Nuclear Energy Agency Nuclear Data Activities

Workshop for Applied Nuclear Data Activities (WANDA)
3-5 March 2020, George Washington University
Washington DC, USA

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Context and background

• OECD Nuclear Energy Agency (NEA)
  – Intergovernmental agency for co-operation amongst countries with advanced nuclear technology infrastructure
  – 8 standing technical committees including Nuclear Science + Data Bank

• NEA Nuclear Science Committee (NSC)
  – Over two dozen mandated subsidiary groups including five Working Parties (WPs)
  – Cross-cutting work in data preservation and priority topics (e.g. fuel, multi-physics)
  – WP on ND Evaluation Co-operation (WPEC) addresses topical areas in nuclear data

• NEA Data Bank (DB)
  – Collect and disseminate knowledge in the field of nuclear science and technology
  – Initially dedicated to computer simulation codes and nuclear data (tools)
  – Now also covers database development, integral experiment benchmarks, and distributing the output of safety joint-projects
  – Nuclear Data Services (NDS) develop V&V, support JEFF and contribute to NRDC
WPEC operation

*Officially thorough member states of OECD-NEA, Observers and Invitees*
Recent WPEC completed activities

- **WPEC Subgroup 40 “CIELO” [Co-ordinator: M. Chadwick (LANL)]**
  - Revision of key isotopes $^{235,8}\text{U}$, $^{239}\text{Pu}$, $^{16}\text{O}$, $^{56}\text{Fe}$, $^{1}\text{H}$ adopted in ENDF/B, JEFF
  - Over 70 participants from 26 countries
  - Peer-reviewed publications and flagship NEA extended summary report Q3 2019

- **WPEC Subgroup 41 on $^{241}\text{Am}$ cross sections [H. Harada (JAEA)]**
  - Based on requests in HPRL, numerous measurements from LANL/DANCE, JRC/GELINA, CERN/nTOF, JPARC/ANNRI in recent years
  - Re-evaluated $^{241}\text{Am}$ with factor 3 reduction in crucial uncertainties (e.g. $\sigma_{\text{th,}\gamma}$)
  - Report finished – started publication process Q1 2020

- **WPEC Subgroup 42 on TSL [Co-ordinator: A. Hawari (NSCU)]**
  - Renaissance in the field of thermal scattering, WPEC brought together community
  - FOAK for ice, porous graphite, YH ++, and revision of many including (L/H) water
  - Official NEA publication out 26 February 2020
WPEC outputs

Peer-reviewed publications

Evaluations for libraries

NEA reports, Guidance, SOARs
WPEC active groups

- **WPEC [1989]**
  - EG-HPRL [1991]
    - SG-43 [2017] (GNDS API)
    - SG-44 [2018] (Covariances)
    - SG-48 [2020] (Scattering)
  - EG-GNDS [2016]
    - SG-45 [2018] (VaNDaL)
    - SG-46 [2018] (Assimilation)
    - SG-49 [2020] (Reproduc.)

- **US leadership highlighted**
  - D. Brown (BNL)
  - V. Sobes (ORNL)
  - G. Palmiotti (INL)
  - A. Hawari (NCSU)
  - M. White / W. Haeck (LANL)

- **Participants**
  - Y. Danon (RPI)
  - C. Mattoon (LLNL)
  - J. Conlin (LANL)
  - M. Herman (LANL)
WPEC EG on Generalised Nuclear Data Structure

- Established in 2016 based on SG38 recommendations
  - International group to review, propose/approve changes and address topical issues
  - Provide long-term management of the GNDS specifications
- Initial SVN repository migrated to new NEA GitLab in Q4 2018
- Specifications approved at June 2019 meeting + process
  - Over 1100 commits (so far) and 18 active branches
  - Version 1.9 to be published Q2 2020 (first official GNDS publication)
  - Already 14 new format proposals for review in May 2020
WPEC EG on High Priority Request List for Nuclear Data

- Established in 1991 as a core component of the WPEC
  - Process for rigorous review, with sensitivity and impact analyses
  - Combined perspective of experimentalists from around the world to review
- Requests have an impact
  - SG41 \(^{(241}\text{Am})\) gives an example: SG26 application targets → HPRL → numerous measurements → inter-comparison through WPEC yields new evaluation
  - Completed request include \(^{235,8}\text{U}\) capture, Si inelastic scattering, \(^{237}\text{Np}\) fission, etc.
  - Progress continuously monitored

The HPRL online

Example entry
Data Bank Nuclear Data Services (NDS)

An international centre for exchanging nuclear data and scientific knowledge in this domain.

- **To support and coordinate** the development of the Joint Evaluated Fission and Fusion Nuclear Data Library Co-ordination Group (JEFF).
- **To develop** tools and databases for the processing, benchmarking, validation of nuclear data, and their visualisation.
- **To contribute** to the compilation of experimental data from DB countries as a member of the International Network of Nuclear Reaction Data Centres (NRDC).

Compiled and exchanged around 300 new or revised data entries per year.

Plot of Nuclear Data of U-235 by JANIS Nuclear Data Browser
JEFF Stakeholder Workshop

• Last release of JEFF-3.3 in November 2017 and new mandate 2018-2021 “on the road to JEFF-4”

• Reaching out to end-users of JEFF Nuclear Data Libraries, Representatives from industry, regulators, technical support organisation (TSO), research institutes and international organisations.

• 6-7 June 2019 at the NEA offices (OECD Boulogne Conference Centre)
1. Alert on the critical situation of nuclear data evaluation expertise world-wide

A fragile situation exists in terms of evaluation expertise, with a trend of diminishing number of specialists working in the evaluation field and dwindling support for nuclear data activities.

This can compromise the development of appropriate nuclear data that is required in emerging or innovative applications where nuclear data are not enough mature, complete or consistent.
Three Takeaway Points

Workshop Statement
NEA/MBDAV/DOC(2019)5

2. Importance of collaboration across borders, with and for stakeholders, to meet expectations of high quality nuclear data

Need to secure and strengthen the support to international nuclear data frameworks such as JEFF, extending collaborations within and across projects, in order to meet end-user expectations.

Through this workshop, the JEFF project seeks to initiate an end-user engagement strategy with industry partners, involving them in the definition of criteria to meet as requirements for their applications of interest (for future JEFF-4 release)
Three Takeaway Points

Workshop Statement
NEA/MBDAV/DOC(2019)5

3. Importance of the underlying data management infrastructure to preserve data and prepare future challenges

Necessary to make today the **strategic investments to consolidate a modern data infrastructure** at the Data Bank in order to support the long-lasting data preservation and development infrastructure that JEFF-4 requires.

Aware that this represents **only part of the answer** to address the many technical challenges ahead, **but an essential one** to allow for greater efficiency, improved collaboration, transparency and faster response time when addressing known deficiencies and new developments in the data.
Next Meetings

• JEFF Nuclear Data Week

  27-30 April 2020

• WPEC-32 Week

  11-15 May 2020
Thank you for your attention

All NEA publications and institutional documentation available at

[www.oecd-nea.org]
**OECD members (36)**

- Chile
- Estonia
- Israel
- Latvia
- Lithuania
- New Zealand

**NEA members (33)**

- Australia
- Canada*
- Iceland
- Ireland
- Luxembourg
- United States*

* Dedicated agreement with the DB for computer programs

**NEA DB countries (27)**

- Argentina**
- Austria
- Belgium
- 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

** Argentina, Romania and Russia are not member countries of the OECD (October 2019)**