RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION • FOR THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

POST OFFICE BOX X • OAK RIDGE, TENNESSEE 37830

No. 137 *May 1976*

Advice comes too late when a thing is done. *...Anonymous*

SPECIAL SESSIONS OF ANS SHIELDING AND DOSIMETRY DIVISION AT TORONTO

Special sessions at the Toronto ANS meeting June 13–18 of interest to shielders include: *Environmental Radiological Monitoring* (Monday a.m.), *Radiation Environments in Nuclear Reactor Power Plants* (Monday p.m.), *Fusion Reactor Nuclear Analysis Methods and Codes* (Tuesday a.m.), *Radiation Streaming* (Wednesday a.m. and p.m.), and *Radiation Shielding for Fusion Reactors* (Thursday a.m.). The Canadian Nuclear Association program includes a session on *Control of Reactor Radiation Fields* on Wednesday at 3:30 p.m.

CANADIAN PARTICIPATION IN ANS SOUGHT

In connection with the forthcoming joint meeting of the American Nuclear Society and the Canadian Nuclear Association, we have been asked to help find ways to encourage increased Canadian–U.S. cooperation through participation in the ANS Shielding and Dosimetry (soon Radiation Protection and Shielding) Division. Probably the business meeting of the Division, to be held after the Wednesday afternoon special session (Wentworth Room), affords the best opportunity for discussions of this matter. We encourage all those interested to make an effort to attend.

NEWS ON THE FIFTH INTERNATIONAL CONFERENCE ON REACTOR SHIELDING

The Call for Papers for the Fifth International Conference on Reactor Shielding to be held at the Hyatt Regency Hotel in Knoxville, Tennessee, April 18–22, 1977, has appeared in the April issues of the RSIC Newsletter and Nuclear News (p. 148). Deadline for summaries (4 copies in English, 300 words, no figures): postmarked August 20, 1976. Mail summaries to: S.A.W. Gerstl, Program Committee Chairman, Los Alamos Scientific Laboratory, T-1, MS-269, P. O. Box 1663, Los Alamos, NM 87545 USA.

The General Chairman, David Trubey, has announced the appointment of Gary A. Vivian, Ontario Hydro, to the Technical Program Committee. He has also announced that commercial exhibits will be a part of the conference. Robert T. Santoro of ORNL has been appointed Exhibits Chairman.

With IAEA support, partial financial assistance to scientists from developing countries is expected to be available. For further information, contact D. K. Trubey, General Chairman, RSIC, ORNL, P. O. Box X, Oak Ridge, TN 37830.

UNFOLDING SEMINAR WORKSHOP IN APRIL

The two-day seminar-workshop on Radiation Energy Spectra Unfolding was successfully concluded on April 13 with about 60 persons in attendance. There were 20 papers presented in the seminar portion. We gratefully thank the leaders of the workshops: Rich Johnson (Purdue University) and Bernie Wehring (University of Illinois at Urbana-Champaign) who led the session on the FORIST code, Francis Kam (ORNL), leader of the workshop on activation detectors, and Walter Meyer (University of Missouri at Columbia) who led discussions on proposed benchmark problem efforts. The proceedings will be issued as ORNL-RSIC-40.

EUROPEAN SHIELDING INFORMATION SERVICE

SEMINAR WORKSHOP ON THE MONTE CARLO CODE TRIPOLI, Ispra, October 18–19, 1976

The seminar-workshop on the French Monte Carlo multigroup TRIPOLI code, announced in the ESIS Newsletter No. 16, and April RSIC Newsletter, will be organized at Ispra the 18–19 October 1976.

A short description of the TRIPOLI code is given in the ESIS Newsletter No. 16. The seminar-workshop will have the following program.

PROGRAM

October 18, 2 p.m.

1. Opening of the seminar-workshop
2. Presentation of the code
3. Problems in the distribution and implementation of the code

October 19, 9 a.m.

4. A simple test case
5. A complex test case
   a) Description of the problem
   b) Input data

Afternoon session starting at 2 p.m.

   c) Output of the complex case
6. General discussion on TRIPOLI and other Monte Carlo codes for shielding calculations.

Official languages English and French; simultaneous translation will be provided.

TRIPOLI treats by the Monte Carlo method the slowing down and diffusion of neutrons in 3D source problems. The version of the code which is distributed at the present is essentially oriented towards the solution of reactor shielding problems. The code is written for IBM computers and uses about 400 K bytes of storage. The geometry of the problem may be described by any set of VOLUMES, each of them being homogeneous and limited by portions of first and second order surfaces. The program treats geometries which are repetitive by symmetry, translation, or rotation. The program enables the source distribution to be described in a very general way, either for the space or the energy or the angle dependence. Nuclear constants are taken from library tapes (LINDA), containing energy-point tabulations from different evaluations. At present LINDA includes data from UKNDL-73, from UNC (GENDA), as well as thermal data from the program LEAP, and response functions for many detectors (activation, damage, heating, and dose equivalent). The code treats absorption and elastic scattering, however anisotropic, while (n,n') and (n,2n) reactions are treated as isotropic in the center of mass system. Only one thermal group is available at the present. The number of energy points may be very high; transport of neutrons being simulated by energy intervals (MACROGROUPS), only the constants of the Macrogroup that is being treated need to be present in the fast storage. TRIPOLI calculates and prints energy spectra and responses averaged over volumes or surfaces; standard deviation of the computed quantities is also provided.

Those interested should notify the organizers at the following address:

ESIS
EURATOM JRC
21020-Ispra (Va)
ITALY

CALL FOR PAPERS

Symposium on Vulnerability and Survivability of Aerial and Surface Targets

The Ballistics and Vulnerability Division of ADPA has scheduled a symposium on Target Vulnerability and Survivability, to be held on 26–28 October 1976 at the Naval Surface Weapons Center, White Oak Laboratory, Silver Spring, Maryland.

Papers are being solicited in the areas of Methodology and Aerial, Land and Sea Targets. Vulnerability and Survivability aspects related to conventional, laser, and nuclear weapons will be considered.

Proposed titles and abstracts (200–300 words) should be submitted in duplicate no later than 15 June 1976. One copy should be submitted to Headquarters ADPA, Attn: Colonel P. H. Scordas, 740 15th Street, N. W., Washington, D.C. 20005, and the other copy to: Dr. William W. Murray, Associate Technical Director for Structural Mechanics, David W. Taylor Naval Ship Research and Development Center, Bethesda, MD 20007, Attn. Code No. 8 17.

Papers will be selected from the abstracts by the Executive Board, Ballistics and Vulnerability Division, for the various sessions and all authors submitting abstracts will be advised regarding selection early in July.

In addition at the end of each session it is planned that an invited Review Paper will be presented summarizing the progress and gaps in Methodology and Technology.

The security level of the symposium will be "SECRET NOFORN". Proposed paper titles and abstracts should be unclassified if possible, but may be classified if necessary to permit a better judgment of the content of the proposed paper.

STATUS OF ORNL-RSIC-13, Volume IV

Problems have been encountered and a delay has resulted in the publication of ORNL-RSIC-13, Vol. IV, "Abstracts of Digital Computer Code Packages Assembled by Radiation Shielding Information Center." Pending requests will be filled as soon as the first copies are off the press.

PERSONAL ITEMS

The U.S. Energy Research and Development Administration has announced the appointment of **William H. Hannum**, previously assistant director for reactor safety at ERDA headquarters, as deputy manager of the agency's Idaho Operations Office, which administers the Idaho National Engineering Laboratory.

Clayton D. Zerby, formerly technical services manager for Union Carbide Corporation's Nuclear Division's production facilities in Oak Ridge, Tennessee, has been named to head a newly established Office of Waste Isolation in the Division. The new office has been established as part of the ERDA waste management program.

VISITORS TO RSIC

The following persons visited RSIC during the month of April: Paul W. Levy, Brookhaven National Laboratory, Upton, New York; E. Wachspress, General Electric, KAPL, Schenectady, New York; Farwell Smith, Energy Research and Development Administration, Washington, D.C.; Richard Shimko, Combustion Engineering, Windsor, Connecticut; Terry Stupar, Cincinnati General Hospital, Cincinnati, Ohio; Charles Peacock, NASA Marshall Space Flight Center, Huntsville, Alabama; T.M.A. Holst, and E. H. Brehm, Brown, Boveri & Cie, Mannheim, Germany; Abbas M. Marafie, University of Liverpool and Kuwait; Gunther Dietze, Physikelisch-Technische Bundesanstalt, 33 Braunschweiz, West Germany; H. Alan Robitaille, Defense Research Establishment, Ottawa, Canada; Janet Luhmann, Aerospace Corporation, Los Angeles, CA; Helga Gerstner, ORNL Information Center Complex and W. Y. Yoon, Oak Ridge National Laboratory, Oak Ridge, TN.

CHANGES TO THE DATA LIBRARY COLLECTION

DLC-27/AMPX01(104,22)

The 104 neutron, 22 gamma-ray group cross section library has been updated to correct an error in the gamma-ray group transfer matrices. The error was pointed out by **H. Alan Robitaille** of the Defence Research Establishment Ottawa, Ottawa, Ontario, Canada. The error was introduced when DLC-27 was updated in September 1974, so users of DLC-27B will encounter erroneous results if they are looking at

problems involving gamma-ray transport (primary or secondary). The corrected library is designated DLC-27C. A reel of magnetic tape should accompany requests for the updated library.

BOOK REVIEW: ENGINEERING COMPENDIUM ON RADIATION SHIELDING, VOL. II SHIELDING MATERIALS, Springer Verlag (New York, Heidelberg, Berlin) 1975

> It has been said that the possession of materials, the understanding of materials and the ability to use materials have been the determinants of every civilization the earth has ever known. If this be granted, then *information* on materials is an even more basic building block in a flourishing society. We need to know the amounts and the qualities of the material resources we possess (or lack). We must record, catalog and retrieve the myriad facts, theories and observations that constitute our understanding of materials, and we must have sufficient handbooks, manuals, texts and tutorial works to guide our citizens in their use. Despite this basic and critical position of materials information, we have become all too familiar with what may be called the materials information syndrome among the users of this information. This syndrome comprises bewilderment, apprehension, dismay, frustration, and outrage: *Bewilderment* with respect to the enormous volume and diversity of needed sources of information; *Apprehension* as to the quality and reliability of those facts; *Dismay* at the redundancy, gaps, and lack of coordination between information sources and systems; *Frustration* with the mechanics of search, retrieval and manipulation of information from the general store; and *Outrage* at the cost of seeking and locating needed information.
>
> ...J. H. Westbrook, General Electric Company, in "Requirements for Fulfilling a National Materials Policy," Proceedings of a Conference by the Federation of Materials Societies for the Office of Technology Assessment, United States Congress, August 11–16,1974, p. 31.

Not long ago this reviewer attempted to assist Norman Schaeffer when he was preparing his popular text, *Reactor Shielding for Nuclear Engineers**. It was axiomatic to us that no text on shielding would be complete without general information on shielding materials. After all—what is shielding but properly selected, arranged, and possibly shaped material? The fact that the resulting section on material comprises less than 3 percent of the book demonstrates not the relative importance of relevant materials information but the critical scarcity of it!

Now there is available at long last the final volume of the IAEA-sponsored **Engineering Compendium on Radiation Shielding**; Vol. II, **Shielding Materials**. Like previously published volumes (Vol. I, **Shielding Fundamentals and Methods** and Vol. III, **Shield Design and Engineering**, this text is a blending of contributions of many specialists (22) organized by the editor Anost Homig of Brno Technical University, with assistance of H. E. (Gene) Hungerford of Purdue University—both highly experienced in practical shield design.

This treatise covers in 436 well-indexed pages the nuclear, physical, and mechanical properties of substances commonly employed specifically as shields and also a few materials likely to be found in or near reactor cores and which contribute to the attenuation (e.g., uranium, copper, aluminum, beryllium, and graphite). Concrete—including the heavy and water-bearing concretes—occupies many pages. The book is

divided into the following major sections: gamma-ray shield materials (including water, transparent materials, and concretes), neutron-gamma-ray shields (including lead, borated materials, concretes, and air), laminated shields (including construction and testing), effects of heating on properties of Concrete, and finally the optimization of material choice and thicknesses. An addendum discusses iron mortars which can be useful in special applications.

Is the book useful? This reviewer, in the short time he has had a copy, found reason to seek radiation damage data for styrene-butadiene rubber and for cost data on concrete shields. He found it.

Aside from the cost ($137.60), the greatest defect is similar to those of the earlier volumes—the long period of preparation results in a lack of recent work. For material properties, however, we would judge that this is not as serious as for the transport analysis methods treated elsewhere. All in all, we conclude that this book is a must for any shield design group. Like the other volumes, it is beautifully printed and bound.

...D. K. Trubey

*Available from NTIS as TID-25951, $13.60.

THIS LITERATURE IS ON ORDER. IT IS NOT IN OUR SYSTEM. PLEASE ORDER FROM NTIS OR OTHER AVAILABLE SOURCE AS INDICATED.

REACTOR AND WEAPONS RADIATION SHIELDING LITERATURE

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Neutron Capture in Reactor Structural Materials.
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