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Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **28-Sep-2017**

English - Or. English

NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE

Working Party on International Evaluation Co-operation

TWENTY NINTH MEETING OF THE WORKING PARTY ON INTERNATIONAL NUCLEAR DATA EVALUATION CO-OPERATION

SUMMARY RECORD

18-19 May 2017
OECD Headquarters
Paris 16e, France

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NEA/SEN/NSC/WPEC(2017)2
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WORKING PARTY ON INTERNATIONAL NUCLEAR DATA EVALUATION CO-OPERATION
29th MEETING

OECD Headquarters, Conference Center
2 rue André Pascal, Paris 75016, France

18-19 May 2017

SUMMARY RECORD

The WPEC Chair, **M. Herman**, opened the meeting and welcomed all participants (a list is given in ***Appendix 1***). **O. Cabellos** acted as NEA/NSC WPEC Secretary.

1. Adoption of the Agenda [NEA/SEN/NSC/WPEC(2017)1]

The proposed agenda was adopted (see ***Appendix 2***).

2. Approval of the Summary Record of the 28th WPEC Meeting [NEA/SEN/NSC/WPEC(2016)2]

The summary record of the twenty-eighth meeting was approved without modification.

3. Membership and observers

H. Harada pointed out the changes in the JENDL delegates: T. Fukahori and M. Igashira are replaced by A. Kimura and T. Katabuchi, respectively. (*This point was officially confirmed by M. Kokubun's e-mail on June 12, 2017. M. Kokubun is First Secretary-Science and Technology Advisor Permanent Delegation of Japan to the OECD*).

4. Reports on experimental activities

Experimental nuclear data activities of relevance to the evaluation projects were reviewed. Detailed information about the experimental activities is given in the reports and viewgraphs presented at the meeting.

- *Europe*

  A. Plompen reported a summary of experiments in different European facilities: 1) Geel/JRC/GELINA; 2) IGISOL- JYFLTRAP; 3) ILL; 4) IPN Orsay; and 5) GSI. He also mentioned projects such as INTEGRAAL (for inelastic scattering validation), CANDELL (for neutron calibration of Li thermo-luminescent dosimeters), ZEPHYR (zero power critical facility), and SPECTRAL (neutron spectrometry). The presentation was based on material presented at the JEFF meetings of November 2016 and April 2017 and further details may be found in the presentations accessible on the JEFF webpage. Some material of JRC Geel was added independently.

- *United States*

  Y. Danon reported on activities in the USA mostly based on presentation in CSEWG-Nov 2016 meeting reporting information from different laboratories: 1) LANL (DANCE, Chi-nu; TPC and SPIDER); 2) ORNL (collaboration with GELINA); 3) LBNL; 4) Univ. Kentucky; 5) RPI (resonance and scattering data); and 6) NIST. The presentation was based on presentations made during the November 2016 CSEWG meeting.

- *Japan*

  H. Harada reported on nuclear data measurements performed at several accelerator and reactor facilities in Japan: 1) J-PARC/MLF/ANNRI; 2) AIMAC collaboration on Minor Actinides; 3) Tokyo Institute of Technology; 4) National Institutes for Quantum and Radiological Science and Technology (QST); 5) Hokkaido University; 6) Osaka University; 7) Konan University; and 8) Kyushu University.

- *Russian Federation*

  A. Ignatyuk reported on recent nuclear data measurements (delayed neutrons and alpha/proton threshold reactions) performed in Russia. There are several projects in progress; he explicitly mentioned the new tandem accelerator 3.5 MV to be devoted to measure (n,alpha) and (n,p) threshold reactions.

- *China*

  X. Ruan reported on China nuclear data measurement activities: 1) China Institute of Atomic Energy (DX and DDX measurement, nuclear data benchmark experiments and CSNS Back-n installation); 2) Peking University; 3) Institute of Modern Physics (HIRFL-CSR accelerator complex); and 4) China Academy of Engineering Physics (CAEP).

5. Brief progress reports from the evaluation projects and discussion of future plans

Progress in the major nuclear data evaluation projects was presented. Detailed information about the status of the evaluated nuclear data libraries is given in the reports and viewgraphs presented at the meeting.

- *ENDF*

  M. Herman reported on the status of ENDF project. He reviewed the main ENDF/B highlights for the neutron induced, charged particles, decay and thermal scattering data. The good performance of ENDF/B-VII.1 in criticality systems is retained in ENDF/B-VIIIβ4 removing historical bias in PST benchmarks. He announced that ENDF/B-VIII.0 will be released by the end of 2017. He also mentioned the role of ADVANCE Quality Assurance tool developed for ENDF/B-VIII. Regarding covariances, **M. Herman** pointed out that now there is a big effort on covariances.

- *JEFF*

  A. Plompen presented the status of the JEFF File project and the final steps to JEFF-3.3. He reviewed the main changes and improvements since T1 (released in April 2016 with 559 nuclides) to T3 beta releases. The final JEFF-3.3 is expected in November 2017. **R. Mills** presented the latest news of JEFF Decay data and Fission Yields activities to be released in JEFF-3.3. **O. Cabellos** presented the Benchmarking and Validation activities within JEFF project. **U. Fischer** presented the status of fusion activities within JEFF project (evaluations of Zr and ^{16}O, new dpa library based on arc-dpa approximation, integral benchmarks in FNG with W

and Cu). More detailed information may be found in the presentations of the JEFF meetings available on the NEA webpage.

- *JENDL*

  O. Iwamoto and **K. Yokoyama** presented the current status of the JENDL project and the plan for JENDL-5 to be released in 2021. **O. Iwamoto** summarized the progress of evaluations for light nuclei, structure materials, fission products, and actinides. Regarding covariances, **O. Iwamoto** said that more effort will be put on covariances, with more files. **K. Yokoyama** introduced the processing (FRENDY system) and benchmarking (VACANCE system) activities toward next JENDL-5. **K. Yokoyama** informed about the new report on "Compilation of the Data Book on Light Water Reactor Benchmark to Develop the Next Version of JENDL – Utilization of Criticality Data in ICSBEP and IRPhEP Open Databases," JAEA-Data/Code 2017-006 (2017) [in Japanese]".

- *TENDL*

  A. Koning reported on the status of the TALYS-based Evaluated Nuclear Data Library, from TENDL-2015 to TENDL-2017. For neutron induced library, he mentioned the improvements in fission products and activation evaluations, covariances in MF33 and the adoption of CIELO files. CIELO-1 files (ENDF/B-VIII) will be adopted by TENDL-2017. TALYS-2.0 is under development, and the package T6/TENDL/TALYS will be an open source.

- *ROSFOND/BROND*

  A. Ignatyuk reported on the status of the BROND-3.1 including 372 complete files and already released to NEA and IAEA. He specially mentioned the work on the evaluation of covariances in the library.

- *CENDL*

  Z. Ge presented the progress of CENDL project. He reviewed new evaluation activities for CENDL-3.2β0 on light elements, structure materials, fission products and actinides with 57 new evaluations. He described the current work on covariance evaluations and the benchmarking testing of CENDL-3.2β0.

6. Review of final or near-final subgroup reports

Results and conclusions of completed or near-completed subgroups were discussed. A summary table of all subgroup status is given in ***Appendix 3***.

- *Subgroup 27 (Prompt photon production from fission products)*
  This subgroup is closed. No final report is expected.

- *Subgroup 28 (Processing of covariance data)*
  This subgroup is closed. M. Dunn was working with a draft report. Probably, the final report will be issued by the end of 2017, to be published in 2018. **O. Cabellos** pointed out that SG28 activities/conclusions could be taken by the new SG44 proposal, and the report assimilated in SG44 report.

- *Subgroup 35 (Scattering angular distribution in the fast energy range)*
  T. Kawano informed O. Cabellos that the final report is in preparation. The final report will be issued by the end of 2017, to be published in 2018. **A. Plompen** recommended that this draft must be circulated to other participants in the Subgroup.

- *Subgroup 36 (Evaluation of experimental data in the resolved resonance region)*
  P. Schillebeeckx informed O. Cabellos that the final report is in preparation. The final report will be issued by the end of 2017, to be published in 2018.

7. Status of ongoing subgroups

Activities of ongoing subgroups were presented. A summary table of all subgroup status is given in ***Appendix 3***.

- *Expert Group/Subgroup C on High priority request list for nuclear data*
  E. Dupont reported on the status of SG-C/HPRL (see current mandate in ***Appendix 5.2***). He mentioned the importance of the HPRL as a reference tool in support to experimental, theoretical and evaluation projects aiming at improving nuclear data, and how HPRL should bridge the gap between nuclear data users and nuclear data producers. Memberships and participation was also revised. Three new requests are under review: SPQs for dosimetry reactions, nu-bar Pu239 and specific needs for ITER/IFMIF/DEMO (39K(n,p)39Ar).

  In the discussion, it was agreed to encourage end-users to contribute to new requests. **R. Capote** expressed high interest on the part of IAEA/NDS to participate and revitalize HPRL with new contributions from evaluators. **M. Chadwick** highlighted the need to identify gaps in nuclear data and the very valuable importance of this database. **T. Ivanova** and **G. Palimiotti** agreed with a new re-evaluation of target accuracy. **T. Ivanova** also mentioned the importance of increasing the visibility of this database in other NEA Working Parties.

  ACTION 1 - NEA: Update NEA website with new layout and features: SPQ requests form/guideline, public HPRL information
  ACTION 2 - NEA: Update list of SGC members
  ACTION 3 - E. Dupont: Distribute information of new draft requests to SGC members. Final requests to be added on the HPRL website
  ACTION 4 - All: Report on the status of all requests describing completed activities and outlook, by the end of 2017
  ACTION 5 - All: Increase the visibility of HPRL

- *Expert Group on Recommended Definition of Generalized Nuclear Data Structure (GNDS)*
  D. Brown reported on the first meeting of EG-GNDS. He reviewed the decision process of group (by consensus first, if it fails EG votes) and the close activity reported by SG38 and SG43 within the expert group. The SG38's Deliverable on "Initial specifications and implementation" will be released late fall 2017 and be approved as the first EG Deliverable "Initial GNDS version". Finally, the meting served to review operations of ENDF Formats Committee, it was approved the CSEWG model with minor changes.

  ACTION 1 - To coordinate the drafting of a "Users' Manual", analogous to the ENDF-6 Formats Manual (ENDF-102)
  ACTION 2 - Organize a discussion between GForge and GitHub platforms for tracker items
  ACTION 3 - Deliverable on "Initial specifications & implementation" due with ENDF/B-VIII.0 release, anticipated late fall 2017

NOTE: The original text of the EG-GNDS Mandate was proposed and approved at the 28th WPEC meeting held in May 2016. This text was commented by the NEA management and then jointly revised by D. Mcnabb, Dave Brown and NEA/NS and NEA/DB. The final version of the mandate (see ***Appendix 4.3***) has simplified the background and context, without changes in the objectives and deliverables. The revised mandate was approved by the NEA Director-General in November 21, 2016. WPEC members were informed on November 22, 2016, and having neither comments nor suggestions on the document, they approved the revised mandate.

- *Subgroup 37 (Improved fission product yield evaluation methodologies)*
  R. Mills reported on this subgroup. No SG meeting was held during WPEC-2017 week. Technical activities were finalised in 2016. The Draft report is in progress. He pointed out that new fission yield evaluations are being developed in JEFF-3.3 and by the China Nuclear Data Centre (Zhu et al, 2017), and there is interest in the US to restart such work based upon their new measurement activities.

  ACTION - Subgroup closed. Final documentation in 2018

- *Subgroup 38 (A modern nuclear database structure beyond the ENDF format)*
  D. McNabb (presented by **D. Brown**) reported on progress made to define a new and improved standard structure for storing nuclear reaction data. Regarding documentation, "*Detailed requirements*" and "*Initial Specifications*" are almost finished. He mentioned that two new sugbroups (SG43 and EG-GNDS) will carry the effort to modernize the nuclear data structure. **M. Herman** remarked the impressive work done by this Subgroup with a complete collection of documents to describe the new database structure.

  ACTION 1 - To close SG38 Subgroup in 2017 with a summary report that references all documentation prepared by SG38
  ACTION 2 - Release ENDF/B-VIII in both ENDF6 and GNDS

- *Subgroup 39 (Methods and approaches to provide feedback from nuclear and covariance data adjustment for improvement of nuclear data files)*
  G. Palmiotti reported on SG39 status. He summarized the current activities as: 1) finalizing several chapters of the final deliverable: Stress test, MC sensitivity calculation, Asymptotic PIA; 2) providing new experiments aimed at improving adjustments; 3) pursuing development of continuous energy adjustment technique; 4) providing some feedback for CIELO isotopes (no covariance yet available); and 5) formulating proposal for follow up activity SG46. He also informed about the recent Intermediate WPEC/SG39 report entitled "Methods and Approaches to Provide Feedback from Nuclear and Covariance Data Adjustment for Improvement of Nuclear Data Files" (https://www.oecd-nea.org/science/docs/2016/nsc-r2016-6.pdf).

  ACTION 1 - Subgroup activities will continue until May 2018. New meeting for this SG is planned in November 2017 joint to JEFF meeting
  ACTION 2 - SG39 will perform adjustment for providing feedback to CIELO when covariances will be available

- *Subgroup 40 (Collaborative International Evaluated Library Organization Pilot Project)*
  M. Chadwick summarised the progress and understanding made by the different SG40-CIELO teams in ^{1}H, ^{16}O, ^{56}Fe, ^{235}U, ^{238}U, and ^{239}Pu. Few items were remarked: 1) it is possible to adopt standards, without adjustment away from standards, 2) in many cases, the previous perceived "too large uncertainties" were correct (e.g. ^{235}U(n,γ)), 3) the major challenge – and accomplishment – was developing a suite of CIELO evaluations that perform well in concert, as a suite. He mentioned the diversity of proposals based on differences of opinion, leading to two CIELO evaluations, CIELO-1 (adopted in ENDF) and CIELO-2 (adopted in JEFF).

A. Koning gave a presentation on "*IAEA plans for follow-up of CIELO*". Here, the current role of NEA and IAEA were discussed. The IAEA instruments for collaboration were presented, in particular, a proposal of a new network devoted to nuclear data evaluation. After some discussion on the way of collaboration and practical matters between IAEA and NEA, it was agreed to organize an IAEA Technical Meeting on December 18-21, 2017 at the IAEA in Vienna, Austria. This Technical Meeting will serve to define the future framework of collaboration.

ACTION 1 - Subgroup activities end in 2017. Documentation in 2018
ACTION 2 - Follow-on being discussed with IAEA & NEA. IAEA Technical Meeting on December 18-21, 2017, IAEA, Vienna, Austria

- *Subgroup 41 (Improving nuclear data accuracy of 241Am and 237Np capture cross-sections)*
  H. Harada reported on SG41 status after the 3rd Meeting. He summarized the main progress of the meeting as the following points: 1) Re-analysis of energy integrated data have been performed by taking into account the bias effects identified by SG-41; and 2) Carefully selected and corrected data are used for recommending the thermal capture cross section of Am-241. In addition, future action ideas effective for data improvements were collected.

  ACTION - Subgroup activities will continue until the end of 2017. Final Report end of 2017

- *Subgroup 42 (Thermal Scattering Kernel S(α,β): Measurement, Evaluation and Application)*
  A. Hawari reported on SG42 after the 2nd Meeting. He reviewed the recent data evaluations, measurements, theory-measurements connections, covariance data, data formats and benchmarking. As coming activities, he mentioned new evaluations will be released in 2017 (some of them already available in ENDF/B-VIIIb4) and upcoming experimental activities, planned or under discussion.

  ACTION - Subgroup activities continuing in 2017. Final meeting in May 2018

- *Subgroup 43 (Code infrastructure to support a general nuclear database structure*)
  F. Malvagi reported on SG43 after the 1st meeting. He reviewed the main goals of SG43 mandate to define an interface for reading/writing checking, visualization, etc. the new GNDS. This effort involves all nuclear data community, from evaluators (and their codes) to processing codes (FUDGE, NJOY, AMPX, GALILEE…). The first year planning is devoted to definition and implementation of API, and to develop checking capabilities.

  ACTION - Subgroup activities continuing in 2017

8. Proposals for new subgroups

The following subgroups proposals were reviewed by WPEC. Detailed information about these proposals is given in the document and viewgraph presented at the meeting.

V. Sobes presented the new proposal for a subgroup entitled *"Subgroup 44: Investigation of Covariance Data in General Purpose Nuclear Data Libraries"* (see ***Appendix 4.1***). The main outcome of this SG is to establish guidance on the quality/fidelity of new covariance evaluation and define a nuclear data covariance validation procedure. The subgroup will discuss on the place of integral experiments in general purpose nuclear data libraries. Other important issues are the new types of data for covariance (secondary distributions, angular distributions, S(a,b), PFNS), the need of different cross-correlations (energy, reaction isotopes) and the covariance format itself. *The Subgroup will collaborate with SG42, SG43 and SG46.*

ACTION - The WPEC approved the proposal and established the subgroup as number 44

M.C. White presented the new proposal for "*Subgroup 45: The Validation of Nuclear Data Libraries (VaNDaL) project*" (see ***Appendix 4.2***). The main goal is to improve the process by which the validation of nuclear data libraries is performed. The SG will build a system of shared tools and procedures to amplify validation efforts. The Subgroup will create the infrastructure and methods to verify and share it to the broader user community of nuclear data. The NEA and IAEA (and the nuclear data centers) will play an important role in the project, providing documents and other tools. In addition, another important aspect is the standardization of the outputs for key nuclear data libraries. The Q&A requirements specification and tools will be applied on an initial benchmark suite.

ACTION - The WPEC approved the proposal and established the subgroup as number 45

G. Palmiotti presented the new proposal for a subgroup entitled: "*Subgroup 46: Efficient and Effective Use of Integral Experiments for Nuclear Data Validation"* (see ***Appendix 4.3***). The aim of this Subgroup is to develop the methodology for selecting appropriate experiments and in particular those that provide separate effects information and performing new generalized adjustments to provide unambiguous feedbacks (it will include the use of reaction cross correlations and of covariance data for angular distributions). Moreover, the Subgroup will provide updated target accuracies for nuclear data uncertainty reduction on a list of selected target power reactors. *This Subgroup will collaborate with SG44 and SG45.*

ACTION - The WPEC approved the proposal and established the subgroup as number 46

9. Conferences and meetings of interest to the nuclear data community

Forthcoming meetings of interest:

A. Plompen briefly reported on the latest *"International Conference on Nuclear Data for Science and technology (ND2016)*" held in Bruges, Belgium, 11-16 September 2016. There were around 500 participants and 660 abstracts received. The papers are being reviewed by external referees and the proceedings will be published in EPJ Web of conferences, July 2017. The participants in WPEC meeting thank Arjan and all participants in the organization of the conference and for all their efforts and good job in the Conference.

Z. Ge presented the venue of the next *"International Conference on Nuclear Data for Science and technology (ND2019)*" in Beijing, at the China International Center. Tentative dates are the end of the spring or beginning of the summer 2019.

O. Cabellos briefly reviewed with the participants the forthcoming meetings of interest to the nuclear data community. Updated information is available on the WPEC web page at www.oecd-nea.org/science/wpec/calendar.html.

10. Any other business

In line with the agreed rotation policy among the heads of the evaluation projects, **A. Plompen** accepted to chair the WPEC for the next two years. The Working Party members thanked **M. Herman** for having served as Chair during the past two years (see updated chairmanship in ***Appendix 5.1***).

O. Cabellos informed that this is the last WPEC meeting for him, leaving the NEA at the mid of October 2017 after three years of services, and his dedication to the WPEC activity was thanked by the participants.

ACTION - To inform NSC of the new chairman of WPEC

11. Time and place of next meeting

The dates initially proposed are **17-18 May 2018**. Subgroup coordinators will have the opportunity to hold short technical meetings the same week on **14-16 May 2018**.

Appendix 1

Participation to the 29th WPEC meeting

OECD Headquarters, Conference Center
2 rue André Pascal, Paris 75016, France

18-19 May 2017

Representatives from evaluation projects

Mark CHADWICK	ENDF/SG 40
Yaron DANON	ENDF
Mike DUNN	ENDF/SG 28
Mike HERMAN	ENDF/WPEC Chair
Alejandro SONZSOGNI	ENDF (excused)
Robert JACQMIN	JEFF/SG 27 (excused)
Arjan PLOMPEN	JEFF/SG C
Ulrich FISCHER	JEFF
Robert MILLS	SG 37/JEFF
Atsushi KIMURA	JENDL
Hideo HARADA	JENDL/SG 41
Osamu IWAMOTO	JENDL
Kenji YOKOYAMA	JENDL
Tatsuya KATABUCHI	JENDL (excused)
Anatoly IGNATYUK	BROND/ROSFOND (via video-conference)
Zhigang GE	CENDL
Arjan KONING	IAEA/TENDL (via video-conference)

Subgroup coordinators

Dennis MCNABB	SG 38/ENDF
Giuseppe PALMIOTTI	SG 39/SG 46/ENDF
Ayman HAWARI	SG 42/ENDF
Fausto Malvagi	SG 43/JEFF
Vladimir SOBES	SG 44/ENDF
Morgan C. White	SG 45/ENDF
Emmeric Dupont	SG-C/EG-HPRL/JEFF
Dave Brown	EG-GNDS/ENDF

Invitees

Xichao RUAN	CENDL
Haicheng WU	CENDL
Roberto CAPOTE	IAEA (via video-conference)

Secretariat

Oscar CABELLOS	NEA
Ivanova TATIANA	NEA (Head of Nuclear Science)

Appendix 2

Participation to the 29th WPEC meeting

OECD Headquarters, Conference Center
2 rue André Pascal, Paris 75016, France

18-19 May 2017

PROPOSED AGENDA

1. **Adoption of Agenda**
2. **Approval of the Summary Record of the Twenty-seventh Working Party meeting**
   [NEA/SEN/NSC/WPEC(2016)2]
3. **Membership and observers**
   - Presentation
4. **Reports on experimental activities**
   - USA
   - NEA DB (Europe, South Korea)
   - Japan
   - Russia
   - China, "Nuclear Data Measurement Activities at China" by X. Ruan
5. **Brief progress reports from evaluation projects and discussion of future plans**
   - ENDF
   - JEFF
   - JENDL
   - IAEA
   - TENDL (by invitation)
   - ROSFOND/BROND
   - CENDL
6. **Review of final or near-final subgroup reports**
   - Subgroup 27: Prompt photon production from fission products *(R. Jacqmin, JEFF)*
   - Subgroup 28: Processing of covariance data *(M. Dunn, ENDF)*
   - Subgroup 35: Scattering angular distribution in the fast energy range *(T. Kawano, ENDF)*
   - Subgroup 36: Reporting and usage of experimental data for evaluation in the resolved resonance region *(P. Schillebeeckx, JEFF)*
7. **Status of on-going or start-up subgroups**
   - Subgroup C: The High Priority Request List for nuclear data *(E. Dupont, JEFF)*
   - EG-GNDS: Recommended Definition of a General Nuclear Database Structure *(D. Brown, ENDF)*
   - Subgroup 37: Improved fission product yield evaluation methodologies *(R.W. Mills, JEFF)*

- Subgroup 38: A modern nuclear database structure beyond the ENDF format *(D. McNabb, ENDF)*
- Subgroup 39: Methods and approaches to provide feedback from nuclear and covariance data adjustment for improvement of nuclear data files *(M. Salvatores, G. Palmiotti, ENDF)*
- Subgroup 40: Collaborative International Evaluated Library Organisation (CIELO) Pilot Project *(M. Chadwick, ENDF)*
- Subgroup 41: Improving nuclear data accuracy of Am-241 and Np-237 capture cross-sections *(H. Harada, JENDL)*
- Subgroup 42: Thermal Scattering Kernel S(□,□): Measurement, Evaluation and Application *(S. Kahler, ENDF)*
- Subgroup 43: Code infrastructure to support a modern general nuclear database (GND) structure *(F. Malvagi, JEFF)*

8. Proposals for new subgroups

- Subgroup 44: Investigation of Covariance Data in General Purpose Nuclear Data Libraries (*C. De Saint Jean, JEFF)*
- Subgroup 45: The Validation of Nuclear Data Libraries (VaNDaL) project (*A. Trkov, IAEA*)
- Subgroup 46: Efficient and Effective Use of Integral Experiments for Nuclear Data Validation (*A. Plompen, JEFF - M. Chadwick, ENDF*)

9. Conferences and meetings of interest to the nuclear data community

- ND2019
- ND Meeting calendar (www.oecd-nea.org/science/wpec/calendar.html)

10. Any other business

11. Date and place of next meetings

- Proposal: May 14-18, 2018, NEA Headquarters

Appendix 3

Subgroups Status

	Topic	Co-ordinator	Status in May 2017
27	Prompt photon production from fission products	R. Jacqmin, JEFF	Closed
28	Processing of covariance data	M. Dunn, ENDF	Closed Final report to be issued by the end of 2017
35	Scattering angular distribution in the fast energy range	T. Kawano, ENDF	Closed Final report to be issued by the end of 2017
36	Reporting and usage of experimental data for evaluation in the resolved resonance region	P. Schillebeeckx, JEFF	Closed Final report to be issued by the end of 2017
37	Improved fission product yield evaluation methodologies	R.W. Mills, JEFF	Ongoing Established in 2012 with effective start in 2013 Closed in 2017 Report 2018.
38	Beyond the ENDF format: A modern nuclear database structure	D. McNabb, ENDF	Ongoing; established and started in 2012. Closed in 2017. Report 2018.
39	Methods and approaches to provide feedback from nuclear and covariance data adjustment for improvement of nuclear data files	G. Palmiotti, ENDF M. Salvatores, JEFF	Ongoing Established and started in 2013 Closed in 2018 Report 2018
40	CIELO pilot project	M. Chadwick, ENDF	Ongoing Established and started in 2013 Closed in 2017 Report in 2018
41	Improving nuclear data accuracy of 241Am and 237Np capture cross-sections	H. Harada, JENDL	Ongoing Established and started in 2015 Closed in 2017 Report 2018
42	Thermal Scattering Kernel S(α,β): Measurement, Evaluation and Application	S. Kahler, ENDF	Ongoing Established and started in 2016 Close in 2018

43	Code infrastructure to support a modern general nuclear database (GND) structure	F. Malvagi, ENDF	Ongoing Established and started in 2017 Close in 2019

Expert Groups

EG-HPRL (SGC)	High Priority Request List	E. Dupont, JEFF	Ongoing Approved new mandate until 30 June 2018
EG-GNDS	Expert Group on Recommended Definition of Generalized Nuclear Data Structure (GNDS)	D. Brown, ENDF	Ongoing Approved new mandate until 31 May 2018

WPEC

WPEC	Working Party on International Nuclear Data Evaluation Co-operation (WPEC)	A. Plompen, JEFF	Ongoing Approved new mandate until 30 June 2019

Appendix 4

Documents presented at the 29th WPEC meeting

OECD Headquarters, Conference Center
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18-19 May 2017

APPENDIX 4.1 - Subgroup 44
Investigation of Covariance Data in General Purpose Nuclear Data Libraries
Vladimir Sobes (ENDF) and Cyrille de Saint Jean (JEFF)

APPENDIX 4.2 - Subgroup 45
The Validation of Nuclear Data Libraries (VaNDaL) project
M.C. White (ENDF) and D. Bernard (JEFF)

APPENDIX 4.3 - Subgroup 46
Efficient and Effective Use of Integral Experiments for Nuclear Data Validation
M. Salvatores (ENDF) and G. Palmiotti (ENDF)

Appendix 4.1 - Subgroup 44

WPEC sub-group proposal

Title

Investigation of Covariance Data in General Purpose Nuclear Data Libraries
Cyrille de Saint Jean (CEA, France) and Vladimir Sobes (ORNL, USA)

Justification for a Subgroup

The motivation for the subgroup is to bring together the international covariance community to understand how the covariance data can be so different between the different evaluated nuclear data files, ENDF, JEFF, JENDL, CENDL, etc., while the mean values (cross sections, nu-bar, etc.) are generally very similar. Many questions have emerged from the groups applying covariance data for analysis, such as the Working Party on Nuclear Criticality Safety (WPNCS) Expert Group on Uncertainty Analysis for Criticality Safety Assessment (UACSA), on how the use of different covariance libraries (e.g. ENDF, JEFF, JENDL, etc.) affects uncertainty quantification and similarity assessment. Further, significant differences in covariance libraries lead to differences in the adjustment of parameters for fast reactors, which is an important topic for WPEC sub-group (SG) 39.

The CIELO project, WPEC SG-40, established an international effort of nuclear data evaluators from different nuclear data projects to provide nuclear data evaluations that may be consistently accepted by all major nuclear data projects. This work has certainly driven the progress towards minimizing the disagreement in the mean values (cross sections, nu-bar, etc.) between different nuclear data libraries. However, with that project coming to a close in the coming year, there has not yet been a concentrated effort on providing consistent covariance evaluations across the different nuclear data libraries. The maturity of the nuclear data evaluation process is such, at this time, that it is warranted to create an international collaboration on cross section covariance evaluation methodologies.

This sub-group will be tasked with the goal to investigate covariance data for a broad range of system types, not just fast reactors as is the focus of WPEC SG-39. This sub-group will leverage the work of previous sub-groups which investigated the generation of covariance data for specific physical regions, such as WPEC SG-24 and SG-36, which focused on evaluations of fast neutron region and the resolved resonance region, as well as WPEC SG-42 which focused on the evaluation and covariance generation for thermal scattering. This sub-group will focus its attention on providing guidance to the international community on methods for systematic and consistent evaluation of covariance data for the whole energy range, paying special attention to energy domain interface (resolved resonance/unresolved resonance/continuum). The group will also deliver examples of the application of the proposed methodology on a few selected isotopes. The ultimate goal of the subgroup is to provide an overview of the best practices of how to generate more consistent covariance data sets.

Subgroup Monitor

Cyrille de Saint Jean, CEA, France, (JEFF)

Subgroup Coordinator

Vladimir Sobes, ORNL, USA, (ENDF)

Subgroup Participants

ENDF: C. Mattoon (LLNL), E. Jurgenson (LLNL), J. Holmes (NNL), D. Barry (NNL), D. Brown (BNL), M. Herman (BNL), D. Smith (ANL, retired), B. Rearden (ORNL), M. Dunn (Spectra Tech Inc.),

D. Wiarda (ORNL), P. Talou (LANL), D. Neudecker (LANL), M. White (LANL), M. Chadwick (LANL), G. Palmiotti (INL), Y. Danon (RPI), D. Roubtsov (AECL)
JEFF: G. Noguere (CEA), P. Archier (CEA), E. Bauge (CEA), L. Leal (IRSN), R. Ichou (IRSN), W. Haeck (IRSN), E. Ivanov (IRSN), D. Rochman (PSI), M. Hursin (PSI), T. Ivanova (NEA), O. Cabellos (NEA), M. Salvatores (Consultant), D.H. Kim (KAERI), H. Leeb (TU Wien, Atominstitut), I. Kodeli (JSI), P. Romojaro (CIEMAT), G. Kessedjian (CNRS), P. Tamagno (CEA)
JENDL: O. Iwamoto (JAEA), K. Yokoyama (JAEA), G. Chiba (Hokkaido U.)
BROND: A. Ignatyuk, E. Rozhikhin, V. Koscheev
CENDL: X. Ruirui, Z. Ge
IAEA-NDS: R. Capote, A. Trkov

Project Definition and proposed activities

The implications for the propagation of nuclear data uncertainty through current modelling and simulation capabilities to the safety of nuclear installations around the world justify the creation of a new sub-group. An international collaboration through a NEA/WPEC subgroup will be essential for leveraging efforts allowing the sharing of information needed for achieving the project goal.

The project will be divided in the following phases:

I) Evaluation of the differences between discrepant covariance data evaluations in different evaluated nuclear data libraries
II) Assessment of the methodologies for generating covariance data utilized by the different nuclear data projects;
III) Documentation and evaluation of the current state-of-the-art methodologies for covariance data generation;
IV) Demonstration of the state-of-the-art covariance evaluation methodologies on a limited set of input data (microscopic/integral measurements) with detailed uncertainties description for one isotope to be defined (e.g. 239Pu,235U,238U);
V) Discussion of the representation and interpretation of nuclear data uncertainty (covariance) in evaluated nuclear data files.

Relevance to Evaluated Data Files

Recommendations for generating nuclear data covariance evaluations.

Time Schedule and Deliverables

2018-2019: The first period will be devoted to collect and review existing evaluations and to identify the major discrepancies between different projects as well as the major issues driving the discrepancies in the propagated nuclear data uncertainties in applications.

- **Deliverable:** Review of discrepant covariance data across major nuclear data projects and establishment of a high priority list for nuclear data covariance evaluation.

2019-2020: The second period will be devoted to the exploration of systematic and consistent methodologies for generating covariance data.

- **Deliverable:** Draft version of Best Practices Document for General Purpose Nuclear Data Library covariance evaluations.

2020-2021: The third period will address the representation of nuclear data covariance in evaluated nuclear data files and their interpretation. Of particular interest will be the representation and interpretation of covariance data for non-cross section data (i.e. prompt neutron fission spectra, angular distributions, cross-correlations).

- **Deliverable:** Final version of Best Practices Document for General Purpose Nuclear Data Library covariance evaluations complete with examples.

Appendix 4.2 - Subgroup 45

WPEC Sub-Group Proposal

Title

Validation of Nuclear Data Libraries (VaNDaL) project
M.C. White (LANL, US) and D. Bernard (CEA, France)
Note: VaNDaL – *In this case, one who seeks to determine the weaknesses of, that is 'break', our data libraries*

Justification

The nuclear data community continues the struggle to test our data libraries in a transparent, reproducible manner. Individuals and institutes spend considerable time building validation suites that often have errors that others have already found so that we do not gain the full benefit from our parallel efforts. Standardized quality assurance (QA) processes can provide us benchmark suites for the validation of nuclear data libraries that can meet a basic tenet of science: our colleagues can reproduce them. We can then go further and build upon our shared work enabling even greater rigor and thought to be applied to this most important activity.

Subgroup Monitor

Andrej Trkov (NDS/IAEA)

Subgroup Coordinators

Morgan White (LANL, ENDF/B) and David Bernard (CEA, JEFF)

Subgroup Participants

TBD.

Context

The challenge for any nuclear data evaluation project is to periodically release a revised, fully consistent and complete library –with all the necessary data and covariances– and to ensure that it is robust and reliable for a variety of applications. Within such evaluation efforts, benchmarking activities are the final crucial step in validating the proposed library. The major data evaluations –JEFF, ENDF/B, JENDL, CENDL, ROSFOND/BROND and TENDL– all aim to provide such a library. Thus, they each require a coherent and efficient benchmarking process. In the past, this has been achieved through ad-hoc efforts by many participants typically using many different benchmarking suites. This process is prone to error and misunderstanding and considerable time can be wasted tracking down, for example, typographical or modeling errors that can be avoided by a more systematic approach.

The last two decades have seen the rise of tremendous new resources to address this issue: the international handbooks for criticality safety, reactor physics, fuel burnup, and radiation shielding. These peer reviewed references comprise our best understanding of the benchmark experiments by which we validate the nuclear data that we use for predictions of neutron reactivity, criticality safety, radiation shielding and other aspects of particle transport; and, more recently, for predictions of isotopic transmutation for waste disposal and dosimetry. But we have failed to take the necessary steps to create, maintain and enhance tools to facilitate widespread use of these benchmarks. This proposal seeks to (1) provide a methodology to assemble Quality Assured (QA) versions of these inputs for the MCNP and other transport codes; (2) to provide an initial repository of the major collections of such inputs and begin the QA process for them;

and, (3) to provide the tools necessary to extract standardized information from such validation tests presented in a harmonized way.

The initial focus of this sub-group will be limited to neutron transport –i.e. validation of the Boltzmann equation– and particularly focused on neutron reactivity, also commonly referred to as k-effective or neutron multiplicity. There are many other aspects of benchmark testing that should be included and these will be discussed more below. Two examples of the advanced test suites used to validate our nuclear data libraries are the criticality test suite of more than 1000 MCNP inputs (developed by Skip Kahler) used heavily by the ENDF/B community and the 2000 tests (developed by Steven van der Marck) used by the JEFF community. Another example of such a test suite is more than 400 tests in the Oak Ridge National Laboratory SCALE code VALID test suite. In an inspiring gesture of good will, these individuals and institutes have agreed to make these inputs available enabling a remarkable starting point for this project. We hope other individuals and institutes will follow their example and contribute their existing inputs to this worthy cause. ORNL has also offered the procedures they have developed to verify the VALID test suite inputs as a starting point for developing the quality assurance process. The rigorous QA of a complete suite of international benchmarks is a task no one person or institute has the resources to tackle. We are stronger if we work together.

The first task is to decide how to lay out a repository of inputs and by what manner to review them for quality assurance. The question of repository layout is not as simple as it seems. There are too many inputs to be reasonably run by hand. Efficient automation is required with standardized scripts and file naming and storing conventions. We must consider that for many benchmarks, there are multiple configurations and, sometimes, more than one description of a configuration (e.g. a simple and detailed model). There are also auxiliary values associated with each configuration that must be stored, e.g. the benchmark k-effective value and, potentially, supplemental information like experimentally measured reaction rate ratios and quantities commonly used for trend analyses, or sensitivities profiles needed for analysis.

Having decided what to store where, we must next ensure that the correct values are present. There is no one who works on these simulations that has not experienced mistyping one of the hundreds and thousands of numbers that must be entered by hand. It is an effort that requires rigorous cross checks and providing a system that ensures such rigorous cross checks is essential. This system will represent a single point of failure and thus must be held to the highest standards. Defining the set of requirements for the review process is a key deliverable for the sub-group. A tiered system is envisioned to enable us to capture inputs in a range of states from initial submittal through thoroughly vetted.

A simple but underlying assumption in this process is revision control of the inputs. It is not enough to have a suite of inputs. They will change over time, so versions must be easily traceable and verifiable, and the reasons for the changes must be clearly documented. The software development process faces this same challenge and many tools exist to facilitate this task. A decision must be made on a standard toolset to use. This is also the appropriate time to discuss and implement access control. It is remarkable the consensus that has emerged that these inputs and tools should be publicly available. However, we must have a cadre of gatekeepers who can effectively enforce the procedures by which we modify them.

Simply having the inputs is only the first step. To enable robust, reliable use of these tests we must automate how they are run and standardize the outputs such that they may be easily parsed, stored, reported and compared. It is not always obvious to users of a code the optimal way to run these problems to ensure reliable results; capturing the best practices of how to run these problems and providing tools that automate these practices is essential. We will also need to determine the set of leakage, reaction rate, sensitivity and other tallies that are needed in order to robustly mine the outputs. This standard suite will be driven by the analyses that are proposed. For example, if plots versus above thermal leakage fraction or average lethargy causing fission are desired, these quantities must be tallied. Scripts will likely be needed that modify the inputs in standardized ways to provide the appropriate quantities in outputs.

Knowing what comparisons to make, and how to show the results, is the final crucial step in validating a nuclear data library for use in some application. Capturing and automating the appropriate comparisons is the final step to enhancing the value of this infrastructure. Similar to providing tools to appropriately run these tests, we must work with these communities to provide the tools to mine the results of these simulations and properly compare them with the benchmark values.

By automating the tasks of running the tests and mining the outputs, we reclaim that time to enable our community to focus on the real task of interpreting their meaning.

Making these results broadly available is highly desirable. The OECD/NEA DICE and NDaST tools and website present an obvious potential starting point. Standardized outputs that feed the DICE and NDaST databases could ensure that test results are broadly communicated and easily mined to understand differences. This will enable our users to better understand the differences of opinions that are represented between different nuclear data libraries and make choices about which data are best suited for their applications.

It should be noted that this sub-group will not perform the QA of all the inputs. It will produce a framework by which this work can be done. An initial population of benchmarks will be provided and a subset of them will be checked to ensure the QA process works as intended. But many of the inputs will still be in the initial stages of the QA process and require the broader community to help in the process. By working together, we can achieve a system that will enable everyone to perform the robust, reliable benchmarking we all need.

Time-Schedule and Deliverables

Year 1

- Collect suitable input decks from participants and other stakeholders
- Define the layout and implement an initial repository
- Generate a prototype QA requirements specification and tools to help implement this process

Year 2

- Perform QA on a subset of inputs using prototype requirements to determine its suitability and revise as necessary
- Generate a prototype requirements document for standard outputs
- Develop tools to run benchmarks and parse these outputs

Year 3

- Finalize QA and outputs requirements
- Release initial benchmark suite and tools

Potential follow-on projects or stretch goals

This project will set the stage for several obvious follow-ons, for example:

- Expand to include shielding and reactor physics transport benchmarks.
- Expand to include fuel burnup transmutation benchmarks.
- Expand to standardize input decks across multiple transport codes.

As time and resources permit, these items may be considered. Certainly we would expect that follow on subgroups would be considered to expand this effort in these types of ways.

Appendix 4.3 - Subgroup 46

WPEC Subgroup Proposal

Title

Efficient and Effective Use of Integral Experiments for Nuclear Data Validation"
M. Salvatores (INL, US) and G. Palmiotti (INL, US)

Justification for a Subgroup

Currently, integral experiments are used for data validation according to different approaches with different objectives:

a) A "global test" approach usually applied to several thousand benchmarks (ICSBEP), when a new evaluated file is released, which consists essentially of the calculation, with the new data set to be validated, of thousands of K_{eff} and few other integral experiments. The resulting list of K_{eff} offers a global feeling for the performance of the new data set and it is not intended to provide specific conclusions on nuclear data e.g. in selected energy ranges.
b) Most current evaluation efforts are, de facto, informed by the results of benchmark (integral experiments) calculations already in the phase of evaluation. This approach can hide some risks since the evaluators should be sure that they are using reliable experiments (i.e. with low uncertainties) and proper decks with adequate level of the details. At that level, the choice of the appropriate experiments is also a rather challenging issue.

In fact, integral experiments (and in particular K_{eff}) are depending on many interconnected effects of different isotopes and reactions and in different energy ranges. The outcome of both these approaches, although valuable within their specific objectives, cannot point out compensation effects: this is a major drawback that has been generally recognized. Moreover, feedback on data uncertainties and correlations are seldom derived. Finally, a large number of very valuable experiments, more reactor physics oriented, are not accounted for.

c) The more general approach to the use of integral experiments is based on a generalized use of sensitivity and uncertainty analysis and uses a larger variety of integral experiments and attempts to account for integral experiment uncertainties, possible systematic errors and correlations. The outcome could be adjusted data sets, revised uncertainties and correlations and, in general, a validated data set applicable to a wide range of different applications.

Despite the potential of this last approach, the appropriate integral data selection, and the use of ad-hoc (e.g. "representative") integral experiments or of specifically tailored experiments are still goals under discussion and a more rigorous, efficient, and effective approach needs to be worked out, agreed and suggested for general use in order to make it a true interdisciplinary integration of evaluation, assimilation and validation, - a critical step in advancing nuclear data methodology.

Subgroup Monitors

M. Hermann (confirmed), A. Plompen (confirmed).

Subgroup Coordinators

G. Palmiotti (ENDF), M. Salvatores (ENDF)

Subgroup Participants (Proposal, to be completed)

The data projects will identify appropriate participants from their community. It will be essential to build-up a group where nuclear data and uncertainty evaluators, integral experiments experts and reactor physics experts will be represented.

Definition of the project and of proposed activities

It is proposed a new WPEC subgroup that should have a mandate on formalizing and applying a methodology for:

- Selecting appropriate experiments and in particular those that provide separate effects information on the basis of the findings of Subgroup 39.
- Analysing C/E by isotope, reaction, and energy range in order to point out compensation effects (based on low uncertainty, sensitivity coefficients, and Chi-2). Possibly, all energy range from thermal to fast, should be examined.
- Computing sensitivity coefficients of selected experiments and integral parameters according to the guidelines worked-out in the previous Subgroups 33 and 39. This part of the work should account for and complete the work performed at the Databank by Ian Hill available through the DICE code.
- Performing new generalized adjustments to provide unambiguous feedbacks. Some approaches has been proposed (Yokoyama, Palmiotti, and Ivanov) but not yet finalized or widely used. Other approaches could be proposed and compared. The use of reaction cross correlations and of covariance data for angular distributions, secondary energy distribution from inelastic scattering should be done as far as these data will be made available in the different nuclear data projects.

Moreover the new SG should give guidelines on:

- How to define a general protocol for the use of sensitivity coefficients and covariances in order to provide an improved traceability for safety and design purposes.
- How to systematically quantify impact on a list of selected target power reactors (thermal, epithermal, and fast spectrum reactors). This list of reactors should be defined as far as possible with the help of industry representatives
- How to provide updated target accuracies for nuclear data uncertainty reduction by combining inverse approach and integral experiments (some efforts in this direction have started at ORNL). This last goal should have a significant impact in prioritizing new experiments, both differential and integral and to foster international collaborations for that purpose.

The new subgroup should work in in close contact with the new WPEC Subgroups 44, working on new Covariance Data, and 45 VaNDaL that is supposed to create a database of the selected benchmarks along with the respective decks for calculations.

Relevance to Evaluated Data Files

This activity is of particular relevance to the foreseen objective to improve future data files using synergies from different nuclear data projects, while focusing on the requirements for specific new experimental programs and effectively accounting for users data needs.

Time-Schedule and Deliverables

It is anticipated that the experts of this SG could complete and document the activities (mandate) listed above in approximately 3 years.

- May 2017 - Review for approval of subgroup proposal by WPEC Committee.
- November 2017 - Kick-off meeting.
- May 2018 - First official meeting (J0).
- May 2021- Final report.

Planned Schedule

a)	Selection of experiments and associated protocol	J0+1year
b)	C/E analysis for experiments of a)	J0+2years
c)	Generalized adjustment and feedbacks (new evaluations, status of uncertainties, target accuracies)	J0+3years

Appendix 5

Current mandates: WPEC and Expert Groups at May 2017

APPENDIX 5.1
WPEC Mandate
Chair: Arjan Plompen

APPENDIX 5.2
WPEC Expert Group on the High Priority Request List for Nuclear Data (EG-HPRL)
Chair: Emmeric Dupont

APPENDIX 5.3
WPEC Expert Group on the Recommended Definition of a General Nuclear Database Structure (EG-GNDS)
Chair: Dave Brown

Appendix 5.1 - Mandate

Working Party on International Nuclear Data Evaluation Co-operation (WPEC)

Chair: Arjan Plompen, JEFF project

Member(s): Representatives of the co-operating nuclear data evaluation projects, nominated by the projects

Date of creation: 30 October 1989

Date of expiration: 30 June 2019

Mandate:

- Status of the NEA Nuclear Science Committee Projects and their Evolution in 2007 [NEA/SEN/NSC(2006)2]
- Sumary Record of the 17th Meeting of the Nuclear Science Committee (NSC) [NEA/SEN/NSC(2006)3]
- Approved at the 20th Meeting of the Nuclear Science Committee [NEA/SEN/NSC(2009)3]
- Extended at the 21st Meeting of the Nuclear Science Committee [NEA/NSC/DOC(2010)3]
- Revised and extended at the NEA Nuclear Science Committee Bureau in December 2010 [NEA/NSC/DOC(2010)14]
- Revised and extended at the 24th Meeting of the Nuclear Science Committee in June 2013 [NEA/NSC/DOC(2013)2]
- Revised and extended at the 27th Meeting of the Nuclear Science Committee in June 2016 [NEA/SEN/NSC(2016)2]

Extract from document [NEA/SEN/NSC(2016)2]

Purpose, scope and membership

The goal of the Working Party is to improve the quality and completeness of evaluated nuclear data available for use in science and technology and to promote the efficient use of available resources through international collaboration.

The Working Party will consist of up to five representatives of each of the following four nuclear data evaluation projects: ENDF (United States), JEFF (NEA Data Bank member countries), JENDL (Japan), RUSFOND/BROND (Russia), as well as up to five representatives of non-NEA nuclear data evaluation projects, such as CENDL or TENDL. The participation from projects in non-NEA member countries will be channelled through the Nuclear Data Section of the International Atomic Energy Agency (IAEA). At least one member of each group will be a representative of the nuclear data measurement community, and another one a representative of the nuclear application community.

A Working Party chairperson shall be elected for a two-year period, with possible yearly extensions; the guiding principle being an alternating chairmanship between the ENDF, JEFF, JENDL and RUSFOND/BROND projects. Eligible candidates are representatives of the evaluation projects in NEA member countries.

Objectives

The Working Party will promote the exchange of information on all nuclear data related topics (i.e., evaluation, measurement, theory/modelling and validation) and foster the adoption of best practices. The Working Party will provide a framework for co-operative activities between the participating projects. The Working Party will assess the needs for nuclear data improvements and address those needs by initiating joint evaluation and/or measurement efforts. The improvements will be reflected in all major evaluated data files and will gradually help eliminate inconsistencies in these files.

In the three-year period, the Working Party will set out to complete the following tasks:

- Recommend improvements in evaluated nuclear data (including covariance data) for fission and fusion applications, in response to indications from sensitivity and uncertainty analysis, integral validation/assimilation activities and new experimental/theoretical information.
- Recommend updates in codes, formats, methods and practices for further improving the nuclear data evaluation process and streamlining their processing and use.
- Monitor and update the "High Priority Request List for Nuclear Data" (HPRL) to stimulate specific nuclear data measurement and evaluation activities.
- Address any other emerging important nuclear data needs.

The Working Party will liaise closely with other Nuclear Science Committee activities to ensure that data needs of nuclear science applications are properly addressed.

Deliverables

- An up-to-date version of the "High Priority Request List for Nuclear Data", accessible through the NEA internet web pages.
- A report on Prompt photon production from fission products.
- A report on Processing of covariance data in the resonance region.
- A report on Scattering angular distribution in the fast range.
- A report on Evaluation of experimental data in the resolved resonance region.
- A report on fission yield evaluation methodologies and recommended improvements.
- A report on the development of a modern nuclear database structure beyond the current ENDF format.
- A report on methods and approaches to provide feedback from nuclear and covariance data adjustments to evaluators and experimentalists.
- A report on a joint assessment of six key isotopes – 1H, 16O, 56Fe, 235,238U, 239Pu – in the framework of a pilot project of a Collaborative International Evaluated Library Organization – CIELO.
- A report on improving nuclear data accuracy of 241Am and 237Np capture cross-sections.
- A report on Thermal Scattering Kernel S(a,b): Measurement, Evaluation and Application.

Appendix 5.2 - Mandate

WPEC Expert Group on the High Priority Request List for Nuclear Data (EGHPRL)

Chair: Dr Emmeric Dupont (France)

Member(s): Representatives of the co-operating nuclear data evaluation projects (ENDF, JEFF, JENDL, ROSFOND/BROND) or NEA member countries

Observer(s): International Atomic Energy Agency (IAEA), *By agreement*

Date of creation: 30 May 1991

Duration: 30 June 2018

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]

Extract from documents [NEA/SEN/NSC/WPEC(2016)2] and [NEA/SEN/NSC(2016)2]

Purpose, scope and membership

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 becoming satisfied.

A revised 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 several 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.

A standing expert group is essential to maintain the HPRL as a point of reference in nuclear data research and development. The expert group will consist of at least three representatives from each data project: one from the data user, one from the evaluation and validation community and one from the experimental

community. The expert group may have additional representatives from the IAEA Nuclear Data Section, as well as countries not represented in the above mentioned projects.

The HPRL will reflect the actions undertaken by WPEC and will help guide future activities. The expert group will report to WPEC.

Objectives

The expert group 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. The expert group 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. This third list is an extension to the present list.
2. Stringent criteria are applied for entries on the lists. These will be evaluated by the expert group 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

- A report on the status of all requests describing completed activities and outlook.
- An up-to-date online version of the "High Priority Request List for Nuclear Data".

Appendix 5.3 - Mandate

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

Chair(s): Dr David BROWN, United States

Members: Representatives of the participating projects

Full Participant: European Commission
Under the NEA Statute

Date of creation: 31 May 2016

End of mandate: 31 May 2018

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 meeting of the NEA Nuclear Science Committee in June 2016 [NEA/SEN/NSC(2016)2]

Extract from document [NEA/SEN/NSC(2016)2]

Context

The 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 WPEC Subgroup 38 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. 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 has become 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. Therefore, the WPEC/EGGNDS will become the steward of a new international definition for the modern nuclear database structure.

This expert group will consist of a governance body that manages the new recommended definition of GNDS. Up to two official representatives from each WPEC nuclear data evaluation project or institution will form the Governance Board. Currently these entities include ENDF, JENDL, ROSFOND/BROND, JEFF, CENDL and the IAEA. *Only NEA members have voting rights with respect to the adoption of a new*

recommended definition by the WPEC, but the larger group serves the goal of meeting the needs of the broader community.

Goals and activities

The main motivations of this subgroup 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 expert group, in close collaboration with the subgroup on infrastructure (WPEC/SG43), will ensure that important and useful tools for using the new recommended definition are developed and maintained.

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

- Release the initial GNDS version.
- Collaborative platform and practices to maintain and discuss the recommended definition.
- Workshops to train evaluators and other members, especially users, of the nuclear data community the new structure.