OECD-NEA Data Bank
46, Quai Alphonse Le Gallo
92100 Boulogne-Billancourt
France

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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 `https://www.oecd-nea.org/jcms/rni_6525/data-bank`.

2 Organisation

The Data Bank's current list of members consists of 28 countries in Europe, North America, Russia and the Asia-Pacific region, as shwon in Figure 1. In 2021 Bulgaria accessioned to NEA as its most recent member and is also member 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.

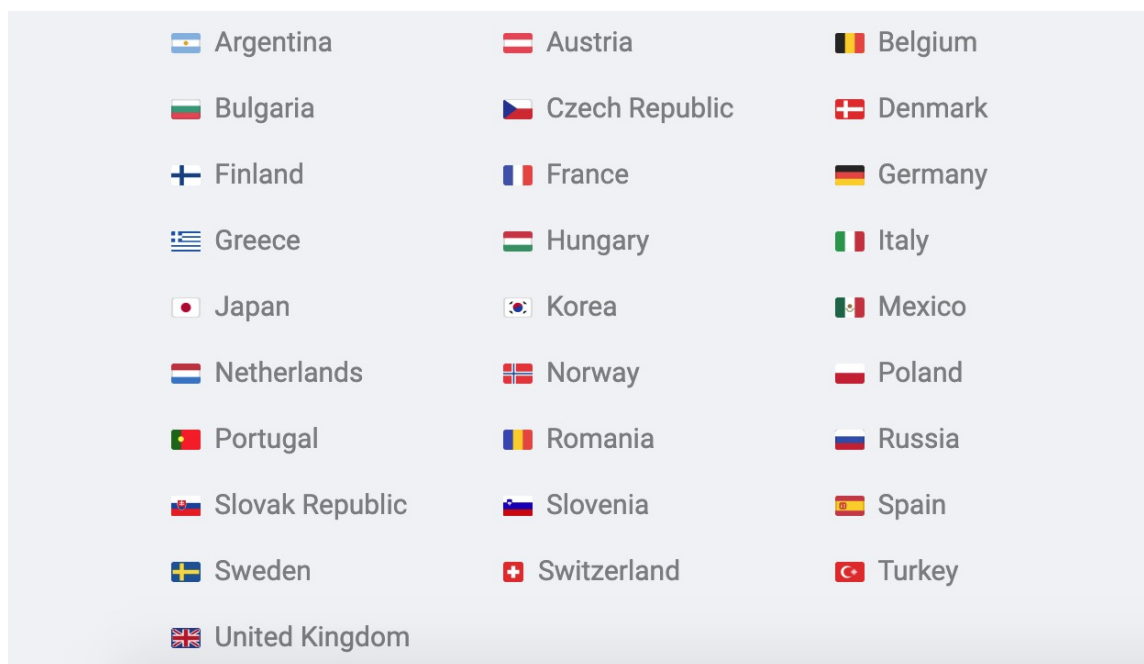|		
🇦🇷 Argentina	🇦🇹 Austria	🇧🇪 Belgium
🇧🇬 Bulgaria	🇨🇿 Czech Republic	🇩🇰 Denmark
➕ Finland	🇫🇷 France	🇩🇪 Germany
🇬🇷 Greece	🇭🇺 Hungary	🇮🇹 Italy
🇯🇵 Japan	🇰🇷 Korea	🇲🇽 Mexico
🇳🇱 Netherlands	🇳🇴 Norway	🇵🇱 Poland
🇵🇹 Portugal	🇷🇴 Romania	🇷🇺 Russia
🇸🇰 Slovak Republic	🇸🇮 Slovenia	🇪🇸 Spain
🇸🇪 Sweden	🇨🇭 Switzerland	🇹🇷 Turkey
🇬🇧 United Kingdom		

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

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, 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/jcms/pl_36698/structure-of-nuclear-energy-agency-committees-and-subsidia`

The Data Bank is composed of 8 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.

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 participating countries. 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://www.oecd-nea.org/jcms/pl_27360/nuclear-data-services`.

3.1   Experimental data compilation

The Data Bank compilation of measured neutron and charged particle induced reaction data continues with the help of three 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.

Table 1: Summary of the NEA DB transmissions to EXFOR over the years 2008-present. Data marked with a (*) includes transmissions listed as preliminary as of the drafting of this report.

Year	Transmissions	Nb. of Trans.	Entries	Subentries
2021	o079-o083*, 2291-2299*	14*	370*	2226*
2020	o073-o078, 2283-2290	14	310	1430
2019	o065-o072, 2268-2282	23	632	4675
2018	o062-o064, 2260-2267	11	316	2099
2017	o059-o061, 2252-2259	11	360	2420
2016	o055-o058, 2243-2251	13	455	3944
2015	o053-o054, 2241-2242	4	155	1264
2014	o051-o052, 2236-2240	7	386	3246
2013	o050, 2231-2235	6	404	2558
2012	o046-o049, 2227-2230	8	384	2218
2011	o040-o045, 2222-2226	11	565	3295
2010	o040-o042, 2214-2222	12	355	2027
2009	o038-o039, 2204-2213	12	303	2222
2008	o034-o037, 2190-2203	18	450	3397

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 the global statistics of NEA-DB transmissions summarised since 2006, while Table 2 summarises in more details the last two years.

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`

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. A recently published article in the new issue of the European Physical Journal A (EPJ A) is now the authoritative reference publication for JEFF-3.3.

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

`https://nds1.gitlab.io/nds/jeff33.html`.

The JEFF-3.3 report is available on the NEA website at:

`https://www.oecd-nea.org/jcms/pl_35577/new-publication-of-jeff-3-3`.

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. The next mandate will be discussed by the JEFF Co-ordination Group during the JEFF Nuclear Data Week, which will take place on the 27-30 April 2021. In order to engage with the community to identify the priorities for the next series

Table 2: Detailed summary of the NEA DB transmissions to EXFOR since the last meeting in 2019, 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
2021	2299*	20	95
	2298*	10	36
	2297	12	93
	2296	62	311
	2295	25	145
	2294	35	294
	2293	10	61
	2292	8	54
	2291	47	286
	o083*	16	57
	o082	4	24
	o081	61	505
	o080	10	43
	o079	50	222
2020	2290	49	113
	2289	13	59
	2288	20	85
	2287	33	129
	2286	6	39
	2285	26	140
	2284	3	15
	2283	50	227
	o078	6	24
	o077	15	50
	o076	27	108
	o075	11	60
	o074	3	31
	o073	48	350
2019	2282	29	135
	2281	17	73
	2280	46	313
	2279	14	45
	2278	42	123
	2277	4	24
	o072	34	110
	o071	25	874
	o070	9	52
	o069	2	8
	o068	60	352
	o067	30	234
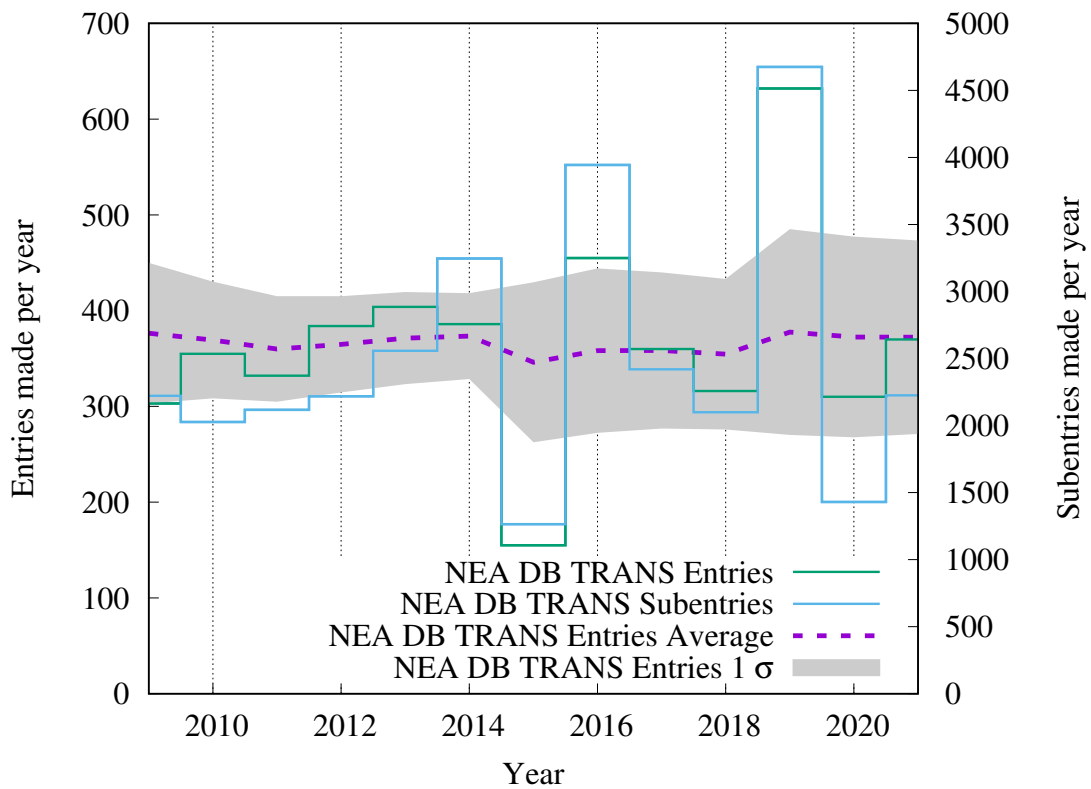
Figure 2: The total number of entries and subentries in NEA DB TRANS per year over the last decade. Note that 2021 figures include preliminary, unfinalised data in the IAEA-NDS open area as of April 2021.

of libraries, a JEFF Stakeholders Workshop was held on the 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 4.1 supports new functionalities, including the drag & drop files over JANIS windows, the support of Nubase, new color modes for cross section charts, and an option to display half-lives on arrows.

More information on the changes made in 2020 can be found at:

`https://www.oecd-nea.org/jcms/pl_39929/janis-changes`.

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 3.

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,

Table 3: 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

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 10-14 May as a Zoom videoconference.

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 established repositories on the NEA GitLab system to store and develop the documentation for the GNDS, including requirements, specifications, and more. The current GNDS specification version 1.9 was published as the first of a kind for GNDS in 2020 and can be found online:

`https://doi.org/10.1787/94d5e451-en`

More information on the Expert Group activities can be found on the GNDS working page:

`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. 50 subgroups have been established over the 32 year history of WPEC, of which six are currently active:

- 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

- Subgroup 48 on Advances in Thermal Scattering Law Analysis

- Subgroup 49 on Reproducibility in Nuclear Data Evaluation

- Subgroup 50 on Developing an Automatically Readable, Comprehensive and Curated Experimental Reaction Database

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 $S(\alpha,\beta)$: 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 2019-2021.