Nuclear Energy Agency

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6 July 2020

NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE

Working Party on International Nuclear Data Evaluation Co-operation

32nd Meeting of the Working Party on International Nuclear Data Evaluation Co-operation (WPEC)

SUMMARY RECORD

14-15 June 2020
WebEx Meeting

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JT03463817

OECD/NEA Nuclear Science Committee

WORKING PARTY ON INTERNATIONAL NUCLEAR DATA EVALUATION CO-OPERATION 32ND MEETING

WebEx Meeting

14-15 May 2020

SUMMARY RECORD

1. Welcome and administrative items

1.1. Welcome

The WPEC Chair, **O. Iwamoto**, opened the meeting and welcomed all participants (see *Appendix 2*) and the WPEC Secretariat, **M. Fleming**. He thanked the participants for their flexibility with the use of teleconferencing and wished them well in the challenging situations presented with the ongoing Covid-19 pandemic.

1.2. Adoption of agenda [NEA/SEN/NSC/WPEC(2020)9]

To facilitate the participation of those from time zones 16 hours apart, a non-standard agenda was agreed with those from Eastern time zones placed before Western time zones (see *Appendix 1*). The organisation of this document follows the typical, logical structure and not the agenda.

1.3. Approval of WPEC-31 summary record [NEA/SEN/NSC/WPEC(2019)2]

The summary record for WPEC-31 was approved without modification.

1.4. Review of WPEC actions

The action items from WPEC-31, provided in *Appendix 3* of the WPEC-31 summary record, were reviewed. All items were complete except **Action 2** on **A. Plompen** to provide draft report materials on the Subgroup 36 activity. It was agreed to keep this as a continuing action.

1.5. Review of WPEC subgroup reports

The Secretariat, M. Fleming, reviewed the status of the summary reports for all closed subgroups. Six of the subgroups without published reports (28, 38, 39, 40, 41 and 42) have had complete reports finalised and two of these have been published as official NEA

reports. In addition to these, the GNDS-1.9 specifications were approved for publication in May 2020. Four subgroups have incomplete reports:

- Subgroup 27 (R. Jacqmin) – Report drafted by C. Dean provided to NEA and Secretariat has requested a grant of rights to include material from this report in a NEA publication. **Action** on **T. Ware** to determine possibility of these rights being granted by Jacobs colleagues.

- Subgroup 35 (T. Kawano) – Report drafted in LaTeX with pdf copy distributed to participants. No updated draft or source materials held at NEA.

- Subgroup 36 (P. Shillebeeckx) – No participants aware of the status of any draft report. Subject of continuing action from WPEC-31.

- Subgroup 37 (R. Mills) – Some text and data have been collected by NEA Secretariat and stored in the NEA GitLab. **Action on the NEA** to engage UKNNL and participants to determine what additional content should be considered.

The Chair thanked the NEA for making good progress with the backlog of reports that was created from groups finishing their activities without reports before 2017. As reported in this record, the subgroups 43 and 44 are closing with draft reports nearing completion. These are expected to be completed before the WPEC-33 meeting in 2021.

2. Reports on activities from international organisations

2.1. Report on Nuclear Science activities at NEA

The Head of the NEA Nuclear Science Division, **T. Ivanova**, shared memories from her experience with **M. Salvatores**, who had passed away only weeks before the current meetings. Massimo had served as the Chair of numerous NEA activities including WPEC, the JEFF project, the Working Party on the Physics of Plutonium Recycle and, from 1997-2000, the NSC, which oversaw all of these working party level activities. Many WPEC participants had shared kind words in the past weeks and a short text, shared by **R. Jacqmin** and endorsed by the NSC Bureau, has been posted on the NEA website. **T. Ivanova** announced the nomination of a new NSC Chair, **K. Pasamehmetoglu** (US), and a new Vice-Chair, **G. Bignan** (France) in 2019 and the review and prioritisation of the Programme of Work (PoW) of the NSC. This reform will adjust the PoW to match the evolving priorities of NEA members and introduce a more efficient NSC structure with new guidance mechanisms and prepare a basis for the Programme of Work and Budget (PWB) for the next biennium. The NSC Bureau has agreed that *"the focused schedule and deliverables within the [WPEC] have been highly effective for over 30 years"* and no reform of the WPEC is envisaged, as WPEC continues to deliver high-quality outputs in a timely manner. The NSC publications were reviewed and it was noted that official NEA NSC publications, of which there have been 7 in the past 5 years, account for more than 75% of the total downloads of over 50 NSC reports. In the past year, WPEC groups have been responsible for three official NEA publications, including the CIELO report, Subgroup 42 report and the GNDS-1.9 specifications (published May 2020). **T. Ivanova** thanked all of the contributors to these and other reports that are in the publications pipeline and announced that a GNDS webinar will be organised with the NEA Central Secretariat in the near future.

2.2. Report on Nuclear Data Section activities at IAEA

The Head of the IAEA Nuclear Data Section, **A. Koning**, reviewed progress made in the last year, including the release of the International Reactor Dosimetry and Fusion File II (IRDFF-II), the IAEA Photonuclear Data Library 2019 – which are both extensively documented in publications within *Nuclear Data Sheets* Volume 163 (January 2020). The NRDC has been prioritising the compilation of fission yield data in parallel to the ramp up of a new CRP on fission yield evaluation that will launch later in 2020. Hundreds of new or updated entries have been identified and work, co-ordinated by the IAEA, is ongoing within all of the main centres. The IAEA has recently launched a new Medical Isotope Browser (nds.iaea.org/mib) with a web-browser interface that allows users to simulate charged-particle irradiations of materials and calculate inventory-related quantities using IAEA special-purpose evaluated libraries complemented with TENDL.

3. Reports on experimental activities

3.1. China

X. Ruan reported on experimental activities from the China Institute of Atomic Energy, including the development of fission mass distribution measurements with the TOF-E technique, showing preliminary results for ^{252}Cf, neutron and gamma leakage spectra for D-D and D-T neutron sources, progress on the construction of 'white' neutron beamlines at the CIAE 100 MeV cyclotron facility and progress at the Chinese Spallation Neutron Source (CSNS), including background measurements and the installation/commissioning of the GTAF-II 40-unit BaF_2 array. New 1.0 eV to 3.0 MeV ^{6}Li(n,t) and 1.0 eV to 2.5 MeV ^{10}B(n,a) measurements were performed at Peking University. The China Academy of Engineering Physics performed experiments with the Fast Ionization Chamber for Fission Cross Section Measurement (FIXM) with results shown for the fission cross section ratios between ^{238}U/^{235}U and ^{236}U/^{235}U.

3.2. Japan

A. Kimura reported on measurements at the J-PARC ANNRI experiment at the Materials and Life Science Experimental Facility, including total and capture measurements on ^{243}Am, and capture measurements on ^{237}Np. Surrogate measurements at the JAEA Tandem facility have included ^{18}O-induced fission on targets including ^{232}Th, ^{238}U, ^{237}Np, ^{243}Am and ^{248}Cm, with results shown for a matrix of different multi-chance fission mass distributions and neutron multiplicities. Measurements on ^{135}Cs activation have been taken at the KURNS reactor. Measurements from a collaboration working at HIMAC have been studying neutron double-differential distributions from 290 MeV/u ^{132}Xe on Nb and Bi targets and charged-particle production reactions from 100 MeV/u ^{12}C on Al. Isotope production for spallation reactions were measured at the RIKEN RI Beam Factory with ^{93}Nb beams. Results were shown from NewSUBARU measurements of nuclear resonance fluorescence of ^{52}Cr. A collaboration between Teikyo Universtiy and HZDR, Germany has measured gamma-ray strength functions for ^{115}In around 5 to 10 MeV using gELBE.

3.3. USA

Y. Danon reported the activities presented at the 2019 CSEWG. The LENZ ^{16}O(n,α_0) measurements currently have 30% uncertainty and efforts are ongoing to quantify various corrections. Chi-Nu data is still being collected although preliminary ^{238}U results were shown, suggesting a later-than-predicted second chance threshold and pre-equilibrium component. Preliminary LANSCE results for ^{35}Cl(n,p) and (n,α) were shown, with a potentially non-statistical behaviour around 2-3 MeV and results for Pt are continuing with corrections for ^{195,198}Pt sample contamination. ORNL has been working in partnership with GELINA at JRC-Geel to measure ^{142}Ce with preliminary transmission results identifying resonance mis-assignment in the current ENDF evaluations. Measurements at the Berkeley 88-inch cyclotron have included ^{75}As and ^{72}Se proton-induced reactions from threshold to 200 MeV. Measurements with the GENESIS array will look into ^{238}U(n,n'γ) and (n,fγ) reactions, the latter of which will probe P(ν) dependence on A, Z, E and J$^\pi$ of products. TUNL continues to carry out γ-fission product yield measurements and study γ-induced medical isotope production reactions. Results from RPI included the ^{181}Ta transmission and capture measurements with evaluated fits, ToF scattering distributinos for Zr and Cu and neutron production in ^{235,238}U. A. Carlson has indicated that improved experimental results are needed for several isotopes, notably for boron, lithium and gold, to increase the maximum energy of the standard and/or generally reduce uncertainties. An extension of the hydrogen standard to 150 MeV or beyond is in progress and there is considerable interest in quantifying unrecognised sources of uncertainty. Work at the ANL Gammasphere has generated branching ratios for 22 new levels in ^{238}U.

4. Progress reports from evaluation projects

4.1. CENDL

Z. Ge presented the progress of the CENDL project, which will shortly be releasing version 3.2. This includes 270 files (up from 250 reported in 2018) with 77 new or updated evaluations, including ^{235}U, ^{239}Pu, ^{233}U, ^{232}Th, ^{56}Fe and ^{1}H and evaluations up to 20 MeV. New fission product nuclei evaluations are included, based on the UNF code system, including covariance libraries generated from input parameter variation. A new fission yield sub-library has been created and is complemented by a new decay sub-library that includes 1415 nuclides. A new photo-nuclear sub-library with 270 new evaluations is included with calculations based on the GLUNF and MEND-G code packages. Large-scale validation using ENDITS, primarily using criticality benchmarks, has shown improvement in CENDL-3.2 performance with respect to previous versions.

4.2. ENDF

Following the release of ENDF/B-VIII.0, CSEWG has been focusing on measurements and new tool development, with several codes (DeCE, AMPX, SAMMY, NJOY, FUDGE, GIDI, FLASSH etc.) released, updated and/or open-sourced in the recent past. Evaluation work has been increasing and slides were shown for new ^{50,53}Cr evaluations as part of INDEN, ^{4}He evaluations with EDA and ^{208}Pb evaluations with CoH$_3$ at LANL, ^{17,18}O and ^{9}Be (α,n) evaluations from NNL, NCSU TSL evaluations for single-crystal sapphire, α-U metal, FLiBe, heavy paraffinic oil and hydrofluoric acid, TSL covariances from ORNL. Several other evaluations are in progress and were listed. The NNDC has launched a new

GitLab service and has migrated, or is in the process of migrating, all of the SVN content of the ENDF project. Repositories are linked directly to the NNDC Buildbot system that executes the ADVANCE suite of processing, verification and testing tools, which has been refactored as part of a modernisation effort. Covid-19 complications have affected progress but enough new work has already been completed that a beta release is being considered for the near future.

4.3. JEFF

A. Plompen announced the acceptance of the JEFF-3.3 paper in EPJ/A which is due for publication in the very near future. While the JEFF-3.3 library benefitted from many different and complementary tests, the community has been greatly interested in feedback from users and testing of the JEFF-3.3 library to ensure the JEFF-4 library is tailored to user needs. He reviewed progress presented in the JEFF meetings of November 2019 and a shortened April 2020 meeting, including new microscopic calculations form Goriely and Dupuis, fission yield work including correlations by Serot et al., and new work from the IAEA as part of INDEN. A set of national and international programmes including SANDA, ARIEL and NACRE are funding work in new measurements and evaluations that will feed into the JEFF-4 projects. At CERN, nTOF continues its multi-year neutron-induced reaction measurement programme that is well into its third phase. The process to establish a 'starter file' is ongoing as part of the planned 2020-2024 JEFF-4 development. New methods for integrating contributions, version control and automated testing are being developed and will be shared via the NEA GitLab

4.4. JENDL

O. Iwamoto provided an overview of the JENDL sub-library projects and releases, which included an updated version of the photonuclear library released as version JEDNL/PD-2016.1. This includes updates to 1096 nuclides of the total 2684, drawing upon the outputs of the IAEA CRP on Photonuclear Data and Photon Strength Functions and extended to 200 MeV with results from the CCONE code. The JENDL/ImPACT-2018 library was released in 2019, including evaluations up to 200 MeV for 163 nuclides produced as part of transmutation of fission products. A new library on deuteron reaction data for ^{6,7}Li, ^{9}B and ^{12,13}C up to 200 MeV based on the DEURACS code is due to be released in 2020. Progress on the JENDL-5 library continues, with new α2 and α3 versions prepared in 2020 that include updates to N, O, Na, Mn, Cu, Pd, Eu, Pb, Bi, U and Pu isotopes. A release is planned for 2022.

K. Tada presented benchmarking and testing activities, where a suite of quality assured inputs for the MVP code have been prepared based on ICSBEP and IRPhEP benchmarks. 772 inputs were prepared and have been shared with the WPEC subgroup 45 (VaNDaL) project via the NEA GitLab. Progress in verification and validation of the test JENDL files is ongoing, with cross-comparison of processing results between NJOY2016 and the FRENDY code of JAEA.

4.5. TENDL

A. Koning presented the TENDL evaluation methodology and progress made in the development of the TENDL-2019 library which was released in December 2019. The full

'T6' package of codes was released alongside the library, including an updated version 1.95 of the TALYS code. The TARES-1.4 code was updated with a resonance evaluation database drawing upon the most recent releases of ENDF/B-VIII.0, JEFF-3.3 and the 6th edition of the *Atlas*, with both MF32 and calculated MF33 included in the output files. Other new developments include a direct route for the creation of GNDS files with the TAGNDS code developed by **C. Mattoon** and new verification/validation efforts on the recently released library.

5. Status of active subgroups

5.1. Expert Group on the High Priority Request List

E. Dupont reported on the progress with the High Priority Request List, with a publication made for the ND2019 conference and materials provided to the NEA for the purpose of drafting a summary report for the HPRL. One completed entry on ^{235}U Capture was archived and justifications for all completed entries were added into the database. A new Java Content Management System (JCMS) based prototype is in development as part of the new NEA website project and is planned to be released shortly after the public webpages are migrated. No new entries were made, but some 16 updates were added including references to progress made in multiple requests. Several requests are in preparation for improving the quantification of delivered therapeutic dose in proton beam treatments.

5.2. Expert Group on the Recommended Definition of a General Nuclear Database Structure

D. Brown reported on the progress made in the past year, including the approval and publication of the GNDS-1.9 specifications in the week of the WPEC-32 meeting. As reported in the subgroup 43 summary, multiple APIs have already been implemented and are available for download from GitHub. Comparisons between the ENDF-6 formats, the subgroup 38 requirements and the GNDS-1.9 specifications are positive, with all low-level non-obsolete ENDF-6 formats supported. With the release of the next version the few remaining main issues with respect to the subgroup 38 requirements will be addressed and all of these were approved at the May 2020 meeting. Of the 14 proposals made since the 2019 June meeting, 12 were approved and the remaining two will be the subject of a follow-up WebEx meeting before the GNDS-2.0 specifications are brought for final endorsement by the EG-GNDS. Several drawbacks of the current build system were identified. While these do not affect the actual specifications, they significantly impact how the project is managed and solutions are being sought to help manage the project with a long-term perspective. With subgroup 43 closing, both the EG-GNDS and subgroup 43 members agreed to include the API-related activities within the EG-GNDS although no specific deliverable will be identified for the foreseeable future. If and when this changes, a mandate alteration would have to be agreed or a separate subgroup proposal made.

5.3. Subgroup 43: Code infrastructure to support a modern general nuclear database (GND) structure

F. Malvagi reported on the progress of subgroup 43, where multiple partial or complete implementations of a GNDS API have been developed. The status as of this meeting is that two (FUDGE and GIDI+) are available now on public GitHub repositories. Another API within AMPX is in beta testing and will be shortly made available online and the GNDS toolkit (GNDStk) is in active development and will also be on public GitHub repositories. This subgroup will now close, although the effort to promote the adoption of GNDS, in part through the implementation of GNDS APIs, will continue within the Expert Group on GNDS as agreed in both the subgroup 43 and EG-GNDS meetings.

5.4. Subgroup 44: Investigation of Covariance Data in General Purpose Nuclear Data Libraries

V. Sobes reviewed the presentations shown in the subgroup 44 and the status of the inter-comparison study of cross-correlations between nuclides and reaction channels. This subgroup will be closing and expects to complete the final report of its activities before the 2021 meeting. The results from this study will form part of the summary report for subgroup 44 and already contributions have been contributed for the majority of the document with the remaining expected in the near future.

5.5. Subgroup 45: Validation of Nuclear Data Libraries (VaNDaL) Project

W. Haeck reported on renewed activities in subgroup 45. With the new responsibilities that **M. White** has taken on with a change of role, **W. Haeck** will take over leadership of the subgroup. Suites from the IAEA, NRG and JAEA for MCNP and MVP codes have been added to the SG45 private spaces of the NEA GitLab. LANL is preparing its own validated suite that will be released once the required QA processes are completed. A draft document discussing QA procedures has been started within the NEA GitLab under the leadership of **N. Leclaire**. A meta-format for input data has been defined and is available on the NEA GitLab, with example files and a detailed schema. Tools to automatically generate inputs for MCNP and compare files are in development and will be released in the coming year.

5.6. Subgroup 46: Efficient and Effective Use of Integral Experiments for Nuclear Data Validation

While no subgroup 46 meeting was held in 2020 due to the passing of **M. Salvatores, G. Palmiotti** commented on the plans for the future of the subgroup in spite of the tremendous loss. **O. Cabellos** has been invited to Co-Chair the subgroup and the WPEC unanimously endorsed this. The target accuracy requirements activity is continuing, as well as the work on integral data assimilation. The *Annals of Nuclear Energy* will be preparing a special issue in memory of **M. Salvatores** and several participants are preparing contributions.

5.7. Subgroup 47: Use of Shielding Integral Benchmark Archive and Database for Nuclear Data Validation

I. Kodeli summarised the presentations and actions from subgroup 47. Results from several SINBAD cases and new experiments that may be included in future SINBAD versions were shown. The NEA GitLab space for subgroup 47 has already been used to collect

information related to new, proposed experiments and additional supplementary information related to existing SINBAD entries may be included in future, subject to outstanding permissions issues. These are expected to aid nuclear data evaluators and provide resources for the SINBAD Technical Review Group to review.

5.8. Subgroup 48: Advances in Thermal Scattering Law Analysis

A. Hawari reported on the kick-off meeting for subgroup 48, which attracted a large number of participants and presentations. Following on the success with subgroup 42, which published its final report in early 2020, the community continues to develop advanced thermal scattering evaluation methodologies, processing tools, validation systems, as well as create new and improved evaluations for advanced reactors, criticality safety and neutron science.

5.9. Subgroup 49: Reproducibility in Nuclear Data Evaluation

M. Herman reported on the work done within subgroup 49 which, although significantly impacted by Covid-19, has made progress and held a kick-off meeting. Already several codes and systems are being modernised and migrated to new tools, such as GitLab or noSQL databases with API interfaces. The TALYS fortran modernisation is continuing and TALYS-2.0 will employ new version-control/distribution techniques. A prototype EMPIRE git repository with multi-OS automated testing and docker containerisation has been created, allowing a simple, git-based evaluation repository with file creation part of the continuous integration system. The NEA Databank has focused on developing library management and testing systems within GitLab, with an advanced prototype system demonstrated in the subgroup meeting. Focused teleconferences on specific topics within subgroup 49 will be organised in the coming months to address components of evaluations.

6. Discussion and subgroup proposals

6.1. Quality assignment and usability of the EXFOR database

A. Koning, Head of the IAEA Nuclear Data Section, commented on the nature and status of EXFOR, which is neither evaluated (by design) nor practically machine readable. Although many efforts have been made in the past two decades to create computational formats and improve the quality of EXFOR data, these by design cannot accommodate all the needs of the evaluation community since subjective, personal and non-unique opinions of evaluators are not within the scope of EXFOR. An 'EXFOR correction system' has been created by **V. Zerkin** (IAEA) although over a decade this contains 6 files covering 182 datasets. He proposed a set of attributes and use cases for an 'ideal' high-quality, machine-readable, evaluated experimental reaction data library, drawing upon other work to highlight how and what meta-data could be stored. Many tools have been created to interface with EXFOR and derived file formats but without co-ordination in methodology or standardisation of the meta-data, resulting in duplicated effort and inferior results compared to a collaborative effort.

6.2. Subgroup on Developing an Automatically Readable, Comprehensive and Curated Experimental Reaction Database

A. Lewis presented a proposal for a new subgroup that will many of the issues raised in the previous presentation by using EXFOR as a fundamental database and building a set of formats that introduce new functionality and meta-data that would be incompatible with the principles of EXFOR. The first 'layer' of the new databases would introduce an automatic machine-readable format without introducing any objective or subjective data to supplement the existing EXFOR-derived data. It is not the objective for this layer to contain the entirety of EXFOR and those required and/or requested by the evaluation community will be prioritised. A second layer will be generated using the first and a secondary database of 'objective' corrections, including identification of missing uncertainties, outliers, updates for relative measurements, etc. The definition of these 'objective' corrections and a format for their storage would be a primary output of the subgroup. The third layer would be derived from the second, allowing a set of 'subjective' expert judgements to be made, introducing or altering uncertainties, modifying data, flagging or weighting data, etc.

The WPEC members agreed that this subgroup proposal was of direct interest to the evaluation projects and key members within the evaluation projects and the Network of Nuclear Reaction Data Centres (NRDC) have already confirmed their interest and intention to actively participate. **T. Ivanova**, Head of the Division of Nuclear Science, informed the participants that as the proposal is well developed, fully in line with the WPEC mandate and that two WPEC subgroups (43 and 44) will be closing, the creation of the new subgroup could be supported within the new PWB. **R. Capote** and **A. Koning**, Deputy Head and Head of the IAEA Nuclear Data Section, addressed a query from **K. Suyama**, Head of the NEA Databank, explaining that the IAEA has rigorously reviewed this proposal before endorsing it and concluded that it would be best placed within the WPEC. The IAEA will play an important role both technically and through co-ordination (alongside the NEA Secretariat) with the NRDC, which is responsible for EXFOR.

WPEC unanimously approved the creation of this subgroup.

7. Conferences and meetings of interest

7.1. ND2022 in California, USA

C. Mattoon presented the plans for the ND2022 conference that is being organised by LLNL. The Sacramento Convention Center has been tentatively selected as the venue with the Sacramento International Airport nearby for transportation. The dates tentatively selected are 24-29 July 2022 and 400 hotel rooms have been reserved with a rate of $140 per night in the Sheraton Grand, Reidence Inn and Best Western. Circulars for the event will be distributed from early 2021 with abstracts due in autumn 2021.

8. Mandate extensions

8.1. Expert Group on the High Priority Request List for Nuclear Data

E. Dupont presented the updated mandate for the EG-HPRL to the WPEC for approval (see *Appendix 4)*. Beyond minor changes, the EG-HPRL mandate is essentially a continuation of the previous one. The new mandate would run until June 2022.

WPEC unanimously endorsed the new EG-HPRL mandate.

8.2. Expert Group on the Recommended Definition of a General Nuclear Database Structure

D. Brown presented the updated mandate for the EG-GNDS to the WPEC for approval (see *Appendix 5)*. With the publication of the GNDS-1.9 specifications, the main deliverable has become the further development of the specifications with periodic releases of new versions. The NEA GitLab has been selected as the collaborative platform and this has proven highly successful. The wording related to a governance board from evaluation projects was removed as the OECD Rules of Procedure provide sufficient guidance on the management of NEA activities and the EG-GNDS has functioned very effectively through consensus-building. As agreed in Sections 5.2 and 5.3, the collaboration between participants on API specification and implementation will continue within EG-GNDS and this was reflected in the new mandate.

WPEC unanimously endorsed the new EG-GNDS mandate.

9. Date and place of next meeting

The next meeting of the WPEC will take place on the week of 10-14 May 2021, with the Working Party meeting on the 13-14 May 2021. This will take place at the NEA Headquarters in Boulogne-Billancourt and arrangements will be made to allow remote participation.

Appendix 1

OECD/NEA Nuclear Science Committee

Meeting of the NSC Working Party on International Nuclear Data Evaluation Co-operation (WPEC)

WebEx Meeting

14-15 May 2020

AGENDA

Day 1 – Thursday, 14 May 2020

Duration	PDT	CEST	JST	Topic	
00:15	02:30	**11:30**	18:30	Introduction of participants	
00:10	02:45	**11:45**	18:45	Opening remarks	O. Iwamoto
00:05	02:55	**11:55**	18:55	Adoption of day 1 agenda	O. Iwamoto
00:05	03:00	**12:00**	19:00	Adoption of WPEC-31 records	O. Iwamoto
00:10	03:05	**12:05**	19:05	Review of actions/reports	M. Fleming
00:25	03:15	**12:15**	19:15	NSC activities and Bureau report	T. Ivanova
00:20	03:40	**12:40**	19:40	Experiments in Japan	A. Kimura
00:20	04:00	**13:00**	20:00	JENDL status and updates	O. Iwamoto / K. Tada
00:20	04:20	**13:20**	20:20	Experiments in China	X. Ruan
00:20	04:40	**13:40**	20:40	CENDL status and updates	Z. Ge
00:30	05:00	**14:00**	21:00	Break	
00:20	05:30	**14:30**	21:30	Experiments in Europe	A. Plompen
00:20	05:50	**14:50**	21:50	JEFF status and updates	A. Plompen
00:20	06:10	**15:10**	22:10	TENDL status and updates	A. Koning
00:20	06:30	**15:30**	22:30	IAEA nuclear data activities	A. Koning
00:20	06:50	**15:50**	22:50	Experiments in USA	Y. Danon
00:20	07:10	**16:10**	23:10	ENDF status and updates	D. Brown
	07:30	**16:30**	23:30	Close	

Day 2 – Friday, 15 May 2020

Duration	PDT	**CEST**	JST	Topic	
00:05	03:00	**12:00**	19:00	Introduction of participants	
00:05	03:05	**12:05**	19:05	Adoption of day 2 agenda	O. Iwamoto
00:10	03:10	**12:10**	19:10	Status of EG-HPRL	E. Dupont
00:10	03:20	**12:20**	19:20	Status of EG-GNDS	D. Brown
00:10	03:30	**12:30**	19:30	Status of Subgroup 43	F. Malvagi
00:10	03:40	**12:40**	19:40	Status of Subgroup 47	I. Kodeli
00:10	03:50	**12:50**	19:50	Status of Subgroup 45	W. Haeck
00:10	04:00	**13:00**	20:00	Status of Subgroup 49	M. Herman / D. Rochman
00:10	04:10	**13:10**	20:10	Status of Subgroup 44	V. Sobes
00:10	04:20	**13:20**	20:20	Status of Subgroup 48	A. Hawari
00:10	04:30	**13:30**	20:30	Status of Subgroup 46	G. Palmiotti
00:20	04:40	**13:40**	20:40	Break	
00:30	05:00	**14:00**	21:00	Discussion on Quality assignment and usability of EXFOR database	A. Koning
00:30	05:30	**14:30**	21:30	Subgroup proposal	A. Lewis
00:10	06:00	**15:00**	22:00	ND2022 udpate	C. Matoon
00:20	06:10	**15:10**	22:10	EG mandate extensions	M. Fleming
00:10	06:30	**15:30**	22:30	Date and place of next meeting	M. Fleming
00:20	06:40	**15:40**	22:40	AOB	
	07:00	**16:00**	23:00	Close	

Appendix 2

List of participants to the 32nd meeting of the WPEC

Working Party on International Nuclear Data Evaluation Co-operation

	Given name	Family name	Representing	Notes
1	David	BERNARD	FRANCE	SG45
2	John	BESS	UNITED STATES	
3	David	BROWN	UNITED STATES	EG-GNDS
4	Mark	CHADWICK	UNITED STATES	ENDF
5	Jeremy Lloyd	CONLIN	UNITED STATES	SG43
6	Theresa	CUTLER	UNITED STATES	
7	Yaron	DANON	UNITED STATES	ENDF
8	Cyrille	DESAINTJEAN	FRANCE	JEFF
9	Emmeric	DUPONT	FRANCE	EG-HPRL
10	Michael	FLEMING	NEA	Secretariat
11	Daniela	FOLIGNO	NEA	
12	Zhigang	GE	CHINA	CENDL
13	Wim	HAECK	UNITED STATES	SG45
14	Ayman	HAWARI	UNITED STATES	SG48
15	Adam	HAYES	UNITED STATES	
16	Michal	HERMAN	UNITED STATES	SG49
17	Tatiana	IVANOVA	NEA	
18	Nobuyuki	IWAMOTO	JAPAN	JENDL
19	Osamu	IWAMOTO	JAPAN	JENDL
20	Robert	JACQMIN	FRANCE	JEFF
21	Atsushi	KIMURA	JAPAN	JENDL
22	Ivan-Alexander	KODELI	SLOVENIA	SG47
23	Arjan	KONING	IAEA	
24	Luiz Carlos	LEAL	FRANCE	JEFF
25	Amanda	LEWIS	UNITED STATES	SG proposal
26	Fausto	MALVAGI	FRANCE	SG43
27	Caleb	MATTOON	UNITED STATES	SG43
28	Franco	MICHEL-SENDIS	NEA	
29	Robert	MILLS	UNITED KINGDOM	
30	Denise	NEUDECKER	UNITED STATES	SG proposal
31	Gilles	NOGUERE	FRANCE	SG48
32	Naohiko	OTSUKA	IAEA	

33	Arjan	PLOMPEN	JRC-GEEL	JEFF
34	Boris	PRITYCHENKO	UNITED STATES	
35	Dimitri	ROCHMAN	SWITZERLAND	JEFF/SG49
36	Evgeny	ROZHIKHIN	RUSSIA	BROND
37	Xichao	RUAN	CHINA	
38	Georg	SCHNABEL	IAEA	
39	Vladimir	SOBES	UNITED STATES	SG44
40	Alejandro	SONZOGNI	UNITED STATES	ENDF
41	Kenya	SUYAMA	NEA	
42	Kenichi	TADA	JAPAN	JENDL
43	Tim	WARE	UNITED KINGDOM	
44	Dorothea	WIARDA	UNITED STATES	ENDF
45	Haicheng	WU	CHINA	CENDL
46	Michael	ZERKLE	UNITED STATES	

Appendix 3

List of Actions from the 32nd meeting of the WPEC

Working Party on International Nuclear Data Evaluation Co-operation

	Action	Responsible	Date
1	Respond to NEA request for transfer of rights to publish material from SG27 report	**T. Ware**	**November 2020**
2	Provide NEA with any draft materials for the SG36 summary report	**A. Plompen**	**November 2020**
3	Request source LaTeX files for SG35 report or other draft materials from LANL staff	**M. Chadwick**	**November 2020**
4	Prepare the final copy of the GNDS-2.0 specifications for NEA publication	**D. Brown**	**December 2020**
5	Prepare an Expert Roundtable / Webinar for the GNDS-1.9 specifications launch	**M. Fleming**	**July 2020**
6	Explore options for NEA/DB training programmes for GNDS and GNDS-API tools	**M. Fleming**	**February 2021**
7	Finalise place and date of ND2022 conference and inform WPEC participants	**C. Mattoon**	**ASAP**
8	Officially inform NRDC members of the creation of the new WPEC subgroup 50 via NRDC memo	**M. Fleming**	**September 2020**
9	Identify in-depth discussion topics and organise presentations for WPEC-33	**M. Fleming and O. Iwamoto**	**February 2021**

Appendix 4

Revised Mandate

WPEC EXPERT GROUP ON THE HIGH PRIORITY REQUEST LIST FOR NUCLEAR DATA (EGHPRL)

Members:	All NEA member countries
Full Participant:	European Commission
	Under the NEA Statute
Observer (International Organisation):	International Atomic Energy Agency (IAEA)
	By agreement
Date of creation:	30 May 1991
Start of current mandate:	30 June 2018
Duration:	30 June 2022

Mandate

- Agreed at the 16th meeting of the Working Party on International Nuclear Data Evaluation Co-operation [NEA/SEN/NSC/WPEC(2004)2]
- Extended as a part of WPEC activities at the 23rd meeting of the Nuclear Science Committee in June 2012 [NEA/SEN/NSC(2012)3]
- Revised and extended at the meeting of the NEA Nuclear Science Committee in June 2013 [NEA/NSC/DOC(2013)2]
- Revised and extended at the 26th meeting of the Working Party on International Nuclear Data Evaluation Co-operation [NEA/SEN/NSC/WPEC(2014)2] and endorsed by the NEA Nuclear Science Committee in June 2014 [NEA/SEN/NSC(2014)2]
- Revised and extended at the 28th meeting of the Working Party on International Nuclear Data Evaluation Co-operation [NEA/SEN/NSC/WPEC(2016)2] and endorsed by the 27th NEA Nuclear Science Committee in June 2016 [NEA/SEN/NSC(2016)2]
- Revised and extended at the 30th meeting of the Working Party on International Nuclear Data Evaluation Co-operation [NEA/SEN/NSC/WPEC(2018)2] and endorsed by the 29th NEA Nuclear Science Committee in June 2018 [NEA/SEN/NSC(2018)6]

Background and scope

The concept of a nuclear data request list has a long history in applied nuclear science. The concept is that if requests from applied users of data are collected in a convenient location, it should provide a stimulus to measurers, modellers, and evaluators to undertake work that could lead to certain requests being satisfied.

A High Priority Request List (HPRL) for nuclear data needed for applications has been in existence under the auspices of the OECD Nuclear Energy Agency (NEA) for many years. This list provides a point of reference for nuclear data stakeholders and developers and has led to many new initiatives in nuclear data measurement, evaluation and validation. Its effectiveness in stimulating new measurements, evaluations and verification actions required to meet the expressed needs is well established in the nuclear data community. The results of completed requests are successfully used to increase the accuracy and reduce the uncertainty of different applications.

Therefore, the Expert Group on the High Priority Request List for Nuclear Data (EGHPRL) was established to maintain the HPRL as a point of reference in nuclear data research and development. The HPRL will reflect the actions undertaken by the Working Party on International Nuclear Data Evaluation Co-operation (WPEC) in this field, and will help guiding future activities. The EGHPRL reports on its activities to the WPEC.

Objectives

The EGHPRL is responsible for managing the activities related to the HPRL, in particular for guaranteeing that the entries are up-to-date and well-motivated by current interests in the field of nuclear energy and other nuclear applications. The Expert Group is also responsible for stimulating follow-up to the entries and collecting the feedback provided by any of the related activities that may further the resolution of a request.

In order to achieve the EGHPRL objectives, representatives from co-operating nuclear data evaluation projects of NEA member countries (such as the Evaluated Nuclear Data File [ENDF], Joint Evaluated Fission and Fusion Nuclear Data Library [JEFF], Japanese Evaluated Nuclear Data Library [JENDL] and Russian Library of Evaluated Neutron Data Files [ROSFOND/BROND]) will be invited to attend the EGHPRL meetings, including:

- a nuclear data user from the nuclear applications community;
- an evaluation and validation expert; and
- an expert in experimental measurements.

The EGHPRL will also be co-operating with the IAEA (specifically, the IAEA Nuclear Data Section), which participates as an Observer.

Working methods

The EGHPRL will work mainly by electronic mail exchanges. Physical meetings will be held typically once a year.

The HPRL is organised as follows:

1. The list consists of one list with truly high priority requests, a list with general requests and a list with special purpose quantities divided in categories.
2. Stringent criteria are applied for entries on the lists. These will be evaluated by the EGHPRL that will take the final decision for adopting a request.
3. A "high priority request" is justified by quantitative sensitivity studies (or the equivalent) and sufficiently documented.
4. A "general request" is well-motivated for a specific quantity on a specific nucleus and is documented, but lacks a detailed backing by a sensitivity analysis or an impact study.
5. A "special purpose request" in a well-defined category is of interest to a recognised important subfield of applied nuclear science, for which it is essential to stimulate new activity. Such a request may not satisfy the criteria as in the case of points 3 and 4 above.

The request lists will be subjected to periodic review to monitor progress and determine whether each individual request should continue to be included in these lists.

Deliverables

The deliverables of the EGHPRL are the following:

- an up-to-date publication on the status of all requests describing completed activities and outlook; and
- an up-to-date online version of the "High Priority Request List for Nuclear Data", including new requirements for fission reactors and other relevant applications.

Appendix 5

Revised Mandate

WPEC EXPERT GROUP ON THE RECOMMENDED DEFINITION OF A GENERAL NUCLEAR DATABASE STRUCTURE (EGGNDS)

Members: All NEA member countries

Full Participant: European Commission

                Under the NEA Statute

Observer   (International Organisation):   International Atomic Energy Agency (IAEA)

                By agreement

Date of creation: 31 May 2016

Start of current mandate: 31 May 2020

Duration: 31 May 2022

Mandate (Document reference):

- Agreed at the 28th meeting of the Working Party on International Nuclear Data Evaluation Cooperation in May 2016 [NEA/SEN/NSC/WPEC(2016)2]
- Approved at the 27th meeting of the NEA Nuclear Science Committee in June 2016 [NEA/SEN/NSC(2016)2]
- Revised and extended at the 30th meeting of the Working Party on International Nuclear Data Evaluation Co-operation [NEA/SEN/NSC/WPEC(2018)2] and endorsed by the 29th NEA Nuclear Science Committee in June 2018 [NEA/SEN/NSC(2018)6]

Context

The Evaluated Nuclear Data File (ENDF-6) nuclear data format has had a long and fruitful history as the preferred format for storing and exchanging evaluated nuclear data. Together with processing codes, it plays a pivotal role connecting nuclear physicists and reactor physicists, allowing them to exchange data between different computer codes. Today, however, it is showing signs of age. In particular, the ENDF-6 format places unnecessary limitations on the types of reactions and the level of precision at which data can be stored, making it more difficult to ensure quality and consistency of the data. Modern users are applying nuclear data towards

solving a broad range of problems (in medical physics, global security and advanced detector designs, among others) that stretch the ENDF-6 format beyond its original design.

Purpose, scope and membership

The Subgroup 38 (SG38) of the Working Party on International Nuclear Data Evaluation Cooperation (WPEC) was formed to solicit feedback from international stakeholders and develop a new General Nuclear Database Structure (GNDS) for storing nuclear data to replace the legacy ENDF-6 format. The SG38 has met its stated goal to develop a nuclear data structure definition that can meet the needs of a broad set of nuclear data users and providers.

In order to take the next step, it was necessary to establish an international expert group to endorse, promote and maintain the new format as the future international standard for disseminating nuclear reaction databases. The Expert Group on the Recommended Definition of a General Nuclear Database Structure (EGGNDS) was established in 2016 and became the steward of a new international definition for the modern nuclear database structure.

Goals and activities

The main objectives of this Expert Group are to make the GNDS:

1. easier for new users, as well as current users, to contribute to the community;
2. general and useful enough that it could also be used to organise nuclear structure data, experimental data and other nuclear data products;
3. adhere to high quality assurance and documentation practices.

Other goals include the development of better open source infrastructure to manipulate, search, plot, process, translate and check nuclear data and the development of new nuclear data products heretofore not possible. The EGGNDS will ensure that important and useful tools for using the new recommended definition are developed and maintained.

The EGGNDS will guide the creation of new infrastructure and promote better evaluation practices. It is foreseen that it will release new GNDS versions with appropriate documentation as necessary, without overburdening stakeholders.

Deliverables

The Expert Group will ensure the recommended definition of the GNDS meets the needs of major international nuclear data communities. In addition, this Expert Group will work on the following deliverables:

*   release periodic updates of the GNDS specifications that incorporate approved format proposals;
*   organise workshops and other outreach activities to train evaluators and other members of the nuclear data community, especially users, on the new structure.