RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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

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No. 141 *September 1976*

One's mind, stretched to a new idea, never goes back to its original dimension.
...Oliver Wendell Holmes

NEWS ON THE FIFTH INTERNATIONAL CONFERENCE ON REACTOR SHIELDING

It has been announced that the International Atomic Energy Agency will provide financial assistance for several scientists from developing countries to attend. Requests from governments nominating one of their citizens must be submitted by November 1, 1976. Further information is available from the conference chairman, D. K. Trubey, at RSIC or from the Agency in Vienna.

An information pamphlet on the conference has been prepared, and is being sent to those requesting information. Please let us know if you are considering attending. A number of tours is being planned in conjunction with the conference. These include trips to ORNL, Tennessee Valley Authority nuclear facilities, and to the Great Smoky Mountains. An evening on a Tennessee River steamboat is another possible event of the conference.

You are encouraged to bring your spouse - he or she will enjoy the conference guest program and the Knoxville Dogwood Arts Festival.

RADIATION SHIELDING COURSE OFFERED

Rockwell International is offering a 5-day course (September 20-24,1976) on Radiation Shielding.

This course will familiarize individuals with the theory and practice of radiation shielding. Numerous problems with various geometries and sources of gamma rays and neutrons will be presented and solved (e.g., reactors, mixed fission products, and radioisotopes). The biological effects of radiation and the effects on various materials will be discussed. The course is intended for engineers of various disciplines who require a background of the subject matter.

The fee is $495. If interested, please contact E. M. Rex, Nuclear Training Center, Atomics International Division, Rockwell International, 8900 DeSoto Avenue, Canoga Park, California 91304. Mr. Rex can be reached at (213) 341-1000, Ext. 2811 for any additional information.

HANDBOOK OF RADIATION SHIELDING DATA AVAILABLE

Professor John C. Courtney has informed RSIC that the Handbook of Radiation Shielding Data is now available from the LSU Bookstore, Union Building, Baton Rouge, LA 70893 for $7.00, postpaid.

This handbook is a compilation of data on units, conversion factors, geometric considerations, sources of radiation, and the attenuation of photons, neutrons, and charged particles. It also includes related topics in health physics. Data are presented in tabular and graphical form with sufficient narrative for at least first-approximation solutions to a variety of problems in nuclear radiation protection. Members of the radiation shielding community contributed the information in this document from unclassified and uncopyrighted sources, as referenced. The handbook is the result of a project sponsored jointly by the Nuclear Science Center at Louisiana State University and the Shielding and Dosimetry (now Radiation Protection and Shielding) Division of the American Nuclear Society.

ASTM PUBLICATION OF NUCLEAR REACTOR NEUTRON ENERGY SPECTRA

The American Society for Testing and Materials is offering Data Series Publication DS 52 "Nuclear Reactor Neutron Energy Spectra" by C. Z. Serpan, Jr. and B. H. Menke, Naval Research Laboratory, Washington, D. C.

The energy crisis has put a spotlight on the need for additional nuclear reactors to meet some of the nation's needs. However, the effects from exposure of materials to neutron bombardment in nuclear reactors is an important consideration in design and operation of such reactors.

This publication makes available information on the energy-level distribution of the neutrons - commonly called neutron spectra.

The information presented for each neutron spectrum in this compilation consists of a graphical representation of the integral neutron spectrum, a description of the reactor and environment plus dosimetry data (including measured fluxes and cross sections), and a computer listing of the lethargy and energy intervals plus the neutron spectrum normalized in two different ways.

The 220 page, softcover report is available under PUBLICATION CODE NUMBER 05-052000-35, from ASTM, 1916 Race Street, Philadelphia, PA 19103. The price is $26.00, less 20% to ASTM Members.

ASTM PUBLICATION PROPERTIES OF REACTOR STRUCTURAL ALLOYS AFTER NEUTRON OR PARTICLE IRRADIATION

The report contains numerous contributions on various aspects of irradiation effects on properties of reactor structural materials. General topics include Reactor Vessel Steels Theory and Effects on Mechanical Properties for Thermal Reactor Materials, Creep of Structural Materials, Voids Caused by Irradiation, and Irradiation Simulation. The 631 page, hardcover report is available under PUBLICATION CODE 04-570000-35 from ASTM, 1916 Race Street, Philadelphia, PA 19103. The price is $69.50, less 20% to ASTM Members.

VISITORS TO RSIC

The following persons came for an orientation visit and/or to use RSIC facilities:

JUNE

Te-Chang Chan, Fluor Pioneer Inc., Chicago, Illinois; Herve' Derrien, OECD-NEA-CCDN, Saclay, France; Ralph L. Hensler and Stephen L. Ostrow, Ebasco Services, Inc., New York, New York.

JULY

H. Behrens and G. Ebel, Nuclear Research Center, Karlsruhe, Germany; T. A. Butler, Oak Ridge National Laboratory; N. B. Ewbank, Oak Ridge National Laboratory; Jean Fernandez, C.E.A., Bordeaux, France; Y. Kishimoto, Nuclear Fuel Development Corporation, Tokai-mura, Japan; Richard Lemon and Bruce W. Wieland, Oak Ridge Associated Universities; Mercury Vlasov, IAEA Nuclear Data Section, Vienna, Austria.

AUGUST

Vernon C. Badham III, UCLA, Los Angeles, California; N. R. Byrn, Science Applications, Inc., Huntsville, Alabama; V. R. Cain, Science Applications, Inc., Oak Ridge, Tennessee and Bechtel Power Corporation, Gaithersburg, Maryland; Thomas J. De Rosa, Picatinny Arsenal, Dover, New Jersey; Vladimir A. Gribkov, Lebedev Physical Institute, Moscow, USSR; Henry E. Lindsey and Luther Rhodes, Defense Mapping Agency, Washington, D.C.; Jim Mincey, Oak Ridge National Laboratory; E. B. Norris, Southwest Research Institute, San Antonio, Texas; Sergei Tserevitinov, Khurchatov's Atomic Energy Institute, Moscow, USSR; Bill Gardner, IBM Corporation, Knoxville, Tennessee; E. Greenspan, Nuclear Research Center and Ben-Gurion University of the Negev, Beer-Sheva, Israel; John Cleveland, Oak Ridge National Laboratory.

CHANGES IN THE CODE COLLECTION

The following changes were made in August.

CCC-229/KRONIC

This code which calculates the annual average external (beta and gamma) doses from chronic atmospheric releases of radionuclides has been extended by the addition of an IBM-360 version designated CCC-229B, contributed by the University of North Carolina, Chapel Hill, North Carolina. KRONIC was contributed originally by Occupational and Environmental Safety Department, Battelle Pacific Northwest Laboratories, Richland, Washington. Reference: BNWL-B-264. FORTRAN IV; UNIVAC 1108(A), IBM-360(B).

CCC-233/CRYSTAL BALL

The CDC version, designated CCC-233B, of this computer program for determining neutron spectra measurements was contributed by Reactor Centrum Nederland, Petten (N.H.), the Nederlands. Reference: ORNL-TM-4601. The code was originally contributed by Oak Ridge National Laboratory. FORTRAN IV; IBM-360(A), CDC 6600(B).

CCC-253/ANISN-PPL

This multigroup one-dimensional discrete ordinates transport code with anisotropic scattering and provision for binary output was updated to correct errors called to RSIC attention by Bill Price, Princeton, code contributor. Converged fluxes were not affected, but when running stacked cases, the advantage of using the previous flux as a guess (IFN=2) if IDAT1=1, is eliminated. Two lines added to subroutine PLSNT will correct the error: after IF (MTP.EQ.0) GO TO 89, add IF (ID2.EQ.2) GO TO 89 and after 89 J=MTP-IGM, add IF (IFN.EQ.2) GO TO 83.

CCC-280/CYLTRAN

This cylindrical geometry multimaterial electron/photon Monte Carlo transport code was contributed by Sandia Laboratories, Albuquerque, New Mexico. Reference: SAND 74-0030 (March 1975). FORTRAN IV, CDC 6600. CYLTRAN is being converted to IBM 360 by RSIC.

PSR-63/AMPX-I

The August Newsletter account of PSR-63 update contained one character in error. The corrected statement 90 INGATE subroutine reads: 90 IF(IHI.LT.NG(J)) GO TO 95.

CHANGES TO THE DATA COLLECTION

The following changes are noted for August 1976.

DLC-31/(DPL-1/FEWG1)

The update announcement in July 1976 did not mention that data sets for Ar, Ti, Gd, P, and S are now on the tape. These additional materials were neither generated nor tested as part of the Defense Nuclear Agency program to provide a few-group library applicable to specific problems. The additional five data sets were generated for other projects but were included for convenience.

DLC-31/(DPL-402/GPDT1)

The DNA Gamma-Ray Production Data Tape in SAM-CE Format has been updated by the Mathematical Applications Group, Inc., with revised data sets for Al-27, B-10, C-12, N-14, Mg, U-238, O-16, and Si. These were changed to reflect a program correction involving the processing of gamma-ray multiplicities. New data sets were added for Cl, W-182, W-183, W-184, and W-186. Data for H-1, Pb, Ca, Li-7, Fe, and U-235 remain the same.

The updated version is designated DLC-31/(DPL-402B/GPDT1). Requests should be accompanied by a full reel of magnetic tape.

DLC-37/EPR

Recipients of the supporting documentation for DLC-37/EPR should be aware of an error in the report ORNL/TM-5249, "Modification Number One to the Coupled 100n-21γ Cross Section Library for EPR Calculations", by W. E. Ford, III, *et.al.* Numerous typographical errors are present in Table 5, EPR

ANISN-Formatted Reaction Data Sets, (pp. 15 and 16) of the report. A corrected table is available upon request. It should be noted that the data tape contains the correct values for these reaction data sets.

AUGUST 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.

Special bibliographies and selected computer-printed abstracts of the literature in the RSIC system are available upon request. The Selective Dissemination of Information (SDI) Service is Available by submitting a list of subject categories defining the recipient's interests.

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

AFCRL-TR-76-0023
An Invariant Imbedding, Orders-of-Scattering Approach to Particle Transport in a Slab.
Garth, J.C.; Woolf, S.
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ANL/CTR/TM-70
Conceptual Design of a Theta-Pinch Fusion Engineering Research Facility.
Burke, R.J.; Coultas, T.A.; Dauzvardis, P.; Foss, M.; Gerstl, S.A.W.; Maroni, V.A.; Pierce, A.W.; Turner, A.P.L.
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Argonne National Laboratory

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Californium-252 Encapsulation and Shipping at Savannah River Laboratory.
In: Applications of Californium-252. Proceedings of the American Nuclear Society National Topical Meeting, Sept.11-13, 1972.
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What You Always Wanted to Know About Californium Source Facilities.
Atkinson, G.D.,Jr.
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Californium-252 Neutron Activation Facility at the Savannah River Laboratory.
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Design Considerations for a Prompt Neutron Activation Analysis Facility Utilizing a ^{252}Cf Source.
Greenwood, R.C.
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Design and Fabrication of a Multipurpose Neutron Source Shield.
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A Radiography and Capture Gamma Ray Facility for Californium-252.
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A Versatile Subcritical Facility for Undergraduate Nuclear Engineering Instruction.
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Medical Applications of Californium-252.
Oliver, G.D.,Jr.
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Uses of Californium-252 in Industrial Process Control.
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Comparison of Nuclear Reactor and ^{252}Cf Neutron Capture Gamma-Ray Studies of Manganese, Iron, Nickel and Copper.
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Statistical Study of Activation Analysis Results Using Isotopically and Machine Produce Neutrons.
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Californium-252 and 14-MeV Neutron Activation: A Comparison.
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Determination of Cement in Soil-Cement Mixtures Using Cf-252.
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An On-Stream Vanadium Process Analyzer Using a Cf-252 Neutron Source.
Orange, J.M.; Larson, J.G.
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Shipboard Use of Californium-252 for Neutron Activation Analysis - A New Oceanographic Tool.
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^{252}Cf Neutron Source Systems for the Assay of Uranium and Plutonium in Fuel Rods.
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Discrimination of Uranium and Plutonium by Gamma Ray Analysis Following Californium-252 Neutron Interrogation.
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Radiography Using Californium-252 Neutron Sources.
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Applications of Californium-252 for Neutron Radiography of Munitions Items.
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A Californium-252 Neutron Multiplier for Neutron Radiography and Activation Analysis.
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Radiation Damage: The Second Most Serious Obstacle to Commercialization of Fusion Power.
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The Influence of Neutron Irradiation Temperature on the Void Characteristics of Niobium and Niobium-1% Zirconium Alloy.
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The Swelling Effects to be Expected in Materials Under High Transmutation Gas Generation Rates.
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Proton Simulation of 14 MeV Neutron Damage and Low Temperature Recovery of 16 MeV Proton Irradiated Iron.
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