

# Data Bank

The Data Bank operates as an international centre of reference for its member countries with respect to basic nuclear tools, such as computer codes and nuclear data, used for the analysis and prediction of phenomena in the nuclear field. It provides a direct service to its users by acquiring, developing, improving and validating these tools and making them available as requested.

The US Department of Energy and the NEA have agreed to continue to exchange nuclear data and computer programs and a five year co-operative arrangement to that effect was signed by the NEA Director-General, Luis Echávarri, and the US Acting Under Secretary of Energy, Dennis Spurgeon, in April 2006.



Dennis Spurgeon (left) and Luis Echávarri (right).

## Computer program services

The NEA Data Bank plays a central role in the collection, validation and dissemination of computer codes and associated application data libraries used by scientists/engineers in member countries. The collection of codes covers many different areas, from reactor design, dynamics, safety and radiation shielding to material behaviour and nuclear waste applications.

In 2006, the Data Bank acquired 65 new or new versions of computer codes. Of these, 22 were received from non-OECD countries through the special co-operative agreement in place between the NEA Data Bank and the International Atomic Energy Agency (IAEA).

## Highlights

- An arrangement between the United States Department of Energy and the NEA to co-operate in the field of nuclear data and computer programs was signed on 10 April 2006 in Washington DC.
- The first edition of the International Handbook of Evaluated Reactor Physics Benchmark Experiments (IRPhE), containing detailed information on measured and evaluated reactor physics parameters, was issued on CD-ROM.
- The documentation of the latest version of the Joint Evaluated Fission and Fusion data library (JEFF-3.1) was issued, and a new processed data library, based on JEFF-3.1 and for use in Monte Carlo (MCNP) applications, was released.

The Data Bank answered requests for 1 781 programs in 2006, of which 118 were sent to non-OECD countries. Requests for data from integral experiments in support of computer code validation were in high demand: 3 796 sets of experiments were distributed, of which 604 were sent to authorised users in the non-OECD area.

Special efforts have been devoted to sensitivity and uncertainty analysis studies. A new covariance data library was published containing cross-section uncertainties for different application areas.

## Computer program training courses

As part of the computer program services, the Data Bank organises training courses on the utilisation of the most popular computer programs. The following courses were organised or co-sponsored in 2006:

*Organised by the NEA:*

- NJOY Users Group Meeting, NEA Headquarters, Issy-les-Moulineaux, France, 20 November 2006.
- Training Course on PENELOPE-2006 for Electron-photon Transport, University of Barcelona, Barcelona, Spain, 4-7 July 2006.

*Co-sponsored by the NEA:*

- *Journées codes de calcul en radioprotection, radio-physique et dosimétrie*, INSTN Saclay, France, 28-29 November 2006.
- Training Course on Monte Carlo Simulation, *Universidad Internacional de Andalucía*, Baeza (Jaén), Spain, 15-17 November 2006.
- Workshop on Use of Monte Carlo Techniques for Design and Analysis of Radiation Detectors, University of Coimbra, Coimbra, Portugal, 15-17 September 2006.
- TOUGH (Unsaturated Groundwater Transport and Heat Transport Simulation) Symposium 2006, Lawrence

Berkeley National Laboratory, Berkeley, California, USA, 15-17 May 2006.

- Training Course on Neutron Spectra Unfolding, Cape Town, South Africa, 7-8 April 2006.
- Seminar and Training on Scaling, Uncertainty and 3D Coupled Code Calculations in Nuclear Technology (3D.S.UNCOP-2005), School of Nuclear Engineering, Barcelona, Spain, 23 January-10 February 2006.

## Preservation of information from integral experiments

The Data Bank continues to compile integral experimental data under the supervision of the Nuclear Science Committee. Well-documented information and data from reactor physics, fuel behaviour, radiation shielding and criticality safety integral experiments are collected, verified, evaluated and made available to scientists and engineers.

The IFPE (fuel performance experiments) database was updated in April and October 2006, including newly compiled experiments. Two revisions of SINBAD (shielding and dosimetry experiments) were made in April and September 2006. Nine new benchmark experiments were added to the SINBAD collection and seven benchmarks were updated. The first edition of the IRPhE (International Handbook of Evaluated Reactor Physics Benchmark Experiments) containing detailed information on measured reactor physics parameters and their evaluation, exceeding 4 000 pages, was issued on CD-ROM in March 2006. More than 200 copies were distributed on request.



## Nuclear data services

The Data Bank maintains large databases containing bibliographic (CINDA), experimental (EXFOR) and evaluated (EVA) nuclear data and makes these databases available online to scientists and engineers in member countries. The number of retrievals from the NEA website averages about 1 200 per month for bibliographic and experimental data, and about the same number for evaluated data libraries. The databases are maintained in close co-operation with other nuclear data centres and cover most types of data needed in nuclear energy applications. In 2006, the Data Bank produced a new version of the CINDA database, with an improved coverage of references to neutron- and charged-particle data including references to EXFOR.

A new version of nuclear data display software, JANIS-2.2.2, was released in November 2006 to respond to users' feedback and needs. The popularity of the program has increased steadily and is now also being used in many university courses around the world as an easy introduction to nuclear data manipulation. The JANIS users access the NEA online databases more than 25 000 times per month. The program is free of charge and can be downloaded or launched from the JANIS home page at [www.nea.fr/janis](http://www.nea.fr/janis), where the complete manual can also be found.

## The JEFF project

In 2006, the Joint Evaluated Fission and Fusion (JEFF) community began to validate the latest version of the evaluated data library (JEFF-3.1). Users are providing feedback to a dedicated webpage and updated, evaluated files are posted on the website following review and approval by the JEFF management committee. A revised version of the radioactive decay data library is under preparation and, together with the corresponding documentation, will be released in 2007.

The Data Bank released a processed library based on JEFF-3.1 for use with the Monte Carlo code MCNP. This library will assist engineers and/or scientists wishing to use the JEFF-3.1 general purpose library in application calculations. Processed, multi-group, cross-section libraries are being prepared for release in 2007.

## International nuclear data evaluation co-operation

The NEA Working Party on International Nuclear Data Evaluation Co-operation (WPEC) provides a framework for co-operative activities between the participating projects in Japan (JENDL), the United States (ENDF), Western Europe (JEFF) and non-OECD member countries (Russia, BROND; China, CENDL; and the IAEA-based FENDL). In 2006, the Working Party issued three reports on covariance matrix evaluation and processing in the resolved/unresolved resonance region; nuclear data standards; and nuclear data for improved low-enriched uranium (LEU)-LWR reactivity predictions. Two new activities on prompt photon production from fission products and on processing of covariance data were started.

A High Priority Request List (HPRL) for nuclear data continues to be maintained. The list, which is based on requests from data users, provides a guide for scientists planning measurements and developing nuclear theory and data evaluation programs. An entirely new list is available on the NEA website and the content is being reviewed on a regular basis by external referees.

## The Thermochemical Database (TDB) Project

The Data Bank continues to develop its database of recommended chemical thermodynamic data for the safety assessment of radioactive waste repositories. This work is performed under the scientific guidance of the NEA Radioactive Waste Management Committee. Details are provided in the section on Joint Projects and Other Co-operative Projects (see page 33).

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