

# RSIC Newsletter



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(For RSIC TELEX Communication Only)

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June 1987

*Education: A debt due from present to future generations.—George Peabody*

## CHANGES TO THE COMPUTER CODE COLLECTION

Four new code systems have been added to the computer code collection during the month. Three additions resulted from foreign contributions.

### CCC-504/PRESTO-II

This code system for low-level waste environmental transport and risk assessment was contributed by Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee. PRESTO-II evaluates health effects from shallow-land and waste-disposal trenches. The code system serves as a non-site-specific screening model for assessing radionuclide transport, ensuing exposure, and health impacts to a static local population for a 1000-year period following the end of disposal operations. Human exposure scenarios considered include normal releases (including leaching and operational spillage), human intrusion, and limited site farming or reclamation. Pathways and transport methods from the trench to an individual or population include groundwater transport, overland flow, erosion, surface water dilution, suspension, atmospheric transport, deposition, inhalation, external exposure, and ingestion of contaminated beef, milk, crops, and water. Population and individual doses, as well as doses to the intruder and farmer, may be calculated. Cumulative health effects in terms of cancer deaths are calculated for the population over the 1000-year period using a life-table approach developed by EPA (CCC-422/RADRISK). A modified CCC-420/DARTAB mod-

el is used to generate human health risk estimates from radionuclide concentrations and intake values. The package includes PRESTO-PREP, a data preprocessor for PRESTO-II; RADFMT, a data file converter; and RADRISK.BCD, a 1981 version of dose and risk factors for radionuclides written by CCC-422/RADRISK for use with the DARTAB subroutine of PRESTO-II. References: ORNL-5970 (April 1986) and ORNL-5981 (July 1984). FORTRAN 66; IBM 3033. PRESTO-PREP runs on PDP-10.

### CCC-510/KENO-IV(RG)

This random geometry model version of the KENO-IV Monte Carlo criticality code system was contributed by the University of Oklahoma, Norman, and the National Tsing-Hua University, Hsinchu, Taiwan, Republic of China. KENO-IV(RG) allows random geometry (RG) descriptions of materials in the geometry model too complex for description using ordinary mathematical models, such as in the case of dumped Raschig rings. KENO-IV(RG) uses Monte Carlo methods to solve the Boltzmann neutron transport equation. In the random geometry model the material thickness of solution or ring along the neutron path is randomly chosen from its predetermined material thickness distribution function, simulating the random orientation of Raschig rings in the solution. These distributions have been obtained experimentally and verified by "mathematical

tests." The package includes 16-group Hansen-Roach cross sections. The code was developed on an IBM-370/158. References: OU-AMNE-78-7 (October 1978) and ORNL 4938 (November 1975). FORTRAN IV and Assembler; FACOM M280.

#### PSR-236/LOUHI82

This general purpose unfolding program with linear and nonlinear regularizations was contributed by the Helsinki University of Technology, Finland. The unfolding problem is cast as a least-squares problem whose objective function includes, in addition to matching the measured data, prior information on the smoothness, shape, and magnitude of the solution. These conditions are formulated either as a linear regularization problem that can be solved through fast matrix inversion techniques or a nonlinear regularization problem allowing also for logarithmic or relative weighting of the conditions and guaranteeing a

nonnegative solution by using gradient minimization methods. References: TKK-F-C69 (February 1983) and *Computer Physics Communications* **21** (1980) 119-44. UNIVAC 1108; FORTRAN IV, EXEC8 Operating System.

#### PSR-244/SLAROM

This code system for producing cell-averaged cross sections for fast critical assemblies and fast power reactors was contributed by the Japan Atomic Energy Research Institute (JAERI), Tokai-mura, Naka-gun, Ibaraki-ken, Japan. SLAROM solves the neutron integral transport equations to determine the flux distribution and spectra in a fast reactor lattice and calculates cell-averaged effective cross sections. The code system uses multigroup data of the type in DLC-111/JFS that use Bondarenko factors for resonance effects. Reference: JAERI 1294 (September 1984). FORTRAN 77, Assembler, FACOM OS IV Operating System; FACOM M380.

## CHANGE TO THE DATA LIBRARY COLLECTION

A contribution from Poland was added to the data library collection.

#### DLC-128/LAHIMACK

This multigroup library of 53-neutron and 21-photon group cross sections and response functions for energies up to 800 MeV was contributed by the Institute of Nuclear Physics, Krakow, Poland. It is based on LAHI, a combination of the ORNL data library, DLC-87/HILO, and the Los Alamos National Laboratory (LANL) high energy neutron multigroup data library, which was further developed at the Institute of Reactor Development, KFA Jülich GmbH, Fed. Rep. of Germany, within the Spallation Neutron Source Project. LAHIMACK also contains the multigroup response functions/reaction cross sections, secondary particle production, kerma factors, etc., obtained from the CCC-178/HETC high energy

transport code (thin target option) and from ENDF/B-IV data processed with PSR-132/MACK-IV. The LANL transport cross sections have been used for the 9-neutron energy groups from 800 to 50 MeV. The DLC-87/HILO transport cross sections were used for lower neutron energies and for photon groups. The data library is designed for the solution of shielding, nuclear heating, and other radiation protection problems connected with accelerator neutron sources. The data contain 10 elements of shielding and biological importance (H, C, N, O, Al, Si, Ca, Fe, W, and Pb). The data can be easily implemented in discrete ordinates neutron transport codes. A program is provided for conversion to unformatted form. References: SNQ 3J/BH 120783, KFA Jülich, (1983), *Nuclear Instruments and Methods in Physics Research*, B16, 506 (1986), and Informal Notes (1987). BCD/EBCDIC card images; IBM 360/370.

## RSIC USER NOTES

### MCNP Transmittal Note

Transmittal of **CCC-200/MCNP** on 1600-bpi tapes requires three tapes rather than the two specified in the March 1987 *RSIC Newsletter* announcement.

### HILO86 Alert

RSIC has been notified that photon production data were not included for tungsten in the data library package **DLC-119/HILO86**. We are grate-

ful to the Air Force Weapons Laboratory for pointing out this omission. Watch the newsletter for the announcement that **DLC-119** has been modified to include the photon production data.

### CCC-476 Option Limited

The ORNL contributors of **CCC-476/CAAC** have notified us that the area around the source may only be subdivided by a circular grid in **AIR-DOS-EPA**. The square grid option is not operable in current versions of **AIRDOS-EPA**.

## PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we note significant changes in the activities of people concerned with radiation protection, transport, and shielding in the nuclear industry. We, therefore, continue to carry personal items as they are brought to our attention. The information should be timely and accurate. That is where you, our reader, can help. Any information (press release, personal note, etc.) you send about changes in employment, major awards, retirements, etc. about yourself or a colleague will be appreciated.

### Steele Establishes EIC

**Myrna Steele**, former Deputy Director of the Nuclear Regulatory Commission (NRC) Division of Technical Information, and a former NRC technical monitor for RSIC, has left the Commission to establish a technical support services firm for research and research applications.

Energy Information Consultants (EIC) is a multidisciplinary advanced technology organization committed

to bringing the best engineering and computing resources to the collection and use of information in the nuclear and electric power industry. Services are available in three broad areas: Operational performance and reliability either at the plant or corporate level; Technical data base design and implementation; and Technical management and information systems management concentrating on those systems that use very large scientific/technical code systems for determining probabilistic risks or thermal-hydraulic analyses.

EIC may be contacted in writing at P.O. Box 38177, Orlando, FL 32819, or by phone at 305-876-5960. A 24-hour answering service is available at 305-849-4020.

### Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Keith W. Marlow*, Sandia National Laboratories, Albuquerque, New Mexico; *Louis A. Beach*, Naval Research Laboratory, Washington, D. C.; *Henry Morton*, Morton and Potter, Potomac, Maryland; *Gerson Santos-Leon*, U.S. Dept. of Energy, Oak Ridge Operations, Oak Ridge, Tenn.; *Edward Mastal*, U.S. Dept. of Energy, Washington, D. C.; and *Tatsuo Nishimura*, Mitsubishi Atomic Power Industries, Inc., Tokyo.

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## 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.

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## Reactor Analysis and Radiation Transport Short Courses

The Department of Nuclear Engineering at the University of Tennessee-Knoxville is offering two five-day short courses of interest to radiation transport specialists during Tennessee Industries Week (TIW-22), September 14-18, 1987.

**Computational Methods in Reactor Analysis** will cover the computational methods and computer code systems used to describe the neutronic behavior of nuclear fission reactors. Areas to be covered include: (a) multi-dimensional diffusion theory and perturbation theory methods for applications in reactor statics, space-dependent kinetics, and fuel depletion; (b) transport theory methods, including discrete ordinates, integral transport theory, and Monte Carlo; and (c) cross section generation and processing utilizing the AMPX and SCALE systems developed at ORNL.

**Monte Carlo Analysis**, designed specifically for the engineer in shield design, does not presume prior knowledge of Monte Carlo methods. Some understanding of radiation transport physics is desirable. A wide range of topics will lead to an understanding of Monte Carlo analysis and the specialized applications of Monte Carlo methods to practical shielding problems. Attention will be given to the understanding and Monte Carlo implementation of the adjoint analysis. Advantages and disadvantages of the adjoint mode versus the forward mode of analysis will be described including several practical applications. Variance reduction techniques will be developed for both forward and adjoint calculations. The MORSE computer code system will be described to illustrate the general features of Monte Carlo.

The registration fee is \$695 per person for each course. The deadline for registration is August 31, 1987. Contact: P. F. Pasqua, Head of the Dept. of Nuclear Engineering, University of Tennessee, Knoxville, TN 37996 (phone 615-974-2525).

## Calendar

Your attention is directed to the following events of interest.

### July 1987

*32nd Annual Meeting of the Health Physics Society*, July 5-9, 1987, Salt Lake City, Utah. Contact: John W. Poston, Sr., Dept. of Nuclear Engr., Texas A&M Univ., College Station, TX 77843-3133 (phone 409-845-4161).

*Advanced Workshop on Occupational & Environmental Radiation Protection*, July 13-17, 1987, Boston, Massachusetts, a course sponsored by the Harvard School of Public Health. Contact: Dade W. Moeller, Office of Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-732-1171).

*8th International Congress of Radiation Research*, July 19-24, 1987, Edinburgh, United Kingdom, sponsored

by the International Association for Radiation Research. Attendance is by application and invitation. Contact: E. Martin Fielden, Medical Research Council, Radiobiology Unit, Harwell, Oxon, OX11 0RD, United Kingdom (phone Abingdon 0235 834393).

*Nuclear and Space Radiation Effects in Electronics Tutorial Short Course*, July 28-31, 1987, Snowmass Village, Colorado, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: William R. Dawes, Jr., Bendix, Albuquerque Operations, P.O. Box 5800, Albuquerque, NM 87185 (phone 505-844-9330).

*24th Annual Conference on Nuclear and Space Radiation Effects in Electronics*, July 28-31, 1987, Snowmass Village, Colorado, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: C. W. Gwyn, United Technologies Microelectronics Center, 1575 Garden of the Gods Road, Colorado Springs, CO 80907 (phone 303-594-8008).

### August 1987

*23rd Nuclear Accident Dosimetry Intercomparison*, Aug. 10-14, 1987, Oak Ridge, Tennessee, sponsored by ORNL. Contact: R. E. Swaja or C. S. Sims, ORNL, Bldg. 7710, P.O. Box X, Oak Ridge, TN 37831-6379 (phone 615-574-5851).

*Occupational and Environmental Radiation Protection*, Aug. 10-14, 1987, Boston, Massachusetts, a course sponsored by the Harvard School of Public Health. Contact: Dade W. Moeller, Office of Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-732-1171).

*9th International Conference on Structural Mechanics in Reactor Technology (SMiRT-9)*, Aug. 17-21, 1987, Lausanne, Switzerland, sponsored by the International Association for Structural Mechanics in Reactor Technology, the Commission of the European Communities, and the École Polytechnique Fédérale de Lausanne. Contact: Folker H. Wittmann, École Polytechnique Fédérale de Lausanne, SMiRT-9, Chemin de Bellerive 32, CH-1007 Lausanne, Switzerland.

*International Conference on Nuclear Fuel Reprocessing and Waste Management*, Aug. 24-28, 1987, Paris, sponsored by the American Nuclear Society and the European Nuclear Society. Contact: Lloyd McClure, Westinghouse Idaho Nuclear Co., Idaho Chemical Processing Plant, P.O. Box 4000, Idaho Falls, ID 83401.

*Seminar on the Adoption, Application and Implementation of the Agency's Regulations for the Safe Transport of Radioactive Materials*, Aug. 31-Sept. 4, 1987, Vienna, sponsored by the International Atomic Energy Agency. Contact: Conference Service Section, IAEA, P.O. Box 100, A-1400, Vienna, Austria.

### September 1987

*Pacific Basin Nuclear Conference*, Sept. 6-11, 1987, Beijing, People's Republic of China, sponsored by the

Chinese Nuclear Society and the American Nuclear Society. Contact: Xu Honggui, Chinese Nuclear Society, P.O. Box 2125, Beijing, People's Republic of China, or ANS, 555 North Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

*ANS/ENS International Conference on Fast Breeder Reactor Systems: Experience Gained and Path to Economical Power Generation*, Sept. 13-17, 1987, Richland, Washington. Contact: M. C. Carelli, Westinghouse-AESD, P.O. Box 158, Madison, PA 15663 (phone 412-722-5284), or W. Marth, Kernforschungszentrum Karlsruhe, Postfach 3640, D-7500 Karlsruhe 1, F. R. Germany.

*Monte Carlo Transport of Electrons and Photons Below 50 MeV*, Sept. 24-Oct. 3, 1987, Trapani, Italy. Contact: David W. O. Rogers, Ionizing Radiation Standards, National Research Council of Canada, Ottawa, Ontario K1A 0R6 Canada (phone 613-993-2715).

*2nd International Conference on New Frontiers for Hazardous Waste Management*, Sept. 27-30, 1987, Pittsburgh, Pennsylvania, sponsored by NUS Corp., National Science Foundation, American Academy of Environmental Engineers, and the U.S. Environmental Protection Agency. Contact: Lynn Casper, NUS Corp., Park West 2, Cliff Mine Road, Pittsburgh, PA 15275-1071 (phone 412-788-1080).

#### October 1987

*Annual Congress of the Association for Radiation Protection*, Oct. 6-9, 1987, Basel, Switzerland. Contact: Fachverband f. Strahlenschutz e.V., c/o H. Brunner, Abt. SU/81, Eidg. Institut f. Reaktorforschung (EIR), CH-5303 Würenlingen, Switzerland (phone 0041 56-99 2350).

*2nd Minicourse on Fusion Plasma Engineering*, in conjunction with the 12th Symposium on Fusion Engineering, Oct. 12, 1987, in Monterey, California. Contact: Chris Stalker, Fusion Studies Laboratory, Univ. of Illinois, 103 South Goodwin Ave., Urbana, IL 61801 (phone 217-333-3772).

*12th Symposium on Fusion Engineering*, Oct. 12-16, 1987, Monterey, California, sponsored by Inst. of Electrical and Electronics Engineers (IEEE), American Inst. of Aeronautics & Astronautics, U.S. Dept. of Energy, Lawrence Livermore National Laboratory, TRW, Inc., and Grumman Aerospace Corp. Contact: Donna Schreiber, L-644, Lawrence Livermore National Laboratory, P.O. Box 5511, Livermore, CA 94556.

*6th Symposium on Neutron Dosimetry*, Oct. 12-16, 1987, Neuherberg, F. R. Germany, sponsored by the Commission of the European Communities, Society for Radiation and Environmental Research, and the U.S. Department of Energy. Contact: Gesellschaft f. Strahlen- und Umweltforschung mbH, München, Dr. H.

Schraube, Ingolstädter Landstr. 1, D-8042 Neuherberg, F. R. Germany.

*12th Symposium on Fusion Engineering*, Oct. 27-30, 1987, Princeton, New Jersey. Contact: IEEE, Technical Activities Dept., 345 E. 47th Street, New York, NY 10017 (phone 212-705-7895).

#### November 1987

*Joint Meeting of the ANS and the Atomic Industrial Forum*, Nov. 15-19, 1987, Los Angeles, California. Contact: Meetings Dept., ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

#### February 1988

*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).

#### April 1988

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

#### June 1988

*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.

## 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.

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

**CONF-870405, . . Theory and Practices in Radiation Protection and Shielding, . .** Proceedings held in Knoxville, TN, April 22-24, 1987, . . Ingersoll, D.T.; Ingersoll, J.K. (Comps.), . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.3-9, . . Post-Accident Streaming Analysis for the Reactor Building Electrical Penetrations at McGuire and Catawba Nuclear Stations, . .** Hilley, J.R., Jr.; Ashe, K.L.; et al., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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**CONF-870405, pp.18-27, . . ISOSHL: Evolution, Experience, and Benchmarking, . .** Greenborg, J., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.28-36, . . Reflection of Gamma Radiation in a Spherical, Steel-Lined, Concrete-Walled Room—Part I: Overview and Integral Results, . .** Lahti, G.P.; Johnson, W.J.; Rich, J.M., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.37-46, . . Reflection of Gamma Radiation in a Spherical, Steel-Lined, Concrete-Walled Room—Part II: Energy Spectra and Angular Distributions, . .** Johnson, W.J.; Lahti, G.P., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.47-56, . . A User-Simplified Version of MORSE/BREESE-II for Use in the Design of Shielded Cells for Gamma Ray Sources, . .** Sanders, R.L.; Stevens, P.N., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, p.59 (Title Only), . . Radiation Protection Management at Indian Point 3, . .** Perrotta, J., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.60-69, . . Radiological Operating Experience at FFTF, . .** Bunch, W.L.; Prevo, P.R., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.70-78, . . Radiological Impact Analysis for a Proposed NPP at Yenliao in Taiwan, . .** Su, M.-F.; Shih, C.-L.; Yin, H.-L.; Chang, B.-J.; Chyr, G.-T., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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**CONF-870405, pp.83-92, . . Recent Advances in Bonner Sphere Neutron Spectrometry, . .** Johnson, T.L.; Lee, Y.; Lowry, K.A.; Gorbics, S.G., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.93-102, . . Measurement of Fast Neutron Streaming with Plastic Track Recorders Registering Recoil Protons, . .** Oka, Y.; Ohno, S.; Yokozawa, M.; Hashikura, H.; Kondo, S., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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**CONF-870405, pp.123-130, . . The DACM Code—An Engineering Approach to the Estimate of Radiation Protection Factors, . .** Stoddard, J.A.; Scott, W.H., Jr.; Caton, H., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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**CONF-870405, pp.181-190, . . . Semiempirical Formula for Energy-Space Distributions of Streaming Neutrons and Gamma Rays in Cylindrical Ducts., . .** Shin, K., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.191-196, . . . Skyshine Study for Next Generation of Fusion Devices., . .** Gohar, Y.; Yang, S., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.197-206, . . . One- and Two-Dimensional Radiation Analysis of the Compact Ignition Tokamak., . .** Selcow, E.C., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.207-216, . . . An Aqueous Self-Cooled Shielding Blanket for NET., . .** Embrechts, M.J.; Bogaerts, W.; Chazalon, M.; Daenner, W.; Steiner, D.; Varsamis, G.L., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.217-225, . . . Neutron Streaming Analysis of an Aqueous Self-Cooled Blanket Applied to MARS., . .** Varsamis, G.L.; Embrechts, M.J.; Steiner, D., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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**CONF-870405, pp.259-263, . . . Effective Use of Lithium Fluoride, TLD-100, at Very Low Radiation Doses., . .** Richmond, R.G.; Cash, B.L., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

**CONF-870405, pp.264-270, . . . Measurement of ORBIT-Averaged, Differential Energy Spectra of Trapped Protons Using Thermoluminescent Dosimeter Techniques., . .** Richmond, R.G.; Badhwar, G.D.; Cash, B.L.; Atwell, W., . . April 1987, . . American Nuclear Society, Inc., 555 North Kensington Ave., LaGrange Park, IL 60525

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