

RSIC Newsletter



RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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

POST OFFICE BOX X •
OAK RIDGE, TENNESSEE 37831

No. 109

December 1973

Be strong enough to find security in risk.

...Herbert Gold

INTERNATIONAL SYMPOSIUM RADIATION PROTECTION - PHILOSOPHY AND IMPLEMENTATION (Second Announcement)

The Second International Symposium organized by the Society for Radiological Protection, the major British Society concerned solely with this subject, will be held at the Aviemore Conference Center, Invernesshire, Scotland, from 2 to 6 June 1974.

The theme of the Symposium is the philosophy of radiological protection, together with the means of implementing that philosophy. Scientific sessions will include discussion of the choice of parameters to measure and the measurement thereof (but not details of actual instruments); the interpretation of results in relation to dose limits and an assessment of significant genetic and somatic doses to the worker and the population; and an assessment of the consequences of exposure, together with subsequent decision-making from the points of view of highly exposed individuals, waste management, reactor safety and siting and sources to which the public may be exposed.

The working languages of the Symposium will be English and French. Papers will be presented in either language and simultaneous translation facilities will be provided at full sessions. Depending on the amount of material offered, papers may be presented in extenso, by rapporteur session or in title.

A special program will be arranged for spouses, children (over 15), and others accompanying attendees of the symposium.

Further details and registration forms may be obtained from the Administrative Secretary, Miss Sylvia Cross, Secretary's Department, CEGB, Room 1324, Sudbury House, 15 Newgate Street, London EC1A 7AU. Notification of interest should be made as soon as possible. The deadline for registration is December 31, 1973.

BOARD OF DIRECTORS ELECTS 10 ANS FELLOWS

The ANS Board of Directors announced recently the election of 10 Fellows of the Society. Fellow certificates will be presented at the Annual Meeting in June 1974.

The awards are made annually to ANS members who have demonstrated outstanding accomplishment in nuclear science and engineering. The selection process begins with nomination of a candidate by five members of ANS. These nominees are then screened by the Honors and Awards Committee, which then forwards its recommendations to the Board for a final balloting. To be elected, candidates had to receive positive votes from a majority of the board, and no more than four negative votes. All 10 candidates submitted this year were elected.

The new Fellows are Robert M. Brugger (Aerojet Nuclear), Eric T. Clarke (Technical Operations, Inc.), Mario Dalle Donne (Euratom), Robert B. Duffield (Los Alamos Scientific Laboratory), Jacob Kastner (USAEC), Marvin M. Mann (USAEC), Charles W. Maynard (U. of Wisconsin), Kalman Shure (Westinghouse Electric), Dieter A. Smidt (Gesellschaft für Kernforschung), and Marvin E. Wyman (U. of Illinois).

FROM "STICE" TO STANDARDS

From early 1965 until the present, volunteers from the ANS Mathematics and Computation Division have been meeting and considering ways to facilitate the exchange of computer programs. Beginning as a Study in Cooperative Efforts (STICE, pronounced 'sticky'), the group today works as standards subcommittee ANS-10. An RSIC staff member has worked with the group since its inception.

Subcommittee 10 has published ANS-STD.3-1971 "Recommended Programming Practices to Facilitate the Interchange of Digital Computer Programs," available from the American Nuclear Society at a cost of \$7.50. RSIC has a limited number of copies which can be distributed as long as they last.

A draft copy (August 1973) of a proposed "American National Standard - Guidelines for the Documentation of Digital Computer Programs" is available from RSIC to any requester interested in cooperating in testing its usage as a tool in documenting applications programs.

We highly recommend all collaborative efforts to facilitate the exchange of computing technology, including codes, and computer-readable data.

CSEWG SHIELDING SUBCOMMITTEE MEETS IN SAN FRANCISCO

The Shielding Subcommittee of the Cross Section Evaluation Working Group met November 8 and 9 in San Francisco. Plans were made for participation in Phase I and Phase II data testing of cross section evaluations important to the shielding community. These efforts are directed toward the release of ENDF/B Version IV which is anticipated early in 1974.

CHANGES TO THE DNA WORKING CROSS SECTION LIBRARY

An evaluation for He-4 has been added to the DNA Working Cross Section Library. It was submitted by R. A. Nisley, G. M. Hale, and P. G. Young of Los Alamos Scientific Laboratory and is designated DNA MAT 4504, MOD 0, Helium 4.

Modifications to Be-9, W-182, W-183, W-184, and W-186 were also made.

The current contents of the DNA library are listed below. The list is followed by a brief description of the latest modifications.

In requesting data from RSIC, several things should be specified.

1. If you can accept a blocked tape, the entire library can be written on one magnetic tape. Blocked tapes will be written FB, LRECL=80, BLKSIZE=3200, unless the user specifies otherwise. If written as unblocked, four tapes are required.
2. Indicate whether you want the entire library on a single physical tape file or each material on a physical file by itself.
3. The U-235, U-238, H, T, He-4, Be-9, and Ta-181 data are available with elastic scattering represented either as tabulated probability distributions or Legendre polynomial expansion coefficients. Please specify which form you want. Note: All other materials have Legendre expansion only.

<u>MATERIAL</u>	<u>EVALUATORS</u>	<u>MAT</u>	<u>MOD</u>	<u>DATE</u>	<u>NO. RECORDS</u>
Nitrogen	Young, Foster - LASL	4133	4	7-73	5472
Oxygen	Young, Foster - LASL	4134	2	8-73	5333
Aluminum	Foster, Young - LASL	4135	2	2-72	5368
Lead	Fu, Perey - ORNL	4136	5	10-73	4244
Hydrogen	Stewart, LaBauve, Young - LASL	4148	2	10-73	506
Silicon	Drake, Kinsey - BNL	4151	2	10-72	12351
Calcium	Fu, Perey - ORNL	4152	3	2-73	6135
Be-9	Howerton, Perkins - LLL	4154	2	11-73	2716
Sodium	Paik, Pitterle, Perey - WARD,ORNL	4156	0	2-72	3251
Tritium	Stewart - LASL	4169	1	10-73	895
Tantalum	Howerton, Perkins, MacGregor -LLL	4179	2	8-73	4628
Iron	Penny, Kinney, Wright, Perey, Fu - ORNL	4180	1	8-72	12798
U-238	Howerton, MacGregor - LLL	4187	1	3-73	2882
U-235	Howerton, MacGregor - LLL	4188	1	3-73	3142
He-4	Nisley, Hale, Young - LASL	4504	0	11-73	455
Mg	Drake, Fricke - SAI	4512	0	4-73	5238
Cu	Drake, Fricke - SAI	4529	0	4-73	3520
Pu-239	Stewart, Hunter - LASL	4539	0	3-73	3499
Pu-240	Stewart, Hunter - LASL	4540	0	3-73	2111

(continued)

<u>MATERIAL</u>	<u>EVALUATORS</u>	<u>MAT</u>	<u>MOD</u>	<u>DATE</u>	<u>No. RECORDS</u>
W-182	Young - LASL	4582	1	11-73	3353
W-183	Young - LASL	4583	1	11-73	3671
W-184	Young - LASL	4584	1	11-73	3241
W-186	Young - LASL	4586	1	11-73	3253

The Be-9 and Tungsten evaluations have been modified as summarized below:

Beryllium-9 - MAT 4152 LLL

MOD 2 November 1973

The (n,2n) reaction was described using ENDF format modification 73-4 which allows the representation of individual neutrons from sequential (n,2n) reactions. This was done utilizing MT numbers 6-9 and 46-49 in files 3 and 4, and MT=46-49 in file 5. The (n,T) reaction now includes (n,T₀) in addition to (n,T₂) data and these are described using MT=740 and 741 respectively.

Tungsten-182 - MAT 4582 LASL

MOD 1 November 1973

File 4 (n,2n) and (n,3n) are now given as Legendre coefficients. Data for (n,n')_p were added to file 4 (assumed isotropic in lab.) and to file 5. The temperatures were based on the same level density parameters that were employed for the (n,2n) and (n,3n) reactions.

Tungsten-183 - MAT 4583 LASL

Tungsten-184 - MAT 4584 LASL

MOD 1 November 1973

The MOD 1 changes for these two evaluations are as described above.

Tungsten-186 - MAT 4586 LASL

MOD 1 November 1973

The MOD 1 changes are as described above. In addition, errors in the file 5 (n,2n) and (n,3n) U-cutoff and fractional probability energy ranges were corrected.

CHANGES TO CODE COLLECTION

Several changes have been made to the codes collection: new code packages, a new software version made available, and additions and corrections made to existing code packages.

CCC-75/G³-6ED Subroutine SPL2D3 has been supplied for the G³ Kernel Integration Code - Multigroup Gamma-Ray Scattering by R. E. Malenfant of Los Alamos Scientific Laboratory. Requests filled after 11-16-73 include this subroutine.

CCC-82/ANISN The CCC-82H/ANISN-FONTENAY version of the one-dimensional multigroup discrete ordinates code has been updated by Werner Schuler of the OECD Nuclear Energy Agency Computer Programme Library, Ispra, Italy. New versions of subroutines FINPR and FINPRI were supplied for the update. Requests filled after 11-1-73 reflect these changes.

CCC-164/NAC A CDC-7600 version (CCC-164C) of the Neutron Activation Analysis and Product Isotope Inventory Code has been supplied by Babcock and Wilcox, Lynchburg, Virginia. Modifications were made to output gamma source by group and to facilitate multiple case runs with a limited amount of input. Reference: NASA TM X-52460.

CCC-187/SAM-CE Corrections to subroutines SETDAT and GG of the CDC 6600 version (CCC-187A) of SAM-CE were brought to the attention of RSIC by Marty Cohen of Mathematical Applications Group, Inc. and Bill Scott of Science Applications, Inc., La Jolla. The corrections are available upon request. Code packages sent after 11-16-73 reflect the changes.

CCC-223/DTK One Dimensional Multigroup Neutron Transport Discrete Ordinates Code was supplied by Karlsruhe Nuclear Research Center, W. Germany. The IBM 360/75/91 code was developed from DTF-IV. Reference KFK-1381.

CCC-225/REST Fission Product Inventory Code with Fission Product Escape Model was contributed by Karlsruhe Nuclear Research Center, W. Germany. There are a number of programs for calculating the fission product inventory following a known reactor history. IBM 360/91. References: KFK-1579 (ORNL-tr-2719).

PSR-11/POPOP4 Converter of Gamma-Ray Spectra to Secondary Gamma-Ray Production Cross Sections was updated. Bob Hubner of Sargent and Lundy pointed out that the statement "RETURN 1" in subroutine LIBRD should be "RETURN". Requests filled after 11-26-73 will reflect this change.

PSR-68/MANYFILE Utility Routine Manipulation of Data Sets Between Various I/O Devices was contributed by ORNL Computer Sciences and Neutron Physics Divisions. FORTRAN IV, IBM 360/91. Reference: ORNL-TM-4377.

DATA COLLECTION CHANGE

DLC-4/HPICO Photon Interaction Library in OGRE Format was updated by increasing the pair-production cross section at 4MeV by 3-5% for all elements. Designated DLC-4D, this version is now consistent with DLC-7D which contains the recommended data for ENDF/B photon interaction library. Requests filled after 11-28-73 reflect this change.

PERSONAL ITEMS

The AEC has appointed *Kaye D. Lathrop* of Los Alamos Scientific Laboratory to its Advisory Committee on Reactor Physics.

Capt. Ronald E. Schaffer now has the address HQ USAENPG ENPG-0D, Fort Belvoir, Virginia.

CURRENT TABLE OF NTIS CHARGES

Current prices for publications available at the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22151, are as follows:

<u>PAGES</u>	<u>COST</u>
1-50	\$4.00
51-150	5.45
151-325	7.60
326-500	10.60
500-1000	13.60

Pages in excess of 1000 can be negotiated.

Microfiche	\$1.45
------------	--------

These are new publication prices. Prices remain as at publication for older reports.

VISITORS TO RSIC

Visitors to RSIC during November were: A. R. Buhl, V. W. Lowry, and G. C. Tillett, USAEC, Washington, D.C.; R. Fröhlich, Kernforschungszentrum Karlsruhe, W. Germany; U. Hansen, Atomic Energy Establishment, Winfrith, England; H. Kawamura, IBM Japan, Ltd., Tokyo; M. Mattes and P. Stiller, IKE, Stuttgart, W. Germany; W. Schuler, OECD Nuclear Energy Agency Computer Programme Library, Ispra, Italy; A. Sideris, Pioneer Service/WPS, Kewaunee, Wisconsin; A. M. Perry, Reactor Division, ORNL; M. Ribon, CEN, Saclay, France.

NOVEMBER ACCESSION OF LITERATURE

REACTOR AND WEAPONS SHIELDING

- AD-744666
Neutrons Scattering and Gamma-Ray Production Cross
Sections for N, O, Al, Si, Ca and Fe.
Nellis, D.O.; Buchanan, P.S.; Martin, T.C.; Tucker, W.E.;
Williams, G.H.
February 29, 1972
NTIS
- AD-745955
Neutron Energy and Flux Distributions from a
Crossed-Field Acceleration Model of Plasma Focus and
Z-Pinch Discharges.
Bernstein, M.J.; Comisar, G.G.
May 30, 1972
NTIS
- AD-748888
Neutron and Gamma-Ray Environments for Point Neutron
Sources in Air-Over-Ground Geometry. Volume I.
Beck, R.L.; Brown, W.W.
July 12, 1971
NTIS \$6.00
- AD-748889
Neutron and Gamma-Ray Environments for Point Neutron
Sources in an Air-Over-Ground Geometry. Volume II.
Beck, R.L.; Brown, W.W.
July 12, 1971
NTIS \$6.00
- AD-763946
Solid Lead Shielding Blocks with Hatches and
Ball-and-Socket Joints.
Translation Div., Naval Intelligence Support Center,
Washington, D.C.
July 11, 1973
NTIS \$4.25
- AECL-3797
Radiation Dosimetry in WR-1 Reactor. III. Determination
of Flux Density.
Mehta, K.K.; Stadnyk, A.M.
July, 1972
Atomic Energy Canada Ltd., Chalk River, Ontario
- AERE-R-7008
Nuclear Accident Dosimetry Systems; U.K. Measurements
at the Second IAEA Intercomparison at ORNL, May, 1971.
Delafield, H.J.; Boot, S.J.; Dennis, J.A.
January, 1972
Dep., NTIS (U.S.Sales Only) \$3.75 UK p 1.00

- AERE-R-7394
Fission Product Chain Yields from Experiments in
Reactors and Accelerators Producing Fast Neutrons of
Energies Up to 14 MeV.
Crouch, E.A.C.
1973
Dep., NTIS (U.S.Sales Only)
- ANL-8032
Applications of a Pulsed Spallation Neutron Source.
Report of a Workshop Held at Argonne National Laboratory,
April 29-May 4, 1973.
Argonne National Lab.
1973
Dep., NTIS \$5.45
- BNWL-568
Buildup of Radioisotopes External to Reactor Core.
Bunch, W.L.; Zwibel, H.S.
September, 1967
Dep., NTIS
- BNWL-SA-4382; CONF-721045-1
Physical Characteristics of Particle Beams.
Roesch, W.C.
September 15, 1972
Dep., NTIS
- BNWL-SA-4732; CONF-730934-1
Neutron Irradiation Damage in Boron Carbide.
Kissinger, H.E.; Cummings, W.V.; Mahagin, D.E.
No Date
Dep., NTIS
- CEA-R-4399
Evaluation of the Equivalent Dose Rates Due to Neutrons
Emitted by Plutonium Metal, Plutonium Oxide and Plutonium
Fluoride - Graphs.
Gouguet, J.
May, 1973
NTIS
- CINDA 73, Vol.1 Z < 52
An Index to the Literature on Microscopic Neutron Data.
IAEA
June, 1973
International Atomic Energy Agency, Vienna, 1973, 2 Vols.
and a Supplement \$31.00
- CINDA 73, Vol.2 Z > 53
An Index to the Literature on Microscopic Neutron Data.
IAEA
June, 1973
International Atomic Energy Agency, Vienna, 1973, 2 Vols.
and a Supplement \$31.00
- CLM-R-121
A Design Concept for a Fusion Reactor Blanket and
Magnet Shield Structure.
Mitchell, J.T.D.; George, M.W.
June, 1972
HMSO

- CLOR-94/D (In Polish)
The Preparation of Radiothermoluminescent Finger
Dosimeter for Beta and Gamma Radiations.
Koczynski, A.; Wolska-Witer, M.; Musialowicz, T.
1973
Nuclear Energy Information Center of the Polish
Government Commissioner for Use of Nuclear Energy
Palace of Culture and Science, Warsaw, Poland.
- CONF-711026, pp.1074-1088
Mixed Neutron-Gamma Dosimetry.
Proceedings of the 3rd International Conf. on
Luminescence Dosimetry, Riso, Denmark, 11-14 Oct.1971.
Dua, S.K.
1972
Riso, Denmark; Danish Atomic Energy Commission, 1972
- CONF-720614-9
Radiation Doses from Hypothetical Exposures to Rulison
Gas.
Barton, C.; Moore, R.; Hanna, S.
1972
NTIS
- CONF-721018-17
Applications of the Transmission Matrix Method in
Gamma Ray Shielding Analysis.
Rohach, A.
1972
NTIS
- COO-2280-1
Finite Elements in Neutron Transport Theory.
Bareiss, E.H.; Abu-Shumays, I.K.
May, 1973
Dep., NTIS \$5.00
- COO-2280-2
Adjoining Appropriate Singular Elements to Transport
Theory Computations.
Abu-Shumays, I.K.; Bareiss, E.H.
May, 1973
Dep., NTIS \$4.50
- COO-2280-3
Computational Complexity in Multidimensional Transport
Theory Calculations. Progress Report, September 1, 1972-
August 31, 1973.
Bareiss, E.H.; Abu-Shumays, I.K.
May, 1973
Dep., NTIS \$3.00
- FMRB-39/72 (In German)
On the Operation and Radiation Shielding of Braunschweig
Research and Measurement Reactors During 1971.
Heintz, W.; Siegel, V.
1972
Phys.-Tech. Bundesanstalt, Braunschweig, Germany

HEDL-SA-555; CONF-730910-7
Neutronic Effects of Irradiation Experiment Loading on
PTR Environment.
Rothrock, R.
No Date
Dep., NTIS \$3.00

ICRP-21
Data for Protection Against Ionizing Radiation from
Extended Sources: Supplement to ICRP Publication 15.
ICRP
Pergamon Press

ISP-1973/03; ESIS Newsletter - Spec. Issue No.1
Neutron Propagation in Laminated Iron-Water Shields.
Nicks, R.; Perlini, G.
March, 1973
EURATOM, Joint Nuclear Research Centre, Ispra
Establishment, 21020 Ispra (Va), Italy

JUL-914-DE (In German)
Catalog of Ge(Li)-Gamma-Spectra.
Zaddach, G.
January, 1973
Dep., NTIS (U.S.Sales Only) \$28.50

LA-2680
ASPEN II: Two-Staging and Radiation Shielding
Effects on ASPEN Vehicle Performance.
Bussard, R.W.
March, 1962 - Declassified August 28, 1973
Dep., NTIS \$5.75

LA-3327
Some Neutronic Results of the Kiwi-B-4E Nevada Test.
Plassmann, E.A.; Helmick, H.H.; Orndoff, J.D.
May, 1965 - Declassified August 29, 1973
Dep., NTIS \$4.25

LA-5356-T; Thesis
A Method of Moments Applied to an Invariant Imbedding
Solution of a Certain Class of Fredholm Integral
Equations.
Boicourt, G.P.
University of New Mexico, Dept. of Math. and Stat.
August, 1973
NTIS \$5.45

LA-4455
Neutronics of the Phoebus-2 Reactor.
Sapir, J.L.; Orndoff, J.D.
March, 1970 - Declassified August 28, 1973
Dep., NTIS \$5.00

KAPL-M-7156; BOB-1
Evaluated Neutron Cross Sections for Chromium (Version
8), Iron (versions 13 and 19) and Nickel (Version 8).
Stieglitz, R.G.; Reynolds, J.T.; Slavik, C.J.;
Lubitz, C.R.
March, 1973
NTIS

- MLM-1270
Plutonium-238 Isotopic Power Sources: A Summary Report.
Grove, G.R.; Powers, J.A.; Goldenberg, N.; Kelly, D.P.;
Prosser, D.L.
June 7, 1965 - Declassified October 31, 1972
Dep., NTIS \$13.75
- ORAU-120
Effective Absorbed Energies.
Barber, L.R.; Cloutier, R.J.; Watson, E.E.
July, 1973
NTIS \$4.00
- ORNL-4810
Natural Titanium Neutron Elastic and Inelastic
Scattering Cross Sections from 4.07 To 8.56 MeV.
Kinney, W.E.; Perey, F.G.
October, 1973
NTIS \$4.00
- ORNL-4923
Radioactive Atoms - Supplement I.
Martin, M.J.
November, 1973
NTIS \$4.00
- ORNL-TM-4026
Dose Estimations for the Hypothetical Use of Nuclearly
Stimulated Natural Gas in the Cherokee Steam Electric
Station, Denver, Colorado.
Moore, R.E.; Barton, C.J.
October, 1973
Dep., NTIS \$4.00
- RD/B/M-2669
Data for the Calculation of Gamma Radiation Spectra
and Beta Heating from Fission Products. (Revision 3)
Tobias, A.
June, 1973
Dep., NTIS (U.S.Sales Only) \$14.00
- RDT-E-12-4-T(8-73)
Shielded Shipping Cask for Spent Reactor Fuel Elements.
Div. of Reactor Research and Development (AEC),
Washington, D.C.
August, 1973
RSO
- RT/PI-(73) 15
A 26-Group Library with Self-Shielding Factors for Fast
Reactor Calculations from the UK Nuclear Data File.
Menapace, E.; Motta, M.; Panini, G.C.
1973
Dep., NTIS (U.S.Sales Only)
- RT/PI-(73) 14
Sensitivity Coefficients Calculation Using Direct and
Generalized Perturbation Methods.
Boeriu, S.; Cecchini, G.P.
1973
Dep., NTIS (U.S.Sales Only)

- TID-3336
Standards in Nuclear Science and Technology.
A Bibliography.
Technical Information Center (AEC), Oak Ridge, Tenn.
September, 1973
Dep., NTIS \$7.60
- TID-26299
Choice of Vacuum Wall Material for a Fusion Reactor.
Dick, R.; Shober, T.; Weiss, J.
July 22, 1971
NTIS
- WASH-1267
Fusion Power: Research and Development Requirements.
Division of Controlled Thermonuclear Research (AEC),
Washington, D.C.
July, 1973
GPO \$0.90
- Annu. Rep. Res. React. Inst. Kyoto Univ., 5, 71-80
Neutron Spectrum in Thoria.
Nishihara, H.; Nishio, M.
1972
- Atomkernenergie, 21(1), 48-54
Construction and Calibration of a Neutron Spectrometer
in the Energy Range of 10-50 MeV.
Bohm, I.; Bohm, J.; Wibberenz, G.
March, 1973
- Atomkernenergie, 21(2), 153-156
On the Problematic Nature of Personal Radiation
Monitoring.
Wagner, S.
1973
- Brit. J. Radiol., 45(538), 784-785
SI Units in Radiation Measurement.
Jennings, W.A.
October, 1972
- Brit. J. Radiol., 45(538), 785-786
Modifying Factors and Dose Equivalent in Radiation
Protection.
Wheatley, B.M.; Burlin, T.E.
October, 1972
- Eng. J. (Canada), 55(9), 22-24
Californium-252, A New Neutron Source for Science
and Engineering.
Wiggins, P.F.
September, 1972
- FAPIG (Tokyo), 65, 18-27 (In Japanese)
Shielding of Fuel Manipulation Systems for a
Sodium-Cooled Fast Reactor.
Tanaka, Y.; Suzuki, I.; Tubosaka, A.
May, 1972

- Health Phys., 23(2), 253-255
An Approximate Relation for the Prediction of the Dose
Rate from Radioactivity Induced in High Energy Particle
Accelerators.
Sullivan, A.H.
August, 1972
- Health Phys., 24(1), 113
Comment on the RAP, A Proposed Unit for Diagnostic
X-Ray Protection.
Burlin, T.E.; Wheatley, B.M.
January, 1973
- Health Phys., 25(5), 499-506
Thermoluminescent Dosimeters for High-Dose Applications.
Gorbics, S.G.; Attix, F.H.; Kerris, K.
November, 1973
- Health Phys., 25(5), 521-524
Panoramic Dental X-Ray Installation Structural
Shielding and Operator Protection Requirements.
Zelac, R.E.
November, 1973
- J. Chem. Phys., 57(12), 5530-5541
Variational Solution of the Linearized Boltzmann
Equation with Applications to Helium.
Revercomb, H.E.; Bruch, L.W.
December 15, 1972
- J. Chem. Phys., 57(12), 5562-5570
Effects of Long-Lived Collisions in the Boltzmann
Equation.
van Santen, R.A.
December 15, 1972
- J. Chem. Phys., 57(12), 5571-5576
Quantum Mechanical Derivation of the Correction to the
Boltzmann Equation Due to the Duration of Collisions.
van Santen, R.A.
December 15, 1972
- J. Nucl. Energy, 26(11), 549-559
Investigations of the Neutron Energy Spectrum in the
Lower eV Region by a 'Scatter Peel-Off Method'.
Bayer, A.
November, 1972
- J. Nucl. Energy, 26(11), 581-583
The Effective Centre of a Moderating Sphere When Used
as An Instrument for Fast Neutron Flux Measurement.
Axton, E.J.
November, 1972
- J. Nucl. Energy, 27(4), 227-239
Gamma Rays Resulting from Nonelastic Processes of 14.2
MeV Neutrons with Sodium, Magnesium, Silicon, Sulfur,
Titanium, Chromium and Iron
Abbondanno, U.; Giacomich, R.; Lagonegro, M.; Pauli, G.
April, 1973

- J. Nucl. Energy, 27(4), 241
Some Activation Cross-Sections for 14.7 MeV Neutrons
on Nickel.
Hemingway, J.D.
April, 1973
- J. Nucl. Sci. Technol. (Tokyo), 9(3), 133-142
Measurements of Gamma-Heat in the JMTR.
Hayashi, T.; Andoh, H.; Takahashi, H.; Onodera, K.
March, 1972
- J. Nucl. Sci. Technol. (Tokyo), 9(7), 383-394
Adjustment of Group Cross Sections by Means of
Integral Data. I. Theoretical Study.
Mitani, H.; Kuroi, H.
July, 1972
- J. Phys. (Paris), 33(8-9), 32
Prompt Fission Neutron Energy Spectrum of ^{235}U at
 $E_n=0.4$ MeV.
Knitter, H.-H.; Islam, M.M.
August-September, 1972
- J. Quant. Spectrosc. and Radiat. Transfer, 12(12),
1659-1672
Partial Redistribution in Radiation Transport.
Kivel, B.
December, 1972
- Kernenergie, 16(4), 96-105
The Radioactivity in the Primary System of Sodium-Cooled
Fast Reactors.
Ullmann, H.; Kunstler, K.; Richter, W.
April, 1973
- Kernteknik, 15(2), 57-64 (In German and English)
Emission and Atmospheric Dispersion of Radioactive
Fission Products.
Huebschmann, W.G.
1973
- Meas. Tech. (USSR) (Engl. Transl.), 15(12), 1840-1844
Contemporary State and Development Trends in the
Metrology of Neutron Radiation.
Vasil'ev, R.D.
December, 1972
- Med. Radiol., 17(10), 70-74 (In Russian)
Distribution of Qualitative Composition and Absorbed
Doses of ^{60}Co Gamma-Radiation when Using Lattice Filters.
Nguyen van Thien; Zaboronskii, A.A.; Krongauz, A.N.
October, 1972
- Nucl. Instrum. Methods, 104(1), 219-220
Proposal of a Method for ^{14}MeV Neutron High Intensity
Pulse Generation.
Taczanowski, S.
October 1, 1972

- Nucl. Instrum. Methods, 106(2), 317-318
Measurements of Gamma-Ray Attenuation Coefficients of
Organic Scintillators.
Goswami, B.; Chaudhuri, N.
January 15, 1973
- Nucl. Phys. A, A206(2), 374-384
Gamma Rays of Primary Fission Products from 235-U(n,f)
and 239-Pu(n,f).
Schindler, W.J.; Fleck, C.M.
May, 1973
- Nucl. Sci. Eng., 51(3), 272-277
Multiple Reaction Correction to Neutron Reaction Cross
Sections.
Devaney, J.J.
July, 1973
- Nucl. Sci. Eng., 52(2), 254-266
Measurements of Fast-Neutron Spectra in Reactor Shields.
Livengood, C.D.; Paulson, C.K.; Hungerford, H.E.
October, 1973
- Nucl. Sci. Eng., 52(2), 247-253
Relativistic Invariance and Photon-Electron Scattering
Kernels in Transport Theory.
Wienke, B.R.
October, 1973
- Nucl. Technology, 16, 543-555
A Storage Container for Fissile Materials.
Schuske, C.L.; Hunt, D.C.
December, 1972
- Nucl. Technology, 17(1), 66-70
Measurement of Total Attenuation Coefficients for 6- to
10-MeV Photons.
Ahmed, K.U.; Cochran, R.G.
January, 1973
- Q. Appl. Math., 30(2), 213-218
On Some Probabilities in Continuous Random Walk.
Melzak, Z.A.
July, 1972
- Radiography, 38(45), 319-322
Photon Interaction Processes: Their Relative Importance
in Bone and Muscle.
Buchan, R.C.T.
December, 1972
- Senpaku Gijutsu Kenkyujo Hokoku, 9(1), 1-17 (In Japanese)
Radiation Shielding Study for an Integral-Type Marine
Reactor. A Study of Secondary Steam System Conditions
for the Reduction of Shield Weight Around the Main
Condenser.
Ueki, K.; Yamakoshi, H.
January, 1972

Soviet J. At. Energy (English Transl.), 33(2), 681-685
The Effect of a Magnetic Field on Neutron Diffusion.
Kazachenkov, Yu. N.; Orlov, V.V.
August, 1972

Transp. Theory and Stat. Phys., 2(3), 197-209
A Modified Variational Method for the Pulsed-Neutron
Problem.
Ahmed, F.; Rangaswamy, L.; Kothari, L.S.
1972

Vop. Fiz. Zashch. Reaktorov, 5, 91-105 (In Russian)
Space-Energy Distribution of Reactor Neutrons in
Metal Hydrides.
Vasil'ev, G.A.; Veselkin, A.P.; Egorov, Yu.A.;
Orlo, Yu.V.; Pankrat'ev, Yu.V.; Piskunov, V.I.
1972

BOOK
EMISSION, ABSORPTION AND TRANSFER OF RADIATION IN
HEATED ATMOSPHERES.
Armstrong, B.H.; Nicholls, R.W.
1972
Oxford, New York, Pergamon Press (1972)

BOOK
TOPICS IN RADIATION DOSIMETRY. SUPPLEMENT 1 TO
RADIATION DOSIMETRY.
Attix, F.A.
November, 1972
Academic Press, New York and London, 111 Fifth Ave.,
New York, N.Y. 10003 \$28.00

BOOK
NEUTRON PHYSICS. Vol. 2.
Bacon, G.E.
1969
London, Wykeham. Distributed by Springer-Verlag, N.Y.

BOOK
NUCLEAR POWER PLANT SAFETY. Administrator's Guide No.2.
Goodwin, J.T. (Executive Director)
1972
Southern Interstate Nuclear Board, Suite 104, 7 Dunwoody
Park, Atlanta, Georgia 30341

Season's Greetings
And best wishes for the coming year

COMPUTER CODES LITERATURE

WAPD-TM-949 March 1973 BE27
 BE27 - A Two Group X-Y Geometry Transport Program For
 Deep Penetrating Homogeneous Media
 Fischer, R.B.; Gelbard, E.M.
 Bettis Atomic Power Laboratory, Pittsburgh, Pa.
 FORTRAN CDC 6600
 AVAIL: ACC

LA-4848-MS July 1973 TWOTRAN-II
 TWOTRAN-II: An Interfaced Exportable Version of the
 TWOTRAN Code for Two-Dimensional Transport
 Lathrop, K.D.; Brinkley, P.W.
 Los Alamos Scientific Laboratory, Los Alamos, N. M.
 IBM 360/195, CDC-6600, CDC-7600

RISO-M-1568 CRS
 CRS: A Code to Produce Multigroup Neutron Cross Sections
 for Reactor Physics Calculations
 Larsen, A.M.; Hvidtfeldt
 Danish Atomic Energy Commission Research Establishment,
 Riso, Roskilde, Denmark

ANL-7722 June 1973 ARC
 ARC - Cross-Section Generation Capabilities, ARC-MC2
 Stenberg, C.G.; Lindeman, A.
 Argonne National Laboratory, Argonne, Illinois

ORNL-TM-4291 August 1973 MAINTAIN
 The Maintain Code for Use in Maintaining and Revising
 Card Image Files on Tape
 Trubey, D.K.
 Oak Ridge National Laboratory, Oak Ridge, Tennessee

KFK-1725 June 1973 KEDAK
 Handling and Service Programs for the Karlsruhe Nuclear
 Data File Kedak, Part I: Management and Retrieval Programs
 Krieg, B.
 Karlsruhe, Germany
 FORTRAN

LA-4751 January 1972 MCN
 MCN: A Neutron Monte Carlo Code
 Cashwell, E.D.; Neergaard, J.R.; Taylor, W.M.; Turner, G.D.
 Los Alamos Scientific Laboratory, Los Alamos, New Mexico
 RT/FI(73)13 1973 RIGEL-ETOE-MC2
 A CNEN Revised Version of the RIGEL-ETOE-MC2 Code System
 to Generate Multigroup Cross Sections and Its Use with
 ENDF/B-III Data
 Gheorghie, D.; Salvatores, M.
 CNEN, Italy

TM-69-1011-3 April 1, 1969 BOF-P
 Bellcomm Orbital Flux Program
 Ingley, J.S.
 Bellcomm, Inc., Washington, D.C.

BNWL-234 March 1966 FCC
 FCC - A Fundamental Mode Code for Fast Reactor Analysis
 Little, W.W., Jr.; Hardie, R.W.
 Battelle-Northwest, Richland, Washington
 FORTRAN UNIVAC 1107, IBM 7090

RT1/PCR(73)10 May 1973 SUPERTOG
 Biblioteca DLC-2 da SUPERTOG e Programmi Di Servizio
 Tondinelli, L.
 CNEN, Italy