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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RSIC'S SCOPE BROADENED

Through an interagency agreement between the U. S. Atomic Energy Commission and the Defense Atomic Support Agency (DASA), RSIC is now providing information relating to the shielding of radiation from nuclear weapons. RSIC still anticipates covering high-energy radiation shielding, but this work has not yet been initiated.

STATE-OF-THE-ART REPORT BEING PREPARED

RSIC's first state-of-the-art report is being prepared by H. C. Claiborne of ORNL and is on the subject of gamma-ray heating. This report should be ready for publication early in 1965 and will be followed by similar publications on other subjects.

CALCULATIONAL METHODS EVALUATED

One of the long-term goals of RSIC is to ascertain, and report, the state of the art of shielding calculational methods. We believe that this will be best accomplished by comparing selected codes that utilize different methods to calculate the same quantities rather than comparing codes that are based on the same method. The latter would consist in comparing the attributes or properties of the various codes, which would be of limited value because the codes were written with different goals in mind; hence, any attempt to evaluate them on an absolute basis would be unrealistic. On the other hand, a comparison of methods would consist in comparing the results obtained for standard problems by different methods, the problems being selected so that the geometry and materials are compatible with the various codes and, where possible, with experiment.

One problem which has already partially been run is that of fission neutrons slowing down in water. Water was selected as the medium because it is a useful shielding material, its cross sections are fairly well known and involve only two nuclides, and experimental data are available for comparison. The geometries used have been a point source, a spherical volume source, and a plane source, and the codes used have been the following:

NIOBE - numerical integration of Boltzmann equation
RENUPAK - moments method (combined with point kernel integration which was compared with NIOBE)

O5R - Monte Carlo (one importance-sampling and several scoring techniques were investigated*)
C-18 - Monte Carlo (slab)
MODRIC - multigroup diffusion
DTF (and others) - Carlson S_N method
MAC (and others) - Spinney (removal diffusion) method

Another problem that has been run is gamma-ray transmission in an iron medium, assuming a spherical volume source having an energy distribution proportional to $e^{-1.1E}$. The codes used were:

FMC - Monte Carlo
OGRE - Monte Carlo
DTF - S_N as modified by K. D. Lathrop of LASL
Special kernel code utilizing NYO-3075 moments-method data

The results of these problems are in good agreement when the individual peculiarities of each code are understood. It has been our experience that perseverance is required in almost all codes before success is achieved. Reports on this work should be available in a few months.

As these comparisons progress, we expect to solicit aid from other installations. This will be especially necessary if codes not operable at Oak Ridge or under development elsewhere are to be utilized. Problems which are on the frontier, such as deep-penetration problems, are obviously beyond the scope of this work.

MARTIN CO. TRANSLATES PHILCO LANGUAGE INTO IBM LANGUAGE

The Nuclear Division of the Martin Company is developing a translation system to convert computer codes written in the Philco computer language into the IBM computer language, and they have already used it to translate several codes. This is of potential interest to the shielding community since several shielding codes, such as P3MG, are written only in the Philco machine language. For further information, contact T. M. Olsen, Analysis, Systems and Advanced Design Unit, Mail Stop 820, Nuclear Division, Martin Company, Baltimore 3, Maryland.

SELECTIVE DISSEMINATION OF INFORMATION

RSIC has initiated an experiment in the selective dissemination of information to individual researchers in order to keep them informed on current literature in their fields of interest prior to the issuance of the next edition of the bibliography. Members of the shielding community were requested to submit a list of their particular fields of interest, and, except where the fields were too restrictive, etc., the lists were translated into the subject categories of the information retrieval system. As newly selected literature is placed in the retrieval system, the subject categories listed for an individual are searched for matching categories assigned to the literature specimen. When a match is found, the individual is sent a sheet of paper containing the bibliographic reference, an abstract of the literature, and the availability of the specimen.

Anyone not now participating in the experiment but wishing to do so can be included by contacting RSIC.

SPECIAL LITERATURE SEARCHES

The information retrieval system is now used routinely to perform special searches, via the computer, of the literature in the RSIC system. At present it is possible to predicate the search upon any of the various logical combinations of five or less subject categories.

Members of the shielding community are invited to make use of this service by informing us of the restrictions they desire to place upon any particular search.

ABSTRACTS OF SELECTED LITERATURE ISSUED

Abstracts of the literature selected for the RSIC system will soon be available in a loose-leaf binder. The abstracts are indexed in the latest bibliography of shielding literature, which is being issued simultaneously with the abstracts. As before, the bibliography is organized both by subject and by author. Updated abstracts that can be included in your loose-leaf copy will be made available each time a new bibliography is issued. The forthcoming bibliography will be identified as ORNL-RSIC-5 and the abstracts as ORNL-RSIC-6.

JOURNALS USED FOR SHIELDING LITERATURE

A large number of journals are scanned for shielding articles, but 75% of the articles accepted into the information system have been obtained from only four journals, as is shown by the following tabulation:

	No. of Articles	Percent of Total
Am. Inst. Aeron. Astronaut. J.	1	
British J. of Radiology	2	
Handbuch der Physik (Encyclopedia of Physics)	2	
Health Physics	12	6
J. American Concrete Institute	4	
J. Applied Physics	2	
J. Assoc. Compt. Mach.	1	
J. Nuclear Materials	1	
J. of Structural Division	2	
Nuclear Energy	1	
Nucl. Instr. Methods	3	
Pakistan J. Sci. and Ind. Res.	1	
Phys. Med. Biol.	1	
Radiation Research	4	
Radiology	1	
J. of Nuclear Energy	2	
Rev. Sci. Instr.	1	
Sc. Papers Inst. Phys. Chem. Res.	1	
SIAM Review	1	
Transactions of Chalmers University of Technology	1	
National Bureau of Standards Journal	5	
Nuclear Science and Engineering	70	35
Nucleonics	36	18
Phys. Rev.	4	
Soviet J. of Atomic Energy (English Translation)	33	16
Am. Institute of Mining Eng. (AIME)	1	

Arkiv for Fysik	1	
ASCE Journal	1	
J. Nucl. Sci. Technol.	1	
J. Optical Soc. of America	1	
Nuclear Engineering	1	
Proc. Conf. Hot Lab. Equip. 9th.	2	
Soviet Physics JETP	1	
	201	75

Journals which have a low probability of containing shielding articles are routinely scanned only in Nuclear Science Abstracts; therefore, articles in obscure publications should be called to the attention of the RSIC staff.

A new journal, called "Nuclear Structural Engineering" and published by the North-Holland Publishing Company, will have a strong shielding orientation. The first issue should appear this month.

THE SHIELDING COMMUNITY NEEDS YOUR INFORMATION

It is obviously impossible for RSIC to be aware of every piece of shielding literature or of all available computer codes for shielding calculations. Therefore, to ensure that your information is made known to the shielding community through RSIC, we request that you assume the responsibility of informing us about it, either by mailing us a copy of your report or by advising us by letter.

MISCELLANEOUS POLICIES AND SERVICES OF RSIC

RSIC is not a documentation center. The literature selected by RSIC may be obtained in general elsewhere.

RSIC maintains files of preliminary or informal publications which generally are not selected to be placed in RSIC bibliographies. These publications include proceedings of symposia, transactions of societies, letters to the editor, progress reports, strictly internal reports, etc. Also, RSIC maintains an archival microfiche file of all the shielding literature (except classified literature) and files of full-size copies of the literature, although no attempt is made to ensure complete coverage since the microfiche file does ensure complete coverage.

DECEMBER ACCESSION LIST OF LITERATURE

The following accession list consists of literature which the RSIC obtained through its usual scanning procedures. This literature will be examined for assignment to various files or for possible rejection.

Technical Note N-651

A Simple Method for Calculation of Gamma-Ray Shielding Properties of Shelter Entranceways
Charles M. Huddleston -- October 26, 1964

NAA-SR-9647

SNAP 10A Radiation Shielding Analysis
J. A. Belcher and W. A. Flynn, et al. -- October 15, 1964

ANL-6908

The Analysis of Complex Gamma-Ray Spectra
William J. Snow -- July 1964

R64SD-41

Non-Equilibrium Radiation
John L. Kulander -- June 1964

UJV-1032/64

Multiple Group Calculations of a Biological Neutron Shield with Layers of Steel and Graphite
1963

RM-4120 AEC

Neutron Fluxes from a Vertically Collimated Source of 14 MeV Neutrons at an Air-Ground Interface
J. L. Marcum -- August 1964

KFKl-16/1963

The Angular Distribution of γ-rays from the Fission of U-235.
S. Desi, G. Graff, A. Lajtai, and L. Nagy -- 1963

JUL-160-NP

On the Determination of the Diffusion Constants of H_2O, Phenyls, $ZrH_{1.26}$, and D_2O by Neutron Single-Scattering Experiments
T. Springer, Ch. Hofmeyr, S. Kornbichler, and H. D. Lemhel -- May 1964

APED-4342

Spatial Expansion of the Transport Equation
G. C. Pomraning and M. Clark, Jr. -- March 25, 1964

NAA-SR-MEMO-9802

Improvements to the Tyche Moments Code and Operating Instructions for Tyche III
R. A. Blaine -- May 1964

AAEC/TM-252

The Radioactivity of Thermal Neutron Fission Products of U-235, U-233, and Pu-239
C. R. Frost -- June 1964

Canadian Patent 693,200

Radiation Shielding Composition
Harold L. Dunegan -- August 25, 1964

U. S. Patent 3,146,366

Neutron Generation
Charles W. Tittle -- August 25, 1964

TO-B-64-49

The Dose Resulting from 1.25-MeV Plane Source Behind Various Arrangements of Iron Barriers - Final Report
Dominic J. Raso and Stanley Woolf -- June 1964

Kernenergie 7:406-11 (June-July 1964) Translation requested

Monte Carlo Calculations of Gamma-Ray Backscattering by Air
F. W. Kruger

Atomkernenergie 9:263-270 (July-Aug. 1964) Translation requested

Combination of Materials with Best Shielding Properties
G. Thuro

Book

Lead for Radiation Shielding. Number Three, Design and Erection of Space Shielding
London, Lead Development Association -- 1964

Book

Lead for Radiation Shielding. Number Four, Local Movable Shields
London, Lead Development Association -- 1964

AWRE-O-78/64

Neutron Cross Sections of He-3 in the Energy Range 0.001 ev - 14 Mev 1963 Interim Revision
R. Batchlor and K. Parker -- August 1964

UCRL-Trans-1062

The Fundamental Aspects of Shielding from Radiation of Accelerators of Protons, Deuterons and Alpha Particles
M. M. Komochkov -- 1963

NDA-2130-2

Validity of Diffusion Theory for Shielding Analysis
J. Agresta, M. Slater, H. Soodak -- December 1961

Genshiryoku Kogyo 8(8), 5-8 (1962) Translation requested

Present State of Shielding Research
V. Furuta

Genshiryoku Kogyo 8(8) 15-21 (1962) Translation requested

Present State of Shield Design Theory
A. Tsuruo

Soviet J. At. Energy (English Translation) 15(5) 1113-1120 (1962)

Methods for the Calculation of the Radiational Thermal Output in the Body and Shielding of a Nuclear Reactor
D. L. Broder and K. K. Popkov

Soviet J. At. Energy (English Translation) 15(5), 1127-1131 (1963)

Calculation of γ-Ray Energy Absorption in Heterogeneous Macro-Systems
B. M. Terent'ev, V. A. El tekov, and D. I. Dolenko

Soviet J. At. Energy (English Translation) 15(5), 1132-1139 (1963)

Measurement of Neutron Tissue Dose Outside Reactor Shielding
I. B. Keirim-Markus, V. T. Korneev, V. V. Markelov

TO-B 63-83

Final Report - Monte Carlo Codes to Investigate the Reflection and Transmission of Gamma Rays and Neutrons in Homogeneous and Heterogeneous Slabs. Volume III. Results
Dominic J. Raso

AE-155

Tests of Neutron Spectrum Calculations with the Help of Foil Measurements in a D_2O- and in an H_2O-Moderated Reactor and in Reactor Shields of Concrete and Iron
R. Nilsson and E. Aalto

AE-157

Measurements of Neutron and Gamma Attenuation in Massive Laminated Shields of Concrete and a Study of the Accuracy of some Methods of Calculations
E. Aalto and R. Nilsson

USNRDL-TR-791

Gamma Rays Resulting from Interactions of 14.7 MeV Neutrons with Carbon, Nitrogen, Oxygen and Silicon
F. C. Engesser, W. E. Thompson, and J. M. Ferguson