RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ATOMIC ENERGY COMMISSION

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The two words "information" and "communication" are often used interchangeably, but they signify quite different things. Information is giving out; communication is getting through.

...Sydney J. Harris

CHANGES TO THE DNA WORKING CROSS SECTION LIBRARY

Evaluated cross section data for four tungsten isotopes have been added to the DNA Working Library by Phil Young of LASL. Gamma-ray production data were added to the neutron files evaluated by J. Otter, E. Ottenwitte, and P. Rose, of Atomics International. The data are identified as MAT 4582, 4583, 4584, and 4586 for 182-W, 183-W, 184-W, and 186-W.

A new modification to nitrogen has also been made by Phil Young as summarized below.

Nitrogen - MAT 4133 LASL

MOD 4 July 1973

Some file 1 comments were changed. The nonelastic cross sections in the energy range 2 to 20 MeV for exciting discrete levels by (n,n'),(n,p), (n,d), (n,T), and (n,α) were revised to be more consistent with the measurements of Dickens, Love, and Morgan (ORNL-4864, 1973) and some earlier experiments. The (n,n'), (n,p), (n,T), and (n,α) cross sections were reconstructed using the revised discrete level data mentioned above. The elastic scattering cross section as adjusted reflects these changes. Many cross sections were thinned such that the interpolated value between 2 points lie within 2.5% of the fine grid value. Elastic and inelastic scattering angular distributions were thinned such that the interpolated distribution have an rms average deviation from the fine grid set of less than 2.5% and that the maximum excursion at any angle be less than 5%. Primary capture gamma rays are now identified using the LP flag. Gamma-ray production cross sections were recalculated using the relevant decay schemes and revised level excitation cross sections mentioned

above. The data were also thinned. Capture gamma-ray angular distributions were made consistent with the revision made to use LP flags.

SLIDE RULE FOR BLACK BODY CALCULATIONS AVAILABLE

Philip Zirkind, of the U.S. Army Picatinny Arsenal, reports that a slide rule for high temperature black body calculations is available. Given the temperature, in °K or keV, the following characteristics can be read: energy flux, partition of energy (energy distribution), energy flux at a distance, and photon flux. A limited number for free distribution is available from Philip Zirkind, Picatinny Arsenal, Bldg. 65, Dover, N. J. 07801.

ORNL NEUTRON PHYSICS DIVISION ANNUAL REPORT PUBLISHED

The ORNL *NEUTRON PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING MAY 31, 1973*, ORNL-4902 (August 1973) has recently been issued. Summaries and abstracts are given under several headings.

Volume I, given UC-34 distribution, is concerned with theoretical studies of medium- and high-energy radiation transport, medium-energy nucleon spectroscopy, weapons radiation cross-section studies, weapons radiation shielding, and the activities of the Radiation Shielding Information Center (RSIC). It is available from ORNL and NTIS. Reprints of the section on the information center is available from RSIC.

Volume II (reactor cross-section studies, reactor core studies, and reactor shielding) was prepared for UC-79d distribution and is available from USAEC Technical Information Center.

PERSONAL ITEMS

Changes of address have been received from the following: *Roland H. Fisher* from Systems, Science, and Software to Science Applications, La Jolla, California; *J. Ranft* from Karl Marx University, Leipzig, Germany, to CERN, Geneva, Switzerland; *Thomas W. Craig* from ESZ, Ann Arbor, Mich., to Consumers Power Company, Jackson, Mich.; *Ray Paquette* from Martin Marietta, Orlando, Fla., to GE-NED, San Jose, Calif.

J. Philip Drummond has taken a leave of absence from Newport News Shipbuilding Atomic Power Division to devote full time to graduate study.

Austin A. O'Dell has changed his employment from EG&G, Santa Barbara Division, where for over 8 years he was a senior nuclear physicist responsible for several AEC- and DoD-sponsored experimental and theoretical

research programs, to Mission Research Corporation, Santa Barbara, California, where he is responsible for developing improved nuclear radiation transport models and calculations required in the performance of various DoD-sponsored weapons effects research programs under contract.

The Mission Research Corporation staff in Santa Barbara - there are 8 MRC employees based in Albuquerque - have "relocated" to 735 State Street, Post Office Drawer 719, Santa Barbara, California 93102 (Telephone: 805-963-8761).

CHANGES TO THE DATA LIBRARY COLLECTION

Several changes have been made to the data collection: new data compilations packaged, and additions, modifications and corrections made to existing data packages.

DLC-5/HALLMARK — Discrete Ordinates and Monte Carlo Results of Neutron and Secondary Gamma-Ray Transport in Air-Over-Ground Geometry Data Library has been updated by E. A. Straker, SAI, Huntsville, Alabama. The package contains an added set of 22 neutron, 18 gamma-ray group cross sections for air and ground which were used in CCC-89/DOT to generate part of the DLC-5/HALLMARK data. These can be used as a reference set of data for those who wish to perform similar calculations or perhaps augment the results which were published by Straker in ORNL-4289, Volume II. The data are available on cards (614) upon request or the entire DLC-5/HALLMARK data package may be transmitted on tape (~ 74K records).

DLC-23/CASK — 40 Group Coupled Neutron and Gamma-Ray Cross Section Data Library has been modified to eliminate errors called to RSIC attention by Bob Paschall of Atomics International. The gamma-ray production data for the thermal neutron groups for some materials were changed as follows. Data for H, Be, B, C, Mg, Al, K, Ca, and W were reduced in magnitude. Data for Na, Ti, Mn, Fe, Cu, Ta, Pu-239, and Pu-240 were increased. In addition, gamma-ray production data for the neutron groups 12-through-22 had to be added for Ni and Cr.

DLC-27/AMPX01 (104,22) — 126 Group Coupled Neutron and Gamma-Ray Transport Cross Section Data Generated by AMPX contributed by the Computer Sciences Division, Union Carbide Nuclear Company and the Neutron Physics Division, Oak Ridge National Laboratory. 104 neutron, 22 gamma-ray group P_5 cross sections for N, O, Al, H, K, Si, Ca, Na, C, and Fe have been generated using AMPX and evaluated data from the ENDF/B-III and DNA cross section libraries. AMPX is the ORNL cross section processor which can generate the coupled library in a single computer run. The data are recommended as a replacement for

DLC-9/FARS for studies of neutron and secondary gamma-ray transport in concrete-like materials. The data are in ANISN format. A full reel of magnetic tape is required for transmittal.

DLC-28/CTR 72-Group P_3 Coupled Neutron and Gamma-Ray Cross Sections for Fusion Reactor Calculations contributed by the Reactor Division, Oak Ridge National Laboratory. Reference: ORNL-TM-4277. The coupled 52 neutron, 21 gamma-ray cross sections for 6-Li, 7-Li, Nb, C, Fe, Cu, LiH, Al_2O_3, Mg, H, O, Pb, Ta, V, and B were generated from ENDF/B and DNA data using SUPERTOG and POPOP4. The neutron groups were collapsed with ANISN using a weighting function typical of the average spectrum in a fusion reactor blanket. The data are in ANISN format and are suitable for use in neutronics calculations for conceptual fusion reactor design. A full reel of magnetic tape is required to obtain the library.

COMPUTER CODE COLLECTION CHANGES

Several changes were made to both categories (CCC and PSR) during the month, including additions, modifications, and corrections.

CCC-180/TDA Time Dependent Multigroup One Dimensional Discrete Ordinates Transport Code (LA-4557) was corrected as follows. In Subroutine GUTS, card #1601, or the 5th card after Statement #13, should read ".GT. instead of .EQ.," as: IF (LQ.GT.J2) ...etc. This error was called to RSIC attention by Ward Engle of ORNL, Ken Adams, of Sandia, and Henry Sandmeier, of LASL.

CCC-184/TASK A new version of the Generalized One-Dimensional Transport and Diffusion Kinetics Code has been contributed by Neutron Physics Division, Oak Ridge National Laboratory. This version, replacing that packaged in July 1972, represents development made on TASK during the past year and contains the following improvements over the original version.

The outer-iteration transport option will now handle multigroup S_2 quadrature problems.

A distributed source normalization package has been added to both the outer-iteration and non-outer iteration options.

Miscellaneous errors in writing subroutines have been corrected and unused subroutines have been removed.

FORTRAN IV; IBM 360. Reference: ORNL-TM-3811.

CCC-193/ESP — General Monte Carlo Neutron Transport Code System was corrected as follows.

In Subroutine RESAP, Cards 6239 (ISN0207 TRAN (JS2) = TRAN (JS2) + E) and 6240 (ISN0208 TRAN (JS3) = TRAN (JS3) + + E*E were removed. In Subroutine SCATR the following card was inserted between cards 7040 and 7041: EGPP = ESPD (NGROUP - EGROUP. In card 7094, "EGROUP" was changed to "EGPP." Requests filled after 8-27-73 will include these changes. These errors were called to RSIC attention by Hans Brockmann, IFR, Julich, Germany, and S. N. Cramer, Union Carbide Nuclear Company, Oak Ridge, Tennessee.

CCC-204/SWANLAKE — Cross Section Analysis Code Package has been modified to include a new sample problem. D. E. Bartine and J. Pace, Oak Ridge National Laboratory, have called RSIC attention to errors in the sample problem input data previously distributed.

CCC-210/NUGAM 2 & 3 — Monte Carlo Prediction of Gamma Photon Transport Distributions code package has been updated by NUS Corporation, Rockville, Maryland,to include the SSALB analysis program described in NUS-786, Vol. 2. FORTRAN IV, IBM 360.

CCC-214/DOPEX-1D2C — One Dimensional, Two Constraint Shield Optimization Code contributed by NASA Lewis Research Center, Cleveland, Ohio. Reference: NASA TM X-2836. FORTRAN IV; IBM 360.

PSR-2/CHAD — Differential Angular Data Transformation Routine package has been extended to include SAD, an ORNL contribution designed to automate the transformation of ENDF/B format secondary angular distribution (file 4) data to the desired form and reference system. Informal documentation. FORTRAN IV, IBM 360.

PSR-49/DINT — An extension has been made to the code package, Multigroup Coherent-Incoherent Cross Section Data Generator for Photon Transport Calculations,contributed by Sandia Laboratories, Albuquerque. The package now includes a CDC 6600 version, PSR-49A, and an IBM 360 operable version, converted by RSIC, PSR-49B.

PSR-55/SIR-3 — Sievert's Integral Routine contributed by the University of Adelaide Anti-Cancer Foundation, South Australia. The code package has been extended to include an IBM 360 version (PSR-55B) converted from the original CDC 6400 version (PSR-55A) by Memory Horatio Turner, III and contributed to RSIC by the Dallas Baptist College, Dallas, Texas.

VISITORS TO RSIC

Visitors to RSIC during the month of August were: R. Baglan, A. B. Brill, K. Larsen, Vanderbilt University, Nashville, Tenn.; H. Biederbeck, Institut fuer Strahlenschutz,(Stohl ueber Kiel), E. H. Brehm and T. M. A. Holst, BBC (Mannheim), W. G. Mertins, Ing. Buro Dr. Hopp (Munich), H. H. Weise, German MoD (Bonn), Germany; Capt. D. C. Kaul and Lt. Col. L. G. Kirchner, Defense Nuclear Agency, Washington, D.C.; C. Burgart, Science Applications, Inc., Albuquerque, N. M.; L. A. Remez (Argentina) presently in Neutron Physics Div., ORNL; N. M. Schaeffer, Radiation Research Associates, Fort Worth, Texas; L. Stewart, Los Alamos Scientific Laboratory, N. M.; J. Tills, AFWL, Kirtland Air Force Base, N. M.; J. J. Wagschal, Hebrew University, Jerusalem, Israel; L. Ward, Environmental Information Center, ORNL; R. Ziskind, TRW Systems Group, Redondo Beach, Calif.

ORNL Neutron Physics Division Staff Changes

Several additions to the staff of the ORNL Neutron Physics Division have been made. D. R. Vondy, T. B. Fowler, and G. W. Cunningham have transferred from the Reactor Division. They will continue radiation transport code development, in particular the 3-dimensional diffusion code VENTURE. C. R. Weisbin, formerly of Los Alamos Scientific Laboratory, and G. P. Cavanaugh, from the University of Illinois, will work in the Shielding Analysis Department of the Division.

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 are 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.

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