on the basis of available data. The relative carcinogenicity per unit of absorbed dose of external x- or gamma-radiation and various iodine isotopes is estimated. A specific model for risk estimation is developed in the report and utilized in formulating risk estimates which are considered to be applicable to the population of the U.S. for mean thyroidal doses in the range from 6 to 1500 rads.

NCRP Report No. 81 is the latest in a series covering various radionuclides perceived as having potential impact on the exposure of man. The report summarizes the available information on carbon-14 in terms of its physical properties, sources, distribution in the environment, sampling and analysis, biology, projected impact, dosimetry, and waste management. The report also considers and evaluates the importance of carbon-14 as a potential source of local and world-wide radiation exposure.

The NCRP Annual Report for 1984 also notes the release of a letter report on definition of radioactive waste and an important Council statement, Control of Air Emissions of Radionuclides, which has provided the basis for EPA regulations on the subject.

The 1984 Annual Report indicates that five additional draft NCRP reports were in the late stages

of preparation at the end of 1984, including those treating: (1) experimental verification of internal dosimetry calculations, (2) general concepts for dosimetry of internally deposited radionuclides, (3) basic radiation protection criteria, (4) biological effects and exposure criteria for radiofrequency electromagnetic radiation and (5) radiation protection in mammography.

The new scientific efforts initiated in 1984 include those concerned with the development of NCRP recommendations on: (1) radiation protection for medical and allied health personnel, (2) models used for assessing transport of low-level radioactive waste, (3) uptake of radionuclides by the embryo-fetus, (4) ocean dumping of radioactive waste, (5) the control of radon inside buildings and (6) radiation emergency planning in academic, medical and industrial institutions.

The NCRP program is vigorous and active and apart from its reports the NCRP has been extremely interactive with agencies of the federal government and its own collaborating scientific organizations. The NCRP strives to serve the public interest in all of its activities and welcomes, therefore, suggestions and comments on its programs and activities.

Copies of the new reports can be purchased at the following prices: NCRP Report No. 58, *A Handbook of Radioactivity Measurements Procedures* (2nd ed.) (Only available casebound) \$22.00;

NCRP Report No. 79, *Neutron Contamination From Medical Electron Accelerators*, \$14.00;

NCRP Report No. 80, *Induction of Thyroid Cancer by Ionizing Radiation*, \$13.00; and

NCRP Report No. 81, *Carbon-14 in the Environment*, \$12.00.

Individuals and organizations on the NCRP standing order list will receive copies of the Reports No. 79, 80, and 81 automatically and will be invoiced for their order. Others may purchase copies of the reports or place their names on the standing order list by directing their order to NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, Maryland 20814, telephone (301) 657-2652.

## COURSES, CONFERENCES, SYMPOSIA

### ASTM Call for Papers on Effects of Radiation on Materials

The Call for Papers has been issued for the Thirteenth International Symposium on "Effects of Radiation on Materials" to be held 23-25 June 1986 in Seattle, Washington. The symposium is held every two years and is sponsored by ASTM Committee E-10 on Nuclear Technology and Applications. The symposium will provide a forum for presentation of recent developments in the field of irradiation effects on materials. Appropriate topics for contributed papers include any effect of radiation on metals, ceramics and other materials which will see irradiation service in thermal, fast or fusion reactor environments. The simulation of such environments using charged particles is also a traditional topic for this symposium, as is the effects of radiation on solid waste forms. The program will be conducted in English and each paper will be followed by discussion. A Special Technical Publication based on the proceedings is anticipated by ASTM.

Prospective authors are requested to submit a title, and three copies of a 300-500 word abstract by September 30, 1985 to Symposium Chairman F. A. Garner, Westinghouse Hanford Company, P. O. Box 1970, W/A-58, Richland, Washington 99352, 509-376-4136. Paper Submittal Forms are available from Garner, or from Symposium Co-chairman, N. H. Packan, Oak Ridge National Laboratory, A-102 (5500), Oak Ridge, Tennessee 37831, 615/574-5070; or from Kathy Greene, ASTM Publications Division, 1916 Race Street, Philadelphia, Pennsylvania 19103, 215-299-5414.

### SNS-1986 Call for Papers

The 3rd Symposium on Space Nuclear Power Systems is being organized by The Institute for Space Nuclear Power Studies, Chemical/Nuclear Engineering Department, University of New Mexico, Albuquerque, NM 87131. Co-sponsors include the American Nuclear Society, The Space Technology Center, U. S. Air Force, and Sandia National Laboratories. It will be held in Albuquerque, New Mexico, January 13-16, 1986. The program consists of fifteen unclassified technical sessions of contributed papers, several invited papers for the plenary session, technical exchange (poster) session, and three classified sessions. This symposium will cover Advanced and Multi-Megawatt System Concepts, Missions and Applications, Nuclear Fuel Systems, Energy Conversion, Systems Inte-

gration and Testing, Reactors and Shielding, Materials, Thermal Management and Safety, Radioisotope Generators, Radiation Effects, Controls, Power Conditioning and Distribution, Survivability and Nuclear Electric and Nuclear Propulsion.

The organizing committee includes:

Honorary Chairman, The Honorable Manuel Lujan, Jr. (R-NM); General Chairman, David M. Woodall, University of New Mexico (505) 277-5405; Technical Chairmen, Mohamed S. El-Genk, University of New Mexico (505) 277-5442, David Buden, Science App'l. Int. Corp. (505) 247-8787, and Maj. John Carson, USAF HQ/AFSTC (505) 846-9750; Finance Chairman, Richard Jimenez, Aerospace Corporation (505) 846-0203; Publications Chairman, Mark D. Hoover, Lovelace ITRI (505) 844-2306; Administrative Chairman, Patricia Quinn, University of New Mexico (505) 277-0446.

Prospective authors should submit five copies of a 300-500 word abstract, with full page figures and tables counting as 100 words each (references not included in the count). Abstracts should include at least 250 words of narrative. The original and two copies of the abstracts for unclassified sessions should be submitted to the chairman of the technical session for which the paper is to be considered. Two additional copies of each submission should also be sent to: Professor Mohamed S. El-Genk, Technical Program Chairman, The Institute for Space Nuclear Power Studies, Chemical & Nuclear Engineering Dept., University of New Mexico, Albuquerque, NM 87131.

Abstracts of papers for consideration in one of the classified sessions should be mailed directly to: Maj. John Carson, Technical Co-Chairman, USAF HQ AFSTC, Kirtland Air Force Base, Albuquerque, NM 87117.

Prospective authors should obtain all necessary clearances for their submissions and for presenting the paper at an unclassified session. Abstracts must be received by July 1, 1985 for consideration. Authors of papers selected for presentation at the symposium will be notified by August 1, 1985. A 1,000 word summary for inclusion in the Symposium transactions will be due November 1, 1985. Manuscripts are due for peer review on December 31, 1985. Accepted papers will be published in Symposium proceedings.

Full details on session topics and chairmen may be secured from Patricia Quinn, address above. In

general, the unclassified sessions will cover Energy Conversion; Space Reactor Fuels; Space Nuclear Missions and Applications; Nuclear Electric and Nuclear Propulsion; Radiation Effects; Reactors and Shielding; Space Reactor Materials; Systems Integration; Safety and Reliability; Thermal Management; Controls, Power Conditioning and Distribution; Advanced Materials for Spacecraft; Radioisotope Generators; Testing; and Advanced and Multi-Megawatt System Concepts.

### Calendar

Your attention is directed to the following additional events of interest to the radiation shielding and protection community.

#### July 1985

*22nd Annual Conference on Nuclear and Space Radiation Effects*, July 22-24, 1985, Monterey, California, sponsored by the Institute of Electrical and Electronics Engineers, Inc. and cosponsored by the Defense Nuclear Agency, Sandia National Laboratories, and the Jet Propulsion Laboratory. Contact: Kenneth F. Galloway, B344 Tech, National Bureau of Standards, Washington, DC 20234 USA.

MIT short course on *Modern Nodal Methods for Analyzing Light Water Reactors*, July 22-26, 1985, Office of the Summer Session (E-19-356) MIT, Cambridge, Massachusetts 02139; telephone 617-253-2101.

#### August 1985

*22nd Nuclear Accident Dosimetry Intercomparison Study*, August 9-13, 1985, Oak Ridge, Tennessee, sponsored by the Oak Ridge National Laboratory. Contact: C. S. Sims, ORNL, Bldg. 7710, P.O. Box X, Oak Ridge, TN 37831 (phone 615-574-5851).

*Australian Radiation Protection Society Annual Meeting*, August 19-21, 1985, Melbourne, Victoria, Australia. Contact: T. H. Gan, Australian Radiation Laboratory, Lower Plenty Road, Yallambie, Victoria 3085, Australia.

*SMIRT-8*, August 19-23, 1985, Brussels, Belgium. Contact: Sergio Finzi, CEC - Directorate Gen., X11-JRC, Brussels, Belgium.

*Occupational and Environmental Radiation Protection*, August 19-23, 1985, Boston, Massachusetts, sponsored by the Harvard School of Public Health, Office of Continuing Education. Contact: Office of Continuing Education, Harvard School of Public Health, 677 Huntington Ave., Boston, MA 02115 (phone 617-732-1171).

*Medical Planning and Care in Radiation Accidents Course*, August 19-23, 1985, Oak Ridge, Tennessee, sponsored by DOE. Contact: Robert C. Ricks, Director, REAC/TS, ORAU, P.O. Box 117, Oak Ridge, Tenn. 37831-0117 (phone 615-576-3131).

*International Seminar on Containment of Nuclear Reactors*, August 26-27, 1985, Brussels, Belgium. Con-

tact: Rolf Krieg, Inst. für Reaktorentwicklung, Kernforschungszentrum, Karlsruhe GmbH, Postfach 3640, D-7500 Karlsruhe 1, F. R. Germany or Algirdas H. Marchertas, Reactor Analysis and Safety Div., Argonne National Laboratory, Argonne, IL 60439 USA.

### September 1985

*17th Japan Conference on Radiation and Radioisotopes*, September 2-4, 1985, Tokyo, sponsored by the Japan Atomic Industrial Forum, Inc. Contact: Section for Industrial Programs and Technology, Japan Atomic Industrial Forums, Inc., Toshin Bldg., 1-13 Shimbashi, 1-chome, Minato-ku, Tokyo 105, Japan.

*ANS Topical on Criticality Safety and the Storage of Fissile Material*, Sept. 9-12, Jackson, Wyoming. Contact: Robert E. Wilson, Idaho Chem Processing Plant, P.O. Box 4000, (CPP-668), Idaho Falls, ID 83403 (phone 208-526-1361).

*Handling of Radiation Accidents by Emergency Personnel Course*, Sept. 10-13, 1985, Oak Ridge, Tenn., sponsored by DOE. Contact: Robert C. Ricks, Director, REAC/TS, ORAU, P.O. Box 117, Oak Ridge, Tenn. 37831-0117 (phone 615-576-3131).

*International Seminar on Finite Element and Allied Methods for Reactor Physics and Shielding Calculations*, September 18-20, 1985, London, England. Contact: A. J. H. Goddard, Mechanical Engr. Dept., Imperial College of Science and Technology, Exhibition Road, London SW7 2BX.

*Health Physics in Radiation Accidents Course*, Sept. 23-27, 1985, sponsored by DOE. Contact: Robert C. Ricks, Director, REAC/TS, ORAU, P.O. Box 117, Oak Ridge, Tenn. 37831-0117 (phone 615-576-3131).

*ANS Topical Meeting on High Level Nuclear Waste Disposal — Technology and Engineering*, Sept. 24-26, 1985, in Pasco, Washington. Contact: Edward B. Ash, Rockwell Hanford, P.O. Box 800, Richland, WA 99352 (phone 509-376-6846).

*3rd International Symposium on Radiation Physics (ISRP-3)*, September 30-October 4, 1985, Ferrara, Italy. Contact: ISRP-3 OC Chairman, Istituto de Fisica Generale dell'Università de Ferrara, Via Paradiso 12, I-44100 Ferrara, Italy.

### October 1985

*Meeting on Nuclear Data, Cross Section Libraries and Application in Nuclear Energy*, October 1-2, 1985, Bonn, Fed. Rep. of Germany, sponsored by the German Nuclear Technology Society and the European Nuclear Society. Contact: Dieter Emendörfer, Stuttgart University (IKE), Pfaffenwaldring 31, D-7000 Stuttgart 80, Fed. Rep. of Germany.

*18th Annual Meeting of the Radiation Protection Association: Population Radiation Exposure*, October 6-10, 1985, Luebeck-Travemuende, Fed. Rep. of Germany. Contact: Dipl.-Phys. K. Henning, GKSS-Forschungszentrum, Geesthacht GmbH, Postfach 1160, D-2054 Geesthacht, Fed. Rep. of Germany.

*3rd International Conference on Nuclear Technology Transfer*, October 14-19, 1985, Madrid, Spain, sponsored by the Spanish Nuclear Society, the American Nuclear Society, and the European Nuclear Society. Contact: Myron Kratzer, International Energy Associates, Suite 600-600, New Hampshire Ave., Washington, DC 20036 (phone 202-342-6752) or Pierre Grau, Framatome, Tour Fiat, CEDEX 16, 92084 Paris, France (phone 796 04 06).

*Technical Committee on the Assessment of the Radiological Impact from the Transport of Radioactive Materials*, October 21-25, 1985, Vienna, Austria, sponsored by the International Atomic Energy Agency. Contact: R. B. Pope, Division of Nuclear Safety, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

*3rd International Topical Meeting on Reactor Thermal Hydraulics*, October 15-18, 1985, Newport, Rhode Island, sponsored by the ANS, American Society of Mechanical Engineers, and the American Institute of Chemical Engineers. Contact: 3rd Internatl. Top. Meeting on Reactor Thermal Hydraulics, c/o H. Shaffer, 1671 Worcester Road, Framingham, MA 01701 USA.

*12th Annual Meeting and International Conference on Nuclear Energy*, October 20-23, 1985, Boston, Massachusetts, sponsored by the World Nuclear Fuel Market. Contact: Donna P. Cason, Administrative Director, WNFM, 5720 Peachtree Parkway, Norcross, GA 30092 (phone 404-447-1144).

*Nuclear Science Symposium*, October 23-25, 1985, San Francisco, California, sponsored by the Inst. for Electrical and Electronics Engineers. Contact: R. S. Larsen, Stanford Linear Accelerator Center, Stanford Univ., P.O. Box 4349, Stanford, CA 94305 (phone 415-854-9300 ext. 2726; FTS 461-9300 ext. 2726).

*International Symposium on Source Term Evaluation for Accident Conditions*, October 28-November 1, 1985, Columbus, Ohio. Participation must be through designation by the Government of a Member State of the IAEA or by an organization invited to participate. Contact: Secretariat, c/o International Atomic Energy Agency, Vienna International Centre, P.O. Box 100, A-1400, Vienna, Austria.

### November 1985

*Joint Meeting of the American Nuclear Society and the Atomic Industrial Forum*, November 11-15, 1985, San Francisco. Contact: Meetings Dept., ANS, 555 North Kensington Ave., La Grange Park, IL 60525, or James R. Sasso, General Electric-MC-871, San Jose, CA 95125 (phone 408-925-1195).

*11th Symposium on Engineering Problems in Fusion Research*, November 18-22, 1985, Austin, Texas. Contact: Ward Harris, Fusion Research Center, Univ. of Texas at Austin, RLM 11.1222, Austin, TX 78712 (phone 512-471-4576 or 4698).

*Technical Committee on Procedures for Assessing the Reliability of Transfer Models*, November 18-22,

1985, Vienna, Austria, sponsored by the International Atomic Energy Agency. Contact: I. Savolainen, Division of Nuclear Fuel Cycle, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

*1st International Conference on Fusion Reactor Materials*, November 19-22, 1985, Tokyo, Japan. Contact: R. R. Hasiguti, Science University of Tokyo, Kagurazaka, Shinjuku-ku, Tokyo, Japan 162.

#### **December 1985**

*Technical Committee on Computer Codes in Fusion Research*, December 3-5, 1985, Lausanne, Switzerland,

sponsored by the International Atomic Energy Agency. Contact: M. Leiser, Head, Physics Section, Division of Research and Laboratories, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

#### **August 1986**

*8th International Conference on Solid State Dosimetry* organized by the National Radiological Protection Board, U.K., 26-29 August, 1986, St. Catherine's College, Oxford. Further details from: Miss L. Ashby, National Radiological Protection Board, Chilton, Didcot, Oxfordshire, U.K.

## **MAY 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.

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*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.**

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### **RADIATION SHIELDING LITERATURE**

**CONF-801053-9**, . . . *Severe Accident Sequence Assessment for Boiling Water Reactors: Program Overview*, . . . Fontana, M.H., . . . October 1980, . . . NTIS, PC A03/MF A01

**CONF-850411, Vol.1, pp.94-102**, . . . *A Three-Dimensional Radiation Transport Problem in Well-Logging*, . . . Badruzzaman, A., . . . April 1985, . . . American Nuclear Society, Inc., 555 N. Kensington Ave., La-



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