RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

POST OFFICE BOX X • OAK RIDGE, TENNESSEE 37830

No. 132 *November 1975*

True wisdom lies in gathering the precious things out of each day as it goes by.
...E. S. Bouton

KNOW YOUR RSIC STAFF MEMBERS

Staff changes in RSIC occur very seldom and we sometimes forget to keep you informed. We belatedly announce that **Betty L. McGill**, who helped RSIC to get going in its infancy (about 10 years ago), has returned on a part-time basis to assist in coordinating the activities associated with the codes collection. She is a graduate of Trinity University, San Antonio, Texas and has done graduate work in mathematics at the University of Tennessee. **Nancy Hatmaker**, a product of Tennessee Technological University's undergraduate and graduate schools, operates the RSIC "paper mill," analyzing, processing, and filling your requests. **Ellen Williams**, of the RSIC secretarial-publications team, has just left us to work full time in ORNL Technical Publications and is replaced by **Martha Carol Abrams** of Tennessee Technological University and the University of Tennessee.

The following staff members have served your information needs for several years. Research staff member, **David K. Trubey**, is a founder of RSIC, managed the Center for several years, and now devotes full-time to R&D to help fill information voids, to coordinate technical review for the RSIC storage and retrieval of information system (SARIS), and to respond to your inquiries for technical information in radiation protection, radiation transport and shielding.

Research staff member, **Robert W. Roussin**, coordinates RSIC's data activities, including the data library collection (DLC), the DNA and CTR data libraries, and working with NNCSC and CSEWG. He serves as your consultant in these and other technical areas when needed. In addition, Bob gives support to all RSIC technical activities and also devotes time to R&D as indicated by the expressed needs of the user community.

Several information and computer specialists help to carry the RSIC workload. **Hemma Comolander** is responsible for the testing and packaging of incoming computer codes; **Henrietta Hendrickson** updates and maintains the code collection; **Carol Coker** processes all your requests for code/data packages; **Juanita Wright** tests and packages data and maintains the special data libraries; **Jane Gurney** maintains RSIC's computerized directory and the SARIS system; **Ann Gustin** manages technical review; **C. Marie Anthony** manages pending code/data testing and packaging; and **Mildred Landay** heads the secretarial team. A part-time consultant-physicist, **Frances Alsmiller**, gives technical support to the codes activities. **Betty F. Maskewitz** is the general coordinator. In addition, RSIC can draw upon personnel of the ORNL Computer Science and other service divisions as needed.

As recommended by the Weinberg Panel (*Science, Government, and Information*, a report of the President's Science Advisory Committee (January 1963)), RSIC is embedded in the ORNL Neutron Physics Division (NPD) where work in radiation transport and shielding has been going on for many years. We acquire the NPD's technology and can freely access its personnel for information and advice. **We claim we are also embedded in our community of users—you and your work—and depend on you to help to make it so.** We always appreciate your willingness to share your technology and value your suggestions for RSIC improvement.

RSIC GRAB BAG

Dr. John C. Courtney of the Nuclear Science Center (NSC), Louisiana State University (LSU) at Baton Rouge, has left with RSIC 30 copies of "A Handbook of Radiation Shielding Data", ANS-SD-14, for distribution on a first come basis. When this supply is exhausted, requesters will be referred to NSC-LSU.

AVAILABILITY OF ORNL-RSIC-39

ORNL-RSIC-39, "The Development of Radiation Shielding Standards in the American Nuclear Society" (November 1975), by D. K. Trubey is 'hot off the press' and a limited number of copies are available. The document will be made available on a continuing basis from the National Technical Information Service (NTIS), Springfield, Virginia at $4.00 for printed copy, $2.25 for microfiche. The report is a definitive statement of the ANS-6 Shielding Subcommittee of the ANS Standards Committee, a roster of its working task force members, their organization into subject area groups, their accomplishments, and their relationships to other ANS standards subcommittees and groups.

ANOTHER REMINDER

Last call for reserved copies of ORNL-RSIC-13, Volume IV, "Abstracts of Digital Computer Code Packages," soon to be published. Write immediately for your copy.

ADDITION TO ERDA CRITICAL REVIEW SERIES

We are pleased to announce the availability of "Particle-Transport Simulation with the Monte Carlo Method" by L. L. Carter and E. D. Cashwell, Los Alamos Scientific Laboratory, Los Alamos, New Mexico, published as part of the ERDA Critical Review Series by the Technical Information Center, Office of Public Affairs, U. S. Energy Research and Development Administration (1975), carrying Library of Congress Catalog Card Number: 75-25993 (CIP). The review is available as TID-26607/YAS for $5.45 ($7.95 foreign) from National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161.

With our computers of today, the Monte Carlo method is a basic tool for solving particle-transport problems. This book is directed to the engineer, physicist, or mathematician who wants to apply the techniques of Monte Carlo to neutron and photon transport.

The fundamental ideas of Monte Carlo are discussed, and many of the techniques used in modern computer codes are reviewed. The important reactions undergone by neutrons and photons are treated, with a view to helping the reader to understand the problems encountered and also to aid him in solving his own problems. The authors attempt to present the important theoretical ideas as clearly as possible, with emphasis on the practical applications to transport problems.

An extensive literature survey is included to help the reader delve into certain topics deeper than is possible in this monograph and to aid him in investigating entirely different uses of Monte Carlo. The contents include an introduction, sampling methods, mathematical prescriptions for simulating particle transport, mechanics of simulating particle transport, neutron transport, photon transport, and a literature survey.

Other available items in the ERDA Critical Review Series are: *Sources of Tritium and Its Behavior upon Release to the Environment* (TID-24635), 1968, $6.00; *Reactor-Noise Analysis in the Time Domain (TID-24512), 1969, $6.00; Plume Rise (TID-25075), 1969, $6.00; Atmospheric Transport Processes, Part 1: Energy Transfers and Transformations* (TID-24868), 1969, $6.00; *Part 2: Chemical Tracers* (TID-25314), 1971, $6.00; *Part 3: Hydrodynamic Tracers* (TID-25731), 1972, $3.00; *Aerodynamic Characteristics of Atmospheric Boundary Layers* (TID-25465), 1971, $3.00; *The Analysis of Elemental Boron* (TID-25190), 1970, $3.00; *Nuclear-Explosion Seismology* (TID-25572), 1971, $3.00; *Boiling Crisis and Critical Heat Flux* (TID-25887), 1972, $3.00; *Neptunium-237 Production and Recovery* (TID-25955), 1972, $3.00; *The Kinetics of the Oxidation-Reduction Reactions of Uranium, Neptunium, Plutonium, and Americium in Aqueous Solutions* (TID-26506/YAS), 1975, $5.45; *Particle-Transport Simulation with the Monte Carlo Method* (TID-26607/YAS), 1975, $5.45.

PUBLICATION OF 1975 ANNUAL BOOK OF ASTM STANDARDS

The increased use of nuclear energy to generate electricity has made it imperative for engineers, designers and scientists concerned with nuclear reactors to have reliable standards. Operators and utilities are equally concerned. Now, for the first time, ASTM provides its standards in a single volume which can be of immense value. *Part 45, Nuclear Standards of the 1975 Annual Book of ASTM Standards,* consists of 1,012 pages (115 standards) in a hard cover (6 x 9) and is priced at $27.00. The publication code number is 01-045075-35.

Part 45 contains all ASTM Standards dealing with nuclear materials and materials related to nuclear reactors. Of the 115 standards in the book, 30% are new, revised or changed in status since 1974. Seventy have also been approved by ANSI and a number of others by other organizations. Among the new standards in this book are: recommended Practice for Descaling and Cleaning Titanium and Titanium Alloy Surfaces; Test for Compressive (Crushing) Strength of Graphite; Test for Thermal Diffusivity of Carbon and Graphite by a Thermal Pulse Method; Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Boron; Chemical, Mass Spectrometric, Spectrochemical, Nuclear, and Radiochemical Analysis of Nuclear-Grade Uranyl Nitrate Solutions; Classification System for Polymeric Materials for Service in Ionizing Radiation; Test for Determining Absorbed Gamma and Electron Radiation Dose with the Ceric Sulfate Dosimeter; Recommended Practice for Alpha Spectrometry of Water; Recommended Practice for Measurement of Low Levels of Activity in Water; Test for Radioactive Zirconium in Water; Test for Radioactive Nickel in Water; Recommended Practice for Reporting Dosimetry Results on Nuclear Graphite. The standards in *Part 45* cover: Concrete Products for Nuclear Applications; Graphite Products for Nuclear Applications; Metal Products for Nuclear Applications (Hafnium, Nickel and Nickel Alloys, Steel, Tantalum, Titanium and Titanium Alloys, Zirconium and Zirconium Alloys); Nuclear Grade Materials; Radiation Effects in Organic Materials; Radioactivity, Inorganic Materials in Water; Analysis, Dosimetry and Radiation Effects in Metals; and Temperature Measurement; Complete listing of nuclear related ASTM Standards.

The book is available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. Requesters should order by publication code number above.

CHANGE IN THE DATA COLLECTION

The following change was made during October.

DLC-34/LENDL

The Livermore evaluated neutron and gamma-ray production cross-section data library in ENDF format was updated by the addition of data sets for Cm-245, Cf-252, and Am-241. The data package is now designated DLC-34B. There are 10,447 records of information in these new data sets and a single reel of magnetic tape will be sufficient for their transmittal. The entire data library ($\geq$ 134,000 records) may be transmitted on one reel written 9-track, 800 bpi, unblocked, or eight reels written 7-track.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made during October.

CCC-253/ANISN-PPL

The code package was updated to correct errors in the ANISN-PPL source called to RSIC's attention by William G. Price, Jr., of the contributing installation, Plasma Physics Laboratory, Princeton University. The changes are relatively minor to implement in an operating version of the code. Requesters may ask for a statement of the changes or for the updated code package.

CCC-269/RSYST

This integrated modular code system for shielding and reactor physics calculations was contributed by the Institut fur Kernenergetik (IKE), University of Stuttgart, Germany. RSYST consists of a data base, a

data base manager, a driver routine, and many modules grouped into five categories: 1) general service routines, 2) mathematical operations, 3) group cross section generating routines (from ENDF/B-III) for shielding or reactor calculations, 4) shielding—one/two-dimensional S_n and three-dimensional Monte Carlo calculations, and 5) reactor static and burnup—diffusion, first collision and more elaborate transport theory, with options for S_n and Monte Carlo. The code system was tested by RSIC on the IBM 360/370 computers. The programming language is FORTRAN IV with minor sets of Assembler language routines. The code package consists of documentation and 57 files of information written on magnetic tape as 39,875 records.

CCC-270/SUBDOSA

The code package, designed for the calculation of external gamma-ray and beta doses from accidental atmospheric releases of radionuclides, was contributed by Battelle Memorial Institute, Pacific Northwest Laboratories, Richland, Washington. Derived from CCC-174/RACER, SUBDOSA is programmed in FORTRAN IV and is operable on CDC CYBER-74. Reference: BNWL-B-351 (UC-11).

CORRECTION TO SPACE CODE PACKAGE

The proton penetration codes for space vehicles, packaged as CCC-76/BPPC, have been made operable on a USSR-made R-20 computer (similar to IBM 360) at the Central Research Institute for Physics, Budapest, Hungary. In the testing process an error was found in the value of a constant, i.e., the MeV/g to rad conversion factor is set to $6.24*10^6$ instead of the correct $6.24*10^7$. Users of the codes should change this value in the **Model D Code** (lines PP001750, 1760, 1850, 1860), and in the **Secondary Proton Program** (lines SP001570, 1580, 1670, 1680). Due to this error, the DE/dx values are off by a factor of 10; all other results are correct.

We are grateful to László Koblinger for calling this matter to RSIC attention. Since we no longer have NASA sponsorship, RSIC can exercise only a "preservation of the technology" role in space radiation coverage.

PERSONAL ITEMS

Dr. Jacques Royen, responsible for the Secretariat of the OECD Nuclear Energy Agency (NEA) Committee on Reactor Physics (CRP) for several years, has relinquished the post for new duties in the fields of reactor safety and fusion power within the Paris office. **Dr. Nigel Tubbs**, physicist on the staff of the NEA Neutron Data Compilation Centre (CCDN) at Saclay for many years, is now in charge of the NEA-CRP Secretariat whose address is: 38 Boulevard Suchet, F-75016 Paris, France.

The following changes of address have been noted: **K. E. Cowser**, from Oak Ridge National Laboratory to ERDA Office of the Deputy Administrator for Environment and Safety; **J. R. Ughum**, from Simulation Physics, Inc., Burlington, Massachusetts to Austin Research Associates, Inc., Texas; **Victor V. Verbinski**, from IRT Corporation, San Diego, to Science Applications, Inc., La Jolla, California; **Richard H. Johnson**, from University of Illinois at Urbana (student) to Purdue University, West Lafayette, Indiana (staff); and **John E. Michales**, from SCI-TEK, Inc., Springfield, Virginia to ISD, San Jose, California where he works as District Manager.

Dr. Ricardo Artigas was recently named Manager, Reactor Safety and Assurance, General Electric Company, Nuclear Energy Systems Division at San Jose, California.

FIFTH INTERNATIONAL CONFERENCE ON REACTOR SHIELDING, April 19-23, 1977

D. K. Trubey, general chairman of the above conference, reports progress in several areas. Following ERDA concurrence in August, the following steps have been taken.

1. Co-sponsorship has been initiated with the American Nuclear Society, IAEA, OECD-NEA, Oak Ridge Associated Universities, and the University of Tennessee (UT). The ANS, ORAU, and UT have agreed. The OECD-NEA is acting on the proposal. We have not heard from Vienna, although the initial informal contact was positive.

2. Invitations to participate on a 10-man technical program committee were sent to 8 countries. Several 024positive replies have been received, including the 3 U.S. members. The committee has started functioning.
3. A local organizing committee is being formed to make local arrangements and plan non-technical activities. The Hyatt Regency Hotel in Knoxville has been tentatively engaged.

OTHER UPCOMING CONFERENCES

The **LSU Nuclear Science Center** will offer a five-day course in **basic health physics** in Baton Rouge beginning on December 15, 1975. The registration fee of $240 includes all the required notes and materials.

The objective of this short course is to present the basic principles of health physics to engineers, scientists, managers, and other technical personnel. An educational background equivalent to a BS degree in science or engineering, or a high school diploma and several years' experience in a technical area should be sufficient. The use of advanced mathematics will be minimized since the emphasis will be on solutions to practical problems.

The program covers five days of lectures, class discussions, demonstrations, solutions to illustrative problems, and laboratory experiments. Subjects to be covered include: Structure of Matter, Properties of Radiation, Radiation Interactions, Radiation Sources, Biological Effects of Radiation, Dosimetry Units, Principles of Radiation Measurement, Laboratory Measurement Systems, Survey Instruments, Radiation Protection Guides, Licensing and Regulations, Californium-252 Neutron Sources, Personnel Monitoring, Lab Exercise—Neutron and Gamma-Ray Sources, Basic Radiation Shielding, Facility Design, Environmental Monitoring, Transportation of Radioactive Materials, Decontamination Techniques, Emergency Procedures, Sources of Information, and Discussion of Individual Problems and Special Topics.

Additional information may be obtained by contacting John C. Courtney, R. C. McIlhenny, or W. F. Curry at LSU, telephone 504-388-2163.

The biennial **9th International Symposium on Fusion Technology** will be held in Garmisch-Partenkirchen (Bavarian Alps near Munich) on June 14–18, 1976. It will be organized as in previous years and is intended to bring together people working on fusion technology to discuss new and original developments and studies. The topics covered are: Systems Studies; Magnet Technology, including Power Supplies and Refrigerators; Plasma Handling (Injection, Heating, Extraction); Control (Feedback and Power Stabilization); Processing of Experimental Data; Blanket Technology (Neutronics, Radiation Damage, Materials); Vacuum Technology; Tritium Handling; and Environmental Considerations.

The Symposium is sponsored by EURATOM and the Max-Planck-Institut fur Plasmaphysik in Garching. The final date for registration is February 1, 1976. Further information may be secured from the Conference Secretary.

The Organizing Committee includes: R. Carruthers (UKAEA Culham), A. M. van Ingen (FOM Jutphaas), A. Knobloch (EURATOM), F. Richter (KFA Julich), G. Rostagni (CNEN Frascati), K. H. Schmitter (IPP Garching), B. Taquet (CEN Grenoble), and A. Torossian (CEA Fontenay-aux Roses). Conference Secretary: Mr. H. Lohnert, Max-Planck-Institut fur Plasmaphysik, D-8046 Garching near Munich, Federal Republic of Germany.

VISITORS TO RSIC

Visitors to RSIC during the month of October were: Jack Courtney, Louisiana State University Nuclear 024Science Center, Baton Rouge, Louisiana; Rasey Feezell, Tennelec, Oak Ridge, Tennessee; P. B. Hemmig, A. Presessky and E. E. Hoffman, ERDA-DRRD, Washington, D. C.; Urban P. Jenquin and Dale R. Oden, Battelle Northwest Laboratory, Richland, Washington; Frank Tooper, ERDA-Germantown, Washington, D. C.; Bruce W. Wieland, Oak Ridge Associated Universities, Oak Ridge, Tennessee; Lionel Lemoine and Jacques Thebault, CNEXO, Brest, France; Sheng-chi Lin, Nuclear Reactor Division, Taiwan AEC, Lung-tan, Taiwan; and Chen Huan Tong, Elizabeth Howard, and W. O. Harms, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

OCTOBER 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

AED-CONF-74-509-012
Depth Dose Distribution Measurements and Attenuation for a 252-Cf Source.
Piesch, E.; Sayed, A.M.
From Second Symposium on Neutron Dosimetry in Biology and Medicine, Neuherberg/Muenchen, F.R. Germany (September 30, 1974)
1974
INIS

AN-924
NERVA Radiation Environment from Liquid Hydrogen.
Anno, G.H.; Witthaus, J.K.
April 1963
Dep., NTIS $6.75

BNWL-B-351
SUBDOSA - A Computer Program for Calculating External Doses from Accidental Atmospheric Releases of Radionuclides.
Strenge, D.L.; Watson, E.C.; Houston, J.R.
June 1975
NTIS $7.60

BNL-19565
Preliminary Reference Design of a Fusion Reactor Blanket Exhibiting Very Low Residual Radioactivity.
Powell, J.R.(Ed.)
December 1, 1974
Dep., NTIS $8.75

BNL-20241; CONF-750723-3
Production and Use of Li(d,n) Neutrons for Simulation of Radiation Effects in Fusion Reactors.
Goland, A.N.; Guminsky, D.H.; Hendrie, J.; Kukkonen, J.; Sheehan, T.; Sneed, C.L.,Jr.
1975
Dep., NTIS $4.50

BNL-20263; CONF-750723-4
Preliminary Design of a 30-MeV Deuteron Linear Accelerator for the Production of Intense Beams of High Energy Neutrons for CTR Research.
Batchelor, K.; Blewett, J.P.; Chasman, R.; Claus, J.; Fewell, N.; Grand, P.; Lankshear, R.; Sheehan, J.; Witkover, R.
1975
Dep., NTIS $4.25

BNL-20299
Beryllium and Lithium Resource Requirements for Solid Blanket Designs for Fusion Reactors.
Powell, J.R.
March 31, 1975
Dep., NTIS $4.00

BNL-20299
Beryllium and Lithium Resource Requirements for Solid Blanket Designs for Fusion Reactors.
Powell, J.R.
March 31, 1975
Dep., NTIS $4.00

BNWL-1855
Shielding Calculational System for Plutonium.
Zimmerman, M.G.; Thomsen, D.H.
August 1975
Dep., NTIS $5.45

CONF-7209124
Nuclear Data and Reactor Physics. Proceedings of the International Summer School, Predeal, Romania, September 12 - 21, 1972.
Purica, I.I.(Ed.)
1974
Institutul de Fizica Atomica, Bucharest (Romania)

CONF-7209124, pp.139-158
Integral Transport Theory.
Benoist, P.
1974
Institutul de Fizica Atomica, Bucharest (Romania)

CONF-7209124, pp.159-174
C_n Method of Solving of the Boltzmann Equation.
Benoist, P.
1974
Institutul de Fizica Atomica, Bucharest (Romania)

CONF-731015-P2, pp.883-907
Measurements of Fast Neutron Spectra in Iron, Uranium, and Sodium-Iron Assemblies.
Kappler, F.; Pieroni, N.; Rusch, D.; Schmidt, A.; Wattecamps, E.; Werle, H.
1973
IAEA

CONF-750303-29
Decay Heat Analysis for an LMFBR Fuel Assemby Using ENDF/B-IV Data.
Morrison, G.W.; Weisbin, C.R.; Kee, C.W.
No Date
Dep., NTIS $4.00

CONF-750723-1
Intense 14 MeV Neutron Source Using a Spherical Drive-In Target.
Kim, J.; Morgan, O.B.
July 11, 1975
Dep., NTIS $4.00

CONF-750723-9
Large-Volume Intense Neutron Source for CTR Materials Studies.
Saltmarsh, M.J.; Horak, J.A.
1975
Dep., NTIS $4.00

EPRI-221, Final
Development of Evaluated and Processed Nuclear Cross-Section Data for Use in Thermal Reactor Calculations (Research Project 221. Final Report).
Leonard, B.R.,Jr.; Kottwitz, D.A.; Jenquin, U.P.
July 1975
Pacific Northwest Laboratories, Battelle

EUR-5335e; EUR FB 150
Gamma Shielding of Irradiated 235-U.
Penkuhn, H.
June 1975
Dep., NTIS (U.S. Sales Only) $5.25

IFA-FR-134-1975
Use of Code DTF-4 for Determining the Coefficient of Back-Reflection of the Neutron Within the Thermonuclear Plasma of a Thermonuclear Reactor Controlled by the Rate of the Fission Reactions. Part I.
Cristea, G.
June 1975
Dep., NTIS (U.S. Sales Only) $4.00

INIS-mf-1383, pp.46-52 (In Russian)
Method for Calculation of the Plane-Parallel Shield with Accurate Account for the Cross-Section Resonance Structure.
Germogenova, T.A.; Ignatov, A.A.; Nikolsev, M.N.
1973
INIS

LA-5836-MS
Neutron Energy and Velocity Distributions from Thermal D-T Reactions.
Marshall, D.A.
December 1974
Dep., NTIS $4.00

LA-6015-T; Thesis
Investigation of Pattern Recognition Techniques for the Identification of Splitting Surfaces in Monte Carlo Particle Transport Calculations.
Macdonald, J.L.
August 1975
NTIS $7.60

LA-6023-MS
Proprietary, Standard, and Government-Supported Nuclear Data Bases.
Poncelet, C.G.; Ozer, O.; Harris, D.R.
August 1975
NTIS $4.00

LA-UR-75-318; CONF-750303-42
Fission-Product Gamma-Ray Photoneutron Spectra.
Stamatelatos, M.G.; England, T.R.
March 1975
Dep., NTIS $4.00

LA-UR-75-1262; CONF-750723-8
Intense Neutron Source Facility for the Fusion Energy Program.
Armstrong, D.D.; Emigh, C.R.; Meier, K.L.; Meyer, E.A.; Schneider, J.D.
1975
Dep., NTIS $5.75

LA-UR-75-1799
The Application of Sensitivity Analysis to Nuclear Data Assessment.
Gerstl, S.A.W.; Dudziak, D.J.; Muir, D.W.
1975
Los Alamos Scientific Lab., University of California, Los Alamos, New Mexico 87544

NBS Handbook 114
General Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV.
National Bureau of Standards
1975
GPO $0.90

NCRP-44
Krypton-85 in the Atmosphere - Accumulation, Biological Significance, and Control Technology.
NCRP
July 1, 1975
National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Washington, D.C. 20014

ORNL-CF-75-9-6
Comparisons of ENDF-III and ENDF-IV Data with Experiments.
Maerker, R.E.
September 9, 1975
Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830

ORNL-TM-5020
One-Dimensional Fast-Neutron Transport Benchmark Calculations.
Ching, J.; Oblow, E.M.
September 1975
NTIS $5.45

ORNL-TM-5023
Measurement of Secondary Neutrons and Gamma Rays Produced by Neutron Interactions with Nitrogen and Oxygen Over the Incident Energy Range 1 to 20 MeV.
Morgan, G.L.
October 1975
NTIS $7.20

ORNL-TM-5040
Preliminary Design Calculations for an Ionization Spectrometer for Use in Colliding Beam Experiments.
Gabriel, T.A.; Amburgey, J.D.; Santoro, R.T.
September 1975
NTIS $4.00

ORNL-TM-5054
Neutron Emission from ORMAK.
Berry, L.A.; England, A.C.; Lyon, J.F.; Morgan, G.L.
September 1975
NTIS $4.00

RISO-M-1787
Response of Thermoluminescence Dosimeters to Monoenergetic Photons of Energies Between 15 keV and 100 keV.
Christensen, P.; Boetter-Jensen, L.; Majborn, B.
June 1975
Dep., NTIS (U.S. Sales Only) $4.00

RP-8A
Radiation Shielding Design and Analysis Approach for Light Water Reactor Power Plants.
Stone and Webster Engineering Corp.
May 1975
Stone and Webster Engineering Corp., Boston, MA.

SAND-75-5772; CONF-750723-10
Large Area Solid Target Neutron Source.
Crawford, J.C.; Bauer, W.
1974
Dep., NTIS $4.25

TID-26607
Particle-Transport Simulation with the Monte Carlo Method.
Carter, L.L.; Cashwell, E.D.
1975
NTIS $5.45

TID/SNA-381
Final Report of Shield System Trade. Volume I. Book 3.
Aerojet Nuclear Systems Co., Sacramento, Calif.
July 1970
Dep., NTIS $16.50

TID/SNA-385
Final Xe-Prime Dosimetry Report.
Hertelendy, N.A.; Courtney, J.C.
August 1970
Dep., NTIS $13.50

TID/SNA-877
NERVA Nozzle Assembly Radiation Environment.
Courtney, J.C.; Warman, E.A.; Roby, H.R.; Lindsey, B.A.; Wilcox, A.D.
June 1970
Dep., NTIS $11.25

TID/SNA-1300
NERVA Radiation Analysis Computer Codes Collections. Volume I. Summary.
Warman, E.A.; Rogers, D.R.; Lindsey, B.A.
April 1972
Dep., NTIS $7.75

UCRL-76896; CONF-750518-3
Repetitively Pulsed Material Testing Facility.
Zucker, O.; Bostick, W.; Gullickson, R.; Long, J.; Luce, J.; Sahlin, H.
August 12, 1975
Dep., NTIS $4.00

UWFDM-128
Heat Transfer and Neutronics of Issec and Partial Issec Blanket Designs.
Sze, D.K.; Conn, R.W.
June 1975
Nuclear Engineering Department, University of Wisconsin, Madison, Wisconsin

WANL-TME-003
Heating Rate Calculations.
Capo, M.A.; Call, D.W.
No Date
Declassified July 14, 1975
Dep., NTIS $4.00

WANL-TME-004
Radiation Environment Around Shielded KIWI B-1 Reactor.
Faught, H.F.
January 4, 1962
Declassified July 14, 1975
Dep., NTIS $4.00

WANL-TME-005
Payload Dose Rate from Direct Beam Radiation and Exhaust Gas Fission Products.
Capo, M.A.; Mickle, R.
No Date
Declassified July 14, 1975
Dep., NTIS $4.00

WANL-TME-018
Radiation Environment Around Shielded and Unshielded KIWI B-1 Reactor.
Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
No Date
Declassified July 14, 1975
Dep., NTIS $4.25

WANL-TME-020
Dose Rates from an Unshielded Engine.
Ricks, L.O.
March 6, 1962
Declassified July 14, 1975
Dep., NTIS $10.00

WANL-TME-150
NERVA Shield Capsule Irradiation Program: Engineering Design, Safeguards Analysis, and Operating Manual.
Vogel, M.A.; Jacobs, D.C.
October 25, 1962
Declassified July 21, 1975
Dep., NTIS $4.75

WANL-TME-239
Heating Rate Distribution in NRX-A-I During Operation and After Shutdown.
Nassano, R.N.
January 3, 1963
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