RSIC Newsletter

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The greatest and noblest pleasure which men can have in this world is to discover new truths; and the next is to shake off old prejudices.)Frederick the Great

Advances in Mathematics, Computations, and Reactor Physics

The International Topical Meeting of the American Nuclear Society (ANS) Mathematics and Computation Division, the Reactor Physics Division, and the Pittsburgh Section will be held in Pittsburgh, April 28!May 2. Strong international participation is encouraged by the co-sponsorship of the Canadian Nuclear Society, the European Nuclear Society, and the Atomic Energy Society of Japan. Evidence of the success of this sponsorship is borne out by the fact that almost 40% of the contributed papers and computer code abstracts come from 24 countries outside the United States. The 218 contributed papers and 54 computer code abstracts form the foundation of a strong technical program plan. The technical program will open with a Plenary Session entitled "Perspectives on Advances in Supercomputing Performance," which will focus on where supercomputing will be a decade from now.

The Plenary Session will be followed by 3½ days packed with 51 technical sessions and 6 parlor/poster sessions. Several sessions should be of particular interest to RSIC readers. Technical sessions on discrete ordinates methods, Monte Carlo methods, nodal transport methods, validation of reactor physics methods and parameters, deterministic transport methods, nodal method for diffusion theory, numerical methods in transport theory, charged particle and radiation transport, and validation of nuclear data and methods will be covered during the conference. Entire poster sessions are devoted to Transport Theory Codes, Monte Carlo and Collision Probability Codes, and to Reactor Physics Codes.

A varied and attractive guest program is planned for those who accompany the conference participants. Guest registration includes the Sunday reception, Wednesday banquet, and continental breakfast and orientation on Monday morning.

Further information about the technical program may be obtained from I. K. Abu-Shumays, Bettis Atomic Power Lab., P.O. Box 79, ZAP 34F, West Mifflin, PA 15122-0079 (phone 412-476-6469).

CHANGES TO THE COMPUTER CODE COLLECTION

Fifteen additions or changes were made to the computer code collection during the month. Twelve new code systems were packaged and added to the collection, two existing code packages were extended with additional hardware versions, and one code package was updated. Ten changes resulted from foreign contributions.

CCC-311/MARC-PN

The United Kingdom Atomic Energy Authority, Risley, Warrington, England, through the OECD Nuclear Energy Agency (NEA) Data Bank, Gif-sur-Yvette, France, contributed the original version of MARC-PN, denoted as CCC-311, written in FORTRAN IV and Assembler for the ICL 2982 and IBM 3081. The NEA Data Bank has adapted the code to run on the VAX 8810 using the FORTRAN 77 compiler under the VAX/VMS Version 5.1-1 operating system. MARC-PN solves the multigroup diffusion or neutron transport equation in most geometries. The code has a finite element option so that irregular problems can be accommodated. Input may be taken from various cross section libraries such as FD5 (developed by UKAEA for fast reactor studies), those in the SCALE package, or the shielding sets CASK and EURLIB. A comprehensive set of post edits is available including perturbation calculations, reaction rate evaluations and burn-up changes for fuel management. Version A for the ICL 2982 and IBM 3081 is available on one 1600- or 6250-bpi tape. Version B for the VAX 8810 is available on one DS/HD 5.25-inch diskette. Reference: TRG Report 2911(R), ND-R-560(R), TRG Report 2344(R), TRG Report 2547(R), TRG Report 2849(R). FORTRAN IV and Assembler, IBM 3081, ICL 2982 (A); FORTRAN 77, VAX 8810 (B).

CCC-336/ASFIT-VARI

Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, provided an update to the PC version of ASFIT-VARI, originally contributed by the Indira Gandhi Centre for Atomic Research, Kalpakkam, India. ASFIT-VARI solves problems of gamma-ray transport in slab geometry. The method is applicable to energy-dependent, multiregion radiation transport with an arbitrary degree of anisotropy. Buildup factors and energy-angular distributions at the spatial mesh points are calculated and printed. The update to ASFIT-VARI involves a few program changes in the FORTRAN 77 statements to avoid the "type mismatch" errors. A correction was also made in subroutine ASF2. The variables PPS and PPB are needed in the calling sequence. This affects annihilation sources generated in subroutine SECSOR. The executable code was compiled and linked with Microsoft FORTRAN Version 5.0 and requires a math coprocessor under DOS 3.3. The Microsoft FORTRAN metacommand "$LARGE" was added to accommodate 3-dimensional, adjustable size arrays to get 32-bit addressing. Alternatively, one can use Ryan MacFarland FORTRAN; in compiling, the use of the "/b" switch for adjustable arrays is necessary. There was no change made to CCC-336A, the mainframe version. The PC version, CCC-336B, is transmitted on one DS/HD 5.25-inch diskette. Reference: Informal Notes, *Nucl. Sci. Eng.*, 43, 186!196 (1971); *Nucl. Sci. Eng.*, 43, 197!211 (1971); *Nucl. Sci. Eng.*, 52(4), 494!498 (1973); *Nucl. Sci. Eng.*, 81, 172!195 (1982). FORTRAN 77, IBM 3033, Data General MV family (A); IBM PC (B).

CCC-548/KENO5A

Battelle, Columbus, Ohio, contributed a PC 386 and 486 version of KENO5A, designated as CCC-548B. Science Applications International Corp. (SAIC), Oak Ridge, Tennessee, also contributed a version which runs on a PC with a Definicon board equipped with a 33 MHz Motorola 68030 processor and a 68882 math coprocessor, designated CCC-548C. CCC-548B and CCC-548C are derived from CCC-548A, a PC version contributed by Idaho National Engineering Laboratory. All versions are written in FORTRAN 77. KENO5A-PC solves the three-dimensional Boltzmann transport equation for neutron multiplying systems. Other calculated

quantities include lifetime and generation time, energy-dependent leakages, energy- and region-dependent absorptions, fissions, fluxes, and fission densities. Version (B) requires a PC 386 (with a 387 coprocessor) or PC 486 with at least 4 Mb of extended memory and a 20-megabyte hard disk. The compiler used is Lahey F77-EM/32 version 3.01 with Lahey/Ergo OS/386 extended memory operating system version 2.1.04 under the DOS 3.3 operating system. Version C requires the Silicon Valley Software FORTRAN version 2.8. Version (A) is distributed on three DS/HD 5.25-inch diskettes. Version (B) and (C) are each distributed on one DS/HD 5.25-inch diskette. Reference: ORNL/NUREG/CSD-2/R2. FORTRAN 77, IBM PC (A); PC 386 and PC 486 (B); PC with a Definicon board, Motorola 68030 processor (C).

CCC-570/REFREP

The Technical Research Center of Helsinki, Finland, through the NEA Data Bank, France, contributed REFREP, originally written for a Microvax II under VMS 4.7, and adapted to run on a VAX 8810. On the VAX 8810, the compiler used was VAX FORTRAN under the VMS version 5.1 operating system. REFREP calculates mass flows of corroding species and radionuclides (actinides) in the near-field of a canister in a crystalline rock repository. Inventories and release rates are calculated as a function of time for a given initial inventory. Species are assumed to diffuse through the backfill and to be carried by the groundwater flowing in rock fissures around the disposal hole. Congruent as well as non-congruent release from the fuel matrix can be considered. Release rates from canisters can be summed up using different probability distributions for canister breaching times. REFREP is divided into different subroutines performing specific tasks. UPDATE allows for the viewing and updating of the data files. CORRFLUX calculates the breaching times of canisters. INVENT calculates actinide inventories from decay chains. ELEMENT calculates elemental inventories of actinides. CONGRUENT calculates nuclide release rates according to congruent release. SENSIT performs sensitivity analysis of one variable. PROBREL sums release rates from individual canisters according to given probability distributions of canister breaching times. DATAOUT forms a compact data file including all input values. REFREP runs on the VAX 8810. The code is transmitted on one DS/DD 5.25-inch diskette. Reference: YJT-88-07, Helsinki, Finland, May 1988; Workshop paper) Workshop on Artificial Clay Barriers for High Level Radioactive Waste Repositories, Lund, Sweden, October 5!7, 1988. FORTRAN 77, VAX 8810.

CCC-571/SACHET

The University of Tokyo, Japan, through NEA Data Bank, France, developed SACHET on the Hitachi M-280 computer, using FORTRAN IV language. The NEA Data Bank converted the code to run on a VAX 8810 compiled with VAX FORTRAN under the VMS version 5.1 operating system. SACHET evaluates the dynamic fission product (FP) inventories in the multiple compartment system of pressurized water reactor plants, utilizing a matrix of the fission product core inventory obtained from the ORIGEN2 code (CCC-371). In normal operation, operating power equilibrium FP source terms and escape rates are used. Iodine spiking phenomena after reactor shutdown are also considered. A source term of the FP inventories in the secondary system is considered. This is the leakage of the radioactive FPs from the primary coolant through a steam generator defect. Accidental air containment systems are included to reduce the activities of the containment atmosphere. The code is transmitted on one DS/HD 5.25-inch diskette. Reference: informal document; *J. Nucl. Sci. Technol.*, (22:10), 802!817, October 1985. FORTRAN IV, VAX 8810.

CCC-572/DIFMOD

The Institut f. Nukleare Entsorgungstechnik, KFK, Karlsruhe, Germany, through the NEA Data Bank, France, contributed DIFMOD, written in FORTRAN 77 for the IBM 3081. The NEA Data Bank tested the code on an IBM 3083 under the MVS/XA operating system. DIFMOD calculates

the leaching of radionuclides and the corrosion of cemented waste forms in contact with water or brine. DIFMOD computes the behavior of specimens in the laboratory-scale experiments and provides a forecast of the behavior of waste forms in the case of an accidental drowning of a repository. The mathematical formalism describes leaching and corrosion on the basis of diffusion and dissolution processes and of the chemical reactions by corrosion. The code was written in FORTRAN 77. On the IBM 3083, the compiler used was VS FORTRAN under the MVS/XA operating system. The code is transmitted on one DS/HD 5.25-inch diskette. Reference: KFK-3905, (in German). FORTRAN 77, IBM 3081, IBM 3083.

CCC-573/PKI

The Southwest Center for Reactor Engineering Research and Design, Chengdu, Sichuan, People's Republic of China, through the NEA Data Bank, France, contributed a new point kernel integration code for radiation shielding of a loop system. PKI solves the radiation shielding problem of gamma-ray transport in geometric space by the point kernel integration method. The geometry is described by using the geometric space configuration method. PKI considers right circular cylinder surface source, ring surface source, spheroidal right angle cone surface source, and ellipsoidal right angle cone surface source. The surface source in general is not isotropically distributed. The coolant volume source includes N-16 decay gamma radiation source, and fission product and corrosion product decay gamma radiation sources. The coolant volume source is isotropic. The nuclear data library has gamma-ray linear mass attenuation coefficients from 92 elements and 8 shielding materials and 20 energy ranges. PKI uses the polynomial buildup factor as given by M. A. Capo.[1] PKI runs on the CDC Cyber 180 and 830. The code was written in FORTRAN IV. On the CDC Cyber 830, the compiler used was FTN 5.1 under the NOS 2.1 operating system. The code is transmitted on one DS/DD 5.25-inch diskette. Reference: IAEA1172, December 13, 1989. FORTRAN IV, CDC Cyber 180 and 830.

CCC-574/PRISIM

JBF Associates, Knoxville, Tennessee, and ORNL, contributed the Plant Risk Status and Information Management System (PRISIM). PRISIM allows inspectors to quickly access probabilistic risk assessment (PRA) information and use it to update risk analysis results, reflecting a nuclear plant's status at any time. PRISIM also allows regulators to access PRA information and modify the information to assess the impact the changes may have on plant safety. The PRA results in PRISIM are based on core damage frequency. PRISIM does not incorporate the results of assessments of plant damage, containment responses, or public health consequences. Only point estimate PRA results are presented. Many of the results in PRISIM do not reflect the effects of operator recovery actions. Recovery actions are actions that operators can take to maintain core cooling during accidents involving failures of the designed emergency cooling system. PRISIM runs on the IBM PC and compatibles with a math coprocessor, 640K of memory, and EGA or VGA graphics. Only the executable programs and command files are included. The code was written in C and Modula 2. PRISIM will run under DOS 2.1 or higher operating system. The code is transmitted on two DS/HD 5.25 diskettes. Reference: NUREG/CR-5021 (vol. 1), ORNL/TM-10604/V1; NUREG/CR-5021 (vol. 2), ORNL/TM-10604/V2. C and Modula 2 language; IBM PC.

CCC-575/GENP-2

Nucleare Italiana Reattori Avanzati, Genova, Italy, through NEA Data Bank, France, contributed GENP-2, a system of programs that uses generalized perturbation theory to calculate perturbation of reactor integral characteristics expressed as ratios of linear and bi-linear functionals of the real and adjoint fluxes due to cross section perturbations. GENP-2 consists of the following codes: DDV, SORCI, CIAP-PMN, and GLOBP-2D. DDV calculates the real or adjoint fluxes and power distributions using multigroup diffusion theory in two dimensions; SORCI uses the fluxes from DDV to calculate the real or adjoint general perturbation sources; CIAP-PMN reads the sources from SORCI and uses them in the two-dimensional calculation of real or adjoint generalized importance

functions; and GLOBP-2D uses the importance calculated by CIAP-PMN and the fluxes calculated by DDV, in generalized perturbation expressions, to calculate the perturbation in the quantity of interest. GENP-2 runs on the IBM 3090 and VAX 8810. The IBM 3090 version was compiled using VS FORTRAN Level 2.1.1 under MVS/XA; the VAX 8810 was compiled using VAX FORTRAN (version 5.0-1) under VAX/VMS 5.1. The code is transmitted on one DS/HD 5.25-inch diskette. Reference: SEC-I-01-03 (in Italian); SEC-I-01-04 (in Italian); SEC-I-01-05 (in Italian); SEC-I-01-06 (in Italian). FORTRAN IV, IBM 3090, VAX 8810.

CCC-576/WIMS-D4

The Atomic Energy Establishment, Winfrith, Dorchester, England, through NEA Data Bank, France, contributed WIMS-D4, a general lattice cell program which uses transport theory to calculate flux as a function of energy and position in the cell. WIMS-D4 first calculates spectra for a few spatial regions in the full number of energy groups of its library, and uses these spectra to condense the basic cross-sections into few groups. A few-group calculation is then carried out using a more detailed spatial representation. The resulting fluxes are then expanded using the spectra of the previous calculation, so that the reaction rates at each spatial point can be calculated in the library group structure. The basic geometries treated are: homogeneous, slab array, regular rod arrays, rod-clusters in cylindrical geometry, and finite cylinders in r-z geometry. In addition to the basic cell calculation, the program may be used to carry out burnup calculations and to solve multicell problems. A 69-group data library is included. WIMS-D4 (A) runs on the VAX 8810 and IBM 3090. Version (B) runs on a PC 386 with 640K main memory, a minimum of 1 megabyte of extended memory, a math coprocessor, and a hard disk. The IBM 3090 version was compiled using VS FORTRAN 2.1.1 under the MVS/XA operating system. The VAX 8810 version was complied using VAX FORTRAN under VAX/VMS 5.0-1. The PC 386 version was compiled with NDP-FORTRAN-386 version 1.4vm, Phar Lap 386LINK linker version 2.0, Phar Lap RUN386 version 2.0, Phar Lap 386ASM assembler version 2.0 and Phar Lap 386 VMM driver for 386 under the MS-DOS version 3.2 operating system. The mainframe version (A) is distributed on four DS/HD 5.25-inch diskettes. The PC 386 version (B) is distributed on two DS/HD 5.25-inch diskettes. Reference: NEA Data Bank informal notes; AEEW-R-538, AEEW-M-845, AEEW-M-1324, AEEW-M-1327, AEEW-M-1782, AEEW-M-1785, AEEW-M-856, AEEW-M-1783, AEEW-M-1832, RTE01-2/2-046, IJS-DP-5729. FORTRAN 77, IBM 3090, VAX 8810 (A); PC 386 (B).

CCC-577/ALDOSE

Oak Ridge National Laboratory, contributed ALDOSE for the VAX, Data General MV/family, IBM PC, IBM PC/XT, and IBM PC/AT computers. ALDOSE calculates the absorbed dose rate, dose-rate equivalent rate, and dose-weighted LET as functions of depth in water irradiated by a uniform alpha disk source. In addition, the average LET and average quality factor for the irradiated water are computed. The source may have a layer of gold, and may be separated from the water by a layer of Mylar. The source may have up to 12 source energies up to 15 MeV. Output data are tabulated as histograms and graphs in files which can be accessed by the user for further processing. Calculations are based on range-energy tables for alpha rays in gold, Mylar, and water and employ ray tracing. Quality factors are based on ICRP Publication 26. The average LET in a subslab is used to assign a quality factor for the dose that the alpha particle delivers there. ALDOSE runs on the IBM PC and compatibles with a math coprocessor. It was developed on a MicroVax II and tested on a VAX 6000 (VMS) and Data General MV/4000 (AOS/VS). The code was compiled and linked on the IBM PC with Microsoft Version 5.0. ALDOSE is transmitted on one DS/DD 5.25-inch diskette. Reference: ORNL/TM-11618. FORTRAN 77, VAX family, Data General MV family, IBM PC, IBM PC/XT, IBM PC/AT.

CCC-578/BCG

Instituto de Estudos Avançados, São José dos Campos, São Paulo, Brazil, contributed BCG for the CDC 170/750. BCG calculates the space-energy neutron flux distribution and effective multiplication

factor of fast-reactor multiregion cylindrical cells. It makes no simplifying assumptions on mathematical models used in ENDF/B-IV to describe anisotropy and secondary neutron emission, thereby providing rigorous treatment of evaluated data. BCG solves a set of balance equations iteratively and interfaces current relations at each energy point in a grid which is the union of the individual cross section energy grids of the materials in the system and at an arbitrary number of annular zones. BCG runs on the CDC Cyber 170/750. The code was written in FORTRAN IV under the NOS 2.5 operating system. The code is transmitted on three DS/HD 5.25-inch diskettes. Reference: IEAv-001/88. FORTRAN IV, CDC Cyber 170/750.

PSR-284/NUFACE

Oak Ridge National Laboratory, contributed the code NUFACE for Cray supercomputers. NUFACE calculates nuclear responses, such as first wall and toroidal field coil irradiation damage limits, the tritium breeding ratio, the helium and hydrogen production rates, and the fast neutron fluence for a given tokamak fusion reactor. NUFACE computes nuclear response rates using the scalar and angular neutron fluxes computed by the ONEDANT code (CCC-547) and the MACKLIB-IV (DLC-060) response functions. The response function library is converted to binary form by CRESPLIB. Calculation of the zone-integrated response rates is performed by multiplying the neutron (gamma) flux at a given position by the response function of interest and summing over all constituents and fine-mesh cells within the zone. Zone-boundary responses are calculated by multiplying the zone-boundary flux by the response functions. The code runs under both CTSS and UNICOS operating systems. Under UNICOS, the CFT77 compiler is used. NUFACE is transmitted on two DS/HD 5.25-inch diskettes. ONEDANT is in the CCC-547/TWODANT-SYS package. Reference: ORNL/FEDC-90/2. FORTRAN 77, Cray computers.

PSR-296/NJOY-UTIL-EIR

The Swiss Federal Institute for Reactor Research, Würenlingen, Switzerland, through NEA Data Bank, France, contributed new utility programs for NJOY (6/83). Note that RSIC currently distributes PSR-171/NJOY89; the utilities apply to the 6/83 version of NJOY and not to the current one. The eight modules in the system have the following functions: collapsing of groupwise files, combining ENDF/B formatted files, separation of one file, plotting of cross sections or differences between two cross section files, and combining ACE cross section files. NJOY-UTIL-EIR runs on the CDC Cyber 825. The graphics routine uses the CALCOMP plotter for the CDC EMOS system. The code is transmitted on one DS/HD 5.25-inch diskette. Reference: EIR-Bericht Nr. 566, FORTRAN IV, CDC Cyber 825.

PSR-297/AXMIX-PC

The Technical University of Prague, Czechoslovakia, contributed a PC version of PSR-75/AXMIX, based on the IBM 360/370 version. AXMIX-PC is written in FORTRAN 77 and Assembler Language for the IBM PC, IBM PC/XT, IBM PC/AT, and PC 386. AXMIX provides a fast, simple, and economical tool for creating cross-section data sets for ANISN and DOT from cross-section sets already available on cards, nuclide-organized libraries, and group-independent data sets. Numerous options including adjointing, P_n adjustments, changing table length, mixing, transport corrections of ANISN-type cross sections, and management of cross-section data sets and libraries are available. The differences between the mainframe and PC version are: the FBSAM routines were replaced by PC Assembler subroutines; printed output for the PC monitor is on 80 column lines; run-time memory allocation is introduced using Assembler routines (this replaces the ALOCAT routine in the mainframe version). The code was compiled with Microsoft FORTRAN Version 5.0 and MASM Version 5.10 under the DOS 3.3 operating system. AXMIX-PC is transmitted on one DS/DD 5.25-inch diskette. Reference: Informal Notes, Technical University of Prague; ORNL/TM-5295; ORNL/TM-5296; Informal Notes, ORNL (November 1975). FORTRAN 77; IBM PC, IBM PC/XT, IBM PC/AT, PC 386.

CHANGES TO THE DATA LIBRARY COLLECTION

Six new data libraries were added to the collection during the month. All of the changes resulted from foreign contributions.

DLC-095/WIMSLIB-JEF87

The Swiss Federal Institute for Reactor Research, Würenlingen, Switzerland, through NEA Data Bank, France, contributed a JEF/EFF 69-neutron group based data library. The Joint European File (JEF), administered by the NEA, is a computer-readable repository of neutron and photon data in the energy range up to 20 MeV. Together with the recently evaluated fusion file (EFF), it is rapidly becoming the standard European data source for thermal reactors, fast reactors, fusion, shielding and controlled thermonuclear analysis. The file has evolved through several updates, the current one being called JEF-1. A new multigroup nuclear data library based on JEF/EFF was generated for general applications. The 69-group cross sections can be read into the transport code WIMS-D. WIMSLIB-JEF87 is based on the 70-group WIMS-BOXER GENDF library which contains P1 neutron data pertaining to 100 JEF-1 nuclides and 19 JEF-1.1 nuclides. NJOY (6/83) modules have been used to reformat the resulting GENDF file into MATXS format. A computer code, CONVERT, is included to convert the Winfrith coded data library to binary form and vice versa. The data are transmitted on one DS/HD 5.25-inch diskette. Reference: EIR-Bericht Nr. 636; Informal Report, Swiss Federal Institute for Reactor Research.

DLC-147/WIMSLIB-IJSO

The University of Ljubljana, Yugoslavia, through NEA Data Bank, France, contributed an extended version of the WIMS library, WIMSLIB-IJSO. It is a result of the feasibility study to update and extend the WIMS library. The library is based on the WIMS-D4 data. The following materials were added to WIMS-D4 to produce WIMSLIB-IJSO: hydrogen (3001), plutonium 241 (1241), uranium 235 (1235), uranium 238 (3238), silver 107 (107), silver 109 (1109), cadmium (1112), indium 115 (1115). These materials have been tested in reactor calculations and the results proved satisfactory. Several materials were also deleted from the original library to reduce the size of the data. These are: hydrogen (4001), deuterium (4002), deuterium (5002), deuterium (8002), deuterium (9002), boron 10 (1010), natural boron (1011), thorium 232 (232), thorium 232 (1232), uranium 233 (233), uranium 238 (238), uranium 238 (1238), plutonium 239 (239), plutonium 239 (1239), plutonium 239 (2239) and plutonium 241 (240). The WIMSLIB-IJSO data library can be used for PWR calculations. The groups constants data are based on the FEDGROUP library, generated by the FEDGROUP-C program (RSIC designation PSR-194) from evaluated library in ENDF/B, UKNDL or KEDAK format. In the thermal region, FLANGE-AE is used. The FLANGE-AE results were converted into FEDGROUP format. The program WRITER is included to convert the data into binary form. The data were tested on a VAX 8810 under the VAX/VMS 5.0 operating system. The data are transmitted on one DS/HD 5.25-inch diskette. Reference: INDC(YUG)-008(L), IJS-DP-5061, IJS-DP-4790.

DLC-148/MATXS-JEF87

The Swiss Federal Institute for Reactor Research, Würenlingen, Switzerland, through NEA Data Bank, France, contributed a 70-group neutron data library in MATXS format based on the JEF data. The MATXS70-JEF87 library can be read into the codes TRANSX-CTR (PSR-206) or TRAMIX, which read nuclear data from a MATXS library and produce problem specific transport tables compatible with many discrete ordinates and diffusion codes. MATXS70-JEF87 is based on the 70-group WIMS-BOXER GENDF library which contains P1 neutron data pertaining to 100 JEF-1 nuclides and 19 JEF-1.1 nuclides. The energy structure of the WIMS-BOXER library consists of the standard 69 WIMS structure and one additional group from 10 MeV to 14.918 MeV. NJOY (6/83) modules have been used to reformat the resulting GENDF file into MATXS format. A computer code, BBC, is in-

cluded to convert the data library to binary form and vice versa. The data can be used on the VAX family of computers. A total of about 28 megabytes of disk storage is required. The library is transmitted on eight DS/HD 5.25-inch diskettes. Reference: EIR-Bericht Nr. 636. FORTRAN 77, VAX 8810.

DLC-149/SCALE-LIB

ENEA, Bologna, Italy, through NEA Data Bank, France, contributed a 219-neutron group library in the AMPX Master Library Interface format. PSR-63/AMPX-II is required to process the data library. The data library evolved through a recommendation of the OECD International Criticality Working Group which suggested the validation of JEF-1 (Joint European File) data in the Paris meeting of 1986. The AMPX-II code system was chosen as the application code. A neutron library was designed at ENEA to be generated by means of the appropriate AMPX-II modules, starting from the basic JEF-1 data. The neutron cross section libraries can be read into transport codes like ANISN and XSDRNPM. The Master Library Interface (MLI) format of the neutron data is relatively problem independent. To obtain a problem-dependent library, that is a Working Library Interface (WLI), the module NITAWL in the AMPX-II system can be used. NITAWL reads the MLI format of the SCALE-LIB, performs resonance self-shielding calculations, and translates the multigroup cross sections into the WLI format, which ANISN or XSDRNPM can read. The cross section data were processed on an IBM 3090. Reference: JEF-DOC-181. IBM 3090.

DLC-150/VITAMIN-J/KERMA

ENEA, Bologna, Italy, through NEA Data Bank, France, contributed the EFF-1 based data library VITAMIN-J/KERMA. While processing the EFF-1 data in order to obtain a 175-neutron, 38-gamma group library, GEFF-1, gas production cross sections, neutron and photon kerma factors were also computed. These comprise the new VITAMIN-J/KERMA library. The cross section data and kerma factors are written in the FOURACES (PSR-183) format. For the gas production cross sections, the lump reactions 203 to 207 included in EFF-1 were assumed as the basis of the computation. The neutronic kerma factors were calculated through the THEMIS module KERMA. The photonic kerma factors were computed from the DLC-99/HUGO library of gamma interaction data through the THEMIS module GROUPG. Some neutronic kerma factors appeared to be doubtful because of threshold values not exactly stated in EFF-1; these data have been discarded. Reference: Informal notes; JEF/DOC-152; JEF/DOC-150; JEF/DOC-151. IBM 3090.

DLC-151/MATXS175/42-JEF87

The Swiss Federal Institute for Reactor Research, Würenlingen, Switzerland, through NEA Data Bank, France, contributed the 175-neutron, 42-photon multigroup VITAMIN-J structure data library in MATXS format. The coupled neutron-photon multigroup library was chosen to give a fine representation of the fast and epithermal neutron energy for fusion blanket and shielding analysis. The VITAMIN-J 175-neutron energy group structure has the same boundaries as the 174-group VITAMIN-E (DLC-113) structure but with an additional boundary taken from the VITAMIN-C (DLC-041) structure at 12.84 MeV. The 42-photon energy group structure contains the energy boundaries of the 38-group VITAMIN-E photon energy structure and the break points: 50, 30, 1.34 MeV, and 1 keV. The neutron ENDF data for the isotopes were taken from JEF-1, JEF-1.1, EFF-1, and ENDF/B-4. The original EFF-1 lead data were written in ENDF/B-VI and contain double differential scattering. The processed groupwise lead data do not include all features of the evaluated scattering laws. The ENDF/B-V photon interaction data were taken from the DLC-99/HUGO package, reconstructed with the module RECONR of NJOY (PSR-171) and put into multigroup form using GAMINR. The GENDF of the neutron energy structure and the 42-photon energy structure have been put into the MATXS format. NJOY (6/83) modules have been used to reformat the resulting GENDF file into MATXS format. The MATXS file is a generalized cross section library in a flexible format similar to the CCCC standard cross section file ISOTXS. The program BBC from PSR-206/TRANSX-CTR converts the data from BCD to

binary form and vice versa. The data library was tested on a VAX 8810 under the VAX/VMS operating system. Reference: EIR-Bericht Nr. 636. VAX family.

PERSONAL ITEMS

In serving a specialized area of scientific endeavor, it seems important that we note significant changes in the activities 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.

Warren K. Sinclair will be honored for his service to the National Council on Radiation Protection and Measurements at a testimonial dinner and reception Tuesday, April 2, in Washington, D.C. Further information may be obtained from NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814 (phone 301-657-2652).

Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *Larry Wetzel*, Babcock and Wilcox, Lynchburg, Virginia; *George Vourvopoulos*, Western Kentucky University, Bowling Green; *John M. McKinney*, Tenera, Knoxville, Tennessee; and *Kazuaki Katoh*, National Laboratory for High Energy Physics, Ibaraki-ken, Japan.

CONFERENCES, COURSES, SYMPOSIA

RSIC attempts to keep its users/contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers to RSIC.

Practical Radiation Shielding Course

Practical Radiation Shielding is a course offered by the Georgia Institute of Technology intended for nuclear engineers, health physicists, and other professionals engaged in radiation control at nuclear facilities. The course is conducted by Georgia Tech and Shonka Research Associates, Inc., May 13!17, 1991, in Atlanta. The $1170 course fee includes the text, class notes, and public domain software. Course emphasis is on personal computer-based solutions to dose rate and shielding problems. A computer will be provided for each student. A degree in engineering or the physical sciences or equivalent work experience is required for participation. The course includes training on (1) MICROSHIELD)interactive analysis of gamma ray sources including N-16, waste packages, shipping containers, etc.; (2) ISOSHLD)bremsstrahlung sources and spent fuel; (3) QAD)complex source and shield geometries simplified by combinatorial geometry; (4) ORIGEN)fission product, activation product, and actinide inventories; and (5) G33)scattering calculations; and (6) introduction to transport theory (ANISN), Monte Carlo. Further information may be obtained from Continuing Education, Georgia Inst. of Technology, Atlanta, GA 30332-0385 (phone 404-894-2547).

Harvard School of Public Health Offers Radiation Protection Courses

The Harvard School of Public Health is offering several courses on radiation protection. A brief description of each course follows. Detailed information about course content and fees may be obtained from the Mary McPeak, Office of Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-3515).

Occupational and Environmental Radiation Protection March 25!29, 1991, or August 12!16, 1991. To provide radiation safety officers and occupational health professionals with the fundamentals for working safely with radiation. Topics include atomic structure and radioactivity, sources and types of ionizing radiation, biological effects of exposures, external and internal radiation hazards, radiation monitoring and instrumentation, protection standards and dosimetry, and inspection and radiation guidelines.

Advanced Occupational and Environmental Radiation Protection May 13!17, 1991. Topics include updated radiation protection standards, regulatory agency inspection procedures, standards and procedures for decommissioning and decontamination, current activities of the NCRP and ICRP, including revisions to Title 10 CFR part 20, and the design and implementation of an ALARA program.

Planning for Nuclear Emergencies June 10!14, 1991. To provide detailed coverage of scenario development, accident source terms and dose estimates,

standards and guides for emergency response, training and notification systems, protective action guides (PAGs), the roles of state and federal agencies, public health needs, and working with public information agencies and the media. NUREG-0654 will receive particular attention.

In-Place Filter Testing Workshop June 24!28, 1991. To provide laboratory and nuclear air cleaning professionals with an in-depth understanding of air filtration theory, aerosol technology, air-flow measurements, and in-place testing of particulate (HEPA) filters and gas adsorption units. The course includes laboratory sessions and review of NRC regulations. Emphasis is placed on practice in the use of instruments.

Management and Disposal of Radioactive Wastes July 15!19, 1991. To meet the needs of federal, state, and local public health and regulatory personnel who have responsibilities for overseeing the safe disposal of radioactive wastes. Topics include management and disposal of low-level and "mixed" wastes, problems in the solidification of low-level wastes, alternatives to shallow land burial, and problems in the disposal of wastes from decommissioning operations.

Calendar

Your attention is directed to the following events of interest.

March 1991

Specialists' Meeting on Advanced Modelling and Computer Codes for Calculating Local Scale and Meso-Scale Atmospheric Dispersion of Radionuclides and Their Applications, Mar. 6!8, 1991, Saclay, France, sponsored by the OECD Nuclear Energy Agency Data Bank. Contact: Enrico Sartori, OECD/NEA Data Bank, Bat. 445, F-91191 Gif-sur-Yvette Cedex, France (phone 33 1 6908-6095, Fax 33 1 6941-3965).

April 1991

27th Annual Meeting of the National Council on Radiation Protection and Measurements, Apr. 2!4, 1991, Washington, D.C. Contact: NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814 (phone 301-657-2652).

Workshop on Welding Criteria for Shipping Containers, April 3!4, 1991, San Francisco, sponsored by the U.S. Department of Energy. Contact: Merry Carter, Lawrence Livermore National Laboratory, Welding Criteria Workshop, P.O. Box 808, L-196, Livermore, CA 94551.

Advances in Mathematics, Computations, and Reactor Physics, Apr. 28!May 1, 1991, Pittsburgh, Pennsylvania, an international topical meeting sponsored by the ANS, Mathematics & Computation Division and the Reactor Physics Division. Contact: J. E. Olhoeft, Westinghouse Electric Corp., P.O. Box 355, WEC-E205, Pittsburgh, PA 15230-0355 USA (phone 412-374-5704).

1991 International High-Level Radioactive Waste Management Conference, Apr. 28!May 3, 1991, Las Vegas, Nevada, sponsored by the ANS and the American Society of Civil Engineers. Contact: Dillard B. Shipler, Technical Program Chair, American Nuclear Society, 555 N. Kensington Ave., La Grange Park, IL 60525 USA.

Conference on Occupational Radiation Protection, Apr. 29!May 3, 1991, Guernsey, United Kingdom, sponsored by the British Nuclear Energy Society. Contact: British Nuclear Energy Society, Secretariat, 1-7, Great George St., London SW1P 3AA U.K.

May 1991

Radiopharmaceutical Dosimetry Symposium, May 7!10, 1991, in Oak Ridge, Tennessee, sponsored by the Radiopharmaceutical Internal Dose Information Center. Contact: Audrey T. Schlafke-Stelson, Program Committee, 5th International Dosimetry Symposium, Radiopharmaceutical Internal Dose Information Center, Medical Sciences Division, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37831-0117 USA (phone 615-576-3450).

Practical Radiation Shielding, May 13!17, 1991, Atlanta, Georgia, a course sponsored by Shonka Research Associates, Inc., and the Georgia Institute of Technology. Contact: Georgia Tech Continuing Education-R, Georgia Institute of Technology, Atlanta, GA 30332-0385 (phone 404-894-2400, 800-325-5007).

Workshop on SCANS, Version 2 (Shipping Cask Analysis System), May 21!23, 1991, Gaithersburg, Maryland, sponsored by the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. Contact: Merry Carter, Lawrence Livermore National Laboratory, SCANS Workshop, P.O. Box 808, L-196, Livermore, CA 94551.

*ICRM `91*, May 27!31, 1991, Madrid, Spain, sponsored by CIEMAT. Contact: J. M. Los Arcos, ICRM`91 Secretariat, CIEMAT, Investigasción Básica, Avenida Complutense, 22, 28040-Madrid, Spain (phone 34-1-3466225, Fax 34-1-3466005).

June 1991

ANS Annual Meeting, June 2!6, 1991, Orlando, Florida. Contact: General Chair John A. DeMastry, Florida Power & Light Co., P.O. Box 14000, Juno Beach, FL 33408 (phone 407-694-3613).

5th International Symposium on Radiation Physics, June 10!14, 1991, Dubrovnik, Yugoslavia. Contact: Dr. Ante Ljubi‡if, ISRP-5 Chairman, Ruder Bo×kovif Inst., P.O. Box 1016, 41001 Zagreb, Yugoslavia (phone 41 425-563 or 41 434-467, Telex 21383 irbzg yu, Fax 41 425-497).

International Conference on Emerging Nuclear Energy Systems (ICENES`91), June 16!21, 1991, Monterey, California. Contact: C. D. Henning, LLNL L-644, P.O. Box 808, Livermore, CA 94551.

A Joint Symposium on Radiation Protection, June 16!23, 1991, in Winnipeg, Canada. Contact: Danny Buksak, Conference Chairman, The University of Manitoba, 191 Frank Kennedy Bldg., Winnipeg, Manitoba, R3J 2N2, Canada (phone 204-474-6633).

July 1991

2d International Symposium on Biophysical Aspects of Auger Processes, July 5!6, 1991, University of Massachusetts, Amherst, Massachusetts, sponsored by the American Association of Physicists in Medicine. Contact: Roger W. Howell, Dept. of Radiology, Div. of Radiation Research, M.S.B. F-451, Univ. of Medicine & Dentistry of NJ, 185 South Orange Ave., Newark, NJ 07103 USA (phone 201-456-5067).

28th Annual International Nuclear and Space Radiation Effects Conference and Short Course, July 15!19, 1991, San Diego, sponsored by the Institute of Electrical and Electronics Engineers, Inc. Contact: Ronald L. Pease, Mission Research Corp., 1720 Randolph Rd., SE, Albuquerque, NM 87106 (phone 505-768-7639).

Health Physics Society Annual Meeting, July 21!26, 1991, Washington, D.C. Contact: Nancy E. Newman, NIH Bldg. 21, Rm. 236, 9000 Rockville Pike, Bethesda, MD 20892 (phone 301-496-5774).

International Illinois Low Level Radioactive Waste (LLWM) Symposium: The Quiet Revolution)Innovations in Low-Level Waste Management, July 29!Aug. 1, 1991, Chicago, Illinois, sponsored by the Illinois Dept. of Nuclear Safety. Contact: Ms. P. Burnett, Illinois Dept. of Nucl. Safety, 1035 Outer Park Drive, Springfield, IL 62704 USA.

September 1991

ICNC '91, Sept. 9!13, 1991, Christ Church, Oxford, England, sponsored by AEA Technology, the OECD Nuclear Energy Agency, with cooperation from IAEA. Contact: John Bentley, 062/A32, AEA Technology Winfrith, Dorchester, Dorset DT2 8DH, England (phone 0305 203316; Fax 0305 202122).

INEL Computing Symposium, Sept. 10!12, 1991, Idaho Falls, Idaho, sponsored by the Idaho National Engineering Laboratory. Contact: Teri Williams, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415-2602 (phone 208-526-9728, FTS 583-9728).

Brazilian Meeting on Reactor Physics and Thermal Hydraulics, Sept. 17!20, 1991, São Paulo, Brazil. Contact: José Rubens Maiorino, IPEN-CNEN/SP, Caixa Postal 11049 (Pinheiros), 05499-São Paulo-SP-Brazil (phone 011 211-6011 Ext. 270; Telex 11 83592-IPEN-BR).

October 1991

7th Symposium on Neutron Dosimetry, Oct. 14!18, 1991, Berlin, Fed. Rep. of Germany, sponsored by the Commission of the European Communities. Contact: Dr. R. Jarh, Physikalisch-Technische Bundesanstalt, Abt. 7, Bundesallee 100, 3300 Braunschweig, FRG.

1991 Joint International Waste Management Conference, Oct. 21!26, 1991, Seoul, Korea. Contact: Mr. Larry C. Oyen, Sargent & Lundy, 55 East Monroe St., Chicago, IL 60603 (phone 312-269-6750, Fax 312-269-3475, Telex 280603).

November 1991

Nuclear Energy Forum, Nov. 10!13, 1991, San Francisco, California. Contact: Conference Office, U.S. Council for Energy Awareness, 1776 I Street, N. W., Suite 400, Washington, DC 20006-2495 USA.

International Conference on Fusion Reactor Materials, Nov. 17!22, 1991, Clearwater, Florida. Contact: P. J. Maziasz, Metals and Ceramics Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6376.

April 1992

New Horizons in Radiation Protection and Shielding, Apr. 26!May 1, 1992, Pasco, Washington, a topical meeting

of the ANS Radiation Protection and Shielding Division. Contact: Wilbur Bunch, HO-36, Westinghouse Hanford Co., P.O. Box 1970, Richland, WA 99352 (phone 509-376-6313).**May 1992**

8th International Radiation Protection Association Conference, May 17!22, 1992, Montreal, Canada. Contact: G. Webb, NRPB, IRPA 8 Secretariat, Chilton, Didcot, Oxon OX11 ORQ, United Kingdom.

JANUARY ACCESSION OF LITERATURE

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

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