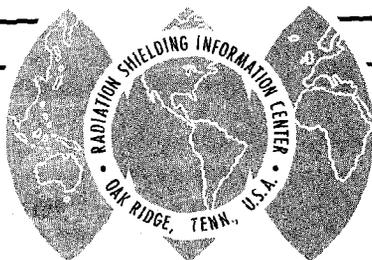


RSIC Newsletter



RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

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

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CURRENT WORK AND PROBLEMS

Beginning with this issue of the newsletter, we shall carry a feature encapsulating work in progress at different installations. Outstanding problems in shielding will be noted as they are called to our attention. We hope with this to stimulate communication and exchange of ideas while the work is being carried on, presumably the time when a fresh outlook does the most good. Success of this feature will depend, of course, on how well we are able to elicit current information from you. The name in parentheses in what follows is our on-the-spot correspondent.

General Atomic continues its time of flight measurements (A. E. Profio) of neutron flux spectra, they are now working with paraffin cylinders and "infinite" graphite targets. Coordinate calculations are being performed with O5R and DTF-IV. Also going on at GA (B. A. Engholm) - shield design for Public Service of Colorado, HTGR - radiation analysis for gas cooled fast reactor - neutron and gamma ray calculations for GA Special Nuclear Effects Lab - code development work in progress includes PATH, a gamma shielding code; MUSCAT, a neutron scattering code; Spinney type code for fast neutron calculations. Areas in which GA people have expressed a desire to see more work include further comparisons of code results with spectral measurements, development of group cross sections appropriate to shielding calculations with SN codes, develop gamma-ray buildup factors for heterogeneous materials, measure capture gamma ray intensities for isotopes like ^{135}Xe , ^{233}U ; get better data on some decay gamma spectra like those from ^{240}Ia , ^{144}Pr .

Radiation Research Associates (N. M. Schaeffer) have a variety of shielding computations in progress. A set of Monte Carlo routines called COHORT for the Marshall Space Center adapted to the geometries of nuclear power rockets -- penetration of shields in the form of hollow cubes and spheres by gamma rays from a surrounding fallout field -- calculation of effects of ground roughness on the attenuation of fallout radiation -- analysis of effectiveness of concrete plug shields against weapon radiation -- calculations of effectiveness of vertical, rectangular, and cylindrical barriers in a fallout field -- penetration of neutrons from a point 14-MeV source in the neighborhood of an air-ground interface.

Technical Operations (Eric Clarke) continues its civil defense related work. "In and down" basement shielding is being analyzed by Monte Carlo and by measurement on ideal cylindrical models. The concept of shield analysis by scale model is being further analyzed to determine when and to what extent it is justified both by theoretical and empirical methods.

The Canadian Defense Research Board (C. E. Clifford) has a number of quite interesting projects. These include dose distributions in phantoms exposed to fast neutrons and gamma rays; dose distributions in ducts exposed to fast neutrons; elastic and inelastic neutron scattering cross sections and angular distributions; effects of an air-ground interface on gamma-ray distributions; thermoluminescence applications to gamma and neutron dosimetry. This agency is interested in seeing further development work in all aspects of shielding against initial radiations from weapons.

Kirtland Air Force Base (Lt. Robert Stovall) has some in-house work going on related to space shielding problems. Electron transport by Monte Carlo is one current job. Also, currently, is the analysis of measurements made on FESS (Flight Experimental Space Shield). This was a satellite in retrograde orbit, 36° inclination, apogee 1865 nautical miles, perigee 224 nautical miles, intersecting the Van Allen Belt. The belt was monitored. Also the dose within a given shield geometry was measured with a tissue equivalent ion chamber. Calculations are being performed to check out shielding codes on this problem.

RECENT VISITORS TO RSIC

The following people visited RSIC during the months of April and May: H. O. Wyckoff, National Bureau of Standards, Gaithersburg, Maryland; H. H. Rossi, Columbia University, New York; William E. Edwards, NSEO, General Electric, Cincinnati; Norman Schaeffer, Radiation Research Associates, Inc., Fort Worth; A. B. Chilton, University of Illinois, Urbana, Illinois; Stanton A. Friedman, Allison Division, General Motors, Indianapolis, Indiana; George Anno, Nuclear Utilities Services, Washington; and Brian E. Clancy, Australian AEC, Sydney, Australia.

RESULTS OF RSIC EUROPEAN TRIP

Staff members S. K. Penny and Betty F. Maskewitz introduced the codes O5R (Monte Carlo), OGRE (Monte Carlo), and SDC (point-kernel integration) at the Seminar-Workshop held at the ENEA Computer Programme Library on April 26-29, 1966. Among the European codes to be introduced to the whole of the community, as a result of the Seminar-Workshop, are COMPRASH (U. K.-Spinney Method), NRN (Swedish-Spinney Method), SALOMON III (Swedish-Monte Carlo), ZEUS 3 (French-Monte Carlo), SABINE (Euratom-Spinney Method), and BIGGI P 3 (Euratom-Numerical Integration). As a further result of the trip, many European reports will be entered in the RSIC collection. Stronger ties of cooperation with RSIC were established through personal contact with members of European shielding groups.

LIST OF REPORTS ISSUED BY RSIC

The following reports have been issued by RSIC and are available upon request:

ORNL-RSIC-1 - (Superseded by ORNL-RSIC-5)

ORNL-RSIC-2 - (Superseded by ORNL-RSIC-5)

- ORNL-RSIC-3 - A Comparison of First- and Last-Flight Expectation Values Used in an O5R Monte Carlo Calculation of Neutron Distributions in Water - D. K. Trubey and M. B. Emmett (May 1965)
- ORNL-RSIC-4 - Some Calculations of the Fast-Neutron Distribution in Ordinary Concrete from Point and Plane Isotropic Fission Sources - D. K. Trubey and M. B. Emmett (June 1965)
- ORNL-RSIC-5 - Bibliography, Subject Index, and Author Index of the Literature Examined by the Radiation Shielding Information Center (December 1964)
- ORNL-RSIC-6 (Vol. I) - Abstracts of the Literature Examined by the Radiation Shielding Information Center
- ORNL-RSIC-7 - Tabulated Values of Scattered Gamma-Ray Fluxes in Iron Interpolated from Moments-Method Calculation - D. K. Trubey (May 1965)
- ORNL-RSIC-8 - Survey of Methods for Calculating Gamma-Ray Heating - H. C. Claiborne (June 1965)
- ORNL-RSIC-9 - A Comparison of Three Methods Used to Calculate Gamma-Ray Transport in Iron - D. K. Trubey, S. K. Penny, and K. D. Lathrop (October 1965)
- ORNL-RSIC-10 - A Survey of Empirical Functions Used to Fit Gamma-Ray Buildup Factors - D. K. Trubey (February 1966)
- ORNL-RSIC-11 - Bibliography, Subject Index, and Author Index of the Literature Examined by the Radiation Shielding Information Center (Space and Accelerator Shielding)
- ORNL-RSIC-12 - Abstracts of the Literature Examined by the Radiation Shielding Information Center (Space and Accelerator Shielding)
- ORNL-RSIC-13 - Abstracts of Digital Computer Codes Assembled by the Radiation Shielding Information Center - Betty F. Maskewitz
- ORNL-RSIC-14 - The Exponential Transform as an Importance-Sampling Device -- A Review -- Francis H. Clark

MAY 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. The accession list is divided into three fields of (1) reactor and weapons shielding, (2) space and accelerator shielding, and (3) shielding computer codes.

RSIC is not a documentation center. Hard copies of the literature cited below must generally be obtained elsewhere. In most cases, however, we will be able to supply microfiche copies upon request. There may be a delay if a microfiche original is not available and we must produce one. This will be the case with ordered and newly obtained literature only. Naturally, we cannot supply copies of literature which is copyrighted or whose distribution is restricted.

Reactor and Weapons Shielding

AFWL-TR-65-216, Vol. I

Elastic and Nonelastic Neutron Scattering in Niobium, Vanadium, and Carbon
Vol. I. Analysis and Development of Methods for the Prediction of Non-
elastic Scattering Cross Sections
H. G. Carter, R. C. Baird, and D. A. Goodwin - March 1966

THESIS

Bremsstrahlung Production in Lanthanum Thick Targets
David Neil Ferguson - November 1965

AFWL-TR-65-210

Angular Distribution of Fast-Neutron and Nonelastically Produced Secondary
Gamma-Ray Dose Rates from 14.6-MeV Neutrons Incident Normal to Slabs
G. T. Western, F. L. Gibbons, J. R. Williams, B. E. Morris, and H. G.
Carter - April 1966

AFWL-TR-65-218

Monte Carlo Analysis of Fast-Neutron Spectra in an Infinite Medium of
Paraffin Wax
F. O. Leopard - April 1966

UCRL-14733

Roof Slab Doors for Hot Cells
E. G. Stearn - March 3, 1966

AD-625251 (P-3170)

A Survey of the Weapons and Hazards which May Face the People of the
United States in Wartime
H. L. Brode - June 1965

IDO-17161

Gamma Energy Release from Fission Product Decay Following a Short Reactor
Transient
J. K. Warkentin - April 1966

ANL-7139

Experimental Shielding Study of the Argonne 12.5 MeV Tandem Van de Graaff
Installation
N. C. Dyer and R. L. Mundis - January 1966

AE-220

Measured and Predicted Neutron Flux Distributions in a Material Surrounding
a Cylindrical Duct
J. Nilsson and R. Sandlin - March 1966

AD-625663

Analysis of Radiation Hazard Networks Using Attenuation Concepts - Final Report
R. N. Skeeters - November 1965

AD-625415

Variable Intensity Isotopic Sources - Annual Summary Report, December 1, 1964 - June 30, 1965
E. D. Jordan and T. E. Carew - August 1965

AD-625406

The Physics and Shielding Aspects of Heterogeneous Isotopic Neutron Sources
Donald F. Knuth - July 1965

AD-627807

The Radiation Environment in the Experimental Facilities of the Diamond Ordnance Radiation Facility
P. G. Berman - December 1, 1965

LA-3439

Graphs of Calculations of Energy Deposition and Air Fluorescence from Radiation Produced by a Nuclear Explosion in Space
E. W. Bennett - November 1965

AD-626147 (RM-4385-PR)

Neutron Capture in the Atmosphere from High-Altitude Point Sources
J. I. Marcum - October 1965

UCRL-14500

Nuclear Decay Properties of Heavy Nuclides Produced in Thermonuclear Explosions -- Par and Barrel Events
Lawrence Radiation Laboratory - March 8, 1966

AFRRI-CR-65-2

A Comparative Study of Radioactive Source Arrangements for Simulating Fallout Gamma Radiation Fields
R. L. French - June 1964

AD-631318 (AFRRI-CR-65-4)

Manual of Radiation Dosimetry Experiments
E.G.&G., Inc. - July 1964

AFRRI-CR-65-5

Gamma-Ray Energy and Angular Distributions Near the Air-Ground Interface from Plane Fallout and Point ⁶⁰Co Sources
R. L. French - June 1964

AD-627323 (AFCRL-65-801)

Research Directed Toward the Study of Nuclear Radiation. Final Report
January 25, 1962 - July 24, 1965
T. B. Barrett and J. W. Carpenter - October 6, 1965