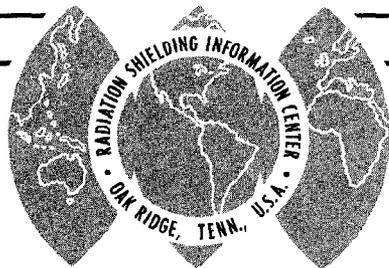


RSIC Newsletter



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. 60

November, 1969

*Knowledge and timber should not be much used
until they are seasoned. - O. W. Holmes*

AMERICAN NUCLEAR SOCIETY MEETING

November 30 - December 4 at San Francisco

The Shielding and Dosimetry Division of the American Nuclear Society has scheduled a full program of shielding and dosimetry sessions for the San Francisco meeting. Included are sessions on nuclear data, cross sections, high energy transport, dosimetry spectrometry, multidimensional calculations, radiation transport, weapons shielding, and space shielding. Full papers from the nuclear data and multidimensional shielding calculations sessions will be published as an ANS-SD report.

CONFERENCE ON NUCLEAR AND SPACE RADIATION EFFECTS

July, 1970 in San Diego

The 1970 Institute of Electric and Electronic Engineers Conference on Nuclear and Space Radiation Effects will be held on the campus of the University of California at San Diego, San Diego, California, July 21-23, 1970. The conference will cover theoretical and experimental studies of nuclear and space radiation on materials, components, circuits, and electronic systems. The program will consist of six to eight sessions of contributed papers, and a number of invited papers to be presented by recognized authorities in radiation-effects and allied fields. Papers describing significant contributions in the following or related areas are invited:

Physical Properties of Irradiated Solids
Displacement Damage and Ionization Effects in Semiconductor Devices,
Integrated Circuits, Transducers, Capacitors, etc.
Methods of Analyzing, Predicting, Simulating, and Hardening Against
Radiation Effects
Energy Deposition by Energetic Particles and Photons in Solids:
Dosimetry
Ion Implantation Effects
Radiation Effects Quality Assurance

Summaries of contributed papers must be submitted by February 16 to the 1970 Technical Program Chairman:

R. K. Thatcher
Battelle Memorial Institute
505 King Avenue
Columbus, Ohio 43201

Registration forms, programs and additional conference information will be distributed in May, 1970.

Conference Chairman: R. A. Poll
Systems, Science and Software
Post Office Box 1620
La Jolla, California 92037

AVKER Data Library for Neutron Kerma Factors Available

A data library of neutron kerma factors for calculating dose and heat generation from flux density is now available from RSIC as DLC-10. The data and the retrieval program AVKER (described in ORNL-TM-2558) were contributed by M. Solomito, J. J. Ritts, and H. C. Claiborne of ORNL. (See also Nucl. Appl. and Tech. 7(1), 89-95 [July 1969]).

The program allows the evaluation of the kerma factors for any desired composition that can be made up from elements presently in the library and for any arbitrary group structure within the energy range 0.023 eV to 19.2 MeV. The present library has the elements H, 6-Li, 7-Li, Be, C, N, O, F, Na, Mg, Al, Si, P, S, Cl, K, Ca, Fe, and Nb.

Requesters of DLC-10 should send one reel of tape to RSIC for the library and code.

CORRECTION TO CCC-82/ANISN - October 1969

Two errors have been called to the attention of the RSIC staff necessitating changes in subroutines in the CCC-82/ANISN Code Package. Richard G. Soltesz of the Experiment Analysis - Nuclear and Radiation Design Group of the Astronuclear Laboratory, Westinghouse Electric Corporation, Pittsburgh, and Ward W. Engle, of the Computing Technology Center, Union Carbide Nuclear Division, have suggested changes to correct the errors.

The errors affect calculations when IDATI = 2.

The first error, in GUTS, results in a tape positioning error in problems where the number of down-scatter cross sections is less than the total number of groups (IGM) minus one.

The second error, in subroutines FINPR1 and FINPR can cause the absorption and balance quantities in the Balance Tables to be in error, as well as a possible mode error in subroutine FINPR when run on the CDC-6600 computer.

For those interested in using this option, the information needed to correct the errors is available in RSIC.

CODE PACKAGES UPDATED

Changes have been made in several code packages due to additions, corrections and/or modifications. In each case cited below, it is suggested that a reel of tape accompany a request for the code package.

- CCC-7/NTC Monte Carlo high energy nucleon transport code incorporating cascade and evaporation processes. Updated with a revised 05R, the Monte Carlo neutron transport code, it is written in FORTRAN IV and incorporates new developments in 05R. This version should be requested as CCC-7B/NTC. Reference describing the new material: ORNL-TM-1866. The revision was made by the Neutron Physics Division, ORNL.
- CCC-22/MAC-RAD Neutron and gamma-ray attenuation code - Spinney (removal-diffusion) calculation in plane geometry. A revised and developed version for the IBM 360/75 has been contributed by EURATOM, Ispra, Italy through the ENEA Computer Programme Library. This version may be requested as CCC-22C/MAC-RAD.
- CCC-46/OGRE A general purpose Monte Carlo gamma-ray transport code system. A major modification has been made to the IBM 360 version of OGRE to read cross section data directly from the ENDF/B master tapes. In addition, several changes have been made to OGRE-G geometry routines following suggestions made by users at Westinghouse Astronuclear. This updated 360 version may be secured by asking for CCC-46E/OGRE.
- CCC-53/LSVDC Space vehicle dose calculation. An addition has been made to the code package by the Nuclear Analysis Department, Lockheed-Georgia Co.: now an all-FORTRAN IV version. Reference: ER-7777, Vol. IV. This version may be secured by requesting CCC-53B/LSVDC4.

- CCC-79/ISOSHLD Kernel integration code - general purpose isotope shielding analysis. ISOSHLD III has been added, including an updated photon probability library and a second RIBD library added for fast reactor fission product inventory calculations. Contributor: Battelle Memorial Institute, Pacific Northwest Laboratories. Reference: BNWL-236 Supplement 2 and BNWL-962. This version may be requested as CCC-79D/ISOSHLD III.
- CCC-82/ANISN Multigroup one-dimensional discrete ordinates transport code. A CDC 6600 version has been received from Westinghouse Astronuclear Laboratory which incorporates the recent developments in the basic code package. This version should be requested as CCC-82F/ANISN. The Nuclear Engineering Department of the University of Virginia has sent to RSIC a patch deck which will allow the user to run the IBM 7090 version of ANISN on the Burroughs computer, B-5500. This package should be requested as CCC-82E/ANISN.
- CCC-89/DOT A multigroup two-dimensional discrete ordinates transport code with anisotropic scattering. CCC-89C/DOT II incorporates the latest developments in this code, and this version is operable on the IBM 360/75/91. It has been contributed by the Computing Technology Center, UCND, Oak Ridge, Tenn.

NEW CODE PACKAGES AVAILABLE

Operable, tested with a sample problem, and available for distribution are the following code packages:

- CCC-120/
SPACETRAN Dose calculations at detectors at various distances from the surface of a cylinder - I, integration of ANISN leakage data, and II, assumed powers of cosine angular distribution. Contributed by the Neutron Physics Division, ORNL. Written in FORTRAN IV and tested by RSIC on the IBM 360/75/91. Reference: ORNL-TM-2592. One reel of magnetic tape needed with request.
- CCC-121/SABINE Spinney (removal-diffusion) shielding code in plane geometry. Contributed by Reactor Theory and Analysis Department, EURATOM, Ispra, Italy, through the ENEA Computer Programme Library. Reference: EUR 3635.e and Addendum. Written in FORTRAN IV and run by RSIC on the IBM 360/75/91. One reel of tape is needed with request.

- CCC-122/RAD 2 Fission product radioactivities calculation. Contributed by Gulf General Atomic through the Argonne Code Center. Reference: GAMD-6519. Written in FORTRAN IV, the code was run by RSIC on the IBM 7090.
- CCC-123/XSDRN Multigroup one-dimensional discrete ordinates spectral averaging transport code. Contributed by Computing Technology Center, UCND, and Reactor Division, ORNL. Reference: ORNL-TM-2500. Written in FORTRAN IV for the IBM 360/65/75/91. One reel of tape is required for the source program. Currently, the data library is available only in HEX and the requester may send an additional reel of tape for this. An announcement will be made when the data is available as card images.
- CCC-124/KDLIBE Kernel-diffusion code system consisting of nine codes and a data library contributed by Nuclear Systems Programs, General Electric Missile and Space Division, Cincinnati, Ohio. The nine codes provide a means for shield analysis using the NRN version of the Spinney method, Albert-Welton and other kernels, 2-component method, and single scattering. References: GEMP-599, GEMP-456, and GESP-226. The codes are written in FORTRAN IV for the GE-635 computer, and this version is now available as CCC-124A/KDLIBE. RSIC is now in the process of making the codes operable on the IBM 360, and an announcement will be made when this is accomplished. One reel of tape is needed for Version A.

NEW PSR ROUTINES AVAILABLE

Operable, tested with a sample problem, and available for distribution are the following peripheral shielding routines:

- PSR-12/GGC A system of codes for the production of multigroup cross section sets and an extensive library of data, contributed by Gulf General Atomic, San Diego, California. References: GA-7157, GA-7158, and GA-9021. Packaged version has been run by RSIC on the IBM 360/65. Tapes required: 1 reel for the GGC source master; DATA: 2 reels for binary data written 9-track on the IBM 360, 4 reels for BCD data written 9-track, 800 BPI, and at least 14 reels for BCD data written 7-track, 556 BPI.
- PSR-13/SUPERTOG Data generator: fine group constants and P_n scattering matrices from ENDF/B cross-section data in the form for use in GAM, ANISN, and DOT computer codes. Contributed by Computing Technology Center, UCND, and the Reactor Division, ORNL. Reference: ORNL-TM-2679. Sample problems were run by RSIC on the IBM 360/75/91. A reel of magnetic tape is needed with each request.

PERSONAL ITEMS

Charles W. Garrett has been named executive secretary of the National Academy of Engineering Committee on the Interplay of Engineering with Biology and Medicine. Chuck is the former chief, Program Analysis Branch, of the NASA Office of Advanced Research and Technology, Washington, D.C.

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Stanton T. Friedman is now a member of the technical staff of the Nuclear Systems Department of TRW Systems Group, Redondo Beach, California. Of primary concern to the group is the shielding of isotopic power sources for space systems such as the Transit and Pioneer F/G missions.

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J. M. Ferguson is now with B-Division of the Lawrence Radiation Laboratory, Livermore, California. Jim, formerly with the Naval Radiological Defense Laboratory, will continue to be involved with radiation transport problems.

VISITORS TO RSIC

Visitors to RSIC during the month of October were: Elinor G. Adensam, Hittman Nuclear Development Corporation, Columbia, Md.; E. D. Arnold and H. F. Soard, Chemical Technology Division, J. W. Carswell and Don Steiner, Reactor Division, and Richard Dyer, Thermonuclear Division, ORNL; M. R. Cleland, Radiation Dynamics, Inc., Westbury, New York 11590; Silvana Giambuzzi and G. C. Panini, CNEN, Bologna, Italy; Robin J. Knies, Brown Engineering, Huntsville, Ala.; G. P. Lahti and Millard Wohl, NASA Lewis Research Center, Cleveland, O.; Reg Prescott and Armand Rafolovitch, ENEA Computer Programme Library, Ispra, Italy; E. Schonfeld, NASA Manned Spacecraft Center, Houston, Texas; Charles Z. Serpan, Jr., Naval Research Laboratory, Washington, D.C.; and Hideo Yamaki, Argonne National Laboratory, Argonne, Ill., and Hitachi Central Research Laboratory, Japan.

NOVEMBER ACCESSION LIST OF LITERATURE

The RSIC is now aware of the literature cited in the following list. This literature has either been obtained by RSIC or has been placed on order. When received, this material will be examined and assigned to various files if suitable for our information system. The accession list is divided into three fields (1) reactor and weapons shielding, (2) space and accelerator shielding, and (3) shielding computer codes. These titles are announced before processing and indexing so that there will be no delay and can serve as a prompt announcement of current literature.

RSIC is not a documentation center. Copies of the literature cited must generally be obtained from the author or from a documentation center such as the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

RSIC maintains a microfiche file of literature entered into its information system. Computer searches of this system (which produces a special bibliography) and duplicate microfiche copies of the literature in our file are available upon request. Naturally, we cannot supply copies of literature which is copyrighted (such as books or journal articles) or whose distribution is restricted. Neither service is available for the codes literature.

REACTOR AND WEAPONS SHIELDING

AD-685 997 (N69-32654)

October 1968

Handbook on Radiation Safety
V. F. Kozlov, Yu. S. Troshkin

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Experimental Verification of Neutron and Gamma-Ray Transport
Calculations in Lithium Hydride and Tungsten
A. E. Profio, R. J. Cerbone, D. L. Huffman

AWRE 033/68

July 1968

Compton Cross Section
A. Waiham
Available: HMSO, 49 High Holborn, London, WCl.

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Recent Work of the NCRP, ICRU, and ICRP of Interest to Accelerator
Health Physicists
F. P. Cowan

CEX-65.11

April 1969

Energy and Angular Distribution of Neutrons and Gamma Rays: Operation
Henre
J. H. Thorngate, D. R. Johnson, P. T. Perdue
Available: AEC Depository Libraries; CFSTI

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Dose-Depth Distributions Produced by Electrons in Multilayer Targets
M. J. Kniedler, J. Silverman
(From Symposium on Utilization of Large Radiation Sources and Accelerators in Industrial Processing, Munich, Germany)
Available: AEC Depository Libraries; CFSTI

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Neutron-Induced Gamma-Ray Production Cross Sections for Silicon and Tungsten
W. E. Tucker, P. S. Buchanan, T. C. Martin, D. O. Nellis, G. H. Williams

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Neutron and Gamma Radiations from Pure Pu-238
J. Bubernak, G. M. Matlack, C. F. Metz
Available: CFSTI as N69-34068

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September 1969

Multigroup Calculations of Resonance Neutron Capture in a Thick Slab of Depleted Uranium
G. P. Lahti
Available: CFSTI

NASA-TM-X-1887

September 1969

Quadrature Variations in Discrete-Ordinates Calculations
R. E. Sullivan

NASA-TM-X-52679

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Estimation of Spatial Capture Distributions in Resonance Absorbers
D. Bogart

NASA-TN-D-5431

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Analysis of the Gamma-Ray-Backscatter Technique for Direct Measurement of the Density of the Martian Atmosphere
P. J. LeBel

ORNL-TR-1891 (BMwF-FBK-67-09 in German)

January 1967

Multiple Scattering of γ -Radiation in Media of Low Atomic Number
A. Schaarschmidt

ORNL-TR-2213

Weighting and Biasing of a Monte Carlo Calculation for Very Deep Penetrations
J. M. Lanore
Available: AEC Depository Libraries; CFSTI

ORNL-TR-2214 (NP-17727 in German)

1968

Direct Determination of Transmission and Reflection Matrices for Gamma Rays
A. H. Maute (author)
K. H. Hoecker, E. Bagge, G. Boehnecke (Editors)

ORNL-TR-2239 (*Health Phys.*, 14(3) 267-69, March 1968, in German)

Activation Half-Times in Accelerators
E. Freytag

ORNL-TR-2247 (*Acta Phys. Austriaca*, 29, 160-5, 1969, in German)

Measurement and Calculation of Dose Rate Removal Cross Sections and
B-Factors of Neutrons
E. Kolb, E. Tschirf

ORNL-TR-3028 (*Atompraxis*, 14(7), 2 pages following 320 [July 1968])

Fast Neutron Shielding by Ordinary Concrete
P. F. Sauermann, W. Schafer

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Fission Product Inventories. Part II. Results for MAGNOX, AGR,
HTR, and CFR Reactors Using FISP
R. H. Clarke, R. E. Utting
Available: AEC Depository Libraries; CFSTI (U.S. Sales Only)

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Fate and Importance of Radionuclides Produced in Plowshare Events
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J. Koranda, Y. Ng, P. Phelps, G. Potter, A. Tamplin

Indian J. Pure Appl. Phys., 7(6), 440- (1969)

Z-Dependence of Pair Cross Sections
V. V. Rao, K. Parthasaradhi

J. Mater., 4(2), 251- (1969)

Neutron Attenuation Mechanisms in Concrete Shielding
J. Greenborg

J. Nucl. Energy, 22(5), 267-82 (May 1968)

Neutron Capture Between 5 keV and 3 MeV

J. Nucl. Med., 10(N3S), 7-12 (1969)

Estimates of Absorbed Fractions for Monoenergetic Photon Sources
Uniformly Distributed in Various Organs of a Heterogeneous Phantom
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J. Nucl. Sci. Tech. (Tokyo), 6(8), 466-473 (August 1969)

A Numerical Method for Solving the Neutron Transport Equation in
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K. Takeuchi

Kernenergie, 12, 51-3 (Feb. 1969)

Semigroup Method Approach to Neutron Transport Theory
P. Tataru, Gh. Lupu

Kernenergie, 12, 53-6 (Feb. 1969) (In Russian)

Solution of the Boltzmann Equation by Means of the Jacobi Polynomials
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Calculation of Efficiency and Cross Section of Cylindrical Scintillators in Axisymmetrical Gamma-Ray Fields
A. Schaarschmidt, H. J. Keller

Nucl. Sci. Eng., 29(2), 165-175 (August 1967)

Correlation of Radiation Damage to Steel with Neutron Spectrum
W. F. Sheely

Nukleonic. 12(1), p. 18-28 (Dec. 1968)

Spatially Dependent Thermal Neutron Spectra in Slab and Cylindrical Geometries
J. M. Neill, J. C. Young

Nukleonic, 12(1), 45-7 (Dec. 1968)

A Method to Solve Multigroup P_3 Equations in Cylindrical Geometry
M. V. Matausek

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Individualized Lung Shields Constructed from Lead Shot Embedded in Plastic
Y. Maruyama, V. C. Moore, D. Burns, M. T. J. Hilger

Soviet Phys. J., (Izv. Vuz. Fiz. [USSR], 12, 127-9 [1968] In Russian)

Perturbation Method for Calculating the Reflection of γ -Radiation from a Two-Layer Barrier
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Energy Spectra of γ -Rays at a Two-Layer Barrier
A. M. Kolchuzhkin, V. V. Uchaikin, V. V. Ryzhov, V. V. Starukhin

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International Commission on Radiation Protection
New York, Pergamon Press, 1968

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Metal Hydrides

W. M. Mueller, J. P. Blackledge, G. G. Libowitz (Editors)
New York, London, Academic Press, 1968

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Fundamentals of Radiation Protection

H. F. Henry
Wiley-Interscience, 1969, 512 pp. \$17.50

THESIS (Order No. 69-1475) (N69-31988)

A Study of the Effects of Polarization, Electron Binding, and
Rayleigh Scattering in Monte Carlo Gamma Ray Transport Calculations
W. E. Vesely, Jr.
Illinois University, Urbana, Ill.
Available: Univ. Microfilms: HC \$15.55/Microfilm \$4.40

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Health Physicists
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Measurements of the Longitudinal and Lateral Development of
Electromagnetic Cascades in Lead, Copper, and Aluminum at 6 GeV
G. Bathow, E. Freytag, K. Tesch, R. Kajikawa, M. Kobberling
Available: DESY, Bibliothek, 2 Hamburg 52, Notkestieg 1, Germany

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A Monte Carlo Simulation of the Transport of High Energy Electrons
and Photons in Matter
H. L. Beck
Available: CFSTI

JINR-P2-4568

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Intranuclear Cascades with the Account of α -Clusters
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H. Burfeindt

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Empirical Pathlength-Energy Relationship for Protons with Energies of 100-100,000 MeV

I. K. Vzorov

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Meson-Nucleon Cascade Interactions with Emulsion in the Energy Range 50 to 80 GeV

I. Z. Artykov, V. S. Barashenkov

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Questions about Radiation

V. Dolezal, J. Luxa

JETP Lett. (USSR) (English Transl.), 9, 232-4 (April 5, 1969)

Interaction of Cosmic Pions with Graphite Nuclei

I. N. Erofeeva, L. G. Mishchenko, V. S. Murzin, L. I. Sarycheva

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Res. Rev. (Office Aerosp. Res.), 7(10), 11 (Oct. 1968)

Cosmic Rays at Supersonic-Transport Altitudes

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Investigations of Electron-Photon Showers with Scintillation Counters
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Energy Loss of Alpha Particles, Protons and Electrons in Matter
P. J. Walsh
North Carolina University, Chapel Hill, N.C., 1968
Available: University Microfilms: HC \$5.80/Microfilm \$3.00

BOOK - (A69-30005)

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*Solar-Terrestrial Physics: Solar Aspects: International Years
of the Quiet Sun and Cospar, Joint Symposium, London, England,
July 17-22, 1967, Proceedings. Part 1*

Edited by E. C. Strickland

- (1) Article: Energetic Solar Particles - (A67-35492) pp. 57-61
E. N. Parker
- (2) Article: The Earth's Radiation Belts - (A69-30016) pp. 281-301
S. N. Vernov

Cambridge, Mass., MIT Press (Annals of the IQSY. Vol. 4)

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Calculation of Reaction Rates in Small Physical Regions by Means
of a New Non-Multigroup Adjoint Monte Carlo Technique
by L. B. Levitt, R. C. Lewis, and J. Spanier

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A Users Manual for ASOP - ANISN Shield Optimization Program
by Ward W. Engle, Jr.
IBM FORTRAN IV H for IBM 360

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The UPDONC Code - Update of Nuclear 19-Group Cross Sections
by M. R. Edwards
FORTRAN IV for GE-625

GEMP-599

March 1968

KDLIBE

Shield Kernel-Diffusion Analysis
by W. E. Edwards

