RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE U.S. DEPARTMENT OF ENERGY

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OAK RIDGE, TENNESSEE 37830

No. 169 *January 1979*

If you would not be forgotten as soon as you are dead, either write things worth reading or do things worth writing. . . . *Franklin*

NEW YEAR—NEW TELEPHONE NUMBER

615-574-6176 Commercial
624-6176 FTS

INFORMATION EXCHANGE AND THE FUTURE—*An Editorial*

RSIC has, since its inception, promoted full and free exchange of scientific information (including bibliographic literature, computer codes, and numeric data) in the subject areas of radiation protection, transport, and shielding. We point with justifiable pride to the fact that our specialized area is relatively free of proprietary or otherwise "closed" information. We believe that science flourishes best when all information is open and available for scientific examination and critical evaluation by knowledgeable scientists and engineers. We are further convinced that, since radiation recognizes no artificial barriers and no political boundaries, there is little or no justification for placing limits on the dissemination of radiation transport and shielding information.

In furtherance of our belief in open and free exchange, we have collected and disseminated RSIC-packaged information around the world and feel that we can share some credit with information generators for "good shielding" practices and methods being used throughout the international shielding community.

Working mostly under international agency agreements for information exchange, we have sought reciprocity in exchange from the beginning and can report modest success. However, there are those among the international technical community who feel that reciprocity can only be achieved through an item-for-item trade basis via bilateral exchange agreements. Having information placed on the bilateral exchange trade lists immediately removes it from the traditional free and open exchange category. In an increasing number of instances, information is being withheld from the accepted exchange centers for trading purposes.

In at least one instance, the new year (1979) will see an RSIC announcement of newly packaged information with "distribution limited to domestic users." In such a case, the domestic requester must agree in writing that he will not disseminate the information further. While we regret the necessity for any restriction placed on free and open dissemination, we must follow directed procedures.

We continue to be optimistic about the future of open and free scientific information exchange. We will continue to seek reciprocity in international shielding information exchange. We believe the international shielding community will continue to cooperate and collaborate with us in seeking to continue to bring shielding information into the public domain where we can work together to evaluate it, to fill gaps in it, to generate new information based on it and thus continue the information cycle, always seeking to improve the state-of-the-art of shielding human beings from the harmful effects of ionizing radiation.

—*B. F. Maskewitz*

INTERNATIONAL CONFERENCE ON NUCLEAR CROSS SECTIONS FOR TECHNOLOGY

The Oak Ridge National Laboratory and the University of Tennessee are organizing a conference on "Nuclear Cross Sections for Technology," to be held at the University of Tennessee, Knoxville, October 22–26, 1979. The Department of Energy and the U.S. National Bureau of Standards are co-sponsors together with the International Union of Pure and Applied Physics, and the American Physical Society. The International Atomic Energy Agency has agreed to cooperate, and co-sponsorship by the American Nuclear Society has been requested. This conference is the fifth of a series of such conferences with slightly changed titles to be held in the United States.

The organizing committee (W. M. Bugg, R. E. Chrien, J. L. Fowler, D. G. Gardner, P. B. Hemmig, H. Motz, S. F. Pasqua, Sol Pearlstein, W. P. Poenitz, and G. L. Rogosa) has selected a program committee with representation from both nuclear physics and nuclear engineering as follows: **From U.S.A.**—H. H. Barschall, University of Wisconsin; C. D. Bowman, NBS; John Browne, LLL; R. E. Chrien, BNL; C. L. Cowan, General Electric FBRD; Alex Elwyn, ANL; W. W. Havens, Columbia University; G. A. Keyworth, LASL; H. J. Kouts, BNL; F. C. Maienschein, ORNL; Odelli Ozer, EPRI; **From abroad**—S. W. Cierjacks, Karlsruhe, Germany; W. G. Cross, Chalk River, Canada; Ugo Farinelli, CNEN, Italy; T. Fuketa, JAERI, Japan; E. Lynn, Harwell, UK; A. F. Michaudon, CEN Bruyeres-le-Chatel, France; B. Rose, Geel, Belgium; J. L. Rowlands, Winfrith, UK; L. N. Usachev, Obninsk, USSR.

Speakers will be invited on such subjects as: nuclear data needs for fission or fusion reactors; for accelerator-produced neutrons for breeding fuel; for waste management—actinide production and burnup; and for safeguards. Other subjects to be discussed include: biomedical applications of nuclear data; application of nuclear physics in manufacturing and in space; nuclear cross sections and flux standards; nuclear instruments and techniques; and nuclear theory in applications. Special sessions involving several invited speakers will be arranged on subjects particularly pertinent to current technology such as for example, alternate fuel cycles. There will also be sessions of contributed papers concerned with nuclear cross sections for technology.

The deadline for abstracts of no more than 200 words in length conforming to the reproduction-ready format standards of the A.P.S. will be July 23, 1979. The registration fee of $40.00 for attendance to the conference includes the cost of proceedings. For further information on the conference, contact Joseph L. Fowler, Conference Chairman, Physics Department, University of Tennessee, Knoxville, Tennessee 37916.

All prospective participants in this conference who require visas should apply for them no later than July 22, 1979.

ORNL–RSIC'S DIVISION NAME CHANGE

The organizational division of the Oak Ridge National Laboratory in which the Radiation Shielding Information Center is embedded has again been changed to reflect the broadening of the scope of work performed. It is now known as the **Engineering Physics Division** of the Oak Ridge National Laboratory.

The Division was originally formed on July 1, 1955, as the Applied Nuclear Physics Division by combining groups from the existing Physics Division that were doing reactor development support work in the areas of critical experiments and radiation shielding, both theoretical and experimental. On July 1, 1958, the name was again changed to Neutron Physics Division since the scope of the Division had enlarged to include basic research, primarily in the areas of neutron cross sections. Currently, there is a substantial increase in the Division's non-neutronic research.

NBS PHOTONUCLEAR DATA CENTER

We are pleased to call to the attention of our readers the existence of a potential resource. The following material is taken from a recent issue of the *NSRDS Reference Data Report* (Sep./Oct. 1978).

> For fifteen years, the Photonuclear Data Center has been providing information analysis and data-center services to the scientific and technological communities needing data on the interaction of electromagnetic radiation with atomic nuclei. The Center has served such diverse areas as astrophysics,

medical physics, **nuclear reactor shielding,** basic nuclear science, and the history of science. It also participates in the U.S. Nuclear Data Network, organized by the National Nuclear Data Center (NNDC) at Brookhaven National Laboratory for the Department of Energy.

Since its inception, the Data Center's mission has been to systematically abstract, collect, and index data from the published literature, maintain a library of digital cross-section data, evaluate the data, and provide services to user communities.

Photonuclear Data Index, 1973–1977 has just been issued.[1] Seventh in a series, it contains in addition to the index itself, new values of the photonuclear reaction thresholds and isotopic abundances for the stable nuclides. These data are based on the 1977 evaluation of atomic masses[2] and a new evaluation of the isotopic compositions of the elements.[3] Also included is an index to the photonuclear reaction cross-section data now available in the Center's Digital Data Library. When used in conjunction with *Photonuclear Reaction Data,* 1973,[4] the index provides an annotated bibliography to the world's literature on the interaction of electromagnetic radiation with nuclei, published during the period 1955 through 1977.

The Center has developed and maintains four primary files of information. The *Index File* is computer searchable. Specialized bibliographies can be produced from the file based on one or more of the following items: nuclide, reaction, type of measurement, excitation energy, angle data, or bibliographic reference code. Also computerized, the *Library File* contains selected cross-section data in digital form and presently includes data for 1073 curves measured for 128 different nuclides covering 75 elements. The *Journal File* contains more than 2500 journal papers published since 1955, which give experimental data in the field. The *Abstract File,* containing over 4700 data abstract sheets, provides information and data from over 5800 separate measurements. A compilation of evaluated photonuclear cross section and reaction yield data for the p-shell nuclei (^{6}Li to ^{16}O) will be issued by the Center in the near future. The publication will appear in the *Journal of Physical and Chemical Reference Data.*

Further information can be obtained from the Photonuclear Data Center, Center for Radiation Research, National Bureau of Standards, Washington, D.C. 20234.

References:

1. E. G. Fuller and H. M. Gerstenberg, "Photonuclear Data Index," 1973-1977, NBS-SP 380, Supp. 1, 1978.
2. A. H. Wapstra and K. Bos, "Atomic and Nuclear Data Tables," 19, 177 (1977).
3. N. E. Holden, "Isotopic Composition of the Elements and their Variation in Nature, A Preliminary Report," BNL-NCS 50605, March 1977.
4. E. G. Fuller, H. M. Gerstenberg, H. Vander Molen, and T. C. Dunn, "Photonuclear Reaction Data," 1973, NBS-SP 380, 1973.
5. H. Vander Molen and H. M. Gerstenberg, "The NIRA Computer Program Package (Photonuclear Data Center)," NBS-TN 903, 1976.

NUCLEAR STANDARDS NEWS

The following British standards are newly published:

BS 5548:1978—Specification for Radiation Detectors for the Instrumentation and Protection of Nuclear Reactors: Characteristics and Test Methods, price: $14.20.

BS 5552:1978—Code of Practice for In-core Instrumentation for Neutron Fluence Rate (Flux) Measurements in Power Reactors, price: $9.50.

BS 5566:1978—Recommendations for Installed Exposure Rate Meters, Warning Assemblies and Monitors for X or Gamma Radiation of Energy Between 80 keV and 3 MeV, price: $14.80.

Order from British Standards Institution, 101 Pentonville Road, London, N1 9ND, England, Attn: BSI Sales.

NCRP HOLDS ANNUAL MEETING

The National Council on Radiation Protection and Measurements (NCRP) has released the provisional program for the 1979 Annual Meeting to be held on March 14–15, 1979 in the National Academy of Sciences Auditorium, 2100 Block of C Street, N.W., Washington, D.C.

The Scientific Session scheduled for March 14, 1979 has as its theme perceptions of risk. Papers will be presented on: Federal Regulatory Agency Approaches to the Assessment and Control of Risks from Carcinogens and Mutagens, by Roy E. Albert of New York University; Ethical and Social Considerations, by Margaret Maxey of the University of Detroit; Perception and Acceptance of Technological Risks: A Psychological Perspective, by Paul Slovic of Decision Research; Risk Analysis in Social Perspective, by Ida R. Hoos of the University of California; Occupational Risks as Viewed by Labor, by George H. R. Taylor of AFL-CIO; Actuarial Considerations, by James Hickman of the University of Wisconsin; and Legal Considerations, by Victor Yannacone, a Counselor at Law.

The program for March 14, 1979 also includes the Lauriston S. Taylor Lecture on Radiation Protection and Measurements. The third Lecture in the series will be presented in the Auditorium at 4:00 p.m. by Hymer L. Friedell, M.D., a radiologist, who recently retired from his position as Director of the Department of Radiology, University Hospital, Case-Western Reserve University in Cleveland, Ohio. Dr. Friedell has long studied the biological effects of ionizing radiation and the balancing of benefits and risks required in diagnostic radiology and other radiation applications. A reception in honor of Dr. Friedell will also be held on March 14, 1979.

The National Council on Radiation Protection and Measurements will be celebrating, in 1979, the 50th anniversary of its founding. To mark the occasion, a banquet will be held on March 14, 1979 at the Watergate Hotel at which Lauriston S. Taylor, who served as President of the Council for more than 47 years, will speak on "Fifty Years of Radiation Protection."

Included in the schedule for March 15, 1979 are: (1) a session devoted to some aspects of low-level radiation risk as a function of LET; (2) the Council's business meeting; and (3) a session devoted to reports on the current activities of selected NCRP scientific committees. The meeting is expected to conclude at noon on March 15, 1979.

The thirty-three Collaborating Organizations of the NCRP will be invited to send representatives to the 1979 Annual Meeting and other members of the Organizations will also be welcome to attend. The more than 350 scientists serving on the Council's scientific committees will also be invited to attend the meeting.

VISITORS TO RSIC

The following persons came for an orientation visit and/or to use RSIC facilities during the month of December:

Robert K. Abercrombie, University of Missouri, Columbia; Tony W. Armstrong, Science Applications, Inc., La Jolla, Calif.; Bobby Brumley and John Casillo, Clinch River Breeder Reactor Project, Oak Ridge; Alan Croff, Chemical Technology Division, ORNL, Oak Ridge; Enrico Sartori, NEA Data Bank (Saclay), Paris, France; Ed Gross, Physics Division, ORNL, Oak Ridge; Ahmad M. Jamil, IAEA, Pakistan; Michael Weber, Nukem GMBH, Hanan, FR Germany; and Kun Joong Yoo, Korean Atomic Energy Research Inst., Seoul, Korea (presently at ORNL Operations Division for one year).

PERSONAL ITEMS

John B. Dee has replaced James Larrimore as Head, Advanced Nuclear Power Technology at the IAEA. John, most recently at the General Atomic Company, was very active in shielding design at Pratt and Whitney and ORNL in the nuclear aircraft propulsion program in the 1950s.

M. Elmaghrabi has left North Carolina State University for a position with Combustion Engineering, Inc., Windsor, Conn.

Robert E. Seamon has returned to his group (TD-6) at Los Alamos Scientific Laboratory (LASL) following an assignment in the Nuclear Data Group of the International Atomic Energy Agency (IAEA) in Vienna, Italy. **Douglas Muir** of LASL is currently in the IAEA Data Group.

David G. Ward, formerly with Stearns-Roger, Inc. of Denver, Colo., is now associated with Nuclear Utility Service in Rockville, Md.

UPCOMING MEETINGS

February 1979

The National Conference on Energy Advocacy, February 2–4, 1979, Mayflower Hotel, Washington, D.C. Contact: The Heritage Foundation, 513 C Street, N.E., Washington, D.C. 20002; 202-546-4400.

WATTec-79, February 21–23, 1979, Hyatt Regency Knoxville, Knoxville, Tennessee. Contact: WATTec, Box 629, Oak Ridge, Tenn. 37830.

March 1979

Nuclear Energy Women (NEW) Biannual Meeting, March 1, 1979, Crown Center Hotel, Kansas City, Mo. following AIF's INFO '79 Conference, February 25–28. Contact: Marie Dunkle, Women's Program Coordinator, Atomic Industrial Forum, Inc., 7101 Wisconsin Ave., Washington, D.C. 20014.

State Energy Audit Impact '79, March 5–7, 1979, Dallas, TX. Contact: Professional Development Department, AIIE, 25 Technology Park/Atlanta, Norcross, GA 30092; 404-449-0460.

June 1979

Policy Analysis and Information Systems, June 28–30, 1979, Duke University. Contact: Paul P. Wang, Department of Electrical Engineering, Duke, Durham, NC 27706.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in the code collection in December.

CCC-321/STREAM

A three-dimensional Monte Carlo ray tracing code for computing light transmission was contributed by the Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico. The purpose of STREAM is to theoretically test light transmission through complex cylindrically symmetric SHIVA chamber geometries. (SHIVA is a Z-pinch device used to produce hot dense radiating plasmas by the ionization and J × B implosion of a short cylindrical foil.) STREAM offers three-dimensional cylindrical geometry with theta symmetry; specular or diffuse reflections or any combination of the two phenomena; absorption calculated for each reflection as a function of angle of incidence, index of refraction and extinction coefficient. Reference: AFWL-TR-76-206. FORTRAN IV; CDC-7600.

CCC-324/OOSII

A code package for the calculation of isotropic scattering by particles for one-dimensional and three-dimensional transport in slabs by invariant imbedding (orders-of-scattering method) was contributed by the Air Force Cambridge Research Laboratories, Hanscom Air Force Base, Massachusetts. A novel, simplified approach to particle transport in slabs, OOSII calculates the number of one-velocity particles such as neutrons or electrons transmitted and reflected by a slab of finite thickness as a function of the number of collisions the particles undergo. The package includes codes used to check results which are based on integral transport theory and Monte Carlo. Reference: AFCRL-TR-76-0023. FORTRAN IV; CDC.

CCC-329/MODEL

The models of trapped proton and electron environments for solar maximum and solar minimum were contributed by NASA National Space Science Data Center, Goddard Space Flight Center, Greenbelt,

Maryland. MODEL creates a computer accessible model of the trapped proton radiation surrounding the earth. The program can access a variety of trapped particle models contained in the form of block data routines and allow the user to generate a series of tables giving the model fluxes at various energies, L (earth radii) values and B (gauss). AP8MAC, included in the package, is thought to be representative of those years corresponding to solar maximum, which is expected to occur around 1980. AP8MIC, also included in the package, is thought to be representative of those years corresponding to solar minimum. References: NSSDC-74-03 and -76-06. FORTRAN IV; CDC.

PSR-120/NANICK

The NANICK program for the computation of infinitely-dilute multigroup cross sections from ENDF/B nuclear data files was contributed by Soreq Nuclear Research Center, Yavne, Israel. Reference: Unpublished paper by Yigal Gur. FORTRAN IV; IBM 360.

PSR-132/MACK-IV

A new version of the MACK program for calculating nuclear response functions from data in ENDF format was contributed by Argonne National Laboratory and Oak Ridge National Laboratory (ORNL). The new version, MACK-IV, processes data in ENDF format corresponding to ENDF/B-IV. The fundamental calculation of MACK-IV is that of kerma factors for neutron reactions. Neutron kerma factors in point and multigroup forms, individual reactions, helium, hydrogen, and tritium production response functions are calculated from data in ENDF format. The program also calculates gamma-ray production cross sections. All point data output can be written or punched. Multigroup data output can be obtained in "MACK-ACTIVITY-Table" format for direct use in discrete ordinates codes. Sample problems are provided. One full tape is required for transmittal. Reference: ANL/FPP-77-5. IBM-360/195, 91, UNIVAC 1110.

CHANGES IN THE DATA LIBRARY COLLECTION

The following change was made in the data collection.

DLC-60/MACKLIB-IV

A new 171-neutron, 36-gamma-ray group nuclear response function library calculated with PSR-132/MACK-IV from data in the ENDF/B-IV master files has been contributed by Argonne National Laboratory. Three data libraries are included. First is the "MACK-ACTIVITY-Table" library containing data for 49 materials, H, He, ^{6}Li, ^{7}Li, Be, ^{10}B, ^{11}B, C, N, O, F, Na, Mg, Al, Si, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Nb, Mo, Ta, ^{182}W, ^{183}W, ^{184}W, ^{186}W, Pb, ^{232}Th, Pa, ^{233}U, ^{234}U, ^{235}U, ^{236}U, ^{238}U, Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu, ^{241}Am, and ^{243}Am. Included are neutron and gamma-ray kerma factors, displacement cross sections, H, T, and He production cross sections, plus individual reaction cross sections. The "MACK-ACTIVITY-Table" can be used directly in a discrete ordinates code such as CCC-254/ANISN to calculate desired responses. The same data are included in an alternate format. There are also 171-neutron, 36-gamma-ray group gamma-ray production cross sections included as part of the package. A program is provided for selectively retrieving the data. A full reel of tape is required for transmittal. Reference: ANL/FPP/TM-106. IBM-360/195, 91, UNIVAC 1110.

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 22151.

RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of

out-of-print reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

THIS LITERATURE IS ON ORDER. IT IS NOT IN OUR SYSTEM. PLEASE ORDER FROM NTIS OR OTHER AVAILABLE SOURCE AS INDICATED.

REACTOR AND WEAPONS RADIATION SHIELDING LITERATURE

AFWL-TR-77-168; AD-A-049626
Thermal Neutron Damage in Bipolar Transistors. Final Report.
Stanley, T.D.
December 1977
NTIS

ARBRL-TR-02097
M113A1 Armored Personnel Carrier - Initial Radiation Protection Factors.
Stueker, S.; Rainis, A.E.; Schwenk, R.M.
August 1978
Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314

ARH-CD-984
Survey of Decontamination and Decommissioning Techniques.
Kusler, L.E.
May 1977
NTIS

HEDL-SA-1495-FP; CONF-780622-64
Fission Product and Actinide Data Evaluations for ENDF/B-V.
Schenter, R.E.
May 1978
Dep., NTIS

HMI-B-235 (In German)
Calculation of the Influence of a Thermal Shield on the Neutron Flux and on the Tritium Production in a Fusion Reactor Blanket.
Schneider, J.
April 1977
Dep., NTIS (U.S. Sales Only)

IAEA-213
Fission Product Nuclear Data (FPND) - 1977. Vol.I.
IAEA
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.5-32
Review of Existing Compilations and Evaluations of FPND.
Lammer, G.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.33-39
Needs and Accuracy Requirements for FPND in the Assessment of Environmental Aspects.
Lindberg, L.
August 1978
IAEA, Vienna (MF Only)

IAEA 213, pp.41-60
Needs and Accuracy Requirements for FPND in the Physics Design of Power Reactor Cores.
Rowlands, J.L.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.61-89
The Importance of Fission Product Nuclear Data in Reactor Design and Operation.
Devillers, C.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.91-104
Needs and Accuracy Requirements for FPND in the Out-of-Pile Fuel Cycle.
McKay, H.A.C.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.105-108
A Review of FPND Requirements for Investigation of Irradiated Nuclear Fuel: Burnup Measurements, Neutron Dosimetry, Nuclear Safeguards.
Maeck, W.J.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.139-218
Status of Neutron Reaction Cross Sections of Fission Products in the Energy Range of Resolved and Unresolved Resonances.
Fort, E.
August 1978

IAEA, Vienna (MF Only)

IAEA-213, pp.219-277
Impact of Integral Measurements on the Capture Cross-Section Evaluations of Individual Fission Product Isotopes.
Gruppelaar, H.; Dekker, J.W.M.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.279-350
Status of Fast Neutron Reaction Cross Section of Fission Products.
Iijima, S.
August 1978
IAEA, Vienna (MF Only)

IAEA-213, pp.351-419
Status of Fission Product Yield Data.
Cuninghame, J.G.
August 1978
IAEA, Vienna (MF Only)

LA-UR-78-964; CONF-780508-5
Scoping Nucleonic Studies for the Riggatron Fusion Reactor Concept.
Wienke, B.R.; Dudziak, D.J.; Bosler, G.E.
1978
Dep., NTIS

LA-UR-78-1197; CONF-780508-4
Nucleonic Aspects of the Linus Imploding Blanket.
Dudziak, D.J.
1978
Dep., NTIS

LA-UR-78-1198; CONF-780508-3
Minimum-Thickness Blanket/Shield with Optimum Tritium Breeding and Shielding Effectiveness.
Gerstl, S.A.W.
1978
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NUREG/CP-0004,Vol.1
Dosimetry Methods for Fuels, Cladding, and Structural Materials.
Morgan, W.C. (Ch.)
Proceedings of the Second ASTM-Euratom Symposium on Reactor Dosimetry - October 3-7, 1977 at Palo Alto, Calif.
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NUREG/CP-0004,Vol.1, pp.1-16
Dosimetry and Shielding.
Farinelli, U.
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NTIS

NUREG/CP-0004,Vol.1, pp.17-60
Standardization of Dosimetry and Damage Analysis Work for U.S. LWR, FBR, and MFR Development Progams.
McElroy, W.M.; Doran, D.G.; Gold, R.; Lippincott, E.P.; Schiffgens, J.O.; Simons, R.L.; Morgan, W.C.; Grundl, J.A.; McGarry, E.D.; Kam, F.B.K.; Swanks, J.H.; Odette, G.R.
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NUREG/CP-0004,Vol.1, pp.61-67
Radiation Damage Outside the Reactor Vessel.
Rossin, A.D.
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NUREG/CP-0004,Vol.1, pp.69-83
FFTF Reactor Characterization Program.
Daughtry, J.W.; Bennett, R.A.; Bunch, W.L.; McElroy, W.N.; King, T.L.
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NUREG/CP-0004,Vol.1, pp.85-99
The Zero-Power Basis of Fast Reactor Dosimetry.
Sanders, J.E.
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NUREG/CP-0004,Vol.1, pp.101-140
Overview of Gamma-Ray Energy Deposition and Spectra in Fast Reactor Environments.
Gold, R.
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NUREG/CP-0004,Vol.1, pp.141-144
Activities of the Irradiation Damage Subgroup.
Alberman, A.; Genthon, J.P.; Mas, P.; Schneider, W.; Weise, L.; Wright, S.B.; Zijp, W.L.
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NUREG/CP-0004,Vol.1, pp.145-228
Introduction to Neutron Metrology for Reactor Radiation Damage.
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NUREG/CP-0004,Vol.1, pp.229-238
Dosimetry Method for Light Water Reactors.
Martin, G.C.,Jr.
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NUREG/CP-0004,Vol.1, pp.239-255
Dosimetry Experiment for Neutron Spectral Characterization of the Second NRC 4T-CT Irradiation Capsules at BSR.
Kam, F.B.K.; Swanks, J.H.; Stallman, F.W.
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NUREG/CP-0004,Vol.1, pp.257-269
Neutron Energy Spectrum Determination for Irradiation Damage Study of Reactor Structural Materials (No. 2).
Takeuchi, K.; Miura, T.; Yamaji, A.
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NUREG/CP-0004,Vol.1, pp.271-283
High Flux-Fluence Measurements in Fast Reactors.
Lippincott, E.P.; Ulseth, J.A.
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NUREG/CP-0004,Vol.1, pp.285-297
Neutron Fluence Determination and Safety Analysis Aspects of Large Specimen Steel Irradiations.
Bartholome, G.; Cerles, J.M.; Leitz, Ch.; Nagel, G.; Schenider, W.; Soulat, P.
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NUREG/CP-0004,Vol.1, pp.299-311
Determination of Fuel Irradiation Parameters: Required Accuracies and Available Methods.
Mas, P.
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NUREG/CP-0004,Vol.1, pp.313-320
Selection of Fission Product Monitors for the Determination of Burnup for Fast Reactor Fuels.
Maeck, W.J.
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Nuclear Measurements for the Irradiation of GCFR-Fuel Elements.
Euringer, H.; Krug, W.; Schneider, W.; Stechemesser, H.
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NUREG/CP-0004,Vol.1, pp.333-351
Intercomparison of the Fission Power Determinations in a Fuel Pin.
Bruet, M.; Michel, F.; Perdreau, R.
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Continuous Parameter Determination of Irradiated Nuclear Fuels in Test-Reactor.
Bevilacqua, A.; Junod, E.; Mas, P.; Perdreau, R.
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NUREG/CP-0004,Vol.1, pp.369-387
The Role of Irradiation Reactor Mock-ups.
Casali, F.; Cerles, J.M.; Debrue, J.
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NUREG/CP-0004,Vol.1, pp.389-399
Some Problems Encountered in Dosimetry of Irradiations of Burnable Poisons.
Grifoni, S.; Lloret, R.; Pistella, F.
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NUREG/CP-0004,Vol.1, pp.401-410
Post-Irradiation Dosimetry Measurements on Nuclear Fuel.
Fudge, A.J.; Foster, E.; Banham, M.F.
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NUREG/CP-0004,Vol.1, pp.411-422
Nondestructive Analysis of Irradiated Fuels.
Dudey, N.D.; Erick, D.C.
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NUREG/CP-0004,Vol.1, pp.423-431
Activity of the Joint Research Centre Ispra in the Field of Post Irradiation Analysis of Spent Fuel.
Guardini, S.; Guzzi, G.
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NUREG/CP-0004,Vol.1, pp.433-447
Special Methods of Non-destructive Burn-up Determination for Nuclear Fuels.
Ramthun, H.
October 1977
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NUREG/CP-0004,Vol.1, pp.449-467
Applications of Reactor Gamma Scanning to Fuel Irradiation.
Simonet, G.; Cerles, J.M.; Perves, J.P.; Michel, F.
October 1977

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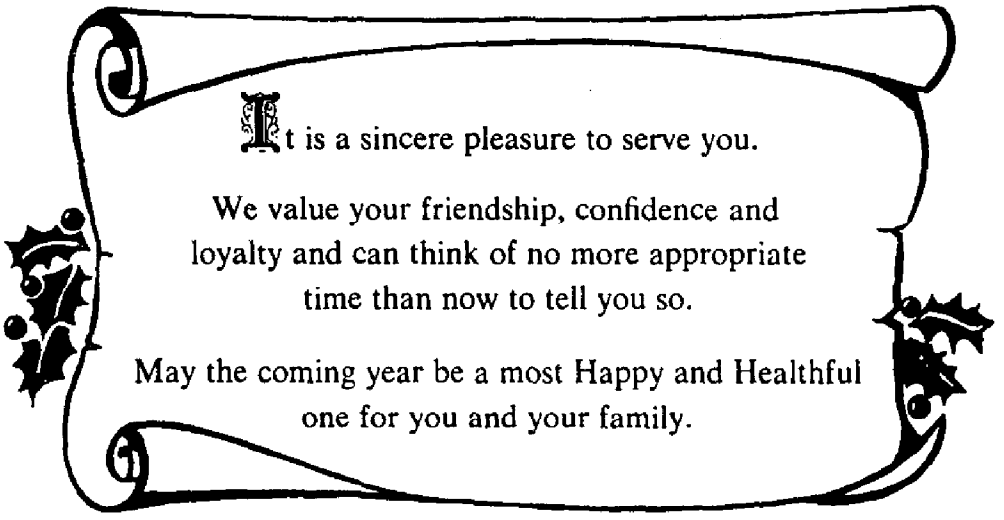
November 1976

AVAIL: NTIS (U.S. Sales Only)



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