OECD-NEA Data Bank

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Contents

1 General

The Data Bank (DB) of the OECD Nuclear Energy Agency (NEA) provides scientists in participating countries with reference materials in the field of nuclear energy applications. The services include the compilation, verification, and distribution of nuclear data, chemical thermodynamic data, integral benchmark experiments, as well as computer programs and associated application libraries. The Data Bank also develops and maintains databases and related administration/retrieval tools, including the JANIS display software. The Data Bank staff work in close co-operation with the secretaries of the Nuclear Science Committee (NSC) Working Parties (WP), especially in the field of computer codes and library benchmarking, integral experiments, nuclear data evaluation, and knowledge preservation. These activities are in essence international and organised in close collaboration with other main national and international organisations.

More information on the NEA Data Bank can be found at `www.oecd-nea.org/databank`.

2 Organisation

The Data Bank's current list of members consists of 27 countries in Europe, North America, Russia and the Asia-Pacific region, as shwon in Figure 1. In 2017 Argentina and Romania accessioned to NEA as its most recent members and are also members of the NEA DB.

The NEA maintains specialised standing technical committees and subsidiary bodies representing the major areas of the Agency's programme, each of which oversees various specialised working groups and task groups. These groups are comprised of member country experts who are both contributors to the programme of work and beneficiaries of its results. The approach is highly cost-efficient as it enables the Agency to pursue an ambitious programme.

Originating from the Recommendations of the Task Force on the Future Programme of the Data Bank, the NEA Steering Committee in 2016 approved the proposal to modify the name, reporting line,

Figure 1: The names and flags of the NEA Data Bank participating countries.

and mandate of the Executive Group of the NSC (Data Bank Management Committee). The EG-NSC became the "Management Board on the Development, Application and Validation of Nuclear Data and Codes" (MBDAV). The MBDAV reports directly to the NEA Steering Committee. For more information on the NEA structure of committees, including the MBDAV, please visit:

`https://www.oecd-nea.org/general/about/organigram/committee_structure.pdf`

The Data Bank is composed of 11 full-time staff working on both Data Bank and related activities under the Nuclear Science Committee. In addition, 2 staff of the NEA/IT services are contributing to NRDC activities.

For an up-to-date list of NEA DB staff please visit:

`https://www.oecd-nea.org/databank/dbcontacts`

3 Nuclear Data Services

The Data Bank maintains large databases containing evaluated, experimental and bibliographic data and makes them available online to scientists and engineers in its participatingcountries. Other important nuclear data related activities of the Data Bank are the coordination of the Joint Evaluated Fission and Fusion (JEFF) file project and the development of the JANIS software, designed to facilitate the visualisation, comparison, and manipulation of nuclear data.

More information on Nuclear Data Services can be found at: `https://oecd-nea.org/dbdata`.

3.1 Experimental data compilation

The Data Bank compilation of measured neutron and charged particle induced reaction data continues with the help of five external consultants. Continuous efforts are made to check the content of the database and retransmit corrected entries.

Neutron induced data (Area 2): In 2018, 256 entries with 1738 subentries were compiled by the Data Bank for area 2. In the first months of 2019, the corresponding figures are 284 entries and 2107 subentries.

Charged particle induced data (Area O): In 2018, 60 entries with 166 subentries were compiled by the Data Bank for area O. In the first months of 2019, the corresponding figures are 42 entries and 231 subentries.

Table 1 shows more detailed statistics of NEA-DB transmissions summarised since 2006.

In 2018 the NEA launched a new GitLab system with EXFOR compilation work as one of the first project areas. It is now used to manage the NEA DB EXFOR work, providing version control and project management tools under private repositories. Those with access permissions may visit:

`https://git.oecd-nea.org/databank/nds/exfor`

Table 1: Summary of the NEA DB transmissions to EXFOR over the years 2006-present, including both new and updated (sub)entries. Tranmissions listed as preliminary as of the drafting of this report are marked with a (*).

Year	**Transmission**	**Entries**	**Subentries**
2019	2276*	13	73
	2275*	20	225
	2274*	44	444
	2273*	46	341
	2272	20	112
	2271	14	61
	2270	78	380
	2269	27	236
	2268	22	235
	O066	29	194
	O065	13	37
2019	Total	326	2338
2018	O064	33	125
	2267	43	172
	2266	21	105
	O063	25	36
	2265	57	256
	O062	2	5
	2264	9	51
	2263	50	503
	2262	14	81
	2261	49	432
	2260	13	138
2018	Total	289	1668
2017	Total	282	1782
2016	Total	421	3915
2015	Total	153	990
2014	Total	373	2965
2013	Total	375	2035
2012	Total	351	1947
2011	Total	289	1678
2010	Total	333	1649
2009	Total	288	2016
2008	Total	377	3166
2007	Total	364	2053
2006	Total	353	1865

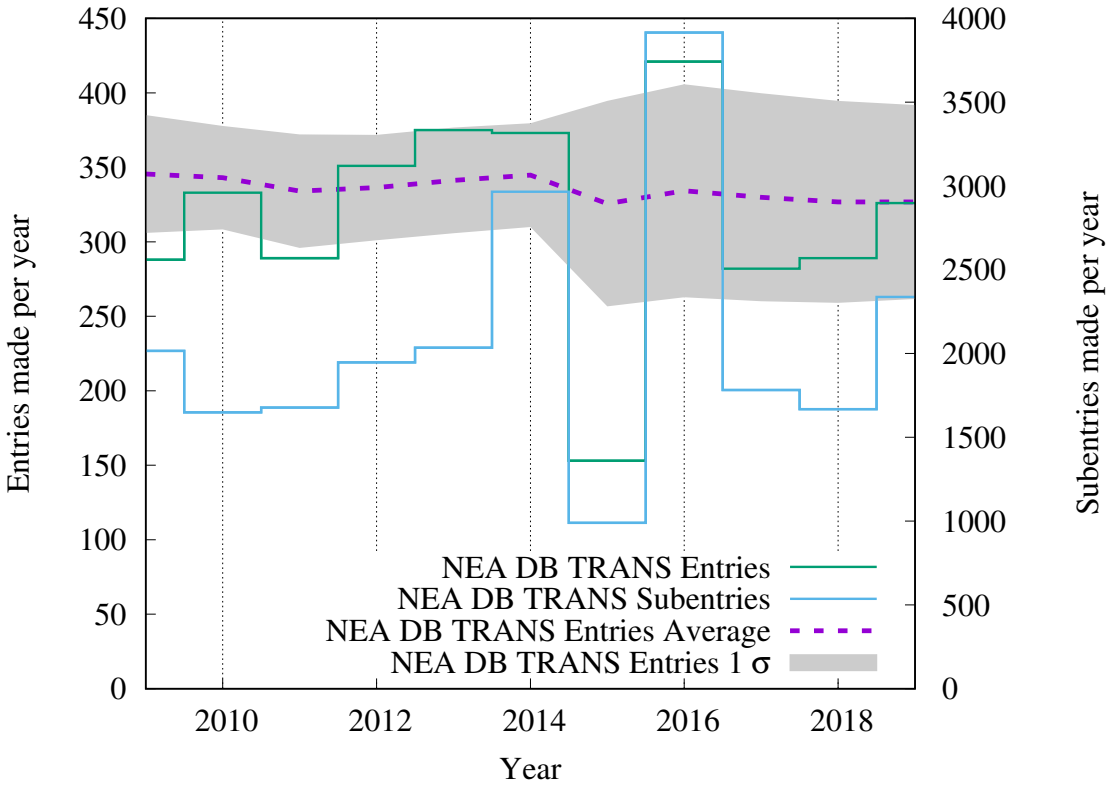

Figure 2: The total number of entries and subentries in NEA DB TRANS per year over the last decade. Note that 2019 figures include preliminary, unfinalised data in the IAEA-NDS open area as of April 2019.

3.2 The JEFF project

The Joint Evaluated Fission and Fusion File (JEFF) project is a collaboration between NEA Data Bank participating countries to produce common sets of evaluated nuclear data, mainly for fission and fusion applications. JEFF is organised as a Working Party under the MBDAV. The JEFF library contains a number of data types, including neutron andproton interaction data, radioactive decay data, fission yields and thermal scattering law data. The latest version of the neutron cross-section JEFF library, JEFF-3.3, was released in November 2017. JEFF-3.3 is a major update of the general purpose neutron library which contains, in particular, new evaluations of neutron data for actinides and several other materials, more complete gamma production data, new decay data, new fission yield evaluations, and more complete covariance data. It has been extensively benchmarked and the results of these works are the subject of a new publication that will be submitted in Q2-Q3 2019.

The JEFF-3.3 data are available on the NEA website at:

`https://oecd-nea.org/dbdata/jeff`.

The current mandate of the JEFF project (2018-2021) is aimed at delivering new systems to provide a revolutionary approach for the JEFF-4 series of nuclear data. In order to engage with the community to identify the priorities for the next series of libraries, a JEFF Stakeholders Workshop has been scheduled for 6-7 June 2019. More information may be found at:

`https://oecd-nea.org/dbdata/meetings/jeff_stakeholders_2019`.

3.3 JANIS software

The NEA has developed and maintains several products that are used in the visualisation and verification of nuclear data, including the Java-based Nuclear Data Information System (JANIS). The JANIS software allows the user to display and compare evaluated and experimental nuclear data from large international databases (e.g. JEFF, ENDF/B, JENDL, EAF, CENDL, BROND, TENDL for evaluated data, and EXFOR for experimental data). JANIS 4 introduced a Web interface, as well as major new features to display fission yields on 2D colour maps, to plot, tabulate and compare user's data in simple text format, as well as the possibility to save and restore JANIS state (plot, table, settings, etc.).

JANIS also interfaces directly with other NEA tools including the Nuclear Data Sensitivity Tool (NDaST) and recent improvements of JANIS have enabled more complete handling of covariance data for sensitivity-uncertainty analyses in nuclear data work and spectrum weighting. Various bug-fixes and the extensions required for the most recent nuclear data libraries are being tested for the next release 4.1 of JANIS due in Q2-Q3 2019.

JANIS is routinely used by NEA staff for checking of preliminary EXFOR datasets from all NRDC compilers and both the online and command-line JANIS TRANS Checker are maintained for routine use by all NRDC members. Recent enhancements have included features to check for DATA duplication and routine updates for new dictionary versions.

More information on JANIS can be found at:

`https://oecd-nea.org/janis`.

3.4 Web services to nuclear data users

The online nuclear data services are now provided through direct access to the NEA databases taking advantage of the new Web interface of JANIS, which allows online browsing, searching and displaying nuclear data in a more user-friendly environment. The online services also include JANIS 'Books', which are comprehensive compilations of cross-section curves of experimental and evaluated data. JANIS Books are available for nuclear reactions induced by neutrons, photons and light charged particles. Online Books are based on JANIS Web in order to allow the users to zoom in the plots, access complementary information and plot additional data. The recent nuclear data libraries updated in the JANIS Books include JEFF-3.3, ENDF/B-VIII.0 and TENDL-2017. The complete list of new datasets loaded since 2017, is shown in Table 2.

Table 2: Nuclear libraries added to the NEA JANIS database.

Data Type	Included Datasets
Radioactive data	ENDF/B-VIII.0, GEFY-6.2, JEFF-3.3, JENDL/DDF-2015
Incident neutron data	ENDF/B-VIII.0, GEFY-6.2, JEFF-3.3, JENDL-4.0/HE, JENDL/AD-2017, TENDL-2017
Incident gamma data	ENDF/B-VIII.0, JENDL/PD-2016, TENDL-2017
Incident proton data	ENDF/B-VIII.0, JENDL-4.0/HE, JENDL/AD-2017
Incident deuteron data	ENDF/B-VIII.0, TENDL-2017
Incident triton data	ENDF/B-VIII.0, TENDL-2017
Incident helion data	ENDF/B-VIII.0, TENDL-2017
Incident alpha data	ENDF/B-VIII.0, TENDL-2017

4 Related Nuclear Science Activities

The Steering Committee for Nuclear Energy oversees nine Committees including the Management Board for the Development, Application and Validation of Nuclear Data and Codes (MBDAV). The Data Bank activities have strong alignment with the activities of other NEA Committees, including the Nuclear Science Committee (NSC).

4.1 WPEC

The NSC oversees the Working Party on International Nuclear Data Evaluation Co-operation (WPEC), which was established to promote the exchange of information on nuclear data evaluations, measurements, nuclear model calculations, validation, and related topics, and to provide a framework for co-operative activities between the participating projects. The working party assesses nuclear data improvement needs and addresses these needs by initiating joint evaluation and/or measurement efforts.

The 30th Anniversary WPEC meeting will take place on 24-28 June 2019 at the NEA Headquarters in Bologne-Billancourt, France.

For more information please visit:
`https://oecd-nea.org/science/wpec/`

4.1.1 WPEC Expert Groups

In addition to several Subgroups, WPEC operates two mandated Expert Groups:

- the Expert Group on the Recommended Definition of a General Nuclear Database Structure (EG-GNDS) and
- the Expert Group on the High Priority Request List for Nuclear Data (EG-HPRL).

The EG-GNDS has recently established repositories on the NEA GitLab system to store and develop the documentation for the GNDS, including requirements, specifications, and more. The current GNDS manual has over 300 pages of content and a release is anticipated after the 31st WPEC meeting in June 2019. In early 2019 the GNDS documentation project was translated into a `git` repository and is now hosted and actively developed in the NEA GitLab:
`https://git.oecd-nea.org/science/wpec/gnds/`

The EG-HPRL maintains the content of the High Priority Request List and the various additional requests that have non-HP designation. Recent work has focused on a thorough review of all outstanding requests and classification as either in progress, completed or archived. The HPRL database, maintained by the NEA Data Bank, has been updated to reflect these changed specifications and is continuously updated based on the requests that are made. To see the continuously updated list, please visit:

`https://www.oecd-nea.org/dbdata/hprl/`

4.1.2 WPEC subgroups

WPEC operates several subgroups that focus on specific topics that may be advanced over the course of three year co-ordinated activities. 47 subgroups have been established over the 30 year history of WPEC, of which five are currently active:

- Subgroup 43 on Code infrastructure to support a modern general nuclear database (GND) structure
- Subgroup 44 on the Investigation of Covariance Data in General Purpose Nuclear Data Libraries
- Subgroup 45 the Validation of Nuclear Data Libraries (VaNDaL) Project
- Subgroup 46 on the Efficient and Effective Use of Integral Experiments for Nuclear Data Validation
- Subgroup 47 on the Use of Shielding Integral Benchmark Archive and Database for Nuclear Data Validation

Recently completed subgroups include the Subgroup 40 *Collaborative International Evaluated Library Organisation (CIELO) Pilot Project*, which served as a forum to co-ordinate international efforts that led to new evaluations for several high-priority isotopes. These were ultimately included in the new ENDF/B-VIII.0 and JEFF-3.3 nuclear data libraries. The Subgroup 39 on *Methods and approaches to provide feedback from nuclear and covariance data adjustment for improvement of nuclear data files* worked in close co-operation with the CIELO project to provide valuable feedback that was used in the evaluation process as well as general advancement of the methods used in integral feedback. The Subgroup 42 on *Thermal Scattering Kernel S(α,β): Measurement, Evaluation and Application* played a central role in bringing experts together that ultimately resulted in several new TSL evaluations in the most recent nuclear data libraries. All of these subgroups have drafted summary reports that are in an advanced state and are anticipated to be published in 2019-2020.