RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBTDE CORPORATION FOR THE DEPARTMENT OF ENERGY

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Science is always wrong. It never solves a problem without creating 10 more. . . , George Bernard Shaw

Gamma-Ray Shielding **Calculations on** the Back of **an** Envelope

In the form of questions of an inquisitive newcomer to a resourceful, experienced, and practical teacher, Hans Penkuhn has published a 7-page guide to making shielding estimates on the back of an envelope. Single reprints of this guide, published in European Shielding Information Service Newsletter No. 38-39 (July-October 1981), are available from RSJC upon request. The contents are listed as follows:

1. Introduction
2. Large sources
2.1 Line sources
2.2 Plane sources
2.3 Spherical sources
2.4 Cylindrical sources
3. Point sources-The unscattered dose rate
4. Estimates for μ
4.1 One-inch-in-iron rule for Co 60
4.2 $\sqrt{E}$-rule
4.3 μ/ρ-rule
4.4 The special cases of water and lead
5. How to estimate the exponential
6. The Total Dose Rate $\dot{H}$
6.1 The dose rate buildup factor B_D
7. Conclusions
8. Eight Rules (a summary)
9. Annex (Neutrons versus gammas)

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made during the month.

CCC-254/ANISN-ORNL

ANISN-ORNL, a multigroup one-dimensional discrete ordinates transport code package, was extended to include a SIEMENS 7541 version. This new version, designated (E), was contributed by Wehrwissenschaftliche Dienststelle, Federal Republic of Germany.

CCC-3071 QAD-CG

QAD-CG, the combinatorial geometry version of QAD-P5A, a point- kernel code for neutron and gamma-ray shielding calculations, was extended to include an IBM version (C) contributed by American Electric Power Service Corporation, New York, N.Y. FORTRAN IV.

CCC-413/FISPIN

FISPIN, a code package for nuclide inventory calculations, was contributed by Risley Nuclear Power Development Establishment, Risley, Warrington, England. The code was created to calculate the production and removal of three groups of nuclides: fission products, actinides, and the structural materials. Modes of production and removal of a nuclide are those of decay and neutron reaction of any type, including fission-energies and intensities calculated for the various modes of decay, i.e., alpha, beta, gamma-rays, and spontaneous fission. Large numbers of nuclides may be involved so calculations are restricted by using a flux spectrum from outside the code and by calculating some nuclides by an approximate method. The user may choose one of the two data formats which are handled: the format, of the accompanying library or the ENDF/B format. Reference: ND-R-328(R). FORTRAN IV; ICL 2982.

PSR-156/PAPIN

PAPIN, a code system to calculate cross section probability tables, Bondarenko and transmission self-shielding factors for fertile isotopes in the unresolved resonance region, was contributed by Oak Ridge National Laboratory, Oak Ridge, Tennessee. Monte Carlo methods are utilized to generate ladders of resonance parameters in the unresolved resonance region, from average resonance parameters and their appropriate distribution functions, The neutron cross-sections are calculated by the single level Breit-Wigner (SLBW) formalism, with s, p and d-wave contributions. The cross section probability tables are constructed by sampling the Doppler- broadened cross *sections,*

PUBLICATION OF FIFTH TAYLOR LECTURE

The National Council on Radiation Protection and Measurements (NCRP) has recently announced the publication of the fifth Lauriston S. Taylor Lecture on Radiation Protection and Measurements: *How Well Can We Assess Genetic Risk? Not Very* by James F. Crow. The Lecture was presented by Dr. Crow in the auditorium of the National Academy of Sciences, Washington, D.C. on April 8, 1981, on the occasion of the Annual Meeting of the NCRP.

The Lecture is the fifth in a series instituted to honor Lauriston S. Taylor following his retirement from the Presidency of the NCRP in 1977 after more than forty-seven years of service. The Lectures are given once annuaIly by distinguished lecturers treating topics related to radiation protection and measurement. Initiation of the lecture series was made possible by a generous grant from the James Picker Foundation.

Dr. Crow, the fifth Lecturer, was born in Phoenixville, Pennsylvania in 1916. He was educated at the Friends University in Wichita, Kansas and the University of Texas-Austin. Subsequently he taught at Dartmouth College and, in 1948, went to the University of Wisconsin. In 1965 he received the John Bascom Professorship in recognition of his distinguished teaching and service. He has served as Professor of Zoology in the College of Letters and Science, Professor of Genetics in the College of Agriculture and Life Sciences and Professor of Medical Genetics in the College of Medicine. Dr. Crow is a member of the National Academy of Sciences and has served on many important national and international advisory bodies.

In his Lecture, Dr. Crow highlights the quantitative uncertainties about the impact of mutations on future generations, but then emphasizes the substantial amount of qualitative information that is available, After treating these qualitative generalities about mutations, the Lecture treats the population kinetics of deleterious mutations concluding that concentration on severe mutants and cytogenetic changes for risk estimation will be most rewarding at the present

time. The Lecture next treats the possibility of being more quantitative and introduces the mutation component as a method for assessing the impact of mutation on the population. This section of the Lecture ends with a demonstration of the urgent need for more attention to studies of genetic epidemiology. The Lecture then concludes with a summary statement emphasizing our understanding of mutation, the uncertainties still prevalent, possibilities for assessing irregularly inherited conditions and diseases for which there is only partial genetic causation and the small potential impact of uncertainties in our understanding of the long time, cumulative risks of individually mild mutants.

Lecture No. 5 will be published in two forms. It will be available immediately as a separate entity comparable to the previously published lectures. Subsequently, it will be available as part of the proceedings of the NCRP's annual meeting, a series of publications inaugurated in 1979.

Copies of Lecture No. 5 (published as a separate entity) can be purchased for $9.00 from NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, Maryland 20814.

Survey of Four Years' Work by UK National Radiological Protection Board

The NRPB has published a survey* of four years' work, from 1977-80, and a review of the organisation's development during its first ten years.

The 10 year review recapitulates briefly the history of the Board's origins and its growth to its present position as an independent organisation devoted to research, advice and services in radiological protection.

The four year survey summarises the work undertaken by the NRPB in relation to the industrial, medical, dental, research and other uses of radiation and to nuclear power in particular. In these four years the NRPB has:

- issued over 3 million radiation dosemeters as part of a service for measuring and recording the radiation doses received by workers (paragraphs 225-230)
- provided advice and assistance, often to cope with unusual problems (paragraph 244) and following accidents and injuries (258-268)
- organised 185 scheduled training courses and numerous courses specially designed for individual clients, and also post-graduate courses for professional health physicists (269-275)
- acted as Agent of the Health and Safety Commission in the inspection of premises (246247)
- contributed to the work of ICRP, UNSCEAR, IAEA, NEA, EC, IMCO, IEC and other international organisations, and maintained close contact with radiological protection organisations in several countries (30-48)
- initiated a system of consultation in relation to the provision of advice on standards (51-54)
- published a major review of the radiation doses received by patients from the medical and dental uses of radiation (90-94)
- assumed responsibility for the national scheme of measurements of radioactivity in milk (100-101)
- measured the exposure of communities in west Cumbria to airborne radioactivity from Windscale (130-132)
- analysed the radiological consequences of national accidental releases from fast breeder reactors (145-15 1)
- developed environmental models to estimate radiation doses to man from the radioactive effluents discharged during the normal operation of nuclear installations (153-159)
- evaluated the radiological impacts of the treatment and disposal options for different types of radioactive waste and provided advice on their acceptability (160-170)
- carried out extensive and detailed studies of the internal radiation dosimetry of radioactive materials taken into the body, particularly of plutonium and similar materials and of the naturally occurring gas radon-222 and the products of its radioactive decay (172-186)
- introduced and expanded a thermoluminescent dosemeter service and an associated automated dose record keeping service to reduce the labour and administrative complexity of dose record keeping for employers (20 I-204)
- established the National Registry for Radiation Workers (216)

* The work of the NRPB 1977/80 and a review of the first 10 years (HMSO, £ 4.00). Further information is available from the Information Officer, National Radiological Protection Board, Chilton, Didcot, Oxon 0X11 ORQ.

PERSONAL ITEMS

Juan E. Volkis is now working with ENACE S.A. (Empresa Nuclear Argentina de Centrales Electricas). ENACE is a nuclear engineering firm, the Argentine Atomic Energy Commission (CNEA) being its main shareholder, created with the purpose of participating in the design and construction of the future Argentine Nuclear Power Stations. He is in charge of a group that deals with "Shielding and Radioactivity" problems.

Bradley Clark, formerly with the University of Arizona, is now with Los Alamos National Laboratory.

George Imel has moved from EG & G, Idaho and is now a staff member of the Nuclear Engineering

Department, Pennsylvania State University,

Philip Heintz was transferred from the N.T. Enloe Memorial Hospital, Chico, California to the Sutter Community Hospital, Sacramento, California.

Steve Marchetti is now Manager, Environmental and Occupational Safety, West Valley Nuclear Services Company, West Valley, New York.. He was formerly at Albuquerque,

VISITORS TO EPIC

The following persons came for an orientation visit and/or to use EPIC facilities during the month of November: J. Peter Johnson, U.S. Department of Energy, Oak Ridge Operations Office; Robert Langley, International Atomic Energy Agency, Vienna, Austria; Mohammed Moghari, Nuclear Associates International, Rockville, Maryland.

UPCOMING MEETINGS

Conference on Structural Mechanics *in Reactor* Technology

The 6th International Conference on Structural Mechanics in Reactor Technology (SMiRT-6) was organised in Paris (France) from 17 to 21 August 1981 and was again a great success.

The previous events were held in Berlin in 1971 and 1973, London in 1975, San Francisco in 1977 and again in Berlin in 1979.

SMiRT-7 is now announced to be held in Chicago from the 22 to the 26 August 1983.

It has been decided that SMiRT-8 will be organised in August 1985 in Brussels (Belgium).

Executive Briefing-Federal Budget / Legislation Update

This one-day executive briefing on federal government activities is designed to update members of the American Nuclear Society on the status of federal planning, budget items and legislative proposals of importance to nuclear energy. The agenda includes speakers from both the *executive* and legislative branches of government and will focus on the insights, philosophies and directions of a new Administration and a new Congress-one year out. Registrants will be encouraged to ask questions and participate actively. There will be a wine and cheese mixer Tuesday evening in the Rayburn House Office Building, to which members of Congress and senior staff personnel involved in nuclear legislative affairs will be invited. We expect a timely and informative dialogue at this second executive briefing. The briefing will be held at The Mayflower Hotel, 1127 Connecticut Avenue, N.W., Washington, D.C., January 26-27, 1982, 202/347-3000, Toll Free 800/228-3000. To register by telephone, call ANS Meetings Department, 312/352-6611.

NOVEMBER ACCESSION OF LITERATURE

The following literature cited has been ordered for review, arid that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22151.

RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of out-of-print reports may be available on request. Naturally, we cannot fill quests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

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

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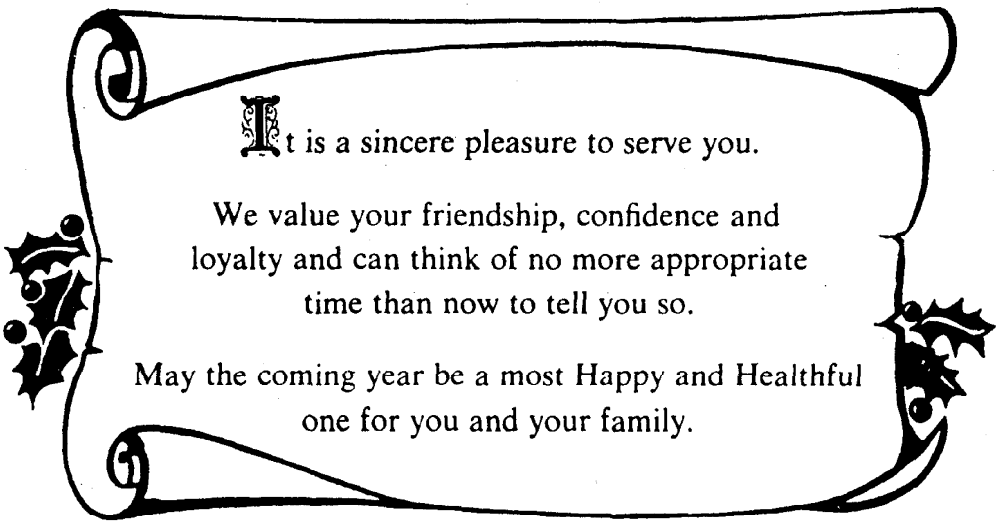

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