



RSIC Newsletter

OAK RIDGE NATIONAL LABORATORY

POST OFFICE BOX X • OAK RIDGE, TENNESSEE
OPERATED BY UNION CARBIDE CORPORATION
FOR THE U.S. DEPARTMENT OF ENERGY

Phone No. 615-674-6176 or FTS 624-6176

Telex No. 8105721076 USDOE OKRE

No. 221

April 1983

Knowledge increases one's responsibilities. — Victor Hugo

6th ICRS Has Varied Program

The third circular has been received on the program of the 6th International Conference on Radiation Shielding (ICRS) to be held May 16-20, 1983, in the Takanawa Prince Hotel, Tokyo, Japan. The program begins with an opening address by the chairman, **H. Ishikawa** (JAERI, Japan), and a paper on the "Present Status of the Development of Nuclear Energy in Japan," by K. Takaoka (STA, Japan). A luncheon, scheduled for May 19, commemorates RSIC's 20th anniversary. The remainder of the program is devoted to various topics in radiation protection and shielding. The program follows.

May 16

Method Development (Deterministic) chairmen, D. E. Bartine (ORNL, USA), T. Hyodo (Kyoto U., Japan), and T. Vergnaud (CEN Saclay, France):

"Development of a Series of PALLAS Discrete-Ordinate Direct-Integration Codes," by K. Takeuchi, Y. Kanai (Ship Res. Inst., Japan);

"BERMUDA-2DN: A Two-Dimensional Neutron Transport Code," by T. Suzuki, A. Hasegawa, To. Mori, T. Ise (JAERI, Japan);

"Application of Three-Dimensional Discrete Ordinates Transport Codes in (X,Y,Z) and (R, θ ,Z) Geometries to Shielding Analysis," by T. Nishimura, K. Tada, Z. Suzuoki, H. Yokobori (MAPI, Japan);

"Formulation of a Geometry Transition Between (x,y)- and (r, θ)-Coordinates for Calculating the Radiation Exposure in the Reactor Pressure Vessel with 2-Dimensional S_N -Methods," by R. Warnemünde (KWU, Germany);

"Development of Albedo- S_N Transport Code DOT-ALB," by M. Kawai, Y. Hayashida, M. Uematsu, J. Itoh (NAIG, Japan);

"Computation of Azimuthally Dependent Albedo Data by Invariant Embedding," by T. E. Albert (Sci. Appl.), P. Nelson (Texas Tech. U., USA);

"On the Solution of Transport Equation in Multiregions with Anisotropic Scattering Using the F_N Method," by J. R. Maiorino, E. D. Pontedeiro (Centro Eng. Nucl., Sao Paulo, Brazil);

"Application of Space-and-Angle Finite Element Method to the Three-Dimensional Neutron Transport Problems," by T. Fujimura, Y. Nakahara (JAERI), M. Matsumura (ISL, Japan);

"Some Representative Tests of Finite-Element Methods for Transport Theory Shielding Calculations," by R. T. Ackroyd (UKAEA Risley), A. J. H. Goddard (Imperial College), J. Issa, J. K. Fletcher (UKAEA Risley), C. S. Quah, M. M. R. Williams (Queen Mary College), J. Wood (UKAEA Risley, UK);

"Source Term Computation and Cross Section Data Handling for Shielding Calculations by Means of Modular Program Systems," by U. Hesse, W. Denk (GRS, Germany);

"Development of Integrated Shielding Analysis Code System RADHEAT-V4," by N. Yamano, K. Koyama (JAERI), K. Minami (Fujitsu, Japan);

"PATH — A Flexible Gamma Shielding Design Tool," by S. D. Su, B. A. Engholm (GA, USA);

"RANKERN — A Point Kernel Integration Code for Complicated Geometry Problems," by P. C. Miller (AEE Winfrith, UK);

"A Parametric Representation of Gamma Ray Attenuation in Two-Layer Shields," by H. Penkuhn (EURATOM-Ispra), Schultz (U. Hannover, Germany);

"Data Library and Method of Economizing Radiation Shielding Calculations for Laminar Shields," by H. Yamakoshi, K. Ueki, M. Nakata (Ship Res. Inst., Japan).

Integral Experiments (General) chairmen, J. Butler (AEE Winfrith, UK), S. An (U. Tokyo, Japan), A. Gandini (ENEA, Italy), and W. L. Bunch (WH Hanford, USA):

"Analysis of Fast Reactor Shielding Benchmarks," R. Indira, A. K. Jena, K. P. N. Murthy, R. S. Singh (Reactor Res. Centre, India);

"Analysis of Benchmark Experiment for Neutron Transport in Sodium, Stainless Steel and Iron," by K. Sasaki, T. Nishimura, H. Yokobori (MAPI, Japan);

"The EURACOS Iron and Sodium Benchmark Experiments," by G. Perlini (EURATOM-Ispra);

"Integral Test of Iron Data in JENDL-2 for Fast Reactor Shielding Analysis," by M. Kawai (NAIG), N. Yamano (JAERI), H. Hashikura (U. Tokyo), K. Minami (Fujitsu), K. Sasaki (MAPI), S. Mandai (IHI), Y. Kikuchi (JAERI, Japan);

"The Adjusted LMFBR Shielding Formulaire PROPANE," by J. P. Trapp (CEN Cadarache, France), A. De Carli (ENEA, Italy);

"Determination of Fission Neutron Field in Water and Steel by Experimental and Calculation Methods — Comparison of Results," by E.B. Brodtkin, M. E. Netecha, Yu. V. Orlov, A. V. Khurstalev (Kurchatov Inst. Atomic Energy, USSR);

"Integral Shielding Experiments for Derivation of Few Groups Nuclear Constants," by E. M. Zsolnay, S. Feher, E. J. Szondi, Gy. Csom (U. Budapest, Hungary);

"Attenuation Analysis of Neutrons and Photons Generated by 52-MeV Protons Transmitted Through Shielding Materials," by Y. Uwamino (Nat. Inst. Rad. Sci.), T. Nakamura (U. Tokyo), K. Shin (Kyoto U., Japan);

"Measurement and Analysis of Leakage Neutron Spectra from SS-316, Concrete, Water and Polyethylene Slabs with D-T Neutron Source," by J. Yamamoto, A. Takahashi, K. Sumita (Osaka U.), K. Shin, T. Hyodo (Kyoto U.), S. Itoh (Nagoya U.), H. Sekimoto (Tokyo Inst. Tech.), K. Kanda (Tohoku U., Japan);

"Experimental Study of Fast-Neutron Attenuation by Various Materials," by S. Sakamoto (Tokai U.), T. Tsujimura (Giken, Japan);

"Fast Neutron Albedo for Iron," by Y. Furuta (JAERI, Japan);

"Saturation and Z-Dependence of Multiple Back-Scattering of 662 keV Photons from Thick Samples," by P. Venkataramaiah, L. Paramesh, K. Gopala, H. Sanjeeviah (U. Mysore, India);

"Spectral Distribution of External Bremsstrahlung Produced by Tc-99 Beta Particles in Thick Samples," by P. Venkataramaiah, B. Rudraswamy, K. Gopala, H. Sanjeeviah (U. Mysore, India);

"Radiative Beta Decay in Sr-90 - Y-90," P. Venkataramaiah, A. Basavaraju, K. Gopala, H. Sanjeeviah (U. Mysore, India);

"The Integral Benchmark Experiments for Improvement of Shield Design," by J. Burian, B. Jansky, M. Marek, J. Rataj (Nucl. Res. Inst., Czechoslovakia);

"The Transmission of Fast Neutrons from the Li(d,xn) Reaction through Thick Iron," by D. L. Johnson, F. M.

Mann, L. L. Carter (WH Hanford), G. L. Woodruff (U. Washington), F. P. Brady, J. L. Romero, J. L. Ullmann, M. L. Johnson, C. M. Castaneda (U. California, USA).

May 17

Shielding Design (Fusion) chairmen, R. T. Santoro (ORNL, USA), E. Greenspan (Nucl. Res. Center-Negev, Israel), and B. A. Engholm (GA, USA):

"Integral Experiments for Fusion Reactor Shield Design — Summary of Progress," by R. T. Santoro, R. G. Alsmiller, J. M. Barnes, G. T. Chapman (ORNL, USA);

"Neutron-Physical Calculation of Blanket and Shield of Fusion Reactor," by A. I. Ilyushkin, A. V. Kashirskij, I. I. Linge, V. P. Mashkovitch, V. K. Sakharov, G. E. Shatalov, A. V. Shikin (Moscow Eng. Phys. Inst., USSR);

"On Optimal Shields for Fusion Reactors," by D. Gilai, E. Greenspan (Nucl. Res. Center-Negev, Israel);

"Shield Design for the Fusion Materials Irradiation Test Facility," by L. L. Carter, F. M. Mann, R. J. Morford, A. D. Wilcox, D. L. Johnson, S. T. Huang (HEDL, USA);

"Buildup Factors for Magnet Shielding Applied to Tandem Mirror Fusion Reactors," by M. E. Sawan, C. W. Maynard, L. A. El-Guebaly (U. Wisconsin, USA);

"An Effective Penetration Shield Design for ICF Reactors," by M. E. Sawan, W. F. Vogelsang, D. K. Sze (U. Wisconsin, USA);

"U.S. INTOR Radiation Shield Design," by Y. Gohar, M. A. Abdou (ANL, USA);

"Shielding Design of the Tokamak TORE SUPRA," by G. Brandicourt, M. Chatelier, C. Diop, G. Ermont, J. C. Nimal (CEN Saclay, France);

"Nuclear Analysis of Blanket and Shield Design for Tokamak Fusion Experimental Reactor," by S. Mori, K. Mohri (KHI), Y. Seki (JAERI), H. Kawasaki (CRC, Japan);

"Shielding of the Neutral Injector Beam Line in the Culham Conceptual Tokamak Reactor Mk II," by A. F. Avery, C. A. Morrison, C. Parry (AEE Winfrith, UK);

"Nuclear Radiation Analysis in Reacting Plasma Facility," by Y. Ogawa, N. Naitou (Nagoya U.), K. Shin, T. Hyodo (Kyoto U., Japan);

"Shielding Calculations for the Joint European Torus," by A. F. Avery, N. Davies, D. Jakeman, R. W. Page (AEE Winfrith, UK);

"Development of a Radiation Transport Code in Axisymmetric Toroidal Geometry for Nuclear Design of Fusion Reactor," by T. Ida, S. Kondo, Y. Togo (U. Tokyo, Japan).

Radiation Damage chairman, G. Hehn (IKE, U. Stuttgart, Germany):

"Adiabatic Microcalorimetry in Shielding Benchmark Experiments," by I. J. Curl, A. Packwood (AEE Winfrith, UK);

- "Analysis of Grid-Assembly Shielding of EBR-II," by D. Meneghetti, F. C. Franklin (ANL, USA);
- "Determination of Characteristics of Neutron Field Acting on the VVER Reactor Vessel," by E. B. Brodtkin, A. N. Kozhevnikov, A. V. Khrustalev (Kurchatov Inst., Moscow, USSR);
- "Development of Pressure Vessel Irradiation Calculation Methods in Finland," by I. Lux, F. Wasastjerna (Tech. Res. Centre, Finland);
- "Necessity of Three-Dimensional Transport Calculations in LWR Surveillance and for MTR Irradiation," by G. Prillinger, G. Pfister, G. Fuchs (IKE, U. Stuttgart, Germany);
- "Radiation Damage for Fusion Application by Use of High Energy Spallation Neutrons," by V. Herrnberger (Fed. Inst. Reactor Res., Switzerland).
- Post-Accident and Decommissioning** chairman, G. P. Lahti (Sargent & Lundy, USA):
- "Dose Rate Evaluation after Accident in a PWR," by C. Cladel, B. Duchemin, J. M. Evrard, A. D. Ville, B. Nimal, J. C. Nimal (CEN Saclay, France);
- "Post Three Mile Island (TMI) Shielding Review — A Case History," by H. H. Isakari (Kaiser Eng., USA);
- "Shielding Measures for the Decommissioning of the Nuclear Ship OTTO HAHN and the Decommissioning of the Nuclear Power Plant Niederaichbach," by U. Birkhold (Gg. Noell), H. Gallenberger (KfK), H. Lettnin (GKSS), J. Obst (Gg. Noell), W. Stasch (NIS, Germany);
- "Shielding Requirements for the Decommissioning of WAGR," by R. F. Burstall, G. H. Clarke, C. D. McElroy (UKAEA Risley, UK);
- "Design of a Spent Fuel Shipping Cask for Korea Nuclear Unit 1," by Chang Sun Kang, Moo Hwan Kim (Seoul U., Korea);
- "Shielding Calculations for Ships Carrying Irradiated Fuel," by R. F. Burstall, M. H. Dean (UKAEA Risley, UK);
- "Dose Planning and Calculations for a Radioactive Waste Repository Plant in a Mine," by W. Ehrlich (PTB), G. Kicherer, G. Hehn (IKE, U., Stuttgart, Germany).
- Method Development (Monte Carlo)** chairmen, H. Rief (EURATOM-Ispira), T. Suzuki (JAERI, Japan), J. W. Dawson (CEGB, UK), and T. Fuse (Ship Res. Inst., Japan):
- "Neutron-Induced Photon Production in MCNP," by P. C. Little, R. E. Seamon (LANL, USA);
- "TRIPOLI-2: Neutron Gamma Coupling — Applications to Shielding Benchmarks and Designs," by S. N. Cramer, (ORNL, USA), G. Dejonghe, J. Gonnord, J. C. Nimal, T. Vergnaud (CEN Saclay, France);
- "Development of Monte Carlo Code Using Multi-Group Double Differential Cross Section Library and its Application to Shielding Calculation for Fusion Materials," by M. Nakagawa, Ta. Mori, Y. Ishiguro (JAERI, Japan);
- "Linked Monte Carlo and Finite-Element Diffusion Methods for Reactor Shield Design," by E. Shuttleworth, S. J. Chucas (AEE Winfrith, UK);
- "Comparison Between Different Codes for Shielding Calculations of Plutonium Sources," by P. A. Landeyro, S. Marcondes (ENEA, Italy);
- "Evaluation of Monte-Carlo Ring Detector in Axisymmetric Deep Penetration Shielding Problems," by E. Tamura, Y. Shimoda (IBM, Japan);
- "Investigation of the NESX Estimation in the Monte Carlo Calculation for Shielding Analysis of a Cask," by K. Ueki, H. Yamakoshi (Ship Res. Inst.), A. Sekiguchi (U., Tokyo), Y. Maki, M. Inoue (CRIEPI, Japan);
- "Monte Carlo Shielding Analysis Using Deep Penetration Biasing Schemes Combined with Point Estimators and Algorithms for the Scoring of Sensitivity Profiles and Finite Perturbation Effects," by H. Rief (EURATOM-Ispira), A. Fioretti (Ansaldo, Genova, Italy);
- "A Weight Window/Importance Generator for Monte Carlo Streaming Problems," by T. E. Booth (LANL, USA);
- "A Continuous Model for the Optimization of Splitting in Deep-Penetration Monte Carlo," by I. Lux (Central Res. Inst. Phys., Budapest, Hungary);
- "Neutronics Analysis of Major Penetrations in Tokamaks Using the Recursive Monte Carlo Method," by M. Goldstein (Nucl. Res. Centre-Negev, Israel).
- May 18**
- Protection Experience** chairmen, A. F. Avery (AEE Winfrith, UK), and C. R. Boss (AECL Ontario, Canada):
- "FFTF Shield and Gamma Ray Measurements," by W. L. Bunch, F. S. Moore, W. P. Stinson (HEDL, USA);
- "Comparison between Neutron Flux Measurements and Calculations in the Dry-Well of Caorso BWR Power Station," by P. Barbucci, F. Di Pasquantonio, G. Mariotti (ENEL, Italy);
- "Neutron and Gamma-Ray Distribution in BWR Drywell," by M. Nakai (NAIG), Y. Hirahara (Tokyo Elec.), H. Hashimoto (Chubu Elec.), F. Noguchi (Toshiba, Japan);
- "Radiation Shielding Analyses of JOYO," by N. Ohtani, T. Kawakita (PNC, Japan);
- "Gamma Ray Benchmark on the Spent Fuel Shipping Cask TN 12," by P. Blum, R. Cagnon (Soc. Transnucl.), C. Cladel, G. Ermont, J. C. Nimal (CEN Saclay, France);
- "Shielding Experiments for a Shielding Safety Evaluation Code System of Spent Fuel Transport Cask," by S. Tanaka, Y. Sakamoto, J. Katakura, M. Adachi, T. Yamahara, I. Nomura, Y. Naito (JAERI), A. Yamaji (Ship Res. Inst., Japan);
- "The Treatment of Gamma-Ray Scattering in Shield Design for Reprocessing Plant," by A. F. Avery, V. G. Small (AEE Winfrith), K. Schneider (British Nucl. Fuels, UK);

"Shielding against Scattered Radiation at Electron Accelerator Installations," by H. P. Weise, P. Jost (BAM, Germany);

"Shielding Problems for the High Energy Linear Accelerator," by P. N. Maheshwari (Assoc. Radio.), D. Allen (St. Mary Hosp.), L. T. Fitzgerald (U. Florida), J. Cummings (Assoc. Radio., USA).

Cross-Section Library chairmen, V. Herrnberger (Fed. Inst. Reactor. Res., Switzerland), and Y. Fukai (Toshiba, Japan);

"The Status of Multigroup Data for Shielding Applications," by R. W. Roussin (ORNL, USA);

"Production of Multigroup Data at INER," by Jing-Tong Yang (Inst. Nucl. Energy Res., Taiwan, China);

"THEMIS — A Coherent Punctual and Multigroup Neutron-Gamma Library for Monte Carlo and S_N Codes from ENDF/B," by G. Dejonghe, J. Gonnord, A. Monnier, J. C. Nimal (CEN Saclay, France);

"The Evaluation of Actinide Cross-Sections for Use in Shielding and Decay Energy Release Rate Calculations," by J. W. Dawson (CEGB, UK);

"The IAEA Cross Section Processing Code Verification Project as It Applies to Shielding Data," by D. E. Cullen (IAEA), N. M. Greene (ORNL), MacFarlane (LANL, USA);

"Adjustment of Neutron Multigroup Cross-Sections to Integral Experiments," by G. Hehn, R. D. Bachle, G. Pfister, M. Mattes (IKE, U. Stuttgart, Germany), W. Matthes (EURATOM-Ispra);

"Effect of Thermal Group Constants in VHTR Shielding Analysis," by K. Mohri, I. Suzuki, T. Watanabe, Y. Tanaka (KHI), T. Doi, M. Hirano (JAERI, Japan);

"The Development of Multigroup Removal Cross-Sections Library for Engineering Design of Radiation Shielding," by A. P. Suvorov (Inst. Phys. Power Eng., Obninsk, USSR).

May 19

Shielding Design (Fission) chairmen, M. Salvatores (CEN Cadarache, France), Y. Tanaka (KHI, Japan), F. P. Youell (NNC, UK), and R. S. Singh (Reactor Res. Centre, India);

"The Status of Reactor Shielding Research in the United States," by D. E. Bartine (ORNL, USA);

"Optimization Searches for Shielding Design Studies by GPT Methods," by A. Gandini (ENEA), M. Guma (U. Rome), G. Palmiotti, V. Rado (ENEA, Italy), M. Salvatores (CEN Cadarache, France);

"Shielding Design for PWR in France," by G. Champion, Mme Charransol (EDF), A. D. Ville, J. C. Nimal, T. Vergnaud (CEN Saclay, France);

"Radiation Shielding of Uranium-Graphite Reactors of the Bilibin's Nuclear Power Plant," by A. P. Suvorov (Inst. Phys. Power Eng. Obninsk, USSR);

"The Use of Linked Shielding Codes to Substantiate the Design of the Top Corner Shielding of a CAGR," by S. J. Cripps (NNC), P. C. Miller (AEE Winfrith, UK);

"Substantiation of the Radiological Design for Access to the Advanced Gas-Cooled Reactor (AGR) Core Vault," by J. W. Dawson (CEGB), J. R. P. Eaton (South Scotl. Elec. Board), F. P. Youell (NNC, UK);

"Shielding Design Methods for LMFBR Validation on the Phenix Reactor," by J. C. Cabrilhat, J. Crouzet (CEN Cadarache), G. Palmiotti, V. Rado (ENEA, Italy), M. Salvatores (CEN Cadarache, France);

"Advances in Shielding Calculations for the PEC Reactor," by A. Baldi, K. W. Burn, R. Guaraldi (ENEA, Italy), B. Godot, D. Maire, J. Marciano (NOVATOM, France), R. Tinti (ENEA, Italy);

"Studies on the Design of Bulk Shields for a Large Fast Breeder Reactor," by A. K. Jena, R. Indira, K. P. N. Murthy, R. S. Singh (Reactor Res. Centre, India);

"MONJU Shielding Design," by F. Nakashima, K. Kinjo, A. Izumi, Y. Ohmori (PNC, Japan);

"Shielding Modification Design of the N. S. Mutsu," by A. Yamaji (Ship Res. Inst.), J. Miyakoshi (Hitachi Zosen), T. Kageyama, Y. Futamura (JNSRDA, Japan).

Sensitivity Analysis chairmen, J. Gonnord (CEN Saclay, France), and S. Katsuragi (JAERI, Japan);

"The Role of Experimental Shielding Benchmarks," by A. K. McCracken, J. Butler (AEE Winfrith, UK);

"International LMFBR Shielding Benchmark Intercomparison and Analysis," by M. Salvatores (CEN Cadarache, France), G. Palmiotti (ENEA, Italy);

"Results of the NEA PWR Shielding Benchmark," by G. Hehn (IKE, U. Stuttgart, Germany);

"Predictive Models Based on Sensitivity Theory and Their Application to Practical Shielding Problems," by S. I. Bhuiyan, R. W. Roussin, J. L. Lucius, D. E. Bartine (ORNL, USA);

"Uncertainty Analysis Applied to the Calculations of Radiation Fields in Shielding," by Yu. I. Balashov, V. V. Bolyatko, A. I. Ilyushkin, V. P. Mashkovitch, V. K. Sakharov (Moscow Eng. Phys. Inst., USSR);

"Sensitivity Analysis for Shielding Using S_N and Monte Carlo Codes," by G. Dejonghe, J. Gonnord, J. C. Nimal (CEN Saclay, France);

"Statistical Error Analysis of Transport Calculations by a 1-D Semianalytical Method," by R. Warnemünde (KWU, Germany).

Radiation Exposure chairmen, G. Frejaville (CEN Cadarache, France), D. V. Gopinath (Reactor Res. Centre, India), D. Meneghetti (ANL, USA), and M. Kitazume (Hitachi Eng., Japan);

- "Development of Radiation Dose Calculation Code for Nuclear Power Plant," by S. Nakai, Y. Andoh (PNC), H. Kadotani (CRC, Japan);
- "Measures for Reducing the Radiation Exposure During Maintenance of Control Rod Drives in Swedish BWRs," by J. Elkert (AB ASEA-ATOM, Sweden);
- "A Study on the Effectiveness of Reactor Shield Wall for a BWR Plant with MARK III Containment," by C. L. Shih, M. F. Su, H. T. Chen, Y. C. Lo, S. H. Jiang (Tsing Hua U., Taiwan, China);
- "Integrated Dose in Normal Operation," by F. M. Garcia (Empre. Agrupados, Spain);
- "Studies Performed in Order to Reduce Occupational Radiation Exposure at French Power Plants," by P. Beslu, G. Frejaville (CEN Cadarache), P. Jeanson (EDF, France);
- "Shielding Test Program during Start-up of Almaraz I," by E. C. Ortega (Empre Agrupados, Spain);
- "RSIC after 20 Years — A Look Back and a Look Ahead," by B. E. Maskewitz, R. W. Roussin, D. K. Trubey (RSIC, ORNL, USA);
- "Determination of Corrosion and Fission Product Sources in PWR for Shielding Purpose," by P. Beslu (CEN Cadarache), P. Charransol (EDF), C. Leuthrot (CEN Cadarache), Ph. Ridoux (EDF, France);
- "Radioactive Products in the Heavy Water Reactor Primary Coolant," by M. M. Ninković, R. Mijailović, J. Raicević (Inst. Nucl. Sci., Yugoslavia);
- "The Evaluation of the Behaviour of Sulphur 35 in the Reactor Circuit of a Typical Gas Cooled Reactor," by J. W. Dawson (CEGB, UK);
- "Experience to Reduce Exposures outside a Critical Assembly Room by Additional Concrete Walls," by T. Suzuki, K. Nitta, T. Furuta, N. Yamano, I. Kobayashi (JAERI, Japan).

Streaming (Fusion) chairman, Y. Gohar (ANL, USA):

- "Evaluation of the Streaming Matrix Method for Discrete-Ordinates Duct Streaming Calculations," by B. A. Clark, W. T. Urban, D. J. Dudziak (LANL, USA);
- "Radiation Streaming in Diagnostic Penetrations," by B. A. Engholm, J. M. Battaglia, J. F. Baur (GA, USA);
- "Simulated 3-Dimensional Radiation Streaming through Straight Concrete Duct," by H. Kadotani, J. H. Narita, H. Kawasaki, N. Iwasa, T. Ishitsuka, Y. Fukano (CRC, Japan), C. E. Clifford (Princeton U., USA);
- "Fast Neutron Streaming Studies Using the Fast Neutron Source Reactor, YAYOI and a 14 MeV Neutron Generator," by H. Hashikura, Y. Oka, M. Akiyama, S. An (U. Tokyo, Japan);
- "Radiation Streaming Studies at the Fusion Neutronics Source (FNS) Facility," by T. Nakamura, Y. Oyama, S. Tanaka, H. Maekawa, Y. Ikeda, T. Fukumoto (JAERI, Japan);

"Monte Carlo Analysis of a Streaming Experiment of D-T Neutron and Secondary Gamma Rays through a Concrete Bent Duct," by Y. Seki, S. Tanaka, Y. Oyama, N. Sasamoto (JAERI), H. Kawasaki (CRC), Y. Ikeda, H. Maekawa, T. Nakamura (JAERI, Japan);

"The Analysis of the Radiation Streaming through RF Heating and Exhaust Ducts of INTOR J-II," by M. Yamauchi, M. Kawai (NAIG), Y. Seki, (JAERI), K. Ebisawa (Toshiba, Japan).

May 20

Streaming (Fission) chairmen, G. L. Simmons (Sci. Appl., USA), P. Barbucci (ENEL, Italy), H. G. Vogt (U. Hannover, Germany), and T. E. Albert (Sci. Appl., USA):

"Analytical Calculations of 3-D Flux Distributions Based on 1-D and 2-D Transport Calculations," by R. Warnemünde (KWU), W. Denk, U. Hesse (GRS, Germany);

"Application of Albedo Monte Carlo Method of FBR Neutron Streaming Analysis," by M. Kawai, Y. Hayashida, M. Yamauchi (NAIG, Japan);

"Analysis of Applicability of Albedo Concept to Neutron Streaming through Ducts and Slits," by K. Shin, T. Hyodo (Kyoto U., Japan);

"Analysis of Neutron Streaming through Void Duct with Three-Dimensional Transport Code PALLAS-XYZ," by N. Sasamoto (JAERI), K. Takeuchi, Y. Kanai (Ship Res. Inst., Japan);

"Study on Additional Shields for Gamma-Rays Streaming through a Duct," by T. Miura, K. Takeuchi (Ship Res. Inst.), M. Kinno (Fujita, Japan);

"Gamma-Ray Streaming in Bent Ducts and Voids," by L. Bourdet, J. C. Nimal, T. Vergnaud (CEN Saclay, France);

"The Development of a Calculational Route for PWR Cavity Streaming," by P. C. Miller, N. Davies (AEE Winfrith), L. M. C. Dutton, P. N. Smith (NNC, UK);

"Reactor Cavity Radiation Streaming Analysis and Shielding Solutions for the ENEL PWR Reference Plant," by P. Barbucci, F. Di Pasquantonio, G. Mariotti (ENEL, Italy);

"Neutron Streaming along Narrow Gaps in VHTR Core," by I. Suzuki, T. Watanabe, Y. Tanaka (KHI), T. Doi, M. Hirano (JAERI, Japan);

"Shielding Design for a Neutron-Antineutron Oscillation Experiment," by P. Barbucci, G. Mariotti (ENEL, Italy);

"Spectrum Measurement of Fast Neutron through Air Ducts in Water, Concrete and Lead," by S. H. Jiang, G. L. Lin, S. Y. Wu, S. Y. Liaw (Tsing Hua U., Taiwan, China).

Skyshine chairmen, D. J. Dudziak (LANL, USA), and H. Penkuhn (EURATOM-Ispra):

"A Benchmark Experiment for γ -Ray Skyshine," by Y. Yamaguchi (JAERI), H. Ryufuku (Visible Inf. Center), Ke. Minami, T. Numakunai (JAERI), Ka. Minami (Fujitsu, Japan);

"SKYSHINE II — Prediction of Nuclear Facility Far-Field Neutron and Gamma-Ray Exposure," by M. B. Wells, M. C. Andrews, R. L. French (RRA, USA);

"Neutron Skyshine from Proton Cyclotron and Electron Synchrotron," by T. Nakamura (U. Tokyo), K. Hayashi (Hitachi Eng.), T. Kosako (U. Tokyo), K. Shin (Kyoto U., Japan);

"Sensitivity Study for Determining Critical Skyshine Parameters in Reprocessing Installations," by I. R. Terry (KWU), H. G. Vogt (U. Hannover, Germany).

Standards, Etc. chairmen, D. K. Trubey (ORNL, USA), and H. Schultz (U. Hannover, Germany):

"Multiple Cost Criteria for Occupational Dose Reduction," by J. Z. James (James Eng., USA);

"The Optimization of Shield Design," by J. Taylor, M. Watmough, K. Schneider (British Nucl. Fuels, UK);

"Comparison of the Two Different Standard Flux-to-Dose Rate Conversion Factors," by M. Metghalchi, R. Ashrafi (Nucl. Res. Center, Iran);

"Standard Reference Data for Gamma-Ray Transport in Homogeneous Media," by D. K. Trubey (ORNL, USA);

"Shielding Benchmarks," by J. Celnik (Stone & Webster Eng., USA);

"Standardization of Moderating-Type Neutron Detectors for the Usage of Neutron Spectrometry," by T. Kosako, T. Nakamura (U. Tokyo), S. Iwai (MAPI, Japan);

"A High Temperature Neutron Shield," by E. R. White (EG & G Idaho, USA);

"Use of Rare Earth Oxides in the Concretes for Reactor Shields," by V. M. Raghunath, V. M. Sundaram, A. Natarajan, O. N. Nambiar, D. V. Gopinath (Reactor Res. Centre, India);

"Development of Neutron Shield Material Using LiF," by K. Kanda, T. Kobayashi (Kyoto U.), M. Takeuchi (Nippon Kagaku Kogyo), S. Ouchi (Toray, Japan).

Integral Experiments (Unfolding) chairmen, Y. Yeivin (Hebrew U., Israel), and I. Kataoka (MAPI, Japan):

"Neutron and Gamma Kerma and Spectrum Measurements to 1.6 km from a Fission Source," by A. H. Kazi, R. C. Harrison, C. R. Heimbach (Aberdeen Pulse Rad. Facil., USA);

"Comparison of Experiment and VCS Calculations for Transmission of Air-Moderated Fission Radiation through a Shielded Structure," by A. E. Rainis, R. Romanelli (Ballistic Res. Lab.), C. Heimbach, H. Kazi (Aberdeen Pulse Rad. Facil., USA);

"Development of a Benchmark Data Base for Use in PWR Dosimetry Analysis," by R. E. Maerker, B. L. Broadhead, M. L. Williams (ORNL, USA), J. J. Wagschal (Hebrew U., Israel);

"On Unfolding Counting-Rate Spectra of Recoil-Proton Neutron Detectors," by Y. Yeivin (Hebrew U., Israel);

"Spectrum Unfolding for Light Water Reactors Developed into Water Shielding," by H. J. Bondars, (Latvijas V. U., USSR).

Closing Session chairman, T. Asaoka (JAERI, Japan):

"Summary of the Conference," by J. Butler (AEE Winfrith, UK).

Additional information concerning the conference may be obtained from T. Asaoka, Division of Reactor Engineering, JAERI, Tokai-mura, Ibaraki-ken, 319-11 Japan.

Microcomputer Exchange

In February we suggested that people who have written programs for microcomputers might be willing to share them. We are beginning to get a response, and we anticipate making them available. We cannot guarantee being able to test and reproduce copies of programs for all possible types of microcomputers, but we expect to be able to do this for the more popular models. We have tested a code successfully on the APPLE II that we received on floppy disk. RSIC has the TRS-80 model III (48K) which can communicate and a nearby group has the IBM PC. We can probably locate others. Please let us know if you have codes to share.

ANS Standards Working Group on Post-Accident Radiological Control Reorganized

At its February 24, 1983 meeting, the American Nuclear Society (ANS) Standards Steering Committee approved the scope for a series of standards, "Criteria for Post-Accident Radiological Control." W. C. Hopkins (Bechtel Power Corporation) is the group's chairman. The series of standards to be developed within this new group will be under the purview of the ANS Nuclear Power Plant Standards Committee (NUPPSO).

ANS-5.5 SCOPE This series of standards provides radiation protection criteria for the systems and equipment external to the containment to minimize post-accident in-plant exposure. Radiation protection criteria and guidance are also provided for those actions and necessary operations to place and maintain the plant in a safe condition. These standards address plant systems and equipment that may become significantly contaminated following an accident and which may require planned personnel access. The pathways for radioactivity transport to and from those systems

are also addressed. These standards include consideration for: shielding, access control and health physics facilities, sampling, in-plant monitoring, system maintainability, and system operability. At present, four areas to be addressed are:

1. Accident Source Terms,
2. Radiation Protection Design Criteria,
3. System Radiological Design Criteria, and
4. Post-Accident Operational Considerations.

Standards proposed for development within the new series are:

- Accident Source Terms
- Radiation Protection Design Criteria, Post-Accident Shielding
- Radiation Protection Design Criteria, Post-Accident Access Control and Health Physics Facilities
- System Radiological Design Criteria, Post-Accident Sampling
- System Radiological Design Criteria, Post-Accident Area Radiation Monitoring
- Post-Accident Operational Considerations — Systems Operation and Maintenance

Ancillary projects are expected to be identified.

This organization plan developed from the merger of ANS-6.9, "Designing for Post-Accident Radiological Conditions," and ANS-58.13, "Design for Post-Accident Access External to Containment." These proposed projects were conceived independently in 1981.

A related project, ANS-6.7.2, initiated by the late George Biro, to develop a standard for design of radiation zoning of LWR plants for accident conditions, will also be included under ANS-5.5.

The fact that the interests and responsibilities of ANS-6, "Radiation Protection and Shielding," cover a broad spectrum, and recognition that a number of professional organizations share similar interests leads to organizational complexity in the development of consensus standards. General shielding standards, after development by ANS-6, are transmitted to ANSI committee N17, "Research Reactors, Reactor Physics, and Radiation Shielding," for the next step in the ANSI approval process. In addition, they are carefully reviewed by N13, "Radiation Protection." Those that are specific to application in power plant technology are developed and approved within NUPPSCO.

Standards Actions

Note the following standards activities which have taken place.

Call for Comment by April 5, 1983

BSR/ANS-19.4 Guide for Acquisition and Documentation of Reference Power Reactor Physics Measurements for Nuclear Analysis Verification (reaffirmation and redesignation of N652-1976). Order from and send comments to ANS, \$14.00.

Submittals

The following ANS draft standards were recently submitted to BSR for public review; they are available from ANS at the prices shown.

ANS-56.4 Pressure and Temperature Transient Analysis for Light Water Reactor Containments (new standard), \$15.00.

ANS-59.3 Safety Criteria for Control Air Systems (revision of ANSI/ANS-59.3-1977), \$7.50.

ANS-19.1 Nuclear Data Sets for Reactor Design Calculations (revision of N411-1975), \$7.50.

Approved

ANSI/ANS-58.6-1983 Criteria for Remote Shutdown for LWRs (new standard); date: February 17, 1983.

ANSI/IEEE 384-1981 Criteria for Independence of Class 1E Equipment and Circuits (new standard); date: January 20, 1983.

ANSI/IEEE 497-1981 Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations (new standard); date: January 20, 1983.

Withdrawals

The criteria of the following standards have been incorporated into ANSI/ANS-15.1-1982.

ANSI/ANS-15.3-1974 Records and Reports for Research Reactors.

ANSI/ANS-15.6-1974 Review of Experiments for Research Reactors.

ANSI/ANS-15.18-1979 Administrative Controls for Research Reactors.

Newly Published

ANSI/IEEE 300-1982 Procedures for Semiconductor Charged-Particle Detectors. Order from IEEE, \$7.00.

U.S. NRC Regulatory Guide Recently Issued

Comments on Regulatory Guides must be received no later than the comment deadline by Secretary of the

Commission, Attn: Docketing & Service Branch, U.S. NRC, Washington, DC 20555. Obtain all Guides from NRC, Attn: Director, Div. of Technical Information & Document Control, Washington, DC 20555.

Guide 1.150 Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations (revision 1).

Guide 1.145 Atmospheric Dispersion Models for Potential Accident Consequence Assessments of Nuclear Power Plants (revision 1). (This guide has been reprinted to correct an error discovered on page 1.145-7. The corrected version has been distributed to subscribers and licensees.)

CHANGES TO THE COMPUTER CODES COLLECTION

During the month there were seven changes to the RSIC codes collection, including the addition of a new hardware version of an existing code package and six new contributions with three coming from foreign contributors — F. R. Germany, Italy, and Japan.

CCC-277/MORSE-SGC

The code package for the super-grouped cross-section version of the MORSE code system (CCC-203) was extended to include a CDC-7600 version, contributed by Sandia National Laboratories, Albuquerque, New Mexico. FORTRAN IV; IBM 360 and CDC 7600.

CCC-435/MCRTOF

This Monte Carlo code package for calculation of multiple scattering in a disk-shaped sample of neutrons in the resonance energy region was contributed by the Japan Atomic Energy Research Institute (JAERI), Ibaraki, Japan. Intended specifically for multiple scattering of neutrons on thick materials having resonances, MCRTOF has the capability for handling multiple scattering of neutrons in resonance regions where analytical calculations are too complicated to obtain reliable results. RSIC extended the package by using the JAERI data to convert the code package for use on an IBM 360/370. Reference: JAERI-M-7988. FORTRAN IV; FACOM-M-200 (A) and IBM 360/370 (B).

CCC-439/NUCON

This code package for calculation of time-

dependent nuclide concentrations, activity, gamma-ray dose rate and, biological hazard potential of fusion reactor materials due to neutron irradiation was contributed by Hahn-Meitner-Institut für Kernforschung, Federal Republic of Germany. The code system calculates the changes in the concentration and activation of a D-T fusion reactor material under neutron irradiation of the parent and daughter nuclides of a given activation chain for any given period in arbitrary time-steps. The number of changes calculated for any given period in arbitrary time-steps is 400. The maximum number of nuclides in an activation chain is 50. Every nuclide of the chain can be linked to the other chain members by a maximum of 6 neutron reactions and radioactive decay. Reference: HMI-B312. FORTRAN IV; SIEMENS 7880.

CCC-440/EXTREME

This discrete ordinates transport code system with exponential expansion of spatial variables was contributed by the Oak Ridge National Laboratory, Oak Ridge, Tennessee. The package computes the spatial dependence of the neutron density in nuclear systems in two-dimensional Cartesian geometry. Any degree of scattering anisotropy can be handled for either external source or fission systems. In the general case the calculation is iterative due to neutron sources which depend on the neutron density itself. Reference: ORNL/CSD/TM-182. FORTRAN IV; IBM 3033.

CCC-442/ACDOS3

This code package for calculation of activities and dose rates produced by neutron activation was contributed by Lawrence Berkeley Laboratory, University of California, Berkeley, California. Designed to calculate the activities and dose rates produced by neutron activation in a variety of simple geometries, ACDOS3 requires neutron fluxes in up to 50 groups with energies up to 20 MeV as input. The code first uses the group fluxes to calculate radioactive products and radioactive daughters of radioactive products, which are produced by single- or multiple-pulse neutron irradiation. Irradiated materials may take the form of solid or hollow spheres and cylinders or cylindrical shells. References: LBL-12711 and LBL-14547. FORTRAN IV; CDC 7600.

PSR-184/CRESO

This resonance data-handling code system was contributed by the Comitato Nazionale Energia Nucleare, Bologna, Italy, through the OECD NEA Data Bank, Gif-sur-Yvette, France. CRESO calculates energy-dependent pointwise cross sections from resonance parameters in ENDF/B format. Both versions IV and V are accepted. Reference: CNEN-RT/FI(81)30; IBM 370.

PSR-195/REPC

This code package for estimation of nuclear reaction effects in proton-tissue-dose calculations was contributed by the National Aeronautics and Space Administration, Washington, D. C. Intended for calculations where geometries are complicated surfaces, such as the human body, REPC estimates dose from external proton exposure of arbitrary convex bodies and dose in soft tissue. Special emphasis is placed on retaining the effects of nuclear reactions, especially for the dose equivalent. Reference: NASA-TM-X-3388. FORTRAN IV; CYBER.

PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we take note of the movement of people concerned with radiation protection, transport, and shielding in the nuclear industry. We, therefore, continue to carry personal items as they are brought to our attention. During the past month we have been informed of the following changes.

Seiji Kabe has left his position with Brookhaven National Laboratory to take an assignment with the National Laboratory for High Energy Physics, in Ibaraki-ken, Japan.

The following address changes have been noted: *William M. Herwig*, from Babcock and Wilcox, to Northeast Utilities Svc. Co., Hartford, Connecticut; *Karl Warkentin*, from Brown & Root, Inc., to Texas Utilities Svcs., Inc., Glen Rose, Texas; *Gordon Lodde*, from Effluent Dose Assessment, to Porter Consultants, Inc., Edgewood, Maryland; *Chin-Mou Peng*, from the University of California-Berkeley, to System Control, Inc., Palo Alto, California; *Sam Bresticker*, from Long Island Lighting Co., to Stone & Webster Engr. Co.; *Guy Martin*, from Ebasco Services, Inc., to Envirosphere Co., New York, New York; *Carl F. Johnson*, from Iowa Electric Light & Power Co., to Black & Veatch Consulting Eng., Kansas City, Missouri; and *John Anselmo*, from San Diego State University, to Science Applications, Inc., Las Vegas, Nevada.

VISITORS TO RISC

During the month of March the following seven people came to visit/use RSIC facilities: *Eliot B. Kennel*, U.S. Air Force; *William B. Line*, R.J. Reynolds, Inc., Winston-Salem, North Carolina; *Josè M. Aragonès*, University Politècnica, Madrid, Spain; *Michael T. Ryan*, Oak Ridge National Laboratory, Oak Ridge, Tennessee; *Yo Taik Song*, Department of Energy, Office of Military Applications, Washington, D. C.; *Metin Yildiran*, IAEA Fellow from Turkey; and *Hans. F. Winder*, Hanau, F. R. Germany.

UPCOMING MEETINGS

Shielding Topics at Fusion Meet

Three special sessions on neutronics and shielding are scheduled for the *5th Topical Meeting on the Technology of Fusion Energy*, to be convened April 26-28, 1983, in Knoxville, Tennessee. Oral concurrent sessions are planned for the Hilton Hotel, and poster sessions will be in the adjacent Holiday Inn.

The topical meeting is sponsored jointly by the American Nuclear Society (ANS), U.S. Dept. of Energy, Office of Fusion Energy, Electric Power Research Institute, and the Oak Ridge National Laboratory. The proceedings, to be published as a special issue of the *ANS Nuclear Technology/Fusion Journal*, will be available September 1983.

Information on the conference is available from P. N. Haubenreich, 9204-1, ORNL, P.O. Box Y, Oak Ridge, TN 37830 (Telephone 615-574-1457 or FTS 624-1457.)

Nuclear Option Discussed at Science Meeting

Key issues in the nuclear power option will be examined in a session on May 27 sponsored by the American Nuclear Society during the *1983 Annual Meeting of the American Association for the Advancement of Science* in Detroit, Michigan. The session, which begins at 9:00 a.m. in the Joliet Room of the Westin Hotel, is devoted to re-examining the changing public perceptions of nuclear power; the advances that must be made by government, industry, and utilities to assure its safety and reliability; and the economic costs/benefits of the nuclear option. Featured speakers are: *Benard C. Rusche*, Management Analysis Corp., on "Safety and Regulation of Nuclear Power;" Nobel Laureate *Rosalyn Yalow*, Veterans Administration Hospital (Bronx, New York), on "Radiation Effects in Man;" *George Coulbourn*, Boeing Engineering & Construction Company, on "The Economics of Nuclear Power Today;" *Byron Lee, Jr.*, Commonwealth Edison Company, on "Post-Three Mile Island Changes in Nuclear Operations;" and *Sidney A. Bernsen*, Bechtel Power Corporation, on "Quality Assurance in Nuclear Power Plant Construction."

For more information on the session, contact: Jon Stouky, Power Cutting, Inc., One Energy Drive, P.O. Box 3000, Lake Bluff, IL 60044; telephone 312-680-8100.

Calendar

The following events of interest to the shielding community are called to your attention.

June 1983

Annual Meeting of the Association for Radiation Protection, June 8-10, Aachen, Fed. Rep. of Germany. Contact: Schweizerische Vereinigung für Atomenergie, Case Postale 2613, Bärenplatz 2, CH-3001 Berne, Switzerland.

23rd Annual International Conference of the Canadian Nuclear Association and 4th Annual Conference of the Canadian Nuclear Society, June 12-15, Montreal, Quebec, Canada. Contact: J. A. Weller, General Manager, Canadian Nuclear Association, 111 Elizabeth St., 11th Floor, Toronto, Ontario, Canada M5G 1P7.

American Nuclear Society Annual Meeting, June 12-17, Detroit, Michigan. Contact: Walter J. McCarthy, Jr., Chairman and Chief Executive Officer, Detroit Edison, 2000 Second Ave., Detroit, MI 48226, USA.

July 1983

7th International Congress of Radiation Research, July 3-8, Amsterdam, The Netherlands. Contact: J. J. Broerese, Secretary General, 7th Inter. Congress of Radiation Research, c/o Radiobiological Institute TNO, P.O. Box 5815, 2280 HV Rijswijk, Netherlands.

Radiation Effects Short Course, July 17, 1983, Sheraton Hotel in Gatlinburg, Tennessee, sponsored by the Nuclear and Space Radiation Effects Conference. Contact: Fred Hartman, Division 9336, Sandia National Laboratories, Albuquerque, NM 87185 (telephone 505-846-1749).

Nuclear and Space Radiation Effects, (20th Annual IEEE Conference), July 18-21, Gatlinburg, Tennessee, USA. Contact: E. F. Hartman, Div. 9336, 1983 NSRE Publicity Chairman, Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185, USA (phone 505-846-1749).

1983 HEART Conference, July 22, 1983, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Contact: Harold L. Flescher, Raytheon Co., 528 Boston Post Road - MS1K5, Sudbury, MA 01776 (phone 617-443-9521, ext. 2531).

August 1983

Australian Radiation Protection Society (8th Annual Conference), August 15-17, Adelaide, Australia. Contact: J. Fitch, Convenor, 1983 ARPS Conference, Private Bag 97, Glenside, S. A. 5065, Australia.

Effects of Heat From Radioactive Waste in Deep Geological Repositories, August 29-September 2, Sweden. Contact: V. Tsyplenkov, Div. of Nuclear Fuel Cycle, IAEA, P.O. Box 100, A-1400 Vienna, Austria.

September 1983

3rd Topical Meeting on Fusion Reactor Materials, September 19-22, Albuquerque, New Mexico, sponsored by Department of Energy, the American Nuclear Society, and the Nuclear Metallurgy Committee of the TMS/AIME. Contact: M. J. Davis, Sandia National Laboratory, Dept. 1830, P.O. Box 5800, Albuquerque, New Mexico 87185 (phone 505-844-4164).

October 1983

American Nuclear Society Winter Meeting, October 30-November 4, 1983, San Francisco, California. Contact: David Pettengill, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 312-352-6611).

December 1983

Israeli Nuclear Society, date to be announced, Israel. The meeting is being held in conjunction with a scientific and cultural visit to Israel by U.S. nuclear scientists, with visitors participating in the dedication of the new Department of Nuclear Engineering building at the Technion, in Haifa. Contact: Review Committee, c/o Lawrence Ruby, Department of Nuclear Engineering, University of California, Berkeley, CA 94720.

MARCH 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 22161.

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

AAEC/E-539 ANAUSN - A One-Dimensional Multigroup SN Transport Theory Module for the AUS Reactor Neutronics System., . . Clancy, B.E., . . May 1982, . . NTIS(U.S. Sales Only), PC A02/MF A01

ANL/FPP/TM-165 Tritium Breeding in Fusion Reactors., . . Abdou, M.A., . . October 1982, . . NTIS, PC A04/MF A01, . . Presented at the International Conf. of Nuclear Data for Science and Technology, Sept. 6-10, 1982, Antwerp, Belgium.

ATS-TUH-1081 (In German) Attenuation of Photon Beams from Radionuclides. Pt. 6., . . Dorner, R.; Vogt, H.G., . . April 1982, . . NTIS (U.S. Sales Only), PC A06/MF A01

BARC-1129 Iterative Solutions of Finite Difference Diffusion Equations., . . Menon, S.V.G.; Khandekar, D. C.; Trasi, M.S., . . 1981, . . NTIS (U.S. Sales Only), PC A09/MF A01

BNL-32212; CONF-821102-52 Physical Basis for Prompt-Neutron Activation Analysis., . . Chrien, R. E., . . 1982, . . NTIS, PC A03/MF A01, . . Portions of document are illegible.

BNL-32361; CONF-8210115-1 Brookhaven Medium-Energy Gamma-Ray Project., . . Sandorfi, A.M.; LeVine, M.J.; Thorn, C.E.; Giordano, G.; Matone, G., . . 1982, . . NTIS, PC A02/MF A01, . . Portions are illegible in microfiche products.

BNL-NCS-51572 Compilation of Requests for Nuclear Data., . . Compiled and edited by the National Nuclear Data Center., . . January 1983, . . NTIS, PC A05/MF A01

CONF-820596-3 PATHWAY: A Simulation Model of Radionuclide-Transport Through Agricultural Food Chains., . . Kirchner, T.B.; Whicker, F.W.; Otis, M.D., . . 1982, . . NTIS, PC A02/MF A01

DOE Symposium Series 55; CONF-810928 Reevaluations of Dosimetric Factors - Hiroshima and Nagasaki., . . Bond, V.P.; Thiessen, J.W. (Eds.), . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.1-5; CONF-810928, pp.1-5 Early Atomic Bomb Casualty Commission Perception and Planning., . . Friedell, H.L., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.6-24; CONF-810928, pp.6-24 Development of the Dosimetric Program, T65D Values., . . Auxier, J.A., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.25-51; CONF-810928, pp.25-51 Revised Estimates of Neutron and Gamma-Ray Doses at Hiroshima and Nagasaki., . . Loewe, W.E., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.52-97; CONF-810928, pp.52-97 Findings of Recent Oak Ridge Na-

tional Laboratory Review of Dosimetry for the Japanese Atom-Bomb Survivors., . . Kerr, G.D., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75, . . Announced previously as ORNL/TM-8078

DOE Symposium Series 55, pp.98-110; CONF-810928, pp.98-110 Yields of the Hiroshima and Nagasaki Explosions., . . Malik, J., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.111-130; CONF-810928, pp.111-130 Status of Los Alamos Efforts Related to Hiroshima and Nagasaki Dose Estimates., . . Whalen, P.P., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.131-158; CONF-810928, pp.131-158 Transport in an Air-over-Ground Environment of Prompt Neutrons and Gammas from the Hiroshima and Nagasaki Weapons., . . Pace, J.V., III; Knight, J.R.; Bartine, D.E., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.159-178; CONF-810928, pp.159-178 Delayed Radiation at Hiroshima and Nagasaki., . . Scott, W.H., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.179-200; CONF-810928, pp.179-200 Building-Transmission Factors., . . Woolson, W.A.; Marcum, J.; Scott, W.H.; Staggs, V.E., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.201-208; CONF-810928, pp.201-208 Dosimetry Studies in Japan., . . Maruyama, T.; Kumamoto, Y.; Hashizume, T., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.209-222; CONF-810928, pp.209-222 Self-Shielding Factors., . . Kaul, D.C., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.223-240; CONF-810928, pp.223-240 Biological Indicators of Radiation Quality., . . Bender, M.A.; Wong, R.M.A., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE Symposium Series 55, pp.241-266; CONF-810928, pp.241-266 Sensitivity of Hiroshima and Nagasaki Epidemiologic Inferences to Dosimetric Parameters., . . Mendelsohn, M.L.; Straume, T.; Dobson, R.L., . . Proceedings of a symposium held at Germantown, Maryland, September 15-16, 1981., . . 1982, . . Available as DE81026279 (CONF-810928) from NTIS. \$15.75

DOE/ER/52076-T1 EPFL (Swiss) Fusion-Fission Hybrid Experiment. Progress Report No.3, May 1, 1982-July 31, 1982., . . Woodruff, G.L.; Sitaramen, S., . . September 9, 1982, . . NTIS, PC A02/MF A01, . . Portions are illegible in microfiche products.

DOE/ET-51013-62; MIT/PFC/RR-82-34 Numerical Modeling of a Fast Neutron Collimator for the -ALCATOR A- Fusion Device., . . Fisher, W.A., . . December 1982, . . NTIS, PC A05/MF A01

DOE/NE-0034 Radiation Protection Enrollments and Degrees, 1979 and 1980., . . Gove, R.M.; Little, J.R.; Shirley, D.L., . . July 1981, . . NTIS, . . Portions of document are illegible.

EGG-PHYS-5890 GAUSS VII: A Computer Program for the Analysis of Gamma-Ray Spectra from Ge Semiconductor Spectrometers., . . McCullagh, C.M.; Helmer, R.G., . . October 1982, . . NTIS, PC A06/MF A01, . . Portions of document are illegible.

EGG-PHYS-6003 RAFFLE V General Purpose Monte Carlo Code for Neutron and Gamma Transport., . . Wheeler, F.J.; Easson, S.A.; Grimesey, R.A.; Wessol, D.W., . . August 1982, . . NTIS MF \$6.25. MF only., . . Illegibility does not permit PC reproduction.

EGG-PHYS-6123 Calculated Heating Rates and Tritium Production for a Conceptual Li₂O Fusion Blanket Test in PFB., . . Bohn, T.S.; Scott, A.J.; Wheeler, F.J., . . November 1982, . . NTIS, PC A03/MF A01, . . Portions are illegible in microfiche products.

EGG-PHYS-6125 Physics Calculations for Bulk-Heating Simulation in Fusion Breeding-Blanket Configurations., . . Bohn, T.S.; Miller, L.G.; Wessol, D.E., . . November 1982, . . NTIS, PC A03/MF A01

EIR-Bericht Nr. 479 Comparison of Different Fusion Nuclear Data Libraries Using the European INTOR Blanket Design., . . Pelloni, S.; Stepanek, J.; Dudziak, D., . . December 1982, . . Eidg. Institut fur Reaktorforschung Wurenlingen, Schweiz

FEI-943 (In Russian) Experimental Studies on the Spectra of Neutron and Gamma Radiation Leakage for Iron Spheres., . . Trykov, L.A.; Kolevator, Yu.I.; Nikolaev, A.N.; Burian, I.; Marek, M.; Yanskij, B.; Tikhij, M., . . 1979, . . Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk, Fiziko-Ehnergeticheskij Inst.

GA-A-16886 Magnetic Fusion Energy Program Nuclear Data Needs. Annual Report, February 1, 1982-September 30, 1982., . . Cheng, E.T.; Mathews, D.R.; Schultz, K.R., . . October 1982, . . NTIS, PC A04/MF A01

IAEA-NDS-13 (Rev.1) ENDF/B-V Actinides., . . Kocherov, N.; Lemmel, H.D., . . January 1981, . . NTIS (U.S. Sales Only), PC A05/MF A01

INDC(BZL)-6/GV Comparison of Seventeen Nuclides Cross Sections from ENDF/B-IV and ENDL/78., . . Corcuera, R.P.; Chalhoub, E.S., . . January 1983, . . IAEA Nuclear Data Section, Wagramerstrasse 5, A-1400 Vienna

INIS-mf-5888, pp.610-648 An Evaluation of Uncertainties in Radioecological Models., . . Hoffmann, F.O.; Little, C.A.; Miller, C.W.; Dunning, D.E., Jr.; Rupp, E.M.; Shor, R.W.; Schaeffer, D.L.; Baes, C.F., III., . . In: 12. Annual Meeting on Radioactivity and Environment, Norderney, Germany F.R., 2 - 8 October 1978., . . 1978, . . INIS

INIS-mf-5888, pp.696-706 Calculation of Dose-Rate Conversion Factors for External Exposure to Photons and Electrons., . . Kocher, D.C., . . In: 12. Annual Meeting on Radioactivity and Environment, Norderney, Germany F.R., 2 - 8 October 1978., . . 1978, . . INIS

IPEN-PUB-32 Dosimetric Characteristics and Radiation Monitoring with CaSO₄/(Dy):NaCl Pellets., . . Kathuria, S.P.; Campos, L.L.; Gordon, A.M.P.L., . . June 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01

JAERI-M-9601 Evaluation of Neutron Nuclear Data for ²⁴³Cm., . . Nakagawa, T.; Igarashi, S., . . July 1981, . . NTIS (U.S. Sales Only), PC A04/MF A01

JAERI-M-9649 Chart of Nuclides Relating to Neutron Activation. Second Edition., . . Okada, M., . . September 1981, . . NTIS (U.S. Sales Only), PC A02/MF A01

LA-9604-MS Gamma Rays from the Interactions of Reactor Fast Neutrons Ordered by Increasing Gamma-Ray Energy., . . Moss, C.E., . . November 1982, . . NTIS, PC A02/MF A01

LA-UR-82-3583; CONF-830304-9 Computational Methods of Electron/Photon Transport., . . Mack, J.M., . . 1983, . . NTIS, PC A02/MF A01

LA-UR-82-3602; CONF-830304-6 Streaming-Matrix Hybrid Method for Discrete-Ordinates Calculations., . . Clark, B.A., . . 1983, . . NTIS, PC A02/MF A01

LA-UR-82-3671; CONF-830304-12 TLC Scheme for Numerical Solution of the Transport Equation on Equilateral Triangular Meshes., . . Walters, W.F., . . 1983, . . NTIS, PC A02/MF A01

NASA-TP-2105 Generation of Pseudo-Random Numbers., . . Howell, L.W.; Rheinfurth, M.H., . . December 1982, . . NTIS

NP-2904532 (In German) Computation of Thermoluminescent Detector Sensitivity to Neutron Irradiation. Part 3. Sensitivity of Radiator-Detector Combinations to Fast Neutron., . . Henniger, J.; Huebner, K., . . May 19, 1980, . . NTIS (U.S. Sales Only), PC A02/MF A01, . . Portions of document are illegible.

NRPB-R46 Radiological Protection Standards in the United Kingdom., . . Pochin, E.; McLean, A.S.; Richings, L.D.G., . . September 1976, . . HMSO

NRPB-R138 Radiological Protection Aspects of Shallow Land Burial of PWR Operating Wastes., . . Pinner, A.V.; Hill, M.D., . . December 1982, . . HMSO

NUREG/CR-2832; LMF-97 Biological Characterization of Radiation Exposure and Dose Estimates for Inhaled Uranium Milling Effluents. Annual Progress Report, April 1981 - March 1982., . . Eidson, A.F., . . December 1982, . . NTIS, PC A04/MF A01 - GPO \$4.75

NUREG/CR-2891 Performance Testing of Personnel Dosimetry Services. Final Report of Test No.3., . . Plato, P.; Miklos, J., . . February 1983, . . GPO \$6.50

NUREG/CR-2892 Performance Testing of Personnel Dosimetry Services. A Revised Procedures Manual., . . Miklos, J.; Plato, P., . . February 1983, . . GPO \$7.50

NUREG/CR-2899; SAND-82-1870 Analysis of a Proposed One Thousand Dollar per Man-Rem Cost-Effectiveness Criterion., . . Strip, D.R., . . October 1982, . . NTIS, PC A02/MF A01 - GPO

NUREG/CR-2928; ORNL/TM-8500 Data Summary Report for Fission Product Release Test HI-1., . . Osborne, M.F.; Lorenz, R.A.; Travis, J.R.; Webster, C.S., . . December 1982, . . NTIS; GPO

NUREG/CR-2974; ORNL/TDMC-2 User's Manual for LPGS: A Computer Program for Calculating Radiation Exposure Resulting from Accidental Radioactive Releases to the Hydrosphere., . . White, J.E.; Eckerman, K.F., . . November 1982, . . NTIS, PC A08/MF A01, . . Portions are illegible in microfiche products.

ORNL/CSD-109 Distributions of the Standard Deviation and Skewness in Random Samples from a Gamma Density: A New Look at a Craig-Pearson Study., . . Rowman, K.O.; Shenton, L.R., . . January 1983, . . NTIS, MF A01, . . Microfiche only, copy does not permit paper copy reproduction. Original copy available until stock is exhausted.

ORNL/CSD/TM-189 SURE: A System of Computer Codes for Performing Sensitivity/Uncertainty Analyses with the RELAP Code., . . Bjerke, M.A., . . February 1983, . . NTIS

ORNL/TM-8547 Atomic Physics Processes in Radial Transport Calculations., . . Hogan, J.T., . . Lectures presented at the NATO Advanced Study Institute on Atomic and Molecular Processes in Controlled Fusion Research, Palermo, Italy, July 1982., . . February 1983, . . NTIS, PC A03/MF A01

SAND-80-1943; TTC-0239 RADTRAN II: Revised Computer Code to Analyze Transportation of Radioactive Material., . . Taylor, J.M.; Daniel, S.L., . . October 1982, . . NTIS

SAND-82-1597C; CONF-821123-11 Status of a Pulsed-Neutron Logging Probe Using a High-Purity Germanium Detector., . . Jensen, D.H.; Barnard, R.W.; Bivens, H.M.; Humphreys, D.R.; Weinlein, J.H.; Stephenson, W.A., . . 1982, . . NTIS, PC A02/MF A01

SAND-82-2230C; CONF-830304-2 Monte Carlo Benchmark Calculations of Energy Deposition by Electron/Photon Showers up to 1 GeV., . . Mehlhorn, T. A.; Halbleib, J.A., . . 1983, . . NTIS, PC A02/MF A01

SAND-82-2563C; CONF-821123-13 Factors Affecting the Operating Characteristic of the Zetatron: A Small Neutron Generator for Borehole Logging., . . Berg, R.S.; Jacobs, E.L., . . 1982, . . NTIS, PC A02/MF A01, . . Portions of document are illegible.

SAND-82-2850C; CONF-830304-5 Analysis and Elimination of the Discrete-Ordinates Flux Dip., . . Morel, J.E.; Montry, G.R., . . 1983, . . NTIS, PC A02/MF A01

SAND-82-7007 Radiation Environment and Shielding Requirements for the Sandia Particle Beam Fusion Accelerator PBFA-II., . . Dupree, S.A., . . February 1982, . . Los Alamos Technical Associates, Inc., P.O. Box 410, Los Alamos, NM 87544

UCID-19601 Fusion-Breeder Program., . . Moir, R. W., . . November 19, 1982, . . NTIS, PC A05/MF A01

UCRL-15515 MARS High-Temperature Blanket., . . Gordon, J.D.; Berwald, D.H.; Flanders, B.A., . . December 1982, . . NTIS, PC A02/MF A01

Health Phys., 44(2), 103-114 Analytical Modeling of Thermoluminescent Albedo Detectors for Neutron Dosimetry., . . Glickstein, S.S., . . February 1983

Kenchiku Kenkyusho Nenpo., 1977, 667-668 (In Japanese) Design of Labyrinth Systems for Radiation Shielding. Gamma-Rays Backscattered from Various Materials., . . Ito, K., . . November 1978

Nucl. Instrum. Methods, 204(1), 179-189 Light Output and Response Function of an NE-213 Scintillator to Neutrons up to 100 MeV., . . Uwamino, Y.; Shin, K.; Fujii, M.; Nakamura, T., . . December 15, 1982

Nucl. Instrum. Methods, 205(1,2), 211-218 Monte Carlo Calculation of Peak Efficiencies of Ge(Li) and Pure Ge Detectors to Voluminal Sources and Comparison with Environmental Radioactivity Measurement., . . Nakamura, T.; Suzuki, T., . . January 15, 1983

Nucl. Technol./Fusion, 3(2), 165-180 Bulk Shield Design for Neutron Energies Below 50 MeV., . . Carter, L.L., . . March 1983

Semento Konkurito, No.389, 38-45 Construction of Radiation Shielding Wall with Superheavy Concrete., . . Suzuki, T.; Baba, T.; Abe, K., . . July 1979

Technol. Rep. Tohoku Univ., 43(2), 409-421 An Improvement of the Treatment of Anisotropic Scattering in Neutron Transport Calculation., . . Nakaya, R.; Tsunoda, H.; Kanda, K.; Hirakawa, N., . . December 1978

Thesis Two Improved Monte Carlo Photon Cross Section Techniques., . . Scudiere, M.B., . . University of Virginia, Charlottesville, VA, . . 1978, . . University Microfilms Order No. 79-16,307

BOOK, pp.1-10 Chapter 1. Introduction., . . Weisbin, C.R., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.11-84Chapter 2. Uncertainty in the Nuclear Data Used for Reactor Calculations., . . Peele, R. W., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.85-157 Chapter 3. Computational Methodology and Associated Uncertainties., . . Kujawski, E.; Weisbin, C.R., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.159-192Chapter 4. Integral Experiment Information for Fast Reactors., . . Collins, P.J., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.193-246Chapter 5. Sensitivity Functions for Uncertainty Analysis., . . Greenspan, E., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.247-312Chapter 6. Combination of Differential and Integral Data., . . Marable, J.H.; Weisbin, C.R.; de Saussure, G., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.313-361Chapter 7. New Developments in Sensitivity Theory., . . Greenspan, E., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

BOOK, pp.363-367Chapter 8. Summary., . . Weisbin, C.R., . . From: ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY, VOLUME 14. Lewins, J.; Becker, M. (Eds.), . . 1982, . . Plenum Publishing Corporation

COMPUTER CODES LITERATURE

AAEC/E-539 ANAUSN
ANAUSN - A One-Dimensional Multigroup SN Transport Theory Module for the AUS Reactor Neutronics System., . . Clancy, B.E., . . Australian Atomic Energy Commission Research Establishment, Lucas Heights, . . May 1982, . . AVAIL: NTIS (U.S. Sales Only)

Ann. Nucl. Energy, 8(11-12), 581-596 FE3DPO
Application of the Finite Element Method to the Solution of Radiation-Shielding Problems., . . Grenfell, D.T., . . British Nuclear Fuels Ltd., Risley, . . 1981

CONF-820596-3 PATHWAY
PATHWAY: A Simulation Model of Radionuclide-

Transport Through Agricultural Food Chains., . . Kirchner, T.B.; Whicker, F.W.; Otis, M.D., . . Colorado State University, Fort Collins, CO, . . 1982, . . AVAIL: NTIS

EGG-PHYS-5890 GAUSS VII
GAUSS VII: A Computer Program for the Analysis of Gamma-Ray Spectra from Ge Semiconductor Spectrometers., . . McCullagh, C.M.; Helmer, R.G., . . EG and G Idaho, Inc., Idaho Falls, ID, . . October 1982, . . AVAIL: NTIS

DOE/TIC-11264 NUFACTS
NUFACTS-Nuclear Fuel Cycle Activity Simulator: Reference Manual. Final Report., . . Triplett, M.B.; Waddell, J.D.; Breese, T.A., . . Battelle Columbus Labs., OH, . . August 1978, . . AVAIL: NTIS

FOA-C-20321 KVAST
KVAST - A Computer Program for Calculation of the Radiation Protection Offered by Buildings Against Residual Radiation., . . Elvers, E.; Nilsson, M.; Danielson, G., . . Foersvarets Forskningsanstalt, Stockholm, Sweden, . . August 1979

KfK 2129 FANAL
FANAL - A Multi-Level Shape-Analysis Program for Resonance Parameter Determination by Least-Squares Fitting of Several Sets of Neutron Transmission Data Simultaneously., . . Frohner, F. H., . . Institut fur Neutronenphysik und Reaktortechnik, Kernforschungszentrum Karlsruhe, . . August 1976

KfK 2145 FANAC
FANAC - A Shape Analysis Program for Resonance Parameter Extraction from Neutron Capture Data for Light and Medium-Weight Nuclei., . . Frohner, F.H., . . Institut fur Neutronenphysik und Reaktortechnik, Kernforschungszentrum Karlsruhe, . . July 1978

KfK 2832/I NITRAN
Fast Rigorous Numerical Method for the Solution of the Anisotropic Neutron Transport Problem and the NITRAN System for Fusion Neutronics Application, Part I., . . Takahashi, A.; Rusch, D., . . Institut fur Neutronenphysik und Reaktortechnik, Kernforschungszentrum Karlsruhe, . . July 1979

KfK 2832/II NITRAN
Fast Rigorous Numerical Method for the Solution of the Anisotropic Neutron Transport Problem and the NITRAN System for Fusion Neutronics Application, Part II., . . Takahashi, A.; Rusch, D.,

- . . . Institut für Neutronenphysik und
Reaktortechnik, Kernforschungszentrum
Karlsruhe, . . . July 1979
- LA-7596-PR, 20-25ERRFILS
ERRFILS: A Preliminary Library of 30-Group
Multigroup Covariance Data for Use in CTR
Sensitivity Studies., . . LaBauve, R.J.; Muir, D.W.,
. . . Los Alamos Scientific Lab., Albuquerque, NM, .
. 1978
- NUREG/CR-0200-Vol.2-Bk.3, 27JUNEBUG
JUNEBUG: Three Dimensional Geometry Plotting
Code., . . Union Carbide Corporation, Oak Ridge,
TN, . . 1982, . . AVAIL: NTIS
- ORNL/CSD/TM-189 SURE; RELAP
SURE: A System of Computer Codes for
Performing Sensitivity/Uncertainty Analyses with
the RELAP Code., . . Bjerke, M.A., . . Oak Ridge
National Laboratory, TN, . . February 1983, . .
AVAIL: NTIS
- ORNL/CSD/TM-192 KENO
The Optimization of Russian Roulette Parameters
for the KENO Computer Code., . . Hoffman, T.J.,
. . Oak Ridge National Laboratory, TN, . . October
1982
- PEL-278 PELSHIE
Testing of the PELSHIE Shielding Code Using
Benchmark Problems and Other Special Shielding
Models., . . Language, A.E.; Sartori, D.E.; De Beer,
G.P., . . Atomic Energy Board, Pretoria, South
Africa, . . August 1981
- Radiat. Res., 79(1), 1-21 PION-1
PION-1: A Monte Carlo Computer Program for
Calculations with Negative Pion Beams., . . Wright,
H.A.; Hamm, R.N.; Turner, J.E., . . Oak Ridge
National Laboratory, TN, . . July 1979
- REL/R-(78)36 SNUG
SNUG: A FORTRAN Program to Calculate
Radiation Levels From a Point, Line or Cylindrical
Source., . . Roberts, G.D., . . General Electric
Company, Whetstone, UK, . . November 1978
- SAND-80-1943; TTC-0239 RADTRAN II
RADTRAN II: Revised Computer Code to Analyze
Transportation of Radioactive Material., . . Taylor,
J.M.; Daniel, S.L., . . Sandia National Laboratory,
Albuquerque, NM, . . October 1982, . . AVAIL:
NTIS
- SAND81-1251 CHART D
New Features and Revised Input Instructions for
CHART D., . . McGlaun, J.M., . . Sandia National
Laboratory, Albuquerque, NM, . . November 1981
- ZfK-364 OMEGA
The Monte Carlo Criticality Code OMEGA., . .
Seifert, E., . . Zentralinstitut für Kernforschung
Rossendorf, Bei Dresden, East Germany, . . October
1978