

# 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 upon request.

## Highlights

- The third edition of the *International Handbook of Evaluated Reactor Physics Benchmark Experiments* was published on DVD in March. This version includes new experiments for 17 reactors and 4 fundamental evaluations.
- A book on *Analytical Benchmarks for Nuclear Engineering Applications: Case Studies in Neutron Transport Theory* was published, reconfirming the importance of the analytical methods in transport calculations.
- A revised JEFF neutron data library, JEFF-3.1.1, was finalised in December 2008 for release in January 2009.
- A report on *Uncertainty and Target Accuracy Assessment for Innovative Systems Using Recent Covariance Data Evaluations*, containing explicit recommendations for nuclear data improvements, was published.
- Updates to the data display program JANIS-3 (3.0.1) included new capabilities for users' prepared data plotting. It is available on the NEA website at [www.nea.fr/janis](http://www.nea.fr/janis).
- The NEA Data Bank electronic newsletter was launched in March; since then four issues were distributed to about 1 300 users.

## 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 and engineers in member countries. The collection of codes covers many different areas, ranging from reactor design, dynamics, safety and radiation shielding to material behaviour and nuclear waste applications.

During 2008, a total of 80 new or revised versions of computer codes were acquired, and 50 were verified, tested and master-filed. The special co-operative agreement in place between the NEA Data Bank and the International Atomic Energy Agency (IAEA) has enabled the NEA Data Bank to receive about 10 computer codes from non-OECD countries. Twenty new or revised sets of integral experiment compilations (such as SINBAD, IFPE and IRPhE) were acquired and integrated during the same period.

The Data Bank answered requests for over 2 000 programs in 2008, of which 115 were sent to non-OECD countries. With regard to integral data experiments in support of computer code validation, slightly under 4 000 sets were distributed, of which about 800 were sent to authorised users in the non-OECD area.

## Knowledge transfer and preservation

As part of the Data Bank services, ten training courses on the utilisation of the most popular computer programs were organised. The areas covered were: computational radiation physics, radiation transport using Monte Carlo codes and sensitivity/uncertainty analysis, analytical

benchmarks, experimental data analysis and coupled neutronics/thermal-hydraulics. Over 200 participants attended in all.

The Data Bank's knowledge preservation activities include the development of the following databases in co-operation with the NEA Nuclear Science Committee: IFPE (fuel performance experiments with data for 1 500 fuel rods), SINBAD (about 100 shielding and dosimetry experiments) and IRPhE (International Handbook of Evaluated Reactor Physics Benchmark Experiments, 38 experimental series from 25 facilities). In co-operation with the NEA nuclear safety division, relevant experimental data from international joint projects are maintained and distributed (for example, from the steam explosion database). A large number of copies of these databases were distributed upon request. Many reports relative to NEA work have been indexed and integrated into the IAEA International Nuclear Information System (INIS) for easy and structured access.

In the field of radiation transport and reactor physics, additional "legacy" books of continuing interest and



importance were released to the Data Bank after publishers reverted the copyrights to the authors. These include *Analytical Benchmarks for Nuclear Engineering Applications* and a series of books on reactor shielding. The Data Bank is now authorised to distribute them in electronic format at no cost to requesters, and in particular to students.

## 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. In 2008, several evaluated special-purpose nuclear data libraries were added to the EVA database, such as the JENDL libraries JENDL/AC-2008 (neutron-induced reactions for 79 actinides), JENDL/HE-2007 (neutron- and proton-induced reaction data up to 3 GeV for 106 nuclides), JENDL/PD-2004 (photon-induced reaction data up to 140 MeV for 68 nuclides), JENDL/AN-2005 (alpha-induced neutron production cross-sections of 17 nuclides) and the UK Heavy Element Decay Data and Activation Product Decay Data libraries, UKHEDD-2.6 and UKPADD-6.8 respectively. The EVA database contains over 40 evaluated data libraries at present.

The Data Bank contributed over 200 experiments on neutron- and charged-particle-induced data to the EXFOR database, of which 70% relate to charged-particle reactions. An emphasis on the correction of erroneous data in collaboration with the WPEC (see below) has resulted in the updating of about 1 640 data sets.

Updates to the nuclear data display software, JANIS-3, was released in February to respond to users' feedback and needs. The main improvements include corrections in the reading of the ENDF and EXFOR formats, and new functionalities such as the possibility to display the user's own data in the nuclide chart (browser) window of JANIS. The program can be downloaded or launched from the JANIS web page at [www.nea.fr/janis](http://www.nea.fr/janis).

The proceedings of the International Conference on Nuclear Data for Science and Technology, held in Nice, France in April 2007 were published. The next conference in the series will be held in Korea in 2010.

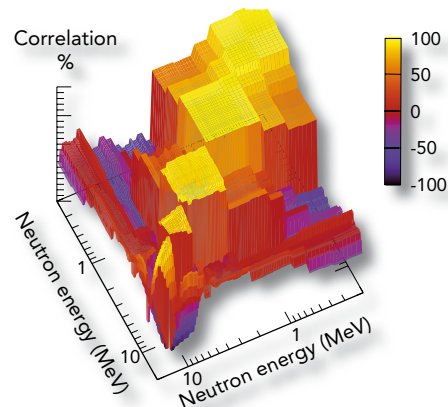
## The JEFF Project

The Joint Evaluated Fission and Fusion (JEFF) Project has revised its neutron data library. The new version, JEFF-3.1.1, was finalised in December and is available on the NEA website. Two reports have been finalised regarding the recent revisions and this updated version. They are scheduled to be published early in 2009.

## International nuclear data evaluation co-operation

The NEA/NSC Working Party on International Nuclear Data Evaluation Co-operation (WPEC) provides a framework for improving the quality and completeness of evaluated

nuclear data libraries available for use in science and technology and for promoting the efficient use of available resources through international collaboration. In 2008, a report was published on *Uncertainty and Target Accuracy Assessment for Innovative Systems Using Recent Covariance Data Evaluations*. The recommendations for nuclear data improvements made in the report have been reviewed and entered into the WPEC High Priority Request List (HPRL) for nuclear data.



Graphical representation of nuclear data uncertainties.

The WPEC has launched two follow-up studies, one on meeting nuclear data needs for advanced reactor systems and another on methods and issues for the combined use of integral experiments and covariance data. Other ongoing studies cover the production and processing of covariance data in different energy regions, a review and quality assurance procedure for the experimental database EXFOR and the review of the uranium-235 capture cross-section in the keV to MeV energy region.

## 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 36).

## In-house computer services

The Data Bank's in-house computer services provide a highly available network, data storage and servers. The web cluster connected by two internet links has served 1.2 million visits in 2008, during which 3 million web pages were browsed and some 2.6 terabytes were downloaded.

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