RSIC Newsletter

RADIATION SHIELDING INFORMATION CENTER

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE DEPARTMENT OF ENERGY

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Only mediocrities rise to the top in a system that won't tolerate wavemaking—Laurence J. Peter

DISCRETE ORDINATES SEMINAR-WORKSHOP

In response to requests over a period of time, we are beginning to consider the possibility of a seminar-workshop (S-W) through which to review the state of the art of discrete ordinates methodology in general in the seminar part, and to feature DOT IV in a workshop environment. It will have been 15 years this August (1967) since this subject was uniquely treated in the standard RSIC S-W format and the one-dimensional discrete ordinates code ANISN was featured. A discussion of two-dimensional discrete ordinates was held in September 1969 in conjunction with multigroup cross section preparation but the proceedings were not published. A review of development through the intervening years may serve a useful purpose.

We solicit your comments on the above possibility, and if affirmative, your suggestions for developing the S-W content and format. Who are the experts on the subject today? What should be covered? Should theoretical aspects be treated in the seminar or should it dwell on applications methods and experience? Should advanced methods be highlighted, or should methods discussed all be available to users now? Write or call *Betty Maskewitz* or *Robert Roussin.* Let us know your thinking.

In the August 1967 S-W on the subject, 112 persons participated, representing 43 different US installations and 5 foreign institutions. We are aware of the wide use of discrete ordinates methods for shielding applications. Should we take the time for a close review of the theory and its application in problem solutions?

We await your feedback.

ANS HONORS "SHIELDERS"

Several persons, well known in the international radiation protection, transport, shielding, and neutronics communities, were honored during the June 1982 meeting of the American Nuclear Society (ANS) held in Los Angeles, California. We are pleased to call attention to their achievements and offer to each our congratulations.

Fellow Citations

Among the twelve citations as Fellow of ANS are the following long-time RSIC participants. The citation for the RSIC director is clearly attributable to the global RSIC/user/contributer interaction which has strongly contributed to advances in the state of the art of shielding methodology.

The names of those cited and their citations read as follows.

Robert W. Conn for his pioneering contributions to the development of fusion engineering and reactor design, for his research in reactor physics and nuclear analysis of fission systems, and for his

contribution to the development of reactor plasma physics and engineering.

Gail de Planque for providing technical leadership in establishing thermoluminescent dosimeters as a practical and reliable monitor of low-level environmental radiation. Her work has provided the principal basis for the broad acceptance of thermoluminescent dosimeters as the major passive environmental radiation detector for nuclear power plants.

Elizabeth B. Johnson for her contributions to the nuclear sciences and to the nuclear industry which have led to improved understanding of nuclear chain reactions and nuclear criticality safety through experimentation and personnel training, and for her dedicated service to the American Nuclear Society standards effort.

Betty F. Maskewitz for her outstanding contributions to the state of the art of computing technology for radiation analysis through the advocacy and development of the "open" code or data package so as to make the technology available to scientific scrutiny and improvement by users in a world-wide technical community.

Warren F. Miller, Jr. for his demonstrated technical excellence and managerial acumen, together with a rare understanding of human aspirations, which he has applied to provide genuine leadership and inspiration for those who have entered, or seek to enter, nuclear science and engineering.

Sol Pearlstein for his vision and leadership which have guided and developed the National Nuclear Data Center as a supplier of quality nuclear data to the nuclear science and technology community plus his skill as a physicist which has led to important contributions in cross section evaluation.

Thomas G. Williamson for his contributions as a lifelong student and practitioner of nuclear science and reactor technology and for the notable, clear and effective manner in which he has passed on his knowledge and understanding to upcoming members of the profession.

1982 Young Members Engineering Achievement Award

Mohamed A. Abdou Associate Director of the Fusion Power Program, Applied Sciences Division, Argonne National Laboratory, was presented with a check for $500 and a certificate for receiving the Young Members Engineering Award for his contributions to fusion technology and engieering in the fields of neutronics and shielding, reactor design and systems analysis. The award was established in 1980 to "recognize an outstanding achievement where engineering knowledge has been effectively applied to yield an engineering concept, design, method of analysis. or product utilized in nuclear power research and development or commercial applications."

Abdou is recognized worldwide as an international expert in fusion neutronics, fusion systems analysis and fusion technology. He is responsible for the complete nuclear analysis of the ANL Fusion Experimental Power Reactor Study (1974–1976) and development of a comprehensive fusion reactor systems code (1976–1978). During the past three years, he served as co-manager of the STARFIRE/DEMO Study, the most comprehensive fusion reactor study to date. Currently, he is also directing the nuclear systems design of the U.S. Fusion Engineering Device (FED) Program and the U.S. team in the International Tokamak Reactor (INTOR) Project sponsored by the International Atomic Energy Agency (IAEA), and is one of the four official U.S. participants in a regular series of workshops held in Vienna, Austria.

Mohamed Abdou first came to RSIC attention as a University of Wisconsin graduate student through work which led to the development of the MACK (playfully named by his RSIC colleagues, *M*ohamed *A*bdou *C*omputes *K*erma) series of computer codes to calculate neutron energy release parameters and multigroup neutron reaction cross sections from nuclear data in ENDF format. Incidentally, currently available in the series is PSR-132/MACK-IV and its complementary data library DLC-60/MACKLIB-IV.

Radiation Protection and Shielding Awards

Barnard A. Engholm of General Atomic was presented a citation for Outstanding Service; and *Jack C. Courtney* of Louisiana State University received the award for Technical Achievement. Both awards were made by the ANS Radiation Protection and Shielding Division. The citations read as follows:

On behalf of the American Nuclear Society, the Radiation Protection and Shielding Division is pleased to present to

Bernard A. Engholm

its award for Outstanding Service to the Division and to the community that it represents by virtue of the following contributions:

He served as chairman of the working group that generated the standard entitled "Guidelines on the Nuclear Analysis and Design of Concrete Radiation Shielding for Nuclear Power Plants," (ANSI/ANS-6.4-1977). Development of this standard took more than five years of diligent effort and patience on the part of the chairman to achieve the final form. He continues to serve as a very active member of the working group (ANS-6.4.2) developing standard specifications for radiation shielding materials.

He has served on the Division Program Committee for a number of years, participating in paper reviews, and chairing sessions. Of special note is his recent leadership in organizing the special session on "Penetration Shielding Problems of Fusion Devices." He is currently serving as guest editor for publication of these papers in a special section of Nuclear Technology–Fusion. He is also currently serving on the Executive Committee of the Division, where he takes an active role in formulating and forwarding the goals of the community.

He has been a leader in the field of shielding design and analysis for gas-cooled reactors in the United States, and has provided technical leadership in methods and data development in support of this effort. He is currently engaged in shielding design for fusion energy devices, and publishes regularly in the field.

On behalf of the American Nuclear Society, the Radiation Protection and Shielding Division is pleased to present to

Jack C. Courtney

its award for Technical Achievement by virtue of his leadership in the publication of radiation shielding handbooks.

His leadership in developing the "Handbook of Radiation Shielding Data," ANS/SD-76/14, sponsored by the Nuclear Science Center, Louisiana State University and the Radiation Protection and Shielding Division, is an outstanding technical achievement. Under his leadership and technical management, this important publication was compiled and made available at reasonable cost to the radiation protection and shielding community.

Jack's technical accomplishments include the management of the Cf-252 Demonstration Center, teaching university courses in radiation safety, neutron physics, shielding, and reactor fundamentals, shielding analysis of nuclear rockets, and neutron spectroscopy. He is the author of many papers on these subjects. He is a contributing author to a forthcoming volume of the "CRC Handbook of Radiation Measurements and Protection."

Jack has served the Division as a member of the Nominating Committee and as chairman of the Publications Committee. In the latter role, he has provided leadership in the publication of important Division sessions such as "Radiation Streaming in Power Reactors," ORNL/RSIC-43. Currently he is a member of the Division Executive Committee. He is a Certified Health Physicist and a Registered Professional Nuclear Engineer.

ESIS NEWSLETTER 10TH ANNIVERSARY HIGHLIGHTS

We congratulate the European Shielding Information Service (ESIS) staff on the tenth anniversary of service to the shielding community and commend the editorial staff on the dramatic new look of the newsletter commemorating the anniversary. For the uninitiated, ESIS is an information analysis center in the field of radiation shielding established by the Commission of the European Communities at the Joint Research Centre—Ispra (VA), Italy.

The *ESIS Newsletter* has been published on a quarterly basis since the first issue of March 1972. RSIC has freely excerpted from the newsletter since its inception. An example is the very popular technical notes of Hans Penkuhn of the ESIS staff, entitled "Gamma-Ray Shielding Estimates on the Back of an Envelope," part I, *ESIS Newsletter* 38–39 (July–October 1981), and Part II in the anniversary issue, No. 40, January 1982.

6th ICRS Reminder

We remind the reader that the deadline of September 6, 1982 is firm for the summaries of proposed papers for presentation to the Sixth International Conference on Radiation Shielding (6th ICRS) to be held in Tokyo, Japan, May 16–20, 1983. As a further reminder, we again list the topics for which papers are solicited.

1. Sensitivity analysis and data requirements for shielding (including target accuracies).
2. Development and testing of multigroup cross-section libraries for shielding.
3. New developments and improvements in multidimensional radiation transport methods (discrete ordinates, finite elements, Monte Carlo, and others).

4. Integral shielding experiments for data and methods testing, and their analyses.
5. Shielding design for fission and fusion power plants (including design criteria).
6. Neutron and gamma-ray streaming in fission and fusion facilities.
7. Radiation protection experience with newly designed or operating facilities.
8. Neutron and gamma-ray skyshine in fission, fusion, accelerator and other facilities.
9. Radiation damage and radiation heating in shield materials.
10. Radiation exposure with operating reactors (including experience and design to reduce exposures) from corrosion and fission product sources for in-plant radiation protection.
11. In-plant radiation protection instrumentation (area radiation monitors, continuous air monitors, experience, design criteria, rationale for location of instruments).
12. Radiation shielding for post-accident and decommissioning.
13. Standards and information resources (e.g., efforts in material standards, penetration designs, and radiation zoning and monitoring).
14. Impact of new radiation protection standards such as ICRP-26 and 30.

The deadline for summaries (10 copies in English, less than 500 words, no figures) is September 6, 1982. Mail summaries to:

Takumi Asaoka
Reactor Engineering Division
Japan Atomic Energy Research Institute
Tokai, Ibaraki-ken 319-11
JAPAN

Full camera-ready papers, not to exceed 10 pages, will be required by May 16, 1983 for publication in the proceedings. Authors are requested to bring 200 preprints for distribution at the conference. For further information, contact T. Asaoka at the above address.

ANNOUNCEMENT OF 6th IRPA

The 6th International Congress of the International Radiation Protection Association will be held in Berlin (West), Federal Republic of Germany, May 7–12, 1984. The Congress is organized by the Fachverband für Strahlenschutz e.V. and will take place at the International Congress Center (ICC) Berlin (West). The Scientific Session and Exhibit will cover all aspects of radiation protection from basic research to practical applications with special emphasis on the risk assessment from ionizing and non-ionizing radiation as compared to risks derived from all other man-made sources. Further information may be obtained by contacting the Secretary General of the 6th IRPA Congress, R. Neider, Bundesanstalt für Materialprüfung (BAM), Unter den Eichen 87, D—1 000 Berlin 45, Federal Republic of Germany; telephone 030/8104 6300, telex 183 261.

STANDARDS ACTIONS

We note the following Standards activities.

Health Physics Society Standards

ANSI N13.1-1969(R1982) *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities* (reaffirmation).

ANSI N13.2-1969(R1982) *Guide for Administrative Practices in Radiation Monitoring* (reaffirmation).

ANSI N13.6-1966(R1982) *Practice for Occupational Radiation Exposure Records Systems* (reaffirmation).

ANSI N13.8-1973(R1982) *Radiation Protection in Uranium Mines* (reaffirmation).

ANSI N15.35-1982 *Guide to Preparing Calibration Material for Nondestructive Assay by Counting Passive Gamma Rays* (new standard) (INMM).

Newly Published

ANSI/ANS-10.2-1982 *Recommended Programming Practices to Facilitate the Portability of Scientific Computer Programs* (revision of ANS Std. 3-1971). Order from ANS, $12.00

Call for Comment

ANSI will be calling for comment soon on the following ANS draft, now available from ANS at the price shown.

ANS-6.1.2 *Neutron and Gamma-Ray Cross Sections for Nuclear Radiation Protection Calculations for Nuclear Power Plants* (new standard);

PERSONAL ITEM

Dr. John F. Clarke has been appointed by *Alvin W. Trivelpiece,* Director of DOE Energy Research, to Acting Associate Director of the Office

of Fusion Energy. In this capacity he has overall responsibility for the Federal magnetic fusion program and the formulation of fusion policy. Clarke replaces *Ed Kintner* who resigned several months ago. Prior to his appointment, Clarke was Deputy Associate Director for Fusion Energy. As Deputy, he chaired the Technical Management Board, a group of leading physicists and engineers who prepared both the conceptual design and the complementary engineering technology of the Fusion Engineering Device.

HISTORY AND CURRENT STATUS OF THE DOT CODE SERIES

Two-dimensional discrete ordinates for shielding calculations began to receive serious consideration in the early 1960's. The beginning of the public domain DOT series of codes was packaged by RSIC in March 1968 as *CCC-89/DOT*. It was widely disseminated by RSIC (194 shipments) and through RSIC/user/developer interaction was updated many times through *DOT II*. The next frozen version, packaged in 1973 as *CCC-209/DOT III*, was shipped to 143 requesters. Continual development by the ORNL contributors resulted in a newly frozen version, *CCC-276/DOT 3.5* (March 1976, IBM and CDC versions), distributed by RSIC 133 times and still widely used. Each of these code packages were also distributed by the OECD Nuclear Energy Agency (NEA) Data Bank (DB).

CCC-320/DOT 4.2 was made available to domestic users and, through formal agreement, to selected non-USA requesters in early 1979. It has been distributed 138 times to date. Versions for IBM, CDC, and the CRAY computers are available.

The ORNL developers have recently contributed to RSIC the current version of their one- and two-dimensional discrete ordinates radiation transport code system denoted *DOT 4.3*. It is in the final packaging process and its availability for domestic usage is announced in this issue of the *RSIC Newsletter. There are certain formalities required of each requester prior to shipping the code package. Therefore, the first step in securing DOT 4.3 is a call or letter to RSIC relating your interest. It is packaged uniquely as CCC-429/DOT 4.3.*

An open letter from the principal code developer, *W. A. Rhoades*, is in response to the RSIC question concerning the differences between DOT 4.2 and 4.3. We print it verbatim.

"The last changes of a substantial nature were made to DOT 4.2 in 1977. In 1978, improvements began to go into a new version called DOT 4.3, while only necessary corrections were made to 4.2.

"In comparison to the older version, DOT 4.3 is faster, cleaner, and easier to use. Its problem size capability on CDC is much larger. It operates on IBM or Amdahl with either MVT or MVS systems. Configurations for CRAY and UNIVAC are available.

"The popular weighted and theta-weighted difference formulations have been made much faster by improved coding. The linear-step model is out, and a faster, better, zero-fixup model is in. This functions like the model in TWOTRAN II, except that it has been extensively corrected. Consistent diffusion acceleration is available, and it is operable with any of the difference models. An error-mode-removal procedure borrowed from VENTURE is very beneficial to difficult K-calculations or upscatter problems.

"Numerous small corrections and improvements have also been made. An extensive error-intercept package screens the input data. An advanced method of zone specification facilitates setting up complicated geometries. A thorough document has been completed. A very thorough set of test problem solutions is distributed with the code."

CHANGES TO THE RSIC CODES COLLECTION

Several changes have been made to the computer code collection as follows.

CCC-429/DOT 4.3

A one- and two-dimensional discrete ordinates radiation transport code system is a contribution of the Oak Ridge National Laboratory. The latest in the ORNL DOT IV series, this code package is available to domestic requesters. Reference: ORNL-5851. FORTRAN IV; IBM (A), CDC (B), UNIVAC (C), and CRAY (D).

PSR-39/REFUM

The REFUM portion of this Monte Carlo code package for calculating efficiencies and response functions of NaI(Tl) crystals for thick disk gamma-ray sources was replaced by a new version provided by the original contributors at the University of Tokyo, Japan. REFUM calculates the response functions, total and peak efficiencies, and photofractions without Gaussian broadening, both for NaI(T1) and Ge(Li) detectors. A revised REFUM User's Manual and the revised code were also provided. FORTRAN IV; FACOM 230/75.

PSR-116/GAMLEG JR

The code package of this multigroup cross-section generator for photon transport calculations has been extended to include an IBM version. The conversion, from the FACOM 230-75 version contributed by the Japan Atomic Energy Research Institute, (B) was contributed by the OECD Nuclear Energy Agency (NEA) Data Bank, Gif-sur-Yvette, France.

PSR-123/FEDGROUP-3

The neutron multigroup cross section processing code system using various evaluated data formats (KEDAK, UKNDL, ENDF/B, LENDL, etc.) has been replaced by a new version designated FEDGROUP-3. The new version was contributed by the Central Research Institute for Physics in Budapest, Hungary, and is based on experience resulting from use in the following additional countries: Bulgaria, Czechoslovakia, the German Democratic Republic, Poland, USSR, and Yugoslavia. The code system, designed to process the IAEA-disseminated evaluated nuclear data files into group-averaged constants, transfer matrices, etc., was altered to run on the EC-1040 type computers using IBM-OS/360. Simultaneously, some shortcomings of FEDGROUP-2 were eliminated. These shortcomings included difficulties when FEDGROUP-2 was unable to handle the specific structure of ENDF/B format. Most of these problems were connected with the representation of cross-sections as a sum of resonance and background cross-sections accepted in the ENDF/B file. The method of processing used in FEDGROUP-2 was retained; the program organization was changed and calculational routines were completely revised. Reference: KFKI-1981-34. FORTRAN IV; EC-1040.

PSR-186/SAMPO

A gamma-ray spectrum analysis code system was contributed by the University of London Reactor Center, Ascot, Berkshire, England. Used for analysis of complex spectra encountered in neutron-activation analysis, SAMPO includes routines for peak-finding, peak-fitting, and peak intensity with energy determinations. The code package contains capability for radioisotope identification and mass determination after simple or cyclic thermal-neutron activation analysis. References: Unpublished paper "Sampo" and "IDENT," *Talanta* Vol. 25, pp. 21-40. FORTRAN IV; CDC 6600.

SCA-08/CESAR

The critical experiment storage and retrieval code package has been updated to correct an error called to RSIC attention by the ORNL Computer Sciences Division, the original contributor. The error affected the LEDIT=4 option. Details of the correction may be requested from RSIC.

SCALE Manual (NUREG/CR-0200) Update

The *SCALE Manual,* published and issued by the Nuclear Regulatory Commission to a large distribution in April 1982, has been revised to make corrections; the revision was mailed to the same distribution this month. The manual (in three volumes) is prepared for use with the current release of the SCALE code system now in the RSIC packaging process. The newly frozen version is expected to be available for dissemination in the near future; it will probably be announced (CCC-424/SCALE) in the August issue of the *RSIC Newsletter.* The RSIC document package includes all corrections to date and will be updated in the future as needed.

CHANGES TO THE DATA LIBRARY COLLECTION

A change was made to the data library collection during the month of June.

DLC-80/DRALIST

DRALIST, a data set of radioactive decay energies, spectra, half lives, and other information for 561 radionuclides in MEDLIST (DLC-46) output format was updated to correct an error discovered by the original ORNL contributor. The half-life of ^{236}Np was recorded as 1.15E+6. The correct half-life value is 1.15E+5.

NAME CHANGE

Please note that ENEA, Comitato Nazionale Per La Ricerca E PER Lo Sviluppo, Dell'Energia Nucleare, E Delle Energie Alternative in Rome, Italy is now: ENEA/DISP - Servizio Trasporti, and the address is Viale Regina Margherita, 125, 00198 ROMA.

VISITORS TO THE CENTER

During the month of June the following persons came for an orientation visit and/or to use EPIC facilities: *G.W.K. Ford,* Sydney, Australia; *Timothy A. Broome,* Rutherford Appleton Laboratory, England; *P. Hague,* Warrington, England; *Steve Goetsch,* University of Wisconsin; *Kenneth Lewis, Robert Tayloe,* and *Stanley A. Jones,* Goodyear Atomic Corporation, Piketon, Ohio; *Harold A. Kurstedt, Jr.,* and *R. Martin Jones,* Virginia Polytechnic Institute, Blacksburg, Virginia; *Enrico Sartori,* OECD NEA Data Bank, Gif-sur-Yvette, France; and *Matthew S. Goodman,* Harvard University, Cambridge, Massachusetts.

CALENDAR

We call your attention to the following meetings.

July 19-23, 1982 International Conference on Safety of Sodium Cooled Fast Neutron Reactors, Problems of Design and Operation. Lyon, France, sponsored by the European Nuclear Society and the American Nuclear Society. Chairman of the Program Committee is Michel Rozenholc, NOVATOME, 20, Avenue Edouard-Herriot, 92350 LE PLESSIS-ROBINSON, FRANCE.

September 22-24, 1982 Advances in Reactor Physics and Core Thermal Hydraulics, Kiamesha Lake, New York. Registration deadline is August 31, 1982. For further information contact Thomas Ruane, General Electric Co., Knolls Atomic Power Laboratory, P.O. Box 1072, Schenectady, New York 12301.

JUNE 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.

RADIATION SHIELDING LITERATURE

AEC Symposium Series No. 49, pp. 109-138; CONF-780421, pp. 109-138 Computer Techniques for Analysis of Gamma-Ray Spectra., . . Gunnink, R., . . In: Conference on Computers in Activation Analysis and Gamma-Ray Spectroscopy. Mayaguez, Puerto Rico. 30 April - 4 May 1978, . . 1979, . . Department of Energy, Washington, D.C.

AEC Symposium Series No. 49, pp. 327-340; CONF-780421, pp. 327-340 Unfolding of Spectra with Continuum and Discrete Components., . . Sperling, M.; Reed, J.; Shreve, D., . . 1979, . . Department of Energy, Washington, D.C.

AEC Symposium Series No. 49, pp. 448-455; CONF-780421, pp. 448-455 Evaluation of Standard Library Spectra for Use in the Least-Squares Resolution of Environmental Gamma-Ray Spectra., . . Kanipe, L.G.; Seale, S.K.; Liggett, W.S., . . 1979, . . Department of Energy, Washington, D.C.

ANL/FPP/TM-150 WILDCAT: A Catalyzed D-D Tokamak Reactor., . . Evans, K.,Jr.; Baker, C.C.; Brooks, J.N.; Clemmer, R.G.; Ehst, D.A.; Herman, H.; Jung, J.; Mattas, R.F.; Misra, B.; Smith, D.L.; Stevens, H.C.; Turner, L.R.; Wehrle, R.B.; Barry, K.M.; Bolon, A.E.; McGrath, R.T.; Waganer, L.M., . . November 1981, . . NTIS, PC A12/MF A01

ANL/NDM-49 Some Comments on Resolution and the Analysis and Interpretation of Experimental Results from Differential Neutron Measurements., . . Smith, D.L., . . November 1979, . . Argonne National Lab., IL, Applied Physics Div.

CONF-7711121, pp. 432-443 Evaluation of End Shield Materials in PHW Reactors., . . Raman, V. V., . . In: Indo-German Seminar on Radiation Damage. Kalpakkam, India. 14 - 16 November 1977., . . 1977, . . Department of Atomic Energy, Bombay (India)

CONF-780984, pp. 125-128 Characteristics of Fast Neutron Sources., . . Smathers, J.B., . . In: 3rd Meeting on Fundamental and Practical Aspects of the Application of Fast Neutrons and Other High-LET Particles in Clinical Radiotherapy, The Hague, Netherlands, 13-15 September 1978., . . 1979, . . Pergamon Press, Oxford ISBN 0 08 024383 5

CONF-780984, pp. 164-165 Practical Dose Calculation Scheme for Neutron Irradiations and Mathematical Description of Necessary Depth Dose and Tissue-Air Ratios., . . Rassow, J.; Meissner, P., . . 1979, . . Pergamon Press, Oxford

CONF-820321-8 LSL: A Logarithmic Least-Squares Adjustment Method., . . Stallmann, F.W., . . 1982, . . NTIS, PC A02/MF A01

DOE/EV/01105-281 Transport Calculations for a 14.8 MeV Neutron Beam in a Water Phantom., . . Goetsch, S.J., . . 1981, . . NTIS, PC A02/MF A01

DOE/EV/01105-285 Fast-Neutron and Photon Doses Determined with Proportional Counters and Ionization Chambers., . . DeLuca, P.M.,Jr.; Higgins, P.D.; Schell, M.C.; Pearson, D.W., . . 1981, . . NTIS, PC A02/MF A01

EPRI-AP-2317 EPRI Workshop on Evaluation of Engineering Opportunities in Inertial Confinement Fusion in Existing and Planned Facilities (Proceedings - New Orleans, Louisiana, November 11-13, 1981)., . . Sink, D.A., . . April 1982, . . Westinghouse Electric Corp., Madison, PA, Advanced Reactors Division

EPRI-NP-2334; TPS-80-756 Feasibility of Applications of Microwave Technology for Nuclear Power Plant Radioactive Wastes. Final Report., . . Potter, J.R.; Woodle, A.S., . . April 1982, . . NTIS, PC A04/MF A01, . . Portions of document are illegible.

EPRI-NP-2345; LA-VR-81-1762, Rev. TOAFEW-V Multigroup Cross-Section Collapsing Code and Library of 154-Group-Processed ENDF/B/Fission-Product and Actinide Cross Sections. Interim Report., . . Wilson, W.B.; England, T.R.; LaBauve, R.J., . . April 1982, . . Los Alamos National Lab., NM, Theoretical Div.

GKSS-81/E/20 (In German) NS OTTO HAHN - the First German Nuclear Ship., . . GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.), . . 1981, . . NTIS (U.S. Sales Only), PC A15/MF A01

HEDL-SA-2378-FP; CONF-820321-11 Gamma-Ray Spectrometry in Light-Water-Reactor Environments., . . Gold, R.; Kaiser, B.J.; McNeece, J.P., . . February 16, 1982, . . NTIS, PC A02/MF A01, . . Portions of document are illegible.

HEDL-SA-2380-FP; CONF-820321-14 Photofission Observations in Reactor Environments Using Selected Fission-Product Yields., . . Gold, R.; Ruddy, F. H.; Roberts, J.H., . . January 22, 1982, . . NTIS, PC A02/MF A01

HEDL-SA-2654-FP; CONF-820321-12 Monte Carlo Studies Indicating that Least Squares is a Biased Estimator for the Charpy Shift Fluence Exponent., . . Guthrie, G.L., . . 1982, . . NTIS, PC A02/MF A01

IDO-1570-T32 Recommended Standards for Gamma-Ray Energy Calibration (1979)., . . Helmer, R. G.; Van Assche, P.H.M.; Van Der Leun, C., . . 1979, . . NTIS, PC A02/MF A01

INDC-36/LN INDC/NEANDC Nuclear Standards File 1980 Version., . . IAEA, . . September 1981, . . NTIS (U.S. Sales Only), PC A06/MF A01

INIS-mf-6714; CONF-810415-(Vol. 2) Advances in Mathematical Methods for the Solution of Nuclear Engineering Problems. Vol. 2., . . 1981, . . NTIS (U. S. Sales Only), PC A99/MF A01

INIS-mf-6917 (In Portuguese) Studies on the Use of the Hematitic Heavy Concrete in the Shielding of Nuclear Reactors., . . de Mello, M.J., . . December 1980, . . NTIS (U.S. Sales Only), PC A10/MF A01

INTT-19 A Higher Order Method for Multiple Zeroes of Nonlinear Functions., . . Victory, H.D.,Jr.; Neta, B., . . February 1982, . . Department of Mathematics, Texas Tech University, Lubbock, Texas 79409

INTT-20 The Convergence Analysis for Sixth-Order Methods for Solving Discrete-Ordinates Slab Transport Equations., . . Neta, B.; Victory, H.D.,Jr., . . February 1982, . . Department of Mathematics, Texas Tech University, Lubbock, Texas 79409

INTT-21 Numerical Solution of Nonlinear Integro-Differential Equation., . . Neta, B., . . February 1982, . . Department of Mathematics, Texas Tech University, Lubbock, Texas 79409

JAERI-M-8163, pp. 297-312 (In Japanese) Secondary Gamma-Ray Data for Shielding Calculation., . . Miyasaka, S., . . In: Proceedings of the 1978 Seminar on Nuclear Data, Tokai, Ibaraki, Japan, 20-21 December 1978., . . March 1979, . . Japan Atomic Energy Research Inst., Tokyo

JAERI-M-8163, pp. 358-381 (In Japanese) Problems in Iron Cross Section on Shielding Analysis., . . Koyama, K.; Kawai, M.; Yamano, N.; Minami, K., . . March 1979, . . Japan Atomic Energy Research Inst., Tokyo

LA-UR-82-744; CONF-820427-1 Basis for Radiation Protection of the Nuclear Worker., . . Guevara, F.A., . . 1982, . . NTIS, PC A02/MF A01

NRPB-R122 A Procedure to Include Deposition in the Model for Short and Medium Range Atmospheric Dispersion of Radionuclides., . . Jones, J.A., . . September 1981, . . HMSO ISBN 0 85951 162 6

NRPB-R123 The Estimation of Long Range Dispersion and Deposition of Continuous Releases of Radionuclides to Atmosphere., . . Jones, J.A., . . October 1981, . . HMSO ISBN 0 85951 163 4

NRPB-R124 A Model for Long Range Atmospheric Dispersion of Radionuclides Released over a Short Period., . . Jones, J.A., . . November 1981, . . HMSO ISBN 0 85951 164 2

NUREG/2593; SAND-82-7013; IRT-6406-003 A User's Manual for Computer Code RIBD/IRT., . . Thayer, D.D.; Lurie, N.A., . . January 1982, . . NTIS/GPO

NUREG/CR-2306; ORNL/CSD/TM-160 CSRL-V: Processed ENDF/B-V 227-Neutron-Group and Pointwise Cross-Section Libraries for Criticality Safety, Reactor, and Shielding Studies., . . Ford, W.E., III; Diggs, B.R.; Petrie, L.M.; Webster, C.C.; Westfall, R. M., . . 1982, . . NTIS, PC A05/MF A01, . . Portions of document are illegible.

NUREG/CR-2594; SAND-82-7014; IRT-6406-004 A User's Manual for the GABAS Spectrum Computer Code., . . Thayer, D.D.; Lurie, N.A., . . January 1982, . . NTIS/GPO

ORNL/TM-8181 Initial Atmospheric-Dispersion Modeling in Support of the Multiple-Site Incineration Study., . . Holton, G.A.; Little, C.A.; O'Donnell, F.R.; Etnier, E.L.; Travis, C.C., . . April 1982, . . NTIS, PC A05/MF A01, . . Portions of document are illegible.

ORNL-tr-4745; SAAS-255 (In German) Analytical Method for Assessing the Mean Gamma Exposure Due to Continuously Emitted Radioactive Off-Gas., . . Sowa, W.; Kruger, F.W., . . 1980, . . National Translation Center, John Crerar Library, 35 W. 33rd St., Chicago, IL 60616

ORNL-tr-4815; SAAS-281 (In German) Response of Neutron Dosimeters to Different Neutron Fields., . . Sgraja, D., . . 1981, . . NTIS, PC A03/MF A01

RISO-M-2299 Calculation of Dose Consequences of a Hypothetical Large Accident at a Nuclear Power Reactor., . . Becher, P.E.; Gjoerup, H.L.; Meide, A.; Micheelsen, B.; Thykier-Nielsen, S.; Pejtersen, V.S.; Petersen, T., . . August 1981, . . NTIS (U.S. Sales Only), PC A03/MF A01; Also available from Risoe Library, DK-4000 Rosklide, Denmark

SAAS-287 (In German) Catalogue of Response Spectra for Unfolding in Situ Gamma-Ray Pulse-Height Distributions., . . Dymke, N., . . 1982, . . Präsident des Staatlichen Amtes für Atomsicherheit und Strahlenschutz der Deutschen Demokratischen Republik, DDR 1157 Berlin-Karlshorst, Waldowallee 117

SAND-81-2163C; CONF-820303-34 Comparison of ICRP2 and ICRP30 for Estimating the Dose and Adverse Health Effects from Potential Radionuclide Releases from a Geologic Waste Repository., . . Runkle, G.E.; Soldat, J.K., . . 1982, . . NTIS, PC A02/MF A01, . . Portions of document are illegible.

SAND-82-0859C; CONF-820107-10 Neutron-Damage Effects in Laser Diodes., . . Barnes, C.E., . . 1982, . . NTIS, PC A02/MF A01, . . Portions of document are illegible.

STI/PUB-401, pp.19-38; IAEA-SM-193/4 Silicon Diodes for Fast Neutron Dosimetry., . . Frank, H.; Seda, J.; Trousil, J., . . In: Biomedical Dosimetry., . . 1975, . . IAEA, Vienna

UCRL-50051-81-3, pp. 62-66 Analysis of MFTF-B Neutron and Gamma-Ray Effects., . . Muelder, S.A., . . February 26, 1982, . . Technical Information Department, Lawrence Livermore National Laboratory, Univ. of California, Livermore, CA 94550

UCRL-52769, Vol. 3 Nuclear Criticality Experiments from 1943 to 1978, an Annotated Bibliography: Volume 3, Subject Index., . . Koponen, B.L.; Wilcox, T. P.; Hampel, V.E., . . April 24, 1979, . . NTIS

UCRL-53228 Calculated Concentrations of any Radionuclide Deposited on the Ground by Release from Underground Nuclear Detonations, Tests of Nuclear Rockets, and Tests of Nuclear Ramjet Engines., . . Hicks, H.G., . . November 1981, . . NTIS, PC A06/MF A01

UCRL-86275; CONF-820613-4 A-Bomb Survivor Dosimetry Update., . . Loewe, W.E., . . June 1982, . . NTIS, PC A02/MF A01

UCRL-86300; CONF-820613-2 Radiological Design Criteria for Fusion Power Test Facilities., . . Singh, M.S.; Campbell, G.W., . . February 12, 1982, . . NTIS, PC A02/MF A01

UCRL-87290; CONF-820351-1 Fusion Breeder., . . Moir, R.W., . . February 22, 1982, . . NTIS, PC A03/MF A01, . . Portions of document are illegible.

UCRL-87369; CONF-811145-9 Resistivity Damage Rates in Fusion-Neutron-Irradiated Metals at 4.2 K., . . Guinan, M.W.; Kinney, J.H., . . 1981, . . NTIS, PC A03/MF A01

UCRL-87477; CONF-820344-2 Cancer Risks and Neutron RBE's from Hiroshima and Nagasaki., . . Dobson, R.L.; Straume, T., . . March 25, 1982, . . NTIS, PC A02/MF A01

ZfK-447 (In German) Application of Rhodium Self-Powered Neutron Detectors for Dynamic Reactivity Measurements in WWER Reactors., . . Hessel, G.; Maletti, R.; Schumann, P.; Ziegenbein, D., . . July 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01

ZfK-449 (In German) Measurement of Neutron Flux Density by Means of a Multicomponent Wire Activation Detector on Power Reactors of the Greifswald NPP 'Bruno Leuschner'., . . Dennstaedt, I.; Mehner, H. C., . . July 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01

ZfK-452 (In German) Texture Investigations by Time-of-Flight Neutron Diffraction at a Pulsed Reactor., . . Matz, W.; Feldmann, K.; Betzl, M.; Hennig, K.; Walther, K.; Kleinstueck, K.; Tobisch, J.; Sprungk, R., . . August 1981, . . NTIS (U.S. Sales Only), PC A03/MF A01

ZJE-260 Skoda In-Core Calorimeters., . . Jirousek, V., . . 1982, . . Skoda Works, Nuclear Power Construction Divison, Information Centre, Plzen, Czechoslovakia

Bull. of the Res. Lab. for Nuclear Reactors, Vol. 7, 43-55 Studies on Fusion Blanket Neutronics., . . Yamamuro, N.; Sekimoto, H.; Yamane, T.; Lee, D.-W., . . 1982

Health Phys., 42(6), 859-861 Gamma Dose Rates to Body Organs from Immersion in a Semi-Infinite Radioactive Cloud; an Alternate Approach Using Absorbed Fraction Data for Internal Radionuclides. (Notes), . . Gillespie, F.C., . . June 1982

Int. J. Appl. Radiat. Isotop., 31, 623-627 Empirical Formulae for Build-Up Factor Calculations in Wide Conical Gamma-Ray Beams., . . Musilek, L.; Cechak, T.; Seda, J., . . 1980

Isotopenpraxis, 11-12, 440-444 Determining Optimum Conditions for Measuring by Gamma-Ray Backscattering., . . Seda, J.; Musilek, L., . . 1972

J. Comput. Phys., 34(2), 211-230 Adjoint Monte Carlo Electron Transport in the Continuous-Slowing-Down Approximation., . . Halbleib, J.A.; Morel, J.E., . . February 1980

J. Nucl. Sci. Technol., 19(1), 11-19 Fusion Reactor Shield Optimization in Terms of Personnel Assess., . . Seki, Y.; Iida, H.; Kawasaki, H., . . January 1982

Med. Phys., 7(1), 51-54 Calculation of the Average Energy Absorbed in Photon Interactions., . . Cunningham, J.R.; Johns, H.E., . . January 1980

Nucl. Instrum. Methods, 59, 179-180 A Method for Automatic Compensation of Deadtime Losses., . . Seda, J., . . 1968

Nucl. Instrum. Methods, 70, 121-122 An Improved Method for Automatic Compensation of Deadtime Losses., . . Seda, J., . . 1969

Nucl. Sci. Eng., 81(2), 161-171 Measurements of Neutron and Gamma-Ray Streaming in a Cavity-Duct System and an Analysis by an Albedo Monte Carlo Method., . . Shin, K.; Murakami, R.; Taniuchi, H.; Hyodo, T.; Oka, Y., . . June 1982

Nucl. Sci. Eng., 81(2), 172-195 Effect of Fluorescence, Bremsstrahlung, and Annihilation Radiation on the Spectra and Energy Deposition of Gamma Rays in Bulk Media., . . Subbaiah, K.V.; Natarajan, A.; Gopinath, D.V.; Trubey, D.K., . . June 1982

Nucl. Sci. Eng., 81(2), 213-271 New Calculation of Prompt Fission Neutron Spectra and Average Prompt Neutron Multiplicities., . . Madland, D.G.; Nix, J.R., . . June 1982

Nucl. Sci. Eng., 81(2), 283-290 Derivation of a Dose Mean Value of Lineal Energy from Variance Measurements of a Secondary Electron Emission Current. (Tech. Note), . . Forsberg, B., . . June 1982

Nucl. Technology, 58(1), 77-83 Alpha-Recoil Damage in Monazite: Preferential Dissolution of the Radiogenic Actinide Isotopes., . . Eyal, Y.; Kaufman, A., . . July 1982

Physics Data, No. 11-2 Nucleon - Nucleon Scattering Data Summary Tables (1981 Edition)., . . Bystricky, J.; Lehar, F., . . 1981

Physics Data, No. 11-3 Nucleon - Nucleon Scattering Data Detailed Tables (Supplement 1)., . . Bystricky, J.; Lehar, F., . . 1981

Physics Data, No. 22-1 Phenomenological Analyses of Nucleon-Nucleon Scattering., . . Kroll, P., . . 1981

Physics Data, No. 23-1 Temperature Dependence of Thermal Neutron Scattering Cross Sections for Hydrogen Bound in Moderators., . . Keinert, J., . . 1982

Radioisotopy, 21(3), 397-451 Calculation and Measurement of Build-Up Factors in Conical Gamma-Ray Beams., . . Musilek, L.; Cechak, T.; Seda, J., . . 1980

Tech. J. Ankara Nucl. Res. Cent., 6(2), 37-40 Removal Cross Section Measurements Using 14 MeV Neutrons., . . Dincer, S.; Ozyol, H.; Barutcugil, E., . . June 1979

BOOK THE ELEMENTS OF NUCLEAR POWER., . . Bennet, D.J., . . 1981, . . London, Longman

BOOK CRC HANDBOOK OF RADIATION MEASUREMENT AND PROTECTION., . . Brodsky, A., . . 1982, . . CRC Press, West Palm Beach, Fla.

BOOK NUCLEAR POWER AND ITS REGULATION IN THE UNITED STATES., . . Muntzing, L.M., . . 1981, . . Pergamon Press, Oxford - New York

BOOK THE TECHNICAL COMMUNICATOR'S HANDBOOK OF TECHNOLOGY TRANSFER., . . Olken, H., . . 1980, . . Olken Publications

BOOK RICKOVER., . . Polmar, N., . . 1982, . . Simon and Schuster, New York, NY

BOOK; EUR-7622 NEUTRON RADIOGRAPHY HANDBOOK: NUCLEAR SCIENCE AND TECHNOLOGY., . . von der Hardt, P.; Röttger, H., . . 1981, . . D. Reidel Pub. Co., Dordrecht, Holland

COMPUTER CODES LITERATURE

Ann. Nucl. Energy, 8(9), 461-464 WIMS-D; CINDER
Verification of the Aggregate Fission Product Formulation in the WIMS Code Depletion Calculations., . . Galperin, A., . . Ben-Gurion University of the Negev, Beersheva, Israel, . . 1981

BNL-NCS-51363-Vol.1, 7-19 . . . . . POINT MONTE CARLO
Point Monte Carlo Data Needs and Constraints., . . Carter, L.L.; Magurno, B.A.; Pearlstein, S., . . Westinghouse Hanford Co., Richland, WA; Brookhaven National Laboratory, Upton, NY, . . March 1981, . . AVAIL: NTIS

Comput. Phys. Commun., 23(4), 385-391 . . . . . EFFY
EFFY, A Program to Calculate the Counting Efficiency of Beta Particles in Liquid Scintillators., . . Garcia-Torano, E.; Grau, A., . . Junta de Energia Nuclear, Madrid, Spain, . . August 1981

Comput. Phys. Commun., 23(4), 411-426 . . . SPALL
FORTRAN Program SPALL for Computing Spallation Reaction Cross Sections., . . Routti, J.T.; Sandberg, J.V., . . Helsinki University of Technology, Otaniemi, Finland, . . August 1981, . . FORTRAN

Comput. Phys. Commun., 24(1), 11-35 . . . SAMPO80
SAMPO80: Minicomputer Program for Gamma Spectrum Analysis with Nuclide Identification., . . Koskelo, M.J.; Aarnio, P.A.; Routti, J.T., . . Helsinki University of Technology, Otaniemi, Finland, . . September-October 1981

ECN-97 ..... ENDF/B-V
Comparison of Two Fine Group Cross Section Libraries Resulting from the ENDF/B-V Dosimetry File., . . Zijp, W.L.; Voorbraak, W.P.; Rieffe, H.Ch.; Nolthenius, H.J., . . Stichting Energieonderzoek Centrum Nederland, Petten, . . August 1981, . . AVAIL: NTIS (U.S. Sales Only)

EIR-340 (In German) ..... FMCEIR
FMCEIR: A Monte Carlo Program for Solving the Stationary Neutron and Gamma Transport Equation., . . Taormina, A., . . Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen, Switzerland, . . May 1978, . . AVAIL: INIS (mf only)

Fortschr. Geb. Roentgenstr. Nuklearmed., 133(4), 425-429 (In German) ..... FGRNA
Estimation of Organ Dose During Radiological and Computer Tomographic Examinations with Calculations of the Somatically Significant Doses., . . Ewen, K.; Steiner, H.; Jungblut, R.; Guenther, D.; Schoppe, W.D., . . October 1980

INIS-SU-25, 37-43 (In Russian) ..... BLANK
Complex of Programs for Calculations of One-Dimensional Problems of Neutron and Gamma Quantum Transport., . . Marin, S.V.; Markovskij, D. B.; Pal'vanov, V.Ch.; Turbina, T.A.; Shatalov, G.E., . . Moskovskij Inzhenerno-Fizicheskij Inst., USSR, . . 1979, . . AVAIL: INIS (mf only)

INIS-SU-25, 63-67 (In Russian) ..... ROZ
Calculation of the Secondary Gamma Radiation by the Monte Carlo Method at Displaced Sampling from Distributed Sources., . . Petrov, Eh.E.; Fadeev, I.A., . . Moskovskij Inzhenerno-Fizicheskij Inst., USSR, . . 1979, . . AVAIL: INIS (mf only)

INIS-SU-25, 68-72 (In Russian) ... OFORZ; ROZ-1
Monte Carlo Calculation of the Capture Gamma Sources Distribution in a 3-Layer Barrier., . . Sakovich, V.A.; Sakharov, V.M.; Sidorenko, L.L.; Khisamutdinov, A.I., . . Moskovskij Inzhenerno-Fizicheskij Inst., USSR, . . 1979, . . BESM-6, . . AVAIL: INIS (mf only)

INIS-SU-25, 106-112 (In Russian) ... KURAGA-M
Energy and Angular Distribution of Gamma Flux and Dose Rate Behind Water Barriers of Different Thickness., . . Kiselev, Yu.V.; Kozlovskij, S.A.; Kuchin, N.L.; Popkov, K.K.; Rubanov, S.M.; Titov, V.I.; Trofimov, I.N., . . Moskovskij Inzhenerno-Fizicheskij Inst., USSR, . . 1979, . . AVAIL: INIS (mf only)

INIS-SU-25, 179-184 (In Russian) . BSN-F; ANISN; ARAMAKO-2F$$
Application of Group Constants in Neutron and Gamma Field Calculations by the Monte Carlo Method., . . Zhezlov, A.M.; Klimanov, V.A.; Makhon'kov, A.S.; Pavlov, G.M.; Stroganov, A.A., . . Moskovskij Inzhenerno-Fizicheskij Inst., USSR, . . 1979, . . BESM-6, . . AVAIL: INIS (mf only)

J. Nucl. Sci. Technol., 17(9), 668-676 ..... FERDO
Backscattering of Neutrons and Secondary Gamma-Rays from Aluminum and Lead Slabs for 15-MeV Neutrons., . . Shin, K.; Hasegawa, T.; Nakano, H.; Hyodo, T., . . Kyoto University, Japan, . . September 1980

JINR-10-81-159 (In Russian) .....PROSPEC
-PROSPEC- Computer Program Complex for Automatic Processing of Multidimensional Gamma-Gamma Coincidence Spectra., . . Volkov, N.G.; Tsupko-Sitnikov, V.M.; Churakov, A.K., . . Joint Inst. for Nuclear Research, Dubna, USSR, . . 1981, . . FORTRAN ,8EC-1040, . . AVAIL: INIS (mf only)

KAERI/RR-201/80 (In Korean) ..... LEOPARD LIBRARY
Update and Benchmark Test of the LEOPARD Library from ENDF/B-IV., . . Kim, J.D.; Lee, J.T., . . Korea Advanced Energy Research Inst., Seoul, Korea, . . 1980, . . AVAIL: INIS (mf only)

NIIAR-36(489) (In Russian) ..... DENSI
Method and Code for Calculating the Sample Thickness in Neutron Spectrometric Analysis., . . Ivanov, V.M.; Karin, L.BV.; Kroshkin, N.I.; Nazarenko, V.I.; Safonov, V.A., . . Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad, USSR, . . 1981, . . FORTRAN, . . AVAIL: INIS (mf only)

Nucl. Instrum. Methods Phys. Res., 185(1-3), 257-259 ..... AIFOM
AIFOM, An Analytic Formula for Universal Assessment of Goodness-of-Fit of Gamma Ray Spectra., . . Misra, S.K.; Eddy, N.W., . . Concordia University, Montreal, Quebec, Canada, . . June 1981

Nucl. Instrum. Methods Phys. Res., 185(1-3), 277-286 ..... SPECTRAL UNFOLDING
Neutron Spectral Unfolding Using the Monte Carlo Method., . . O'Brien, K.; Sanna, R., . . Environmental Measurements Lab., New York, NY, . . June 1981

ORNL/TM-7943 ..... PRESTO Environmental Assessment Model for Shallow Land Disposal of Low-Level Radioactive Wastes: Interim Report., . . Little, C.A.; Fields, D.E.; Emerson, C.J.; Hiromoto, G., . . Oak Ridge National Laboratory, TN, . . September 1981, . . AVAIL: NTIS