RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE U. S. DEPARTMENT OF ENERGY

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Discontent is the first step in the progress of a man or a nation . . . Oscar Wilde

THE IMPORTANCE OF PROPER CITATION OF RSIC PRODUCTS

A government sponsor has called to RSIC attention the importance of properly citing RSIC products, particularly data libraries, in references supporting research results. We offer the following guidelines.

All RSIC products are assigned package numbers. In the case of code packages, the master tape list sent with the code package has on it the original date of testing and packaging, and the date of the latest update. In addition, the description of each file of information has a date when that portion of the computerized material was updated. The preservation of this tape list may become important if the user must run an audit trail on calculations for quality assurance programs. In the event this tape list is lost, RSIC maintains records of what and when and to whom the material has been disseminated.

In the case of data, the package number was initially identified by the next letter of the alphabet to denote an updated version. Since this alphabetic notation did not tell when it happened, it was decided (July 1980) to append a date (year of update) to the name of the data library as, for example, DLC-75/BUGLE-80. In further documentation of changes to data/code packages, we date the master tape list when changes occur, and we maintain records of such changes and of dissemination.

When citing RSIC products in published material, we suggest the following examples as appropriate.

a) Radiation Shielding Information Center Code Package CCC-254/ANISN – ORNL, *Multigroup One-Dimensional Discrete Ordinates Transport Code With Anisotropic Scattering*, contributed by Oak Ridge National Laboratory.

b) Radiation Shielding Information Center (Oak Ridge National Laboratory) Code Package PSR-118/NJOY, *A Code System for Producing Pointwise and Multigroup Neutron and Photon Cross Sections from ENDF/B-IV and -V Evaluated Nuclear Data*, contributed by Los Alamos National Laboratory.

c) Radiation Shielding Information Center (Oak Ridge National Laboratory) Data Package DLC-60/MACKLIB-IV, *171 Neutron, 36 Gamma-Ray Group Nuclear Response Function Library Calculated with MACK-IV from Cross-Section Data in ENDF/B-IV*, contributed by Argonne National Laboratory.

Please note that, in each case, the above represents information taken from the front cover of the RSIC documentation package which may contain several reports by a number of different authors. You should, however, use the above notation when citing the use of the given package. **If you are citing an individual's research results which have been formally published; you will, as usual, cite that publication even when it is packaged with an RSIC product.** If you wish to cite availability of that report, you may state that it is packaged in an RSIC product – and the citation would be as a—c above.

Please feel free to contact RSIC for any recorded information needed to support your audit trail in quality assurance programs.

SUGGESTIONS ON RSIC SCOPE REVIEWED

Last year we sent to each Newsletter recipient a query to determine whether the Newsletter was still desired. Other questions were asked to help us determine interests and requirements of the user community.

On one version of the form, we briefly listed the elements of the RSIC scope and asked whether the scope should be expanded. Many responded affirmatively and gave suggestions that we have carefully considered.

Nearly all the suggestions related to subject areas that were not explicitly mentioned in the scope but are indeed included in our field of interest, or that we have had to exclude for lack of funding.

Some of the most frequently mentioned topics were:

- Dispersion of Radionuclides in the Environment

  Codes and literature are indexed in our information system under ENVIRONMENTAL DOSE and other descriptive terms. We have a number of computer codes and related data packages for analysis of this problem. Our work for NRC has generally been in this area and radiological assessment.
- Radiation Damage

  We try to include review or summary articles in the literature and have a few codes and data libraries indexed under this topic. Several years ago we sought unsuccessfully to obtain funding to expand our work in this area. We still believe that it would be useful to significantly increase our work in this field and to provide a service similar to that formerly provided by the Battelle Radiation Effects Information Center.
- Accelerators

  At one time NASA and the AEC provided minimal support for RSIC to actively cover charged-particle transport, especially for medium and high energies. This support was discontinued several years ago. We have had to essentially terminate this work, although we still distribute the codes we acquired some years ago. We do pick up some literature on accelerator shielding, especially if neutron generation and transport are treated.
- Waste Management

  We try to cover nuclear waste analysis to some extent if radiation transport is treated.
- Fusion Reactors

  This is actually a significant effort for us. We include blanket analysis, nuclear heating, and damage analysis in addition to shielding. We also try to note applications of shielding technology to other purposes, e.g., neutral particle transport in the plasma. We process, to the extent funding allows, multigroup cross-section libraries (VITAMIN-C) for application to fusion neutronics.
- Gamma-Ray and Neutron Spectrum Analysis and Unfolding

  We have collected codes for energy spectrum analysis, e.g., for activation analysis, and for unfolding measured spectral data. We also have acquired some codes for the determination of detector sensitivity.

For many years we have somewhat facetiously decribed our scope as follows: "If a particle moves, that's shielding." For practical purposes, that seems to be a good definition of our scope within the limits of available manpower. Additional insight into the contents of our collections can be obtained from the description of our RECON data bases and "Capsule Review" of the code and data collections, both available from RSIC upon request.

ANS RADIATION PROTECTION AND SHIELDING DIVISION NEWS

Several items of general interest have been gleaned from the ANS RP&S Division Newsletter for January 1981. We recap as follows.

The division's November 1980 meeting "Best Paper Award" was won by **Denise C. George, T. R. England, R. J. LaBauve,** and **C. W. Maynard** of Los Alamos National Laboratory. Their paper *Delayed Photon Sources for Shielding Applications* was selected from three nominated for the award of $100 and appropriately engraved certificates. Formal presentations will be made to the authors at the June 1981 meeting.

As part of division efforts to encourage student interest, the Executive Committee in its November 1980 meeting approved an award to be made for the best student paper. The award, consisting of $250

and a certificate, will be made for the best paper (within the scope of the division's activities) submitted by a student for presentation at the 1981 winter meeting. Details will appear in the May 1981 division newsletter in advance of the paper submittal date (mid-July) for the November meeting.

X-RAY AND IONIZING RADIATION DATA CENTER

RSIC Newsletter readers are familiar with our center and the services it provides. We call your attention to another center with which you should also be familiar, that's the National Bureau of Standard's (NBS)X-Ray and Ionizing Radiation Data Center (XIRDC) headed by a well known member of the shielding community, **John Hubbell.**

The Data Center was started in 1952, is affiliated with the National Standard Reference Data System and is supported by the NBS Office of Standard Reference Data. Its mission is to provide x-ray attenuation data required for: radiation shielding design (reactor, space vehicle, medical); analysis of nuclear physics experiments and of medical x-ray effects; thickness and density gauges; irradiation technology; electron microprobe microanalysis; x-ray crystallography and ionosphere prediction. Its scope includes attenuation and energy-absorption coefficients (cross sections) for 1 keV–100 GeV photon (x-ray, gamma-ray) interactions with matter, including Compton and Rayleigh scattering, atomic photoeffect, and electron-positron pair production.

XIRDC holdings include 10,000 reprints of direct or peripheral relevance to photon attenuation or cross sections, books, periodicals, and reports. Its publications include reports such as *Photon Cross Sections, Attenuation Coefficients, and Energy Absorption Coefficients from 10 keV to 100 GeV* (1969, NSRDS-NBS 29), state-of-the-art reviews published in appropriate journals, data compilations, bibliographies, abstracts, and indexes.

The center answers inquiries by letter or phone; provides consulting services, and distributes data compilations.

For more information, contact John. His mailing address and phone number is: Mr. J. H. Hubbell, X-Ray and Ionizing Radiation Data Center, Center for Radiation Research, Radiation Physics Bldg. – Room C313, National Bureau of Standards, Washington, D. C. 20234, Telephone: (301) 921-1685.

NEW SCALE DOCUMENT TO BE PUBLISHED

A significant revision to the existing SCALE documentation, SCA-0, along with some major additions will soon be issued. A copy may be reserved in advance of publication by those interested by writing to the **Radiation Shielding Information Center**, Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tennessee 37830 or by calling (615) 574-6176 or FTS 624-6176 giving your request to anyone who answers.

The document will go to press no later than March 1st. If you want a copy reserved, you must respond immediately. RSIC will, of course, continue to disseminate documentation as a part of the code package, and it will be updated as needed.

Through funding supplied by the U. S. Nuclear Regulatory Commission, a modular system of computer programs called SCALE (Standardized Cask-Analysis for Licensing Evaluation) has been developed at the Oak Ridge National Laboratory for performing criticality, shielding, and heat transfer analysis. The primary effort was directed toward developing standardized methods for performing safety analyses of nuclear fuel shipping containers; however, the SCALE system has the capability to be used for criticality and shielding analyses of reactors, experiments, and spent storage pools.

The SCALE system consists of a driver module, control modules, functional modules, and a data base. The control modules constitute standard analytical sequences which are characterized by the type of analysis to be performed and the complexity of the system being analyzed. Input to the control modules is in terms of easily visualized engineering parameters specified in a simplified, free-form format. The functional modules perform either problem-dependent data processing or some type of system analysis.

Some of the functional modules included within the SCALE system are NITAWL, XSDRNPM, ORIGEN-S, MORSE-SGC, BONAMI, and KENO V. Besides being used in a standard analytical sequence, each functional module can be run in a stand-alone fashion. Through the selection of standard analytical sequences, the SCALE system user can perform sophisticated, state-of-the-art analysis in a commonly understood, well documented manner.

The Criticality Safety Analytical Sequences were completed and packaged in RSIC in July 1980 as SCA-O/SCALE (CSAS1, CSAS2) and documented as NUREG/CR-0200.

The code developers intend that the manual describing the SCALE system will eventually consist of several large loose-leaf notebooks. Documentation of the control modules, functional modules, data bases, driver module, and subroutine libraries will be included within the manual.

CHANGES IN THE COMPUTER CODE COLLECTION

The following changes were made in January.

CCC-401/QADQC

A three-dimensional point kernel gamma-ray shielding code system was contributed by the Power Authority of the State of New York. This code system is based on QAD-P5 (CCC-48) developed at the Los Alamos National Laboratory but has several different features. All neutron moment and heating calculations have been eliminated, the number of regions and boundaries has been reduced, and various changes to the output formats have been changed. This version was developed for quick and fairly inexpensive direct-beam gamma-ray dose calculations. A comprehensive users manual was written to accompany the new version. Reference: RP-100. FORTRAN IV; CDC and IBM 360.

PSR-149/FIGERO

FIGERO, a collection of processing codes for generating multigroup neutron cross sections from ENDF/B for use in discrete ordinates calculations, was contributed by the Experimental Reactor Physics Section, Bhabha Atomic Research Center, Bombay, India. The package contains RESEND for generating energy-point cross sections. Also included in the package is INSCAT which calculates group-to-group scattering matrices for the discrete level, continuum, and (n,2n) scattering data. Reference: Unpublished notes by S. G. Garg. FORTRAN IV; CDC.

ATTENTION: DOT 4.2 USERS

Attention is called to an error in the IBM version of CCC-320/DOT 4.2. **Mahmout Youssef** of the University of California Nuclear Engineering Department in Los Angeles, California, and **W. A. Rhoades** of the Engineering Physics Division at the Oak Ridge National Laboratory have pointed out that when ICMAT is greater than zero for an activity, and when ICMAT is a microscopic (not a macroscopic) cross section, then the activity is twice what it should be in zones where the microscopic cross section is used as macroscopic.

This trouble is initiated in Subroutine ACTIVITY, at Statement 1700+2 which reads: E5=1.0. This statement should be corrected to read: E5=0.0. This correction needs to be made in the IBM 360 version only (not in the CDC version).

A mailing has been made to those known to be using the DOT 4.2 IBM version, and printed here are copies for those we may have missed.

DO YOU USE THESE CODES?

We have received user feedback suggesting changes which should be made: to ANISN-W Subroutines PLSNT, SUMARY, and S824; to DOT III Subroutine INP; and to DOT 3.5 Subroutine PCON. Since these codes have been so widely disseminated, we take this means to alert possible users of these early versions. Copies of the suggested modifications are available upon request to RSIC.

CHANGE IN THE DATA LIBRARY COLLECTION

The following change was made in January.

DLC-73/GARG

GARG, a 27-group neutron cross section data set in discrete ordinates format generated with FIGERO (PSR-149) from ENDF/B data, was contributed by the Experimental Reactor Physics Section, Bhabha Atomic Research Center, Bombay, India. The package contains cross sections in DTF-IV format for 16 elements: Li-6, Li-7, Be-9, Th-232, Pu-241, O-16, U-235, C-12, U-233, Pu-239, Pu-240, U-238, Cr-52, Ni-58, Na-23, and Fe-56. Also included are self-shield factors, cross sections and inelastic matrices in 1-DX format for 11 elements: Cr, Ni, Fe, U-235, U-238, U-239, Pu-240, Na, O-16, C-12, and Pu-241. Reference: Informal notes by S. B. Garg. FORTRAN IV; CDC.

PERSONAL ITEMS

Luisa F. Hansen, experimental physicist at Lawrence Livermore National Laboratory (LLNL) for nearly 20 years, was recently elected to the American Physical Society's (APS) Committee on the Status of Women in Physics. The APS has also nominated Dr. Hansen to an advisory group which will administer an ambitious 10-year, multi-million dollar program aimed at encouraging the participation of women in scientific and technical careers. The program is known as Women in Science and Technology Equal Opportunity Act, passed into law in December 1980. Dr. Hansen is well known to the shielding community through her many publications related to the results of her research at LLNL.

Sidney Fernbach, recently retired from LLNL, was elected a Fellow of the American Association for the Advancement of Science (AAAS) during the last annual meeting held in Toronto.

VISITORS TO EPIC

The following persons came for an orientation visit and/or to use EPIC facilities during the month of January. **Kyoshi Asai** and **Toshinore Iijima**, Japan Atomic Energy Research Institute, Japan; **Ed Straker**, Science Applications, Inc., La Jolla, California; **M. Gary Verholek**, Environmental Systems Corp., Knoxville, Tennessee.

AMERICAN NUCLEAR SOCIETY PROCEEDINGS PUBLICATIONS OFFERED

The American Nuclear Society is calling attention to the availability of its special conference proceedings publications, but only a limited number of each remain. There are several of interest to the shielding specialist. These are (ANS order number in parentheses):

- *Protection Against Radiation Hazards in Space*, TID-7652 (660001), 2 vols, 1962, $7.
- *Aerospace Nuclear Safety*, SC-DC-3553 (660002), 1963, $2.
- *Nuclear Data for Shielding*, ANS-SD-11 (660003), 1969, $2.
- *Fast Neutron Spectroscopy*, ANS-SD-2 (660004), 1964, $3.
- *Radiation Transport and Biological Effects*, ANS-SD-4 (660006), 1966, $3.
- *Fast Reactor Shielding*, ANS-SD-13 (660010), 1971, $3.

All orders should be placed with the **American Nuclear Society**, 555 North Kensington Avenue, LaGrange Park, Illinois 60525. Except for the first item, please add a $4 shipping and handling charge for each item ordered.

COMPUTER TAPES TO CALCULATE RADIATION DOSES TO THE EUROPEAN COMMUNITIES

The United Kingdom National Radiological Protection Board (NRPB) has established a computer tape library which can be used to calculate the collective dose to the population of the European Communities (EC) from discharges of radioactive effluents within the EC. The tape library can be used to determine the collective dose to, and hence, the radiological impact on the population of the EC of: airborn discharges from any location in the EC, liquid discharges to the marine environment from any location in the EC, and liquid discharges into the Rhine and Rhone rivers from any location.

Information concerning availability of the tape library can be obtained from **Dr. R. H. Clarke**, Head of Nuclear Assessments Department, National Radiological Protection Board, Harwell, Didcot, Oxon OX11 ORQ.

CONFERENCES AND COURSES

Several conferences and courses of general interest are planned for the coming months as follows:

Annual WATTec Conference

The 8th Annual WATTec Energy Conference & Exhibition entitled "A Call for Leadership" will be held at the Hyatt-Regency Hotel, Knoxville, Tennessee, February 18–20, 1981. This annual event, sponsored by 30 chapters of 27 national technical and professional societies, brings together specialists from government, private industry, and educational institutions. Full details of the program may be secured from WATTec, P. O. Box 629, Oak Ridge, Tennessee 37830, or call **Gail Smith**, Conference Registrar, (615) 482-6200 or **Bob Stepp** (615) 574-9254 or FTS 624-9254.

Radiation Effects Conference Planned

The Call for Papers has been issued for the 1981 IEEE Annual Conference on "Nuclear and Space Radiation Effects" to be held in Seattle, Washington, on July 21–24, 1981, under sponsorship of the IEEE/NPSS Radiation Effects Committee in cooperation with the University of Washington and cosponsored by the Defense Nuclear Agency/DoD, Jet Propulsion Laboratory/NASA, and Sandia National Laboratories. This 1981 Conference will be held on the campus of the University of Washington in Seattle. It will cover nuclear and space radiation effects, and EMP effects, on electronic devices, materials, circuits and systems, as well as semiconductor processing technology and techniques for producing radiation-tolerant ("hardened") devices, and integrated circuits and memories.

The program will consist of six to eight sessions of contributed papers, several invited papers, and a special VLSI session. A poster session is also planned. In addition, a short course on radiation effects will be offered on July 20. Papers describing significant findings in the following or related areas are solicited: Basic Mechanisms of Radiation Effects on Materials, Devices, and Systems; Radiation Effects on Integrated Circuits & Systems: CMOS, NMOS, CCD, I^2L, SOS, LSI, VLSI, and Bubble Memories; Radiation Effects on Devices and Components: Bipolar, MOS, Quartz Resonators, Clocks, Fiber Optics, Solar Cells, etc.; Processing Technology and Techniques for Manufacturing Radiation-Tolerant ("Hardened") Devices, and Integrated Circuits and Memories; Testing Techniques and Technologies for Hardness Assurance; Circuit and Process Diagnostics, Failure Analysis, and Reliability Physics for Hardness Assurance; Computer Aids for Hardened IC Design; Prediction of Radiation Damage; Short-Term and/or Long-Term Degradation and Transient Annealing; Upset & Latchup Phenomena; Single Particle Upset Phenomena; Electromagnetic Pulse Phenomena: EMP, IEMP, SGEMP, and SREMP; Electromagnetic Pulse Assessment & Test Technology for Systems; Radiation Sources, Simulation and Energy Deposition and Dosimetry; Rad-Hard Semiconductors for Nuclear Reactor Control; and New Developments, New Technologies: Semiconductor Processing, Radiation-Hardening, and EMP Hardening.

All summaries submitted before the deadline will be reviewed and those accepted will be presented at the conference. A paper accepted for the conference also becomes a candidate for the conference issue of the *IEEE Transactions on Nuclear Science*, subject to an additional review of the full paper. It is not necessary to be an IEEE member to present a paper. DEADLINE: The original and eight copies of the summary must be in the hands of the 1981 Technical Program Chairman no later than March 2, 1981. Mail summaries to: **Dr. Eric Wenaas**, c/o JAYCOR, P. O. Box 85154, San Diego, California 92138.

UPCOMING MEETINGS

We call attention to the following additional meetings. For ANS meetings contact the individual named in the announcement or contact David G. Pettengill, ANS Meetings Manager, American Nuclear Society, 555 North Kensington Avenue, LaGrange Park, Illinois 60525, (312) 352-6611.

March 1981

8th Energy Technology Conference & Exposition, March 9–11, 1981, Sheraton Washington Hotel, Washington, D. C. Contact: Energy Technology Conference, c/o Government Institutes, P. O. Box 1096, Rockville, Maryland 20850.

Fuel Cycle Conference '81, March 15–18, 1981, Century Plaza Hotel, Los Angeles, California. Contact: Atomic Industrial Forum, Inc., Washington, D. C.

April 1981

ANS/ENS International Topical Meeting on Advances in Mathematical Methods for the Solution of Nuclear Engineering Problems, April 27–29, 1981, Munich, Germany. Contact: Manfred R. Wagner, Kraftwerk Union AG, Postfach 3220, Dept. R121, D8520 Erlanger, F. R. Germany.

June 1981

ANS Annual Meeting, June 7–12, 1981, Sheraton Bal-Harbour, Miami Beach, Florida. Contact: Professor Nils Diaz, Nuclear Science Center, University of Florida, Gainesville, Florida 32611, (904) 392-1406.

JANUARY 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.

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

ANL-77-26, Rev.1
SLIDES: A Program to Draw Slides and Posters., Bertrand, R.M.; *et al.*, August 1980, NTIS

CONF-7810231
Computer Techniques in Radiation Transport and Dosimetry., Proceedings of a School, Erice, Sicily, October 1978), Nelson, W.R.; Jenkins, T.M. (Eds.), 1980, Plenum, New York

CONF-791223; RIT/FIS-LDN(80) 1
Proceedings of the Specialists' Meeting on Neutron Cross Sections of Fission Product Nuclei., Held at "E. Clementel" CNEN Centre, Bologna, Italy, Coceva, C.; Panini, G.C. (Eds.), December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.5-18; RIT/FIS-LDN(80) 1, pp.5-18
Integral Cross Section Measurements on Fission-Product Nuclides in Fast Neutron Fields., Harker, Y.D.; Anderl, R.A., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.85-94; RIT/FIS-LDN(80) 1, pp.85-94
Fast Neutron Capture Cross Section Measurements, Evaluation and Model Calculation of Fission Product Nuclei., Poenitz, W.P., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.121-144; RIT/FIS-LDN(80) 1, pp.121-144
Review of the Different Methods to Derive Average Spacing from Resolved Resonance Parameter Sets., Fort, E.; Derrien, H.; Lafond, D., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, p.195; RIT/FIS-LDN(80) 1, p.195
Phenomenological and Theoretical Basis for the Parameterization of Nuclear Models Used in Reactor Data Evaluation. (Abstract Only), Reffo, G., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.233-252; RIT/FIS-LDN(80) 1, pp.233-252
On Optical Model Calculations in the Mass Region A=80 to A=170., Lagrange, L., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.253-284; RIT/FIS-LDN(80) 1, pp.253-284
ENDF/B-5 Fission Product Cross Section Evaluations., Schenter, R.E.; England, T.R., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.285-297; RIT/FIS-LDN(80) 1, pp.285-297
The Contribution of (n,p) and (n,alpha) Reactions to Fission-Product Capture Cross Sections., Gruppelaar, H.; Van den Bos, B.P.J., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.299-315; RIT/FIS-LDN(80) 1, pp.299-315
Intercomparison of Adjusted Data Sets for Capture Cross Sections of Fission Products., Gruppelaar, H.; Hammer, P.; Martin-Deidier, L., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.317-346; RIT/FIS-LDN(80) 1, pp.317-346
Fission Product Neutron Cross Section Evaluations for JENDL and the Integral Tests., Iijima, S.; Watanabe, T.; Yoshida, T.; Kikuchi, Y., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.347-361; RIT/FIS-LDN(80) 1, pp.347-361
Fission Product Nuclear Data at the NEA Data Bank., Johnston, P.D.; Osterhage, W.W., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.363-373; RIT/FIS-LDN(80) 1, pp.363-373
Neodymium, Samarium and Europium Capture Cross Section Adjustments Based on EBR-II Integral Measurements., Anderl, R.A.; Harker, Y.D.; Schmittroth, F., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

CONF-791223, pp.375-389; RIT/FIS-LDN(80) 1, pp.375-389
Status of Pseudo Fission-Product Cross Sections for Fast Reactors; Sensitivity Studies for Sodium Void Effects., Heijboer, R.J.; Janssen, A.J.; Lekkerkerk, F., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

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Neutron Cross Section Calculations for Fission Product Nuclei., Arthur, E.D.; Foster, D.G.,Jr., December 14, 1979, "E. Clementel" CNEN Centre, Bologna, Italy

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1980 Advances in Reactor Physics and Shielding., Proceedings of the Conference held September 14-19, 1980, in Sun Valley, Idaho., Haire, J.C. (Ch.), September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Recent Reactor Physics and Shielding Investigations in the Federal Republic of Germany., Kusters, H., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

CONF-800942, pp.70-83
The Status of Reactor Shielding Research in the U.S., Maienschein, F.C., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

CONF-800942, pp.131-143
Reactor Physics and Shielding Implications of TMI-2., Andrews, J.B.,II; Whitmarsh, C.L.; Woods, J.J.; Nitti, D.A., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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The Current Status of Methods for Shielding Analysis., Engle, W.W., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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CRBRP Reactor System Shield Design and Impact of New Material Irradiation Damage Data., Wrights, G.N., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

CONF-800942, pp.414-426
Application of a Three-Dimensional Discrete Ordinates Transport Code to Shielding Design and Analysis., Yokobori, H.; Nishimura, T.; Tada, K., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Neutron Transport Calculations Involving a Mixture of Group and Discrete-Energy Fluxes., Liu, Y-W.H.; Goldstein, H., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Experience with Correlated Tracking in Deep Penetration Monte Carlo Sensitivity Analysis., Rief, H.; Dubi, A.; Sundaraman, V., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Neutron and Gamma Characterization Within the FFTF Reactor Cavity., Bunch, W.L.; Carter, L.L.; Moore, F.S.; Werner, E.J.; Wilcox, A.D.; Wood, M.R., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Radiation Streaming in Light Water Reactors., Till, H.; Cogburn, C.O., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Narrow Gap Design Against Neutron Streaming Through Reactor Cavity in PWR Plant., Ohkubo, M.; Ashida, S.; Takahashi, Y., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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LWR-PV Damage Estimate Methodology., Wagschal, J.J.; Maerker, R.E.; Broadhead, B.L., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

CONF-800942, pp.625-632
A New Cross Section Library for Light Water Reactor Shielding and Pressure Vessel Dosimetry Applications., Simmons, G.L.; Roussin, R.W., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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Monte-Carlo Validation of Secondary Sodium Activation in a Pool-Type LMFBR., Palmiotti, G.; Rado, V.; Salvatores, M., September 1980, American Nuclear Society, Incorporated, 555 North Kensington Avenue, LaGrange Park, IL 60525

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