# RSIC Newsletter

OAK RIDGE NATIONAL LABORATORY
POST OFFICE BOX X • OAK RIDGE, TENNESSEE 37831
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE U.S. DEPARTMENT OF ENERGY

EasyLink Mailbox: 62813374
Telex(Answer Back): 854467(ORNL EPIC UD)
Phone No. 615-574-6176 or FTS 624-6176

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*The great accomplishments of man have resulted from the transmission of ideas and enthusiasm.—Thomas J. Watson*

## SCALE WORKSHOP PLANS FINALIZED

A detailed orientation to the use of SCALE, the modular code system for performing standardized computer analyses for licensing evaluation, will be given in a workshop at Oak Ridge, Tennessee, April 15-18, 1986. The new Garden Plaza Hotel, near the downtown campus of the Oak Ridge Associated Universities (ORAU), has been selected for the technical sessions and for lodging ($50 single/$57 double). Full details will be mailed to those persons (106 to date) who have indicated an interest in attending the workshop.

The SCALE code system, for which RSIC has served as a clearinghouse for dissemination and interactions with developers and users, is the development of the Nuclear Engineering Applications Department (NEAD) of the Computing and Telecommunications Division of Martin Marietta Energy Systems, Inc. under the sponsorship of the U.S. Nuclear Regulatory Commission. Several NEAD staff members will participate in the workshop.

Early registration for the workshop is encouraged. A form for this purpose is appended to this issue of the newsletter. The deadline for preregistration is **March 31, 1986**. The registration fee, if mailed by the deadline, is $125; $150 afterwards.

A preliminary agenda for the RSIC/Oak Ridge workshop follows.

*Tuesday, April* 15

1. History and Overview of SCALE—C. V. Parks
2. Functional Modules for Preparation of Cross Sections: NITAWL, XSDRNPM, BONAMI, ICE—R. M. Westfall
3. Criticality Functional Modules: XSDRNPM, KENO-IV, KENO-V.a—L. M. Petrie and N. F. Landers
4. Shielding Functional Modules: MORSE-SGC/MARS, PICTURE, JUNEBUG, XSDRNPM, XSDOSE—J. S. Tang, M. B. Emmett, and J. A. Bucholz
5. Heat Transfer Functional Modules: HEATING 6, HEATPLOT, REGPLOT—G. E. Giles
6. Depletion/Decay Functional Modules: ORIGEN-S, PLORIGEN, and COUPLE—O. W. Hermann

*Wednesday, April* 16

7. Data Libraries: Cross Sections, Standard Compositions, Experimental Descriptions (CESAR), and Isotope Generation and Depletion Data—R. M. Westfall and J. C. Ryman
8. Miscellaneous: System Driver, Subroutine Library, Reading Routines, Standard Composition Data Generator (COMPOZ), and System Portability—L. M. Petrie
9. Heat Transfer Control Module: HTAS1—C. V. Parks
10. Parallel Sessions
    (a) Criticality Control Modules: Part I—L. M. Petrie and N. F. Landers
    (b) Heat Transfer Breakout Session—G. E. Giles and K. Childs

*Thursday, April 17*

11. Parallel Sessions
    (a) Criticality Control Modules: Part II—L. M. Petrie and N. F. Landers
    (b) Shielding Breakout Session—O. W. Hermann, J. S. Tang, and M. B. Emmett
12. Parallel Sessions
    (a) Shielding Control Modules: Part I—C. V. Parks and O. W. Hermann
    (b) Criticality Breakout Session—L. M. Petrie

*Friday, April 18*

13. Parallel Sessions
    (a) Shielding Control Modules; Part II—C. V. Parks, O. W. Hermann, L. M. Petrie, and J. S. Tang
    (b) Criticality Breakout Session—N. F. Landers
14. Closing Plenary: Attendee Questions and Feedback—C. V. Parks and R. W. Roussin (RSIC)

The SCALE Workshop will be repeated in Europe under the sponsorship of the OECD Nuclear Energy Agency (NEA) Data Bank on June 24–27, 1986. Those interested in the European workshop should contact Luis Garcia de Viedma at NEA Data Bank, 91191 Gif-sur-Yvette, France (phone (6) 908-49-12 or (6) 941-39-65).

## CHANGES TO THE COMPUTER CODES COLLECTION

The following seven changes were made in the computer codes collection since the last news announcement. Five new code systems were added to the collection and two existing code packages were updated. Five of the changes resulted from foreign contributions.

### CCC-474/MORSE-CGA

The IBM version of this Monte Carlo multigroup neutron and gamma-ray code system with array geometry was updated to add a three dimensional plotting capability via JUNEBUG, also packaged separately as CCC-466. The change included the addition of FORTRAN Assembler Language and sample problem data. The CRAY version of the package was not affected by this update. IBM-3033 (C).

### CCC-476/CAAC

This code system for implementation of atmospheric dispersion assessment required by the Clean Air Act has been updated with material supplied by the original contributors at Oak Ridge National Laboratory. Dosimetric data was added to the system and a small program was added to convert that data from formatted to binary data as needed by the code system. FORTRAN IV; and Assembler Language. IBM 3033 (A).

### CCC-479/BALTORO

This general purpose code system for coupling Monte Carlo and discrete ordinates radiation transport calculations was contributed by Institut für Reaktorentwicklung, Kernforschungsanlage Jülich, GmbH, Federal Republic of Germany. The objective of the system is to use the external coupling of neutron and gamma-ray radiation transport data obtained from the three-dimensional CCC-203/MORSE-CG and the one-dimensional discrete ordinates CCC-254/ANISN code systems to find the numerical solutions to problems involving (a) the quantity of a radiation-induced nuclear effect occurring in a neutron field in an infinite homogeneous medium perturbed by a complex object containing a radiation source, and (b) the score from a radiation yielding nuclear effect occurring in a neutron field in an infinite homogeneous medium perturbed by a complex object containing a radiation detector. It is possible to create data bases for unperturbed media and for source or detector tools (probes) that could be repeatedly coupled by the user by selecting them in various combinations and by specifying responses of those effects considered and of other items of interest. Reference: 1228/AP. FORTRAN IV; CDC 6600.

### PSR-217/ETHEL

This code system for generating cross sections for PSR-128/THERMOS was contributed by the OECD NEA Data Bank. The scattering model can be chosen among different Nelkin-type models, the Wigner-Wilkin model, and the Brown-St. John model. Reference: N5/81/05. FORTRAN IV; IBM 360/370.

### PSR-219/ERINNI

This code system for optical model calculation of multiple cascading particle emissions was contributed by Centro di Calcolo del CNEN, Bologna, Italy. The system computes 42 cross sections for each incident energy, representing all possible compound nucleus processes of types (x,a), (x,abc) where x can be indifferently a neutron, proton or alpha particle; a and b can be a neutron, a proton, an alpha or gamma-ray particle; and c can be a neutron or a gamma-ray particle. Reference: RT-F1(77)4. FORTRAN IV; IBM 360/370.

### PSR-222/X4R

This code system for retrieving EXFOR cross section data was contributed by the Chinese Nuclear Data Center, Institute of Atomic Energy, Beijing, People's Republic of China, through the OECD NEA Data Bank. The code system retrieves data according to a given target nucleus, reaction type, year range and incident energy range and converts them to a data table for further computer processing. The system works on the base of 3 dictionaries: (1) EXFOR reaction quantities, (2) EXFOR data headings, (3) EXFOR data units. This gives flexibility and ease to extending for more complicated EXFOR data formats. The user may add to or update items in the dictionaries. Reference: Informal Notes. FORTRAN IV; VAX.

### PSR-225/MARCOPOLO

This code package for calculating the radial and axial neutron diffusion coefficients in one-group and multigroup theory was contributed by Beijing Institute of Nuclear Engineering, through the OECD NEA Data Bank. The methodology allows calculation of the buckling-independent diffusion coefficients in a Wigner-Seitz cell for a linearly anisotropic scattering law. It allows testing of the degree of approximation of the transport correction in various types of lattices and shows that the axial coefficient may be strongly underestimated in certain cases. This method also allows testing of the simple formulas presented in the past for diffusion coefficients, which lead to good results. The problem of the coupling between energy groups, which appears in the calculation of diffusion coefficients, is also analyzed by the present method; it usually appears to be weak. Reference: Rapport CEA-R-5182 and *Nucl. Sci. Eng.* **86**: 47–62 (1984). FORTRAN IV; IBM 360/370.

## CHANGES TO THE DATA LIBRARY COLLECTION

Five changes were made to the data library collection. Four new libraries were added to the collection and the documentation for an existing data library was updated.

### DLC-75/BUGLE 80

The document (Table 8, page 16) of this coupled 47-neutron, 20-gamma-ray, $P_3$ cross section data library for LWR shielding calculations by the ANS 6.1.2 working group on multigroup cross sections was updated. The spectra included to represent fission product photons from $^{239}$Pu was for thermal fission with irradiation time of $10^{13}$S. The need for this change was reported to RSIC by users at Stone and Webster Engineering Corp., Cherry Hill, New Jersey.

### DLC-114/MATXS1

This 30-neutron, 12-photon group cross section data library in MATXS format was contributed by Los Alamos National Laboratory. The library was generated from ENDF/B-IV at 300 K using PSR-171/NJOY-II. The PSR-206/TRANSX-CTR code can be used to derive cross sections from MATXS1 in a variety of formats such as card (6E12.5), CLAW, FIDO, ANISN, and ISOTXS for use in radiation transport codes (for example, DLC-36B/CLAW-IV was derived from MATXS1). While no resonance self-shielding is possible with MATXS1, it is useful for many high energy applications where such can be ignored. Coupled libraries for 37 materials are available and neutron data are given for 64 elements. Some cross sections from the ENDF/B dosimetry file are also included. The BBC code is provided for format conversion, listing, and indexing the MATXS1 data. FORTRAN 77; CRAY, CDC, IBM. Documentation: Informal notes by RSIC.

### DLC-115/MATXS5A

This 30-neutron, 12-photon group cross section data library in MATXS format was contributed by Los Alamos National Laboratory. The library was generated from ENDF/B-V at 300 K using PSR-171/NJOY-II. The PSR-206/TRANSX-CTR code can be used to derive cross sections from MATXS5A in a variety of formats such as card (6E12.5), CLAW, FIDO, ANISN, and ISOTXS for use in radiation transport codes. While no resonance self-shielding is possible with MATXS5A, it is useful for many high energy applications where such can be ignored. Coupled libraries for 65 materials are available and neutron data are given for 87 elements. Some cross sections from the ENDF/B dosimetry file are also included. The BBC code is provided for format conversion, listing, and indexing the MATXS5A data. FORTRAN 77; CRAY, CDC, IBM. Documentation: Informal notes by RSIC.

### DLC-116/MATXS6A

This 80-neutron, 24-photon group cross section data library in MATXS format was contributed by Los Alamos National Laboratory. The library was generated from ENDF/B-V using PSR-171/NJOY-II. The PSR-206/TRANSX-CTR code can be used to derive application-dependent cross sections from MATXS6A in a variety of formats such as card (6E12.5), CLAW, FIDO, ANISN and ISOTXS for use in radiation transport codes. The library has self-shielded cross sections for temperatures from 300 to as high as 5000 K and a range of background cross sections. Coupled libraries for 62 materials are available and neutron data are given for 91 elements. Some cross sections from the ENDF/B

dosimetry file are also included. MATXS6A is intended for fast reactor applications but the group structure and weight function make it attractive for fusion and shielding applications as well. The 24-photon group structure helps improve results for both high and low energy photon flux calculations. The BBC code is provided for format conversion, listing, and indexing the MATXS6A data. FORTRAN 77; CRAY, CDC, IBM. Documentation: Informal notes by RSIC.

### DLC-117/MATXS7A

This 69-neutron group cross section data library in MATXS format was contributed by Los Alamos National Laboratory. The library was generated from ENDF/B-V using PSR-171/NJOY-II. The PSR-206/TRANSX-CTR code can be used to derive cross sections from MATXS7A in a variety of formats such as card (6E12.5), CLAW, FIDO, ANISN, and ISOTXS for use in radiation transport codes for solving thermal reactor problems. The library contains 80 materials (no photon production) and includes self-shielded cross sections for the important actinides. Thermal scattering data are given for all materials, with bound scattering provided for the major moderators. The group structure contains 42 thermal groups extending to 4 eV. The BBC code is provided for format conversion, listing, and indexing the MATXS7A data. FORTRAN 77; CRAY, CDC, IBM. Documentation: Informal notes by RSIC.

## PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we take note of the movement 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.

### Hubbell Receives Radiation Industry Award

The Radiation Industry Award for outstanding contribution in research or basic development to the industrial application of radiation technology was presented to **John H. Hubbell** of the National Bureau of Standards at the 1985 Winter Meeting of the ANS. The citation read:

*For his contribution to basic radiation measurement techniques and our understanding of the interaction of photons with matter; as a major contributor in the measurement, interpretation, and compilation of photon transport and cross section data. His work is the standard reference used in shielding design, dosimetry, and the application of radiation physics in many scientific disciplines.*

We have been informed of the following address changes: *David Michlewicz,* from Ebasco Services, Inc., to Rogers and Associates/Weston of Rockville, Maryland; *Robert C. Haight,* from Lawrence Livermore Laboratory, to Los Alamos National Laboratory; and *Donald Frederick,* from Science Applications Intl. Corp., to IRT Corp., San Diego, CA 92138.

### Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Brandon Thomas,* Nutech Engineers, San Jose, California; and *Jeffrey M. Corbin,* Martin Marietta Aerospace, New Orleans, Louisiana.

## 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.

### H. P. Schwan Named Taylor Lecturer

The National Council on Radiation Protection and Measurements (NCRP) has named **Herman P. Schwan** as the Tenth Taylor Lecturer. His lecture, entitled "Nonionizing Radiation Bioeffects: Cellular Properties and Interactions," will be a featured presentation at the NCRP Annual Meeting, April 2–3, at the National Academy of Sciences in Washington, D. C.

Herman P. Schwan, born in Aachen, F. R. Germany and educated at the University of Frankfurt, is best known for his work in biophysics and biomedical engineering. He has made important contributions in biological interactions with electromagnetic fields, electrical and acoustical properties of living matter, electrical properties of membranes, ultrasonic properties of biological systems, and principles which govern electrode properties and their application to biomedical research. Schwan has been a member of the University of Pennsylvania faculty since 1950 and is currently Professor of Bioengineering. He is a Fellow of the Institute of Electri-

cal and Electronic Engineers and the American Association for the Advancement of Science and a member of the National Academy of Engineering.

The Taylor Lecture honors *Dr. Lauriston S. Taylor* for 47 years of service to the NCRP.

## Calendar

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

### February 1986

*Workshop on Applications in Nuclear Data and Reactor Physics,* Feb. 17–Mar. 21, 1986, Miramare, Trieste, Italy, sponsored by the International Centre for Theoretical Physics. Contact: International Comm. for Theoretical Physics, Workshop on Appl. for Nucl. Data and Reactor Physics, P.O. Box 586, I-34100 Trieste, Italy (phone 040-224281-6).

*National Symposium on Atomic Energy,* Feb. 24–25, 1986, Tokyo, sponsored by the Atomic Energy Society of Japan. Contact: Minoru Masamoto, Atomic Energy Soc. of Japan, No. 1-13, 1-Chome, Shimbashi, Minato-ku, Tokyo 105, Japan (phone 03-508-1261).

### March 1986

*Advances in Fuel Management,* Mar. 2–5, 1986, Pinehurst, North Carolina, sponsored by the American Nuclear Society (ANS). Contact: Al Watson, Harris Nuclear Plant, P.O. Box 101, New Hill, NC 27562.

*Waste Management '86,* Mar. 2–6, 1986, Tucson, Arizona, sponsored by the Univ. of Arizona. Contact: Roy Post, Editor-NT, Univ. of Arizona, Nucl. Engr. Dept., Tucson, AZ 85721 (phone 602-621-6158).

*International Symposium on the Optimization of Radiation Protection,* Mar. 10–14, 1986, Vienna, Austria, sponsored by the International Atomic Energy Agency (IAEA). Contact: IAEA/NEA Internatl. Symp. Optimization of Radiation Protection, c/o IAEA-SM-285, Vienna International Centre, P.O. Box 100, A-1400 Vienna, Austria.

*China Energy '86,* Mar. 18–22, 1986, Tinajin, People's Republic of China. Contact: Aideen Barrett, Industrial & Trade Fairs International Ltd., Radcliffe House, Blenheim Court, Solihull, West Midlands B91, 2BG, England (phone 011-021-705-6707).

*Occupational and Environmental Radiation Protection,* Mar. 24–28, 1986, Boston, Massachusetts, a course sponsored by the Harvard School of Public Health. Contact: Office of Continuing Education, Harvard School of Public Health, 677 Huntington Ave., Boston, MA 02115.

*Internal Dosimetry for Fixed Nuclear Facilities,* Mar. 31–Apr. 4, 1986, a course sponsored by ORAU. Contact: Jo T. Tipton, Registrar, ORAU, P.O. Box 117, Oak Ridge, TN 37831-0117 (phone 615-576-3434).

*General Meeting of the American Physical Society,* Mar. 31–Apr. 4, 1986, Las Vegas, Nevada. Contact: APS, 335 E. 45th St., New York, NY 10017 (phone 212-682-7341).

### April 1986

*Applied Health Physics,* Apr. 7–May 9, 1986, a course sponsored by ORAU. Contact: Jo T. Tipton, Registrar, ORAU, P.O. Box 117, Oak Ridge, TN 37831-0117 (phone 615-576-3434).

*Annual Meeting on Nuclear Technology,* Apr. 8–10, 1986, Aachen, F. R. Germany, sponsored by the German Nuclear Society and the German Atomic Forum. Contact: Deutsches Atomforum e.V., Tagungsbuero, Heussallee 10, D-5300 Bonn 1, F. R. Germany (phone 0228-507223).

*Fast Burst Reactor Workshop,* Apr. 8–10, 1986, Albuquerque, New Mexico, sponsored by Sandia National Laboratories and ANS. Contact: T. F. Luera, SNL, Div. 4450A, P.O. Box 18063, Albuquerque, NM 87185 (phone 505-844-0049).

*International Meeting on Further Improvement of LWR Technologies,* Apr. 10–11, 1986, Tokyo, sponsored by the Japan Atomic Industrial Forum. Contact: Japan Atomic Industrial Forum, Inc., No. 1-13, 1-chome, Shimbashi, Minato-ku, Tokyo 105, Japan (phone 03-508-2411).

*2nd International Conference on Fusion Reactor Materials, (ICFRM-2),* Apr. 13–17, 1986, Chicago, Illinois, sponsored by the U.S. Dept. of Energy, ANS, Argonne National Laboratory, and Nuclear Metallurgy Committee of TMS/AIME and ASM. Contact: Dale Smith, Fusion Power Program, Argonne Natl. Lab., Bldg. 205, 9700 S. Cass Ave., Argonne, IL 60439, or A. Rowcliffe, ORNL, Metals and Ceramics Div., P.O. Box X, Oak Ridge, TN 37831 (phone 615-574-5057).

*12th Personnel Dosimetry Intercomparison Study,* Apr. 14–18, 1986, Oak Ridge, Tenn., sponsored by ORNL. Contact: C. S. Sims, ORNL, Bldg. 7710, P.O. Box X, Oak Ridge, TN 37831 (phone 615-574-5851).

*General Meeting of the American Physical Society,* Apr. 28–May 1, 1986, Washington, D. C. Contact: APS, 335 E. 45th St., New York, NY 10017 (phone 212-682-7341).

### May 1986

*Seventh Annual Meeting of the Canadian Radiation Protection Association,* May 5–7, 1986, Quebec City, Canada. Contact: Roch Desrochers, Comm. de la santé et de la sécurité du travail, 1199 rue De Bleury, 9e étage, Montreal, Que., Canada H3B 3J1.

*Conference on the Science and Technology of Fast Reactor Safety,* May 12–16, 1986, Channel Islands, U. K. Contact: Inst. of Civil Engineers, Conference Office, 1-7 Great George St., London SWIP 3AA.

# DECEMBER ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22161.

*RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of out-of-print reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.*

**This Literature is on order. It is not in our system. Please order from NTIS or other available source as indicated.**

## RADIATION SHIELDING LITERATURE

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**CONF-8504162,** . . *Workshop on Radiobiological Effectiveness of Neutrons. Held in Germantown, Maryland, April 9, 1985,* . . Stapleton, G.E.; Thomas, R.G.; Thiessen, J.W., . . September 1985, . . USDOE Office of Energy Research, Washington, DC; Office of Health and Environmental Research

**DOE/ER-0250,** . . *The Fusion Connection: Contributions to Industry, Defense, and Basic Science Resulting from Scientific Advances Made in the Magnetic Fusion Energy Program.,* . . DOE, . . October 1985, . . USDOE Office of Energy Research, Washington, DC; Office of Fusion Energy

**EPRI-NP-4238,** . . *Neutron Energy Spectra in the Core and Cavity of the ANO-2 PWR.,* . . Ghantous, C.A.; Hock, K.; Edwards, D.R., . . September 1985, . . Research Reports Center, P.O. Box 50490, Palo Alto, CA 94303

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Maps of the area surrounding the Garden Plaza Hotel will be available at the registration desk. The maps will show several fast food and shopping places within walking distance of the workshop site. The American Museum of Science and Energy is also within walking distance of the site.

A group tour of Oak Ridge National Laboratory (ORNL) will be offered on Friday afternoon, April 18. I wish to participate in the tour.
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