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

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The trouble with most people is that they think with their hopes or fears or wishes rather than with their minds ...Walter Duranty

ANS SHIELDING & DOSIMETRY DIVISION HONORS GROTENHUIS AND MASKEWITZ

The Shielding & Dosimetry Division of the American Nuclear Society has included in its Honors and Awards program the recognition of members who have been judged as having given outstanding service to the International shielding community. The first citations were made at the November 1975 ANS Meeting in San Francisco to Marshall Grotenhuis, formerly with Argonne National Laboratory and now with the Nuclear Regulatory Commission, and to Betty F. Maskewitz, Oak Ridge National Laboratory. A suitably inscribed desk set, carrying the ANS Seal, was presented to each honoree.

Marshall Grotenhuis was honored for:

> pioneering efforts in the field of radiation shielding, theoretical, experimental, and pedagogical, and for his part in the founding of the Shielding and Dosimetry Division of the American Nuclear Society; as exemplified:
>
> in the erection of a shielding facility at Argonne National Laboratory;
>
> in the establishment by him in the late 1950's of one of the very first courses in radiation shielding in the curriculum of the International School at Argonne National Laboratory, taught from his *Lecture Notes on Reactor Shielding,* ANL 6000;
>
> through his diligence in collecting together diverse data on concrete and codifying it into well-recognized types, as published in ANL 6000 and in *Reactor Physics Constants,* ANL 5800;
>
> by his authorship of various treatises in the field of shielding, such as Chapter 6, *Shielding Experiments in Nuclear Reactor Experiments,* Van Nostrand, 1958, and his editorship of Volume I of the *Engineering Compendium on Radiation Shielding,* Springer-Verlag, 1968;
>
> and for his vision and leadership by which he promulgated in many informal sessions on shielding in the early days of the American Nuclear Society the idea of a **Shielding Division** where members could have more complete recognition of their own works and a sounding board for new ideas, and for his part in bringing this idea into fruition with the establishment of this Division as a formal Division of the American Nuclear Society in 1960, and his successful nurturing it through its first year as the Division's first Chairman, 1960–61.

The Maskewitz citation reads as follows:

> On behalf of the American Nuclear Society, the Shielding and Dosimetry Division is pleased to present to **Betty F. Maskewitz** its award for Outstanding Service to the Society, to the Division, and to the radiation transport community worldwide.
>
> For distinguished service as a leader in Division affairs as a member of the Executive Committee, Nominations Committee, and elsewhere; and in Society affairs, including the development of computing technology standards as a member of ANS-10 and the organizing of the 1969 Conference on the Effective Use of Computers in the Nuclear Industry. Possibly, her greatest contribution has been the multiplication of her efforts through suggestion, stimulation, and inspiration to others.
>
> She has been a real force in the industry toward the sharing of computer technology. Her role in developing the concept of the *open code* whereby a computer code is open to scientific scrutiny, modification, and improvement and then made widely available, and her finding means of implementing this concept through her work at the Radiation Shielding Information Center, have materially advanced the state-of-the-art.
>
> For her ability to be of service to each person who makes inquiry, for her philosophy and hard work which have helped to make RSIC a model of a center which truly serves its user community, and for regarding each person and request as important, the Division expresses its gratitude for a job well done.

We congratulate Marshall for well deserved recognition for his accomplishments and are pleased to recall his friendship and continuing support of RSIC. We accept the tribute to Betty as appreciation for the role RSIC has filled in serving the international radiation transport and shielding community as a unifying force, as a technology resource, and as your partner in advancing the state-of-the-art. Each member of the RSIC staff is committed to your service and deserves a share of this award. We are all deeply honored.

FLASH! RSIC FTS NUMBER CHANGED

All persons on the Federal Telecommunications System (FTS) wishing to directly dial the Radiation Shielding Information Center (RSIC) will dial the following number after dialing their local FTS installation access number: **850-6944**. No area code is necessary.

The RSIC commercial telephone number remains unchanged as 615-483-8611, extension 3-6944.

SEMINAR–WORKSHOP ON SPECTRA UNFOLDING TO BE HELD APRIL 12–13, 1976

There has been considerable interest expressed in the proposed seminar–workshop on the unfolding of radiation energy spectra. Therefore, plans are being made to hold it April 12–13, 1976, in Oak Ridge. Since the program will not have to be finalized until March 1976, we continue to welcome your comments, suggestions, and indication of your willingness to actively participate.

Preliminary plans include a seminar portion consisting of contributed papers on the theoretical and practical aspects of unfolding and workshops on one or more recently-developed computer codes. We anticipate coverage to include both the few-channel and many-channel problems and detector response functions. Authors will be asked to supply a camera-ready copy of their papers for publication in the proceedings. Please let us know as soon as possible if you plan to attend and give us the title of your paper.

The conference will coincide with the Knoxville Dogwood Arts Festival, so plan to bring your spouse.

CHANGES TO CODE COLLECTION

PSR-78/FORSIM

This FORTRAN-Oriented Simulation Package for the Automated Solution of Partial and Ordinary Differential Equation Systems was contributed by Chalk River Nuclear Laboratories, Chalk River, Ontario, as a replacement for an earlier packaged version (9/74). The new version contains the contributor's code development in the intervening period. Reference AECL-4844. FORTRAN IV, CDC 6600.

CCC-209A/DOT III

This two-dimensional discrete ordinates transport (IBM 360) code package was updated to include output from running the RZ6G sample problem described (50.20.05) in the DOT III documentation. The table (50.20.06) in the document was changed to reflect the results of the recent test run. The need to test this problem was called to RSIC's attention by Robert G. Spangler, University of Texas, and Wayne A. Rhoades of ORNL. The new file of information (5424 records) may be requested or the entire code package (35,175 records).

CCC-217/ORIGEN FEEDBACK FROM USER

Gerald P. Lahti, Shielding and Radiological Safety, Sargent Lundy has recently (10/23/75) pointed out to us several helpful items of information concerning the CCC-217/ORIGEN code package and its use.

1. One can assemble a working data file from the distributed data without using the update codes COLAPS and UPDATE. From DLC-38, one needs only file 1 (Kee's light element library), file 5 (actinide library), file 3 (ORFIP-Y fission product library) and files 8, 9, and 10 (photon libraries).
2. File 6 (supplementary actinide library) should be used with care as the Q-value is for alphas only, not alpha + beta + gamma as on file 5.

3. The code dimensions are not large enough to run a problem simultaneously with light, actinides, and fission products using the libraries listed in item 1 above. One has to set up two libraries (or for IBM 360 users, via dummy DD cards), one with light elements and actinides only and a second with only actinides and fission products. Problems must then be set up accordingly including only the nuclides of the appropriate group.

CHANGE TO DATA COLLECTION

DLC-37/EPR

This 100n-21γ Cross Section Library has been updated by the ORNL contributors to add new P_8 photon production data sets using a new version of the XLACS module of PSR-63/AMPX and to make other changes. The new data are: Cl, MAT 1149, ENDF IV, and Ca, MAT 1195, ENDF IV, and Zr-nat, MAT 7141, ENDL. The 1/E weighting function was used for the neutron and photon production cross sections for $E_n > 67.4$ keV; the Maxwellian weighting function ($T = 800°K$) was used for $E_n < 67.4$ keV. A flat weighting function was used for the photon interaction cross sections.

The new package contains 73,394 records of information, including a retrieval (edit) code and a sample problem. This data package should be requested as DLC-37C.

SENSITIVITY—SHIELDING BENCHMARK SPECIALISTS MEET

S. Gerstl, LASL, and E. M. Oblow, ORNL, attended the Specialists' Meeting on Sensitivity Studies and Shielding Benchmarks—OECD Headquarters, Paris, France, on October 7–10, 1975. Information exchanged at the Sensitivity Specialists' Meeting included the results of cross-section sensitivity studies for reactor shield design and analyses of integral measurements of fast neutron transport in sodium and iron shield systems. A review of shielding and sensitivity methodology for thermal and fast reactor systems was also discussed. The following is reported by **E. M. Oblow.**

The overall objectives of the IAEA/NEA sponsored meeting was to develop a coordinated international program for assessing cross-section data requirements for shield design and establishment of an international request list of nuclear data measurements and evaluations for shielding. Specific emphasis was placed on trying to identify the roles of sensitivity methodology, and integral and differential measurements in meeting the overall cross-section assessment objectives. Some twenty countries sent representatives, with major roles played by the U. S., U. K., France, Germany, Italy, and Japan in the actual presentations and discussions. The proceedings focus on three major areas of concern: (1) methodology and application of sensitivity analysis, (2) integral measurements and their analysis, and (3) cross-section data adjustment and shield design philosophy. Papers were given and discussed in each of the above categories. At the conclusion of the meeting, summaries in each of the areas were presented by editorial panel members and agreements were reached as to the steps needed to meet the objectives of the proposed follow-up cross-section assessment meeting to be held in Vienna in the fall of 1976. The papers, discussions, summaries, and agreements will all be published at some later date.

In an overall sense the meeting was a highly successful exchange of information, with a great deal of progress having been made outside the U.S. in applying sensitivity methodology to cross-section data assessment problems. In addition, a significant number of papers presented the results of integral measurements on sodium and iron systems in an attempt to verify data and design methods for these two fast reactor shield materials. Iron and stainless steel experimental work in support of thermal reactor systems was also discussed. The ultimate use of integral measurement information and the degree of application of sensitivity methodology in data quality assessment, however, touched off the greatest amount of discussion. Cross-section data adjustment, uncertainty estimation, and shield design philosophy and methodology were covered in some detail in these debates. It was clear that both in scope and depth, the USA shielding program is in the forefront of the areas discussed but the approaches we are using are being more widely adopted due in some measure to the efforts of the Radiation Shielding Information Center (RSIC). It

appears quite likely that a quantitative assessment of cross-section data needs for shielding of some important generic design problems will be made using sensitivity methodology for the Vienna meeting in 1976.

Sensitivity Methodology and Applications

Great progress was made in the European community in understanding and applying one-dimensional sensitivity methodology to the analysis of integral experiments and generic reactor design problems. The ANISN-SWANLAKE code system was the dominant analysis tool for these studies. The most widespread application appears to be the generation of total sensitivity profiles for one-dimensional analysis of shield designs and integral measurements. Information gleaned from these profiles was geared towards understanding the relative importance of the cross-section data in various energy ranges. This was used to determine the suitability of the integral measurement in data testing for a particular generic shield design. Efforts in Germany, the U.K., and Japan were commendable in this area. Multidimensional sensitivity studies, uncertainty analysis using the concept of error files, coupled neutron-gamma-ray sensitivity and inverse problem solutions are still confined to LASL and ORNL efforts. An attempt at a pseudo two-dimensional approach and an interesting uncertainty and inverse problem analysis with crude uncertainty data was, however, reported by the Winfrith group. This represents a significant step forward for them in the sensitivity field. Correlated Monte Carlo methods are also being looked into at Winfrith and CNEN/ISPRA for exact multidimensional sensitivity capabilities. In an overall sense these initial applications have served to whet some appetites and there was a great deal of interest in the ORNL work on ENDF error file data, coupled neutron-gamma libraries based on ENDF/B-IV and the VIP-SWANLAKE two-dimensional sensitivity code.

The applications reported reflected the particular interests of shielding in each country, with the German group interested in PWR and BWR generic shield designs and iron cross-section data; the U.K. effort emphasizing iron data for their CANDU-type PTR and iron and sodium data for the PFR fast breeder; and the Japanese efforts on iron and sodium for their fast reactor. Despite the known core physics sensitivity capabilities of the French group, little information in the sensitivity area was given by them reflecting their tough schedule on SUPER-PHENIX and an overriding concern with completing integral experiment analyses and data adjustment for sodium-iron shield systems.

Integral Experiments

The results and analysis of a significant number of integral experiments were reported. The types of experiments were representative of the facilities available in each country but most reported iron and/or sodium results using reactor and ^{252}Cf sources. Several D-T source experiments were also done with iron. Some sensitivity studies were done in an attempt to understand the relevance of the results to the particular design problems of interest. Most, if not all, of the results could be analyzed by one-dimensional transport methods and it was strongly stated that multidimensional experiments, especially those with streaming problems, were too difficult to analyze for data assessment purposes. Thus criticism was raised concerning the iron, sodium, and stainless steel ORNL benchmark series at the TSF in that the gun-shot source configuration made multidimensional transport analysis necessary. Another significant difference with ORNL methods was reflected in the extensive use of threshold detectors for taking integral data. Proportional counters and NE-213 detectors were also used but problems with unfolding the spectra seem to have arisen. Most of the analyses of spectrometer results on iron over a wide energy range, however, seem to support the analysis made at ORNL in that the only disagreements of significance appear in the 1-10 MeV range. Problems with the total cross section being too high were implied.

The new stainless steel-sodium-iron CRBR upper axial shield experiment at ORNL seems to have aroused strong interest. The French and U.K. participants were particularly interested in the results and analysis of this shield mockup. The particular advantages of the experiment that make it attractive are the sheer amount of material through which the measurements were made and the use of a half-core source

spectrum as opposed to the gun-shot configuration used in the past. The high sensitivities of the CRBR design to fast-neutron data (above 2 MeV) seem also to have created a stir and there will likely be some European experiments on sodium and iron in this energy range to study cross-section data deficiencies.

Cross-Section Adjustment and Shield Design Philosophy

An animated discussion took place when the question of the ultimate use of integral measurement results was raised. The participants here split into three basic groups represented by ORNL, France, and the U.K. The U.K. approach was to use simple geometry and material experiments to adjust diffusion coefficients to match spatial and energy dependent spectra. The adjusted diffusion data, bearing little resemblance to base cross-section data, were then used in diffusion based design work. This by the way, marks a step closer to the U.S. position in that removal diffusion and kernel methods have fallen by the wayside. In this scenario, prototypic experiments play an important role in testing the adjusted data files.

The French approach was to rely on transport methods but specifically low-order transport methods like S_4P_1, to fit the experimental results with adjusted cross sections. By not going to higher-order transport methods they seem to build into the basic adjusted data both method and data discrepancies. They seem to justify this approach by saying that at least they are using transport theory and basic cross-section data as opposed to diffusion theory and physically meaningless adjusted constants. In line with this philosophy they only use a limited class of experiments on which to base adjustments and restrict the use of the adjusted data to design problems which are well representative of that class of experiments. For SUPER-PHENIX this class is represented by binary systems of sodium and iron covering a full range of percentages of each material from 0-100%. Since SUPER-PHENIX will contain stainless steel they may have some problems with the iron and stainless steel adjusted data conversion.

The ORNL position was represented as using integral results to uncover cross-section discrepancies which would then lead to requests for reevaluations or measurements. Integral results would also be used in uncertainty analysis and projecting data needs and Phase II CSEWG data testing but not in adjusting basic ENDF/B data. Our approach to using sensitivity-designed integral experiments in addition to single-material experiments to uncover design oriented data problems seems to have caught a responsive ear.

Agreements for Compiling a Shielding Data Request List

At the end of the meeting, agreements were reached on the proposed path to compiling a data request list for the 1976 Vienna meeting. Several generic one-dimensional shield designs were offered, (PWR, BWR, HTR, and FBR) each representative of some countries' special interest. The FBR shield will be specified by the French-Italian group and be essentially an addition to the EACRP tabled FBR core benchmark design. These designs will be analyzed using sensitivity methodology to see what data is important for a series of representative responses (heating, dose, damage, etc.). The analysis will use ANISN-SWANLAKE and a 100-group library called EURLIB based on ENDF/B-IV. This analysis, coupled with design accuracy requirements for the responses studied, should lead to at least a qualitatively compiled data request list. In this scenario, error file data will also be requested where such information is needed. The design target accuracies were specified in a paper from Switzerland reviewing the collective literature on design tolerances. In the integral experiment area, agreement was reached to try to gather together information on, or actually plan, a series of single material one-dimensional integral experiments using a ^{252}Cf source. Spectrometers were recommended as the means of taking data so that unfolding methods could be compared. These experiments would serve as data testing benchmarks and the basis for adjustment of data. In this light they would be analyzed using sensitivity methods.

E. M. Oblow, NPD/ORNL

PERSONAL ITEMS

Floyd Anderson has transferred from Lynchburg, Virginia, to the Alliance, Ohio office of Babcock and Wilcox where he is engaged as an R & D marketing specialist.

W. Ross Burrus has left Tennecomp, Inc. to establish Mini-Max Services, Inc. in Lenoir City, Tennessee.

We note recent changes of address to the Nuclear Regulatory Commission, Washington, D. C. as follows: **Clyde Jupiter,** formerly EG&G, Las Vegas, Nevada, has joined the staff of Herbert Kouts, Office of Nuclear Regulatory Research, and **Frank C. Skopic,** formerly with GE-San Jose, California, has joined the Office of Standards Development.

MIRD PUBLICATIONS AVAILABLE

The Medical Internal Radiation Dose Committee (MIRD) of the Society of Nuclear Medicine announces the availability of two new publications:

PAMPHLET 10: *Radionuclide Decay Schemes and Nuclear Parameters for use in Radiation-Dose Estimation* provides essentially radioactive decay scheme information in convenient form on more than 120 medically important radionuclides. This publication updates and supercedes Pamphlets 4 and 6 which provided data for 54 radionuclides. In loose-leaf binder format for ease of updating and adding additional radionulcides. $8.75 with binder, $6.50 without binder.

PAMPHLET 11: *"S" Absorbed Dose Per Unit Cumulated Activity for Selected Radionuclides and Organs.* The tabulated vales of "S" in this publication simplify dose calculations. Instead of requiring separate consideration of each radiation of the decay scheme and its associated absorbed fraction, the "S" tabulation permits dose calculations by simply referring to a single table entry for each organ combination. This pamphlet provides "S" values for 117 radionuclides plus 6 parent and short-lived daughter combinations as a uniformly distributed source in 20 source organs irradiating 20 target organs which include ovaries, red bone marrow, testes, and total body. In loose-leaf binder format for ease of updating and adding additional radionuclides and source and target organs. $10.20 with binder, $7.95 without binder.

Other publications available from the MIRD Committee are: **SUPPLEMENT NUMBER 1**—$1.50—Pamphlet 1—*A Schema for Absorbed Dose Calculations for Biologically Distributed Radionuclides*; Pamphlet 2—*Energy Deposition in Water by Photons from Point Isotropic Sources*; Pamphlet 3—*Absorbed Dose Fractions for Photon Dosimetry.*

SUPPLEMENT NUMBER 3—$1.50—Pamphlet 5—*Estimates of Absorbed Fractions for Monoenergetic Photon Sources Uniformly Distributed in Various Organs of a Heterogeneous Phantom.*

SUPPLEMENT NUMBER 5—$1.50—Pamphlet 7—*Distribution of Absorbed Dose Around Point Sources of Electrons and Beta Particles in Water and Other Media*; Pamphlet 8—*Absorbed Fractions for Small Volumes Containing Photon-Emitting Radioactivity.*

PAMPHLET 9—$3.00—*Radiation Dose to Humans from* ^{75}Se-L-Selenomethionine.

UPCOMING CONFERENCES—1976

January 7–9, **1st Topical Conference on Diagnostics of High Temperature Plasmas,** Knoxville, TN, Contact: C. F. Barnett, ORNL.

February 2–5, **Annual APS Meeting,** New York, N. Y., Contact: APS.

March 10–12, **2nd International Symposium on Ballistics and Warhead Mechaniams,** Daytona Beach, FL, Contact: Col. Paul Scordas, American Defense Preparedness Association, 819 Union Trust Building, 740 15th Street, N. W. Washington, D. C. 20005.

March 13–16, **Internat'l Conference on Advanced Nuclear Energy Systems,** Pittsburgh, PA, Contact: A. Redding, W. P. O. Box 355, Pittsburgh, PA 15230

March 23–26, **VIIIth International Conference on Basic and Applied Aspects of Dosimetry,** Saclay, France, Contact: M. Le Gallic, C.E.N. de Saclay B. P. No. 2, 91190 Gif-sur-Yvette, France.

April 7–9, **Annual Sherwood Theory Meeting,** Madison, WI, Contact: J. Shohet, University of Wisconsin.

April 27–30, **2nd European Conference on Computational Physics,** Munich, Germany.

June 13–18, **Annual ANS Meeting,** Toronto, Canada.

June 14–18, **9th Symposium on Fusion Technology,** Garmisch-Pautenkiuchen.

June 28–July 2, **Conference on Plasma Heating,** Grenoble, France, Contact: T. Consoli, Grenoble.

September 6–17, **3rd Conference on Heating of Devices,** Varenna, Italy, Contact: W. Hooke, PPPL.

September 21–23, **2nd Topical Meeting on the Technology of Controlled Nuclear Fusion,** Richland, WA, Contact: L. Schmid, PNL.

October 6–13, **IAEA 6th Conference on Plasma Physics & CTR,** Berchtesgaden, Germany, Contact: J. A. Phillips, Vienna

November 14–18, **APS Division of Plasma Physics,** San Francisco, CA, Contact: F. W. Crawford, Stanford University.

November 14–19, **ANS/AIF International Meeting,** Washington, D. C. Contact: D. G. Pettergill, ANS, Hinsdale, IL.

TWO NEW NCRP REPORTS AVAILABLE

The publication of two new reports has been announced by the National Council on Radiation Protection and Measurements (NCRP). They are NCRP Report No. 45, **Natural Background Radiation in the United States,** and NCRP Report No. 46, **Alpha-Emitting Particles in Lungs.**

NCRP Report No. 45 is concerned with the assessment of the radiation dose to the population from natural background radiation. Included are the absorbed doses to the population due to radiation from cosmic sources, radionuclides in the earth, inhaled radioactivity, internally deposited radionuclides, and fallout from nuclear weapons tests. It is the first in a series of reports envisioned to examine and evaluate the results of the many private studies and government programs related to sources of ionizing radiation that may contribute to the overall exposure of the population.

NCRP Report No. 46 specifically addresses the question of whether the current practice of averaging over the lung the absorbed dose from particulate alpha-emitting radionuclides is a defensible procedure in the practice of radiation protection and whether exposure limits derived on this basis are more or less conservative than those that might result from a precise consideration of the spatial distribution of dose. It compares the observations in experimental animals and in man with theoretical considerations and concludes that the current practice of averaging the absorbed dose over the lung is a defensible procedure.

OTHER AVAILABLE NCRP REPORTS ARE:

Report No. 8, *Control and Removal of Radioactive Contamination in Laboratories* (1951).
Report No. 9, *Recommendations for Waste Disposal of Phosphorus-32 and Iodine-131 for Medical Users* (1951).
Report No. 10, *Radiological Monitoring Methods and Instruments* (1952).
Report No. 12, *Recommendations for the Disposal of Carbon-14 Wastes* (1953).
Report No. 14, *Protection Against Betatron-Synchrotron Radiations Up to 100 Million Electron Volts* (1954).
Report No. 16, *Radioactive Waste Disposal in the Ocean* (1954).
Report No. 22, *Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure* (1959).
Report No. 23, *Measurement of Neutron Flux and Spectra for Physical and Biological Applications* (1960).
Report No. 25, *Measurement of Absorbed Dose of Neutrons and of Mixtures of Neutrons and Gamma Rays* (1961).
Report No. 27, *Stopping Powers for Use with Cavity Chambers* (1961).
Report No. 28, *A Manual of Radioactivity Procedures* (1961).
Report No. 30, *Safe Handling of Radioactive Materials* (1964).
Report No. 31, *Shielding for High-Energy Electron Accelerator Installations* (1964).
Report No. 32, *Radiation Protection in Educational Institutions* (1966).
Report No. 33, *Medical X-Ray and Gamma-Ray Protection for Energies Up to 10 MeV—Equipment Design and Use* (1968).
Report No. 34, *Medical X-Ray and Gamma-Ray Protection for Energies Up to 10 MeV—Structural Shielding Design and Evaluation* (1970).
Report No. 35, *Dental X-Ray Protection* (1970).
Report No. 36, *Radiation Protection in Veterinary Medicine* (1970).
Report No. 37, *Precautions in the Management of Patients Who Have Received Therapeutic Amounts of Radionuclides* (1970).
Report No. 38, *Protection Against Neutron Radiation* (1971).
Report No. 39, *Basic Radiation Protection Criteria* (1971).
Report No. 40, *Protection Against Radiation From Brachytherapy Sources* (1972).
Report No. 41, *Specification of Gamma-Ray Brachytherapy Sources* (1974).
Report No. 42, *Radiological Factors Affecting Decision-Making in a Nuclear Attack* (1974).
Report No. 43, *Review of the Current State of Radiation Protection Philosophy* (1975).
Report No. 44, *Krypton-85 in the Atmosphere—Accumulation, Biological Significance, and Control Technology* (1975).
Report No. 45, *Natural Background Radiation in the United States* (1975).
Report No. 46, *Alpha-Emitting Particles in Lungs.*

Copies of NCRP Reports are available from NCRP Publications, P. O. Box 30175, Washington, D. C. 20014.

VISITORS TO RSIC

Visitors to RSIC during the month of October were: Jacob Neufeld, Oak Ridge National Laboratory, Oak Ridge, Tennessee; E. H. Brehm, Brown Boverie Cie, Mannheim, Germany, and H. L. Germ, INT Stohl, Stohl-Kiel, Germany; G. Aubert, CEA, Saclay, France, P. Lafore, CEA, Saclay, France, and A. L'Homme, CEA, Saclay, France; F. H. Clark, Instrumentation and Controls, Oak Ridge National Laboratory, Oak Ridge, Tennessee and Petro Otabey, Instrumentation and Controls, Oak Ridge National Laboratory, Oak Ridge, Tennessee; Chi-Kang Cheng, Institute of Nuclear Energy Research, Lungtan, Taiwan, ROC, Chao-Yie Yang, Institute of Nuclear Energy Research, Lungtan, Taiwan, ROC, and Kueng Yeh, Institute of Nuclear Energy Research, Lungtan, Taiwan, ROC; M. Bustraan, Reactor Centrum Nederland, Petten, Netherlands; and V. R. Cain, Bechtel Power Corp, Gaithersburg, MD.

NOVEMBER ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and 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 requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.

Special bibliographies and selected computer-printed abstracts of the literature in the RSIC system are available upon request. The Selective Dissemination of Information (SDI) Service is available by submitting a list of subject categories defining the recipient's interests.

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

AED-CONF-74-509-006
Neutron Collimator Calculations.
From 2nd Symposium on Neutron Dosimetry in Biology and Medicine, Neuherberg/Nuenchen, F.R. Germany (30 Sept. 1974)
Gruenauer, F.
1974
INIS

AED-CONF-74-509-040
The Calculation of Fluence, Let, and Event Size Spectra for Neutron Beams.
Edwards, A.A.
1974
INIS

ANS-SD-15; CONF-750661
Proceedings of the Special Session on Plant and Equipment Design Features for Radiation Protection, New Orleans, Louisiana, June 8-13, 1975.
American Nuclear Society
November 1975
NTIS

ANS-SD-15, pp.1-20; CONF-750661, pp.1-20
Shielding Design for Better Plant Availability.
Biro, G.G.
November 1975
NTIS

ANS-SD-15, pp.21-26; CONF-750661, pp.21-26
Design Features to Reduce Occupational Exposure.
Adam, J.A.; DiSabatino, A.A.,Jr.; Vanasse, R.E.
November 1975
NTIS

ANS-SD-15, pp.27-34; CONF-750661, pp.27-34
Architect Engineer Balance-of-Plant Radiological Design Considerations.
Piccot, A.R.
November 1975
NTIS

ANS-SD-15, pp.35-47; CONF-750661, pp.35-47
Control of Occupational Radiation Exposures in TVA Nuclear Power Plants Design and Operating Philosophy.
Stone, G.F.; Beasley, E.G.,Jr.; Zobel, W.; Belvin, E.A.,Jr.
November 1975
NTIS

ANS-SD-15, pp.49-70; CONF-750661, pp.49-70
Minimizing Radiation Exposures in PWR Plants.
Clemons, L.,Jr.; Battaglia, J.A.
November 1975
NTIS

ANS-SD-15, pp.71-74; CONF-750661, pp.71-74
Labyrinth Design in Nuclear Power Plants.
Kaiseruddin, M.
November 1975
NTIS

BISI-11902
Boron/Gypsum: A Neutron-Absorbent Building Material.
Ertl, H.H.; Bodemann, M.; von Erichsen, L.
1975
Kernforschungsanlage Juelich G.m.b.H. (F.R. Germany), Inst. fuer Medizin

BNWL-B-389
DACRIN - A Computer Program for Calculating Organ Dose from Acute or Chronic Radionuclide Inhalation.
Houston, J.R.; Strenge, D.L.; Watson, E.C.
August 1975
NTIS

BRL-R-1830
The Effects of the Evaluator Assigned Nitrogen Nuclear Cross Section Uncertainties Upon the Transport of Neutrons in Air.
Beverly, W.B.; Niiler, A.; Banks, N.E.
September 1975
NTIS

CEA-R-4683 (In French)
Sensitivity of Various Thermoluminescent, Photoluminescent and Photographic Detectors to Neutrons Emitted by a Pu-Be Source.
Spurny, F.; Marsault, R.; Medioni, R.; Portal, G.
July 1975
Dep., NTIS (U.S. Sales Only) $4.50

CONF-730907-P1, pp.225-228
Dose Equivalent Equation.
Wyckoff, H.O.
February 1974
Dep., NTIS

CONF-730907-P1, pp.229-231
Index Quantities of the ICRU.
Rossi, H.H.
February 1974
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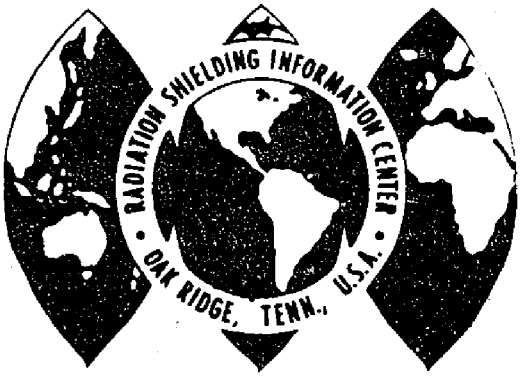

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And best wishes for the coming year