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. 110 January 1974

One can stand still in a flowing stream,
but not in a world of men.
...Japanese Proverb

NEA CPL SECU ACTIVITY REPORT

In early 1973 the OECD Nuclear Energy Agency's Computer Programme Library in Ispra (Varese), Italy initiated an activity called "Service on Experience of Code Utilization (SECU)" in which they would collect feedback from users of 1-D ANISN; 2-D DOT II; Group Monte Carlo, MORSE and TIMOC; Point Monte Carlo, UCN-SAM II; 1-D Removal Diffusion, SABINE; 2-D Removal Diffusion, ATTOW; and Point Kernel, MERCURE-3. The activity was publicized in the RSIC Newsletter and some feedback was furnished from USA users of several of the programs. The NEA CPL Newsletter No. 15, November 1973 reports preliminary results of the study.

The information is collected through a questionnaire aimed at acquiring a clear picture of the present situation of the standard shielding codes. There are, of course, different versions of the programs adapted and used on different computers. Special adjustments have been undertaken in order to use these programs on smaller machines. Since computer time is high in two- and three-dimensional shielding programs, subroutines are still needed in machine language. If the code is used as a module in program systems, the input preparation can be reduced to a minimum. Plotting routines for the results and updated cross-section libraries are important additions to the code packages today. So a continuous production of related materials such as libraries and retrieval routines accompanies the application of the program. For routine application of the programs such related codes and libraries become more and more important. Of course, the main code itself is also continuously improved. New fields of application often need special changes of the code which are sometimes made independently by different users. The questionnaire should help to obtain the information on improvements which have been made, are being made or being planned.

A major part of the questionnaire concerns the type of problems to which each code appears to be most applied and most suitable, for example reactor bulk shielding, shield irregularities, special shielding applications, generation of weighting spectra for group condensation, checking of less rigorous or less general codes and of evaluated cross-sections.

Of primary interest is the broad field of user's experience gained in applying a certain code to various problems. This experience can best be incorporated in typical problem cases which have been solved with the programs and which can be representative of the capabilities of the code. The typical problems proposed by the users will be recalculated using new standard cross-section data input and will be checked, if necessary, by performing comparative runs. The typical problems will be added to the code package showing the possibilities of the code application and information on the correct use of the code. The questionnaire represents the first step of the SECU pilot study. It has been sent to shielding groups throughout the world and to date about 100 replies have been received by the Library. Their analysis is now the next step of this study and will be based on the following items:

1) the number of installations effectively using the code and with what frequency;
2) for which shielding problems the code is used;
3) collection of the errors which have been detected in the code packages;
4) a list of the different versions representing modifications of the original packages by adaptation to other computers;
5) collection of improvements to the code which have been made, are being made, are being planned or being requested;
6) a list of related codes or material (libraries, documents) in connection with the code;
7) similar programs in use or under development;
8) computational effort needed when the program is used for special shielding problems;
9) a list of typical problems proposed; and
10) indications of the qualities and deficiencies of the code when applied to different problems.

The analysis of the questionnaire will be completed by direct contact with the users in order to obtain more information on their experience in applying the codes to various shielding problems and to discuss the strengths and weaknesses of the codes in different fields of application. The number and types of different versions of each code in the Library should be fixed according to the requirements of the users. These reference versions should include all related material available, for example, libraries and retrieval routines which are needed for practical applications. The opinions on future trends of code improvements and code application should be clarified and general conclusions should be drawn. Typical problems will be selected to demonstrate the field of application, including as much as possible of the user's experience. They will be recalculated, checked and packaged together with the reference version. The checking will comprise comparative studies already published and, if necessary, new comparative studies which might be performed.

A final report including all these studies and, in particular, the present situation of the eight selected programs will be published by the NEA CPL in 1974 as Newsletter No. 17. A summary of the users' experience in the different fields of application of these codes, together, in some cases, with typical problems, will be an essential part of this report. Mr. C. Devillers from the Centre d'Etudes Nucleaires, Saclay, France, Dr. G. Hehn from the University of Stuttgart, Germany, and Dr. C. Ponti of the European Shielding Information Service, CCR Euratom, Italy, have been charged to carry out this activity in the form of a pilot study under the sponsorship of the NEA CPL.

CONFERENCE ON LASER EMISSIONS CALLED

A National Conference on "Measurements of Laser Emissions for Regulatory Purposes" to be sponsored by the Division of Electronic Products, Bureau of Radiological Health, Food and Drug Administration, DHEW, Rockville, Maryland, with the cooperation of the Quantum Electronics Division, National Bureau of Standards, Boulder, Colorado, is called for June 4-7, 1974, at the Twinbrook Parkway facilities of the Bureau of Radiological Health in Rockville, Maryland. The purpose of the conference is to establish a common framework of optical measurement and calibration methodology for the testing of laser products for regulatory purposes.

Papers will be presented on measurement requirements of the Federal Laser Performance Standard and recent work of the National Bureau of Standards on precision laser power and energy measurement and calibration systems. A limited number of contributed papers covering such topics as measurement of radiance, irradiance, pulse energy and pulse duration will be accepted. Contributions are invited on specific measurement systems and calibration techniques. Workshop sessions coordinated by nationally recognized technical experts will be conducted to examine specialized measurement procedures, problems, and alternative solutions.

There will be no registration fee. Each conference attendee will receive one copy of the proceedings. Abstracts not to exceed 250 words should be submitted by February 15, 1974. If accepted, completed papers must be submitted by May 1, 1974. Requests for further information on the conference should be directed to: Richard W. Peterson, Chief, Electro-Optics Branch, Division of Electronic Products, Bureau of Radiological Health (RH-220), 5600 Fishers Lane, Rockville, Maryland 20852.

In order that the facilities required for the meeting can be estimated, anyone planning to attend should so notify Mr. Peterson by March 31, 1974.

RSIC VISITORS

The following visitors were received in RSIC during the month: Cal Burgart, SAI, Albuquerque, N. M.; Bill Woolson, SAI, La Jolla, Cal.; Tom Baker and Martin K. Leimer, Kaman Sciences, Colorado Springs, Colo.; W. E. Kreger, USAEC Directorate of Licensing's Radiological Assessment Branch; and Hans O. Penkuhn, EURATOM, Ispra, Italy.

THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

Incorporated

FIRST CALL FOR PAPERS

1974 IEEE ANNUAL CONFERENCE

NUCLEAR AND SPACE RADIATION EFFECTS

JULY 15-18, 1974 **FORT COLLINS, COLORADO**

SPONSORED BY THE RADIATION EFFECTS COMMITTEE OF THE IEEE NUCLEAR AND PLASMA SCIENCES SOCIETY IN COOPERATION WITH COLORADO STATE UNIVERSITY

The 1974 IEEE Conference on Nuclear and Space Radiation Effects will be held on the campus of the Colorado State University in Fort Collins, Colorado, on July 15-18, 1974. The conference will cover theoretical and experimental studies of nuclear and space radiation effects on materials, components, circuits, and electronic systems. The program will consist of about six sessions of contributed papers, and a number of invited papers presented by recognized authorities in radiation effects. Papers are invited in the following fields and related areas:

- PHYSICAL PROPERTIES OF IRRADIATED SOLIDS
- DISPLACEMENT DAMAGE AND IONIZATION EFFECTS IN SEMICONDUCTOR AND OPTICAL DEVICES, ELECTRONIC COMPONENTS, TRANSDUCERS, ETC.
- ANALYSIS, PREDICTION, SIMULATION AND HARDENING AGAINST RADIATION EFFECTS IN CIRCUITS AND SYSTEMS
- RADIATION EFFECTS QUALITY ASSURANCE
- EFFECTS OF SPACE RADIATION ON COMPONENTS AND SYSTEMS
- DOSIMETRY AND ENERGY DEPOSITION

Procedure:

- Prepare an informative summary (not an abstract) that furnishes sufficient detail to present a meaningful review.
- Summaries are to be two to four pages in length, including figures, following the format shown on the reverse side of this sheet.
- Include authors' names and company affiliations on the first page of the text. Underline name of the author presenting the paper.
- Make sure to include your mailing address.
- Obtain all necessary clearances for presenting and publishing the summary and paper at an unclassified meeting.
- Submit six copies, including one reproducible. The summaries will be printed for publication directly from the material sent.

All summaries will be reviewed, and those accepted will be presented at the conference. A paper accepted for the conference also becomes a candidate for the conference issue of the IEEE Transactions on Nuclear Science, subject to another review. It is not necessary to be an IEEE member to present a paper.

Summaries must be submitted by March 4, 1974, to the 1974 Technical Program Chairman:

Ralph H. Stahl
Intelcom Rad Tech
P. O. Box 80817
San Diego, CA 92138
(714) 565-7171, ext. 266

Acceptance letters will be mailed before May 1, 1974. Registration forms, programs, and additional conference information will be distributed in May.

Conference Chairman:

Edward A. Burke
AFCRL LQR/Stop 30
L. G. Hanscom Field
Bedford, MASS 01730
(617) 861-4051

NEW STANDARDS AVAILABLE

Nuclear Standards News announces the availability of the following new standards.

ASTM - Approved Standards:

E 418-73 Fast-Neutron Flux Measurements by Track-Etch Technique.

E 419-73 Selection of Neutron-Activation Detector Materials (Rev.).

E 481-73T Method of Measuring Neutron Flux Density by Radioactivation of Cobalt and Silver.

E 496-73 Method for Measuring Neutron Flux Density and Average Energy from $^{3}H(d,n)^{4}He$ Neutron Generators by Radioactivation Techniques.

ANSI - Newly Published:

N105-73 Definitions of Terms Relating to Dosimetry [ASTM E 170-63 (1968)]. Order from: ASTM, $1.50.

N109-73 Method for Measuring Neutron Flux by Radioactivation Techniques (ASTM E 261-70). Order from: ASTM, $1.50.

N148-73 General Methods for Analysis of Radioisotopes [ASTM E 181-62(1968)]. Order from: ASTM, $1.50.

CORRECTION TO CODE PACKAGES

CCC-82/ANISN Several corrections to code packages were completed during the month of December. CCC-82D/ANISN (CDC 6600 WANL Version) has been corrected in two areas. Bernard Yeatts of CDC, Rockville, Maryland, called attention to a missing CDC 6600 Control Card from the RSIC-issued code package. Yo Taik Song of the Naval Ordnance Laboratory, Silver Spring, Maryland, called attention to difficulties resulting to division by zero in Subroutine S833. A modification has been made to the RSIC code package and is available to requesters from RSIC. The above changes were verified and authorized by the contributors of this version of the code package.

CCC-89/DOT Joe Sapyta, Babcock and Wilcox, Lee Simmons, SAI, and Kep Disney of Westinghouse have called attention to an error in the variable format entry (W and X options) of the FIDO Subroutine in CCC-89F (IBM 360) and CCC-89G (CDC 6600) WANL versions of DOT II-W. The RSIC code package has been updated. Other users may update by inserting one statement, J=NCOUNT in CCC-89F after Statement 255 and before the GO TO statement, and in CCC-89G, after Statement 270 and before the GO TO statement.

CCC-161/NMTC and CCC-178/HETC

Corrections should be made in the DRES Subroutine of the EVAP and/or I4C routines in CCC-161/NMTC and in CCC-178/HETC as follows: The correct values of the constants are, ZMASS(5)=2809.2539 and ZMASS(6)=3728.1883.

CCC-109/SOSUM

The following change should be made in the SOSUM data library: Library Data Card #19401 should be corrected from .1110T to read .11103.

CCC-203/MORSE-CG

The CCC-203A (UNIVAC), CCC-203B (CDC) and CCC-203C (IBM) versions of MORSE-CG have been updated to reflect changes suggested by the code originators.

In Subroutine EUCLID, card 3700 should read: 20 IF(DISTO-DIST.LE.0.0) CØ TØ 120. The following two cards should be added: (1) 120 MRK=1 EUC06180 and (2) RETURN EUC06190.

Subroutine NØRML, card 500, and Subroutine MESH (of the PICTURE program), card 600, should read:

1 KKR1,KKR2,KNSR,KVØL,NADD,LDATA,LTMA,LFPD,NUMR,IRTRU,NUMB,NIR.

The following change applies only to the CCC-203A and CCC-203B versions. Add the following cards to Subroutine JØMIN: (1) CØMMØN/TAPE/INT,IØT JØM01850 and (2) IØT=IO JØM01860.

CCC-217/ORIGEN

The ORNL developers have called attention to an error in the ORIGEN data library. The resonant fission cross-section for U^{233} should be 86.2 instead of 862. A description of a temporary method for correcting this card is available from RSIC. The substituted card should be:

922330 4.90E 01 1.85E 020.0 5.05E 02 8.62E 01 0.0

3.90E-03.0 6.30E-061

PERSONAL NEWS ITEMS

Marcel Barbier, formerly with the European Organization for Nuclear Research, CERN, Geneva, Switzerland, has moved to the USA to accept employment with JRB Associates, Inc., in McLean, Virginia.

Carl F. Johnson, formerly with the Shielding Group, General Dynamics, Fort Worth, Texas, is now at Black and Veatch Consulting Engineers in Kansas City, Missouri, where he is responsible for developing a shielding capability for design of nuclear power plants.

The following changes of address are noted: Victor V. Verbinski from Gulf Radiation Technology to Intelcom Rad Tech, San Diego, California; J. N. Davidson from Texas A & M University to the School of Nuclear Engineering, Georgia Institute of Technology, Atlanta, Georgia.

DECEMBER ACCESSION OF LITERATURE

REACTOR AND WEAPONS SHIELDING

AAEC/E-277
A Compilation of s and p Wave Neutron Strength Function Data.
Musgrove, A.R.de L.
March, 1973
Dep., NTIS (U.S. Sales Only)

AAEC/TM-619; INDC(AUL)-19G
Thermal Capture Cross Sections and Resonance Integrals for the AAEC Fission Product Library.
Clayton, E.
September, 1972
Dep., NTIS (U.S. Sales Only)

AEC-TR-7477
Calorimetric Measurement of Residual Power of Rapsodie and Fortissimo Fuel Elements.
Devillers, C.; Lhiaubet, G.; Lott, M.; N'guyen Van Dat; Dufreche, F.
1973
Dep., NTIS $4.50

ANL/NDM-1
Cobalt Fast Neutron Cross Section - Measurement and Evaluation.
Guenther, P.T.; Moldauer, P.A.; Smith, A.B.; Smith, D.L.; Whalen, J.F.
July, 1973
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BMFT-FBK-73-17 (In German)
Radiation Through Complex Geometrical Shielding Ducts.
Koban, J.
July, 1973
NTIS

BNL-17541; ENDF-201
ENDF/B Summary Documentation.
Brookhaven National Lab.
May, 1973
Dep., NTIS $18.50

BNL-50336, pp.6-31
Stopping Power and Range-Energy Relations.
Schloett, H.E.
February, 1973
Dep., NTIS $3.00

BNL-50336, pp.186-201
Computer Simulation of Radiation Damage in Solids.
Torrens, I.M.
February, 1973
Dep., NTIS $3.00

BRL-1633; AD-758449
Correlated Sampling Monte Carlo Neutron Transport Using SAMCRP: Three Studies.
Beverly, W.B.; Engebretson, A.C.
February, 1973
NTIS

BRL-R-1665
In-and-Down Scattered Radiation in a Simple Concrete Structure.
Schmoke, M.A.
September, 1973
Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314

BRL-R-1666
Sensitivity of the Transport of 14-MeV Neutrons to the Shape of the Nitrogen Elastic Angular Distribution.
Beverly, W.B.
September, 1973
NTIS

BRL-R-1679
Effects of Building Eccentricity Upon the Basement Ceiling Attenuation Factor, Bc(Xc, Omega).
Schmoke, M.A.; Zink, J.
October, 1973
NTIS

CEA-N-1612 (In French)
Rapid Method for Calculating the Neutron Spectra in the Case of a Criticality Accident (Carnac Program).
Bessis, J.
May, 1973
NTIS

CEA-N-1655 (In French)
Gamma Spectra Processing for the GERMAINE Air Loop and IRENE Water Loop.
Le Meur, R.; Bechemilh, J.P.
May 2, 1973
Dep., NTIS (U.S. Sales Only) $3.00

CEA-R-4504 (In French)
(Alpha, n) Neutron Spectra Determination by Liquid Scintillator Spectrometer Technique.
Capgras, A.; Ronteix, C.; Sueur, M.
October, 1973
Dep., NTIS (U.S. Sales Only) $3.50

CONF-700939-(Vol.1)
Radiation Dosimetry. Vol. 1. Proceedings of the International Summer School on Radiation Protection, Cavtat, Yugoslavia, September 21-30, 1970.
Miric, I. (Ed.)
1971
Belgrade, Boris Kidric Institute of Nuclear Sciences (1971)

CONF-730327-1
Electromagnetic Pulse and the Electric Power System.
Baird, J.K.
From Annual Meeting of the South Central Systems of NAPSIC, Jackson, Mississippi, USA (16 March 1973)
No Date
Dep., NTIS $3.00

CONF-730414-P1 and P2
Proceedings of the 1973 Conference on Mathematical Models and Computational Techniques for Analysis of Nuclear Systems, Ann Arbor, Michigan, April 9-11, 1973.
Nims, J.B. (Conf. General Chairman)
April, 1973
NTIS $27.50 (2 Vol. Set), Mf $0.95

CONF-730414-P1, pp.I-1 - I-9
Transport Theory Numerical Methods.
Lathrop, K.D.
In Proceedings of the 1973 Conference on Mathematical Models and Computational Techniques for Analysis of Nuclear Systems, Ann Arbor, Michigan, April 9-11, 1973.
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CONF-730414-P1, pp.I-10 - I-31
Triangular Mesh Methods for the Neutron Transport Equation.
Reed, W.H.; Hill, T.R.
In Proceedings of the 1973 Conference on Mathematical Models and Computational Techniques for Analysis of Nuclear Systems, Ann Arbor, Michigan, April 9-11, 1973.
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CONF-730414-P1, pp.I-32 - I-52
PSTR: Present Status and Future Prospects.
Jones, R.B.; Tavel, M.
In Proceedings of the 1973 Conference on Mathematical Models and Computational Techniques for Analysis of Nuclear Systems, Ann Arbor, Michigan, April 9-11, 1973.
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Calculations of the Absorbed Dose to a Man Immersed in an Infinite Cloud of 85-Kr.
Snyder, W.S.; Dillman, L.T.; Ford, M.R.; Poston, J.W.
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CONF-731105-6
Probability and Consequences of Accidents in the Nuclear Fuel Cycle.
Shappert, L.B.; Brobst, W.A.; Sisler, J.A.; Langhaar, J.W.
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Validation of Monte Carlo Calculations of Shipping Cask Systems.
Petrie, L.M.; McCarty, P.G.
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DHEW(FDA)-73-8002
Quality Control in Medical X-Ray. Proceedings of the Radiological Health Section of the American Public Health Association Meeting Held at Atlantic City, New Jersey, November 12-16, 1973.
U.S. Dept. of Health, Education, and Welfare, Public Health Services
August, 1973
GPO

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Integral Experiment to Test Carbon and Nitrogen Cross Sections.
Harris, L. Jr.; Trimble, G.D.; Young, J.C.
September 12, 1972
Intelcom Rad Tech., P.O. Box 80817, San Diego, California 92138

DNA-3182T
Additional Analysis of Neutron and Secondary Gamma Ray Transport in Concrete Using the SAM-CE Monte Carlo Code.
Cohen, M.O.; Beer, M.
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Mathematical Applications Group, Inc., 3 Westchester Plaza, Elmsford, New York 10523

EURFNR-1097
Total Neutron Cross Section of Boron 10 Between 90 and 420 keV.
Spencer, R.R.; Beer, H.; Froehner, F.H.
January, 1973
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FTD-HT-23-0304-73
Biological Shielding of Propulsion Reactor Plants.
Broder, D.L.; Kozlovskiy; Kyz'yurov, V.S.
1969
Translation Division, Foreign Technology Div., WP-AFB, Ohio

HEDL-TME-73-62
EBR-II Dosimetry Test (Reactors Runs 50G and 50H).
Jackson, J.L.; McElroy, W.N.; Ulseth, J.A.; Kellogg, L.S.
July, 1973
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HEDL-TME-73-79; ENDF-195
Neutron Capture Calculations for En=100 keV to MeV.
Schmittroth, F.
November, 1973
NTIS $5.45

IEA-267
Nuclear Elastic and Inelastic Scattering of Iron Capture Gamma Rays from Lead and Nickel.
Bianchini, F.G.
April, 1972
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INDC(SEC)-31-U
Topical Discussion on Inelastic Scattering of Fast Neutrons.
International Nuclear Data Committee
January,1973
NTIS

ITEF-921 (In Russian)
Effective Cross Sections for Calculation of Fast Neutron Attenuation in Multigroup Approximation.
Bergel'son, B.R.; Chuprakov, D.V.
1972
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JAPFNR-105; PNC-J-72-18
Analysis of Joyo Mock-Up Experimental Data by Two-Dimensional Gamma-Ray Heating Distribution Calculation Code 2D-GAMM.
Iwaki, T.; Seki, Y.; Osada, H.
August,1972
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Flux Measurement of 0.01 to 18-MeV Monoenergetic Fast Neutrons.
Kung, L.H.; Liu, C.
July 10,1973
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KAPL-P-4005
Fast Neutron Flux Measurement.
Kirouac, G.J.; Eiland, H.M.; Slavik, C.J.
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LA-5392-MS
Summary of Radiation Transport and Radiation Hydrodynamics.
Wienke, B.R.
September,1973
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LA-5407
A Method of Sampling Certain Probability Densities Without Inversion of Their Distribution Functions.
Everett, C.J.; Cashwell, E.D.; Turner, G.D.
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LA-5411-MS
Sensitivity of Fusion Reactor Average Cross Sections to Thermal Broadening of the 14-MeV Neutron Peak.
Muir, D.W.
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NASA-TM-X-2906
Measured and Calculated Fast Neutron Spectra in a Depleted Uranium and Lithium Hydride Shielded Reactor.
Lahti, G.P.; Mueller, R.A.
October,1973
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NIM-1503
Fast-Neutron-Activation Analysis for the Determination of Oxygen in Rock Samples.
Bibby, D.M.
May 16,1973
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ORNL-TM-4335
Radiation Transport Cross-Section Sensitivity Analysis, A General Approach Illustrated for a Thermonuclear Source in Air.
Bartine, D.E.; Oblow, E.M.; Mynatt, F.R.
December,1973
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ORNL-TM-4353
The Nuclear Performance of Vanadium as a Structural Material in Fusion Reactor Blankets.
Steiner, D.
October,1973
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ORNL-TM-4357 (Appl. Tech.)
LMFBR Spent Fuel Transport: A LiOH-NaOH Neutron-Thermal Shield for Spent Fuel Shipping Casks.
Irvine, A.R.; Shappert, L.B.
October,1973
TIC (AT), USAEC

ORNL-TM-4406
Gamma-Ray Production Due to Neutron Interactions with Tin for Incident Neutron Energies Between 0.75 and 20 MeV: Tabulated Differential Cross Sections.
Dickens, J.K.; Love, T.A.; Morgan, G.L.
November,1973
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ORNL-TM-4408
Effects of Highly Anisotropic Scattering on Moncenergetic Neutron Transport at Deep Penetrations.
Oblow, E.; Kin, K.; Goldstein, H.; Wagschal, J.J.
December,1973
NTIS

PNE-RB-42
Diffusion and Dose Calculations for Projects Rio Blanco and Wagon Wheel.
Peterson, K.R.
April 28,1972
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RD/B/N-2710
Calculations of Fission Product Energy Release.
Tobias, A.
June,1973
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RL-73-87
Shielding for EPIC First Estimates.
Perry, D.R.
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RT/FI-(73)11
Boundedness, Continuity, Positivity, Convergence and Summability for the Solution of the Neutron Boltzmann Equation in a Multiregion Problem.
Premuda, F.
March, 1973
NTIS

SGAE-2097
Influence of Uncertainties in Fission Product Nuclear Data on the Interpretation of Gamma-Spectrometric Measurements on Burnt Fuel Elements.
Eder, O.J.; Lammer, M.
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SLA-73-140
Fast Burst Reactor Neutron Transport Calculations.
Schmidt, T.R.
September, 1973
Dep., NTIS $5.50

SLA-73-5731; CONF-731024-1
Radiation Effects on Microelectronics.
Gregory, B.L.
1973
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TID-26402
Biological Effects of Radiation and Related Biochemical and Physical Studies. Proposal 1. Radiation Studies: Theoretical Investigations of LET Spectra and Dose Relationship. Progress Report, May 1971 - April, 1973
Laughlin, J.S.
May, 1973
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Problems with Predicting Fallout Radiation Hazard in Tactical Battlefield Situations.
Schiff, A.
August 14, 1973
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WARD-XS-3045-3
Utilization of Integral Experiments and Related Data in LMFBR Designs.
Dyos, M.W.; Paik, N.C.
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Atomic Data and Nucl. Data Tables, 12(2), 179-194
Delayed Neutron Precursors.
Tomlinson, L.
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Photon Fluence Calculations for Estimating Dose Distribution in the Thorax.
Sidwell, J.M.
May, 1973

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Applications of Monte Carlo Methods in Medical Radiology.
Burlin, T.E.; Sidwell, J.M.; Wheatley, B.M.
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Commentat. Phys.-Math., 43(1), 21-30
Monte Carlo Calculations of Efficiency Values for Various Source-To-Detector Geometries.
Holmberg, P.; Rieppo, R.; Blomster, K.
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Angular Dependence of the Components of Dose to the Bone Marrow and Abdomen in a Human Phantom from 2.95-MeV Neutrons.
Facey, R.A.; Clifford, C.E.
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Monte-Carlo Calculation of the Neutron Sensitivity of Self-Powered Detectors.
Goldstein, N.P.
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Spencer, L.V.
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Response Function of a 1-Inch Diameter by 6-Inch Long 3-He Proportional Counter to Neutrons.
Nishino, S.; Nakamura, T.; Hyodo, T.
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Low-Energy Components of Scattered Gamma Radiation. 2. Calculation of the Energy Spectra of Reflected Gamma Radiation by Monte Carlo Method.
Minato, S.
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Minato, S.
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(In Japanese)
Low-Energy Components of Scattered Gamma Radiation. 4. Study on the Position of the Peak.
Minato, S.
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Calculation of the Response Function of Semiconductor Proton Recoil Counters with a Radiator of Finite Thickness.
Gotoh, H.; Yagi, H.; Harayama, Y.
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