

**NUCLEAR ENERGY AGENCY
MANAGEMENT BOARD FOR THE DEVELOPMENT, APPLICATION AND VALIDATION OF
NUCLEAR DATA AND CODES**

Joint Evaluation Fission and Fusion (JEFF) Co-ordination Group Meeting

Summary Record

26 November 2021
Hybrid Meeting
Chateau de La Muette, Paris / Zoom Videoconference

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Opening and introduction of the participants

1. The Chair of the Co-ordination Group (CG), **Mr Arjan PLOMPEN**, opened the meeting and invited the participants to introduce themselves. The list of participants is provided in **Appendix 1**.
2. He noted that the Nuclear Data Week was highly successful, in part due to the reorganisation of the meeting into Technical Sessions chaired by the relevant technical leads, but also as the meeting had included some in-person participation for the first time since 2019. He noted that the CG meeting should focus on the progress of JEFF-4 and decisions that should be taken.
3. **Mr Arjan PLOMPEN** welcomed the new Slovenian representative, **Mr Gašper ŽEROVNIK**. **Mr Ivan KODELI**, the outgoing Slovenian representative, introduced **Mr Gašper ŽEROVNIK**, who is an employee of the Josef Stefan Institute with experience in nuclear data and reactor physics simulations. He has worked previously at the JRC in Geel on projects in collaboration with the SCK CEN, Mol, Belgium.

Adoption of the agenda

4. The proposed agenda [[NEA/MBDAV/DOC\(2021\)15](#)] was approved without modifications (see **Appendix 2**). Mr PLOMPEN asked the participants to respect the time allocated in the agenda.

Approval of the summary record from the CG April 2021 meeting

5. The summary records from the April 2021 sessions [[NEA/MBDAV/DOC\(2021\)8](#)] and the 'pre-CG' October 2021 meeting [[NEA/MBDAV/DOC\(2021\)14](#)] were approved without comments from the CG members.
6. **Mr Arjan PLOMPEN** noted that the summary record included some implicit actions, which were addressed in presentations made during the Technical Sessions and that will also be commented on in the meeting.
7. He invited **Mr Michael FLEMING**, the Acting Head of the Data Bank, to provide some information on the 40 years anniversary of JEFF together with the administrative items.

Administrative items and feedbacks from MBDAV and NEA NSC

8. **Mr Michael FLEMING**, Acting Head of the Data Bank, introduced the changes that were implemented in September, placing the Data Bank Secretariat within the Division of Nuclear Science and Education. This was designed to increase the collaboration with the Secretariat for the Nuclear Science Committee (NSC) and better leverage the products and expertise of the subsidiary bodies, including NEA benchmark projects that are widely used by the JEFF community for verification and validation.
9. He noted that the long-serving JEFF Secretary, **Mr Franco MICHEL SENDIS** took a new position in the NEA Nuclear Technology and Economics Division. The CG expressed its appreciation for the services that **Mr Franco MICHEL SENDIS** provided to the JEFF project and wished him all the best in his new function and his future career.

10. A new A2 position for a Nuclear Data Scientist was published in October 2021. Examinations and interviews are already underway, and the new official staff should provide support for the Data Bank activities, including the JEFF project, in short order. The outcome should be announced in the beginning of 2022.

11. JEFF was founded in the fall of 1981 and the first SCG meeting was held in Antwerpen, Belgium at the second Nuclear Data (ND) conference in 1982. This year the JEFF project celebrates its 40th anniversary. On 20 January 2022 a one-hour video event is being planned that will celebrate the 40 years of the JEFF project. Four speakers have been invited to give a wide audience a synopsis of the historical evolution the JEFF project from the 1980s to today.

Action: The NEA will inform the CG and JEFF participants when more details are available.

Process and criteria for ND2025 host selection

12. **Mr Michael FLEMING** reminded the CG of the procedure that was explained in an email circulated on Friday 22 October 2021. Four proposals were received by the deadline of 30 September 2021 for expressions of interest to host the International Conference on Nuclear Data for Science and Technology in 2025 (ND2025). CG members not representing countries making a proposal will, collectively with one assessment by country, complete an appraisal for each proposal. The endorsement of the CG will be communicated by the JEFF CG Chair to WPEC that will make its recommendation to the NSC. There are four major criteria for each of which the maximum score is 5. Each of the four major criteria has sub-criteria clarifying the main criterion:

1) Meeting Leadership

- i. *Committed General Chair and Program Chair, well known within the nuclear data community*
- ii. *Strong local organising committee identified and committed to the proposal*
- iii. *Organising committee's overall contributions to the nuclear data field*
- iv. *Well thought-out and structured schedule for parallel Technical Sessions*

2) Finances and Sponsorship

- v. *Competitive conference costs, including registration, publications and banquet/catering*
- vi. *Executive support from organisations to cover initial (recoverable) costs*
- vii. *Any confirmed non-recoverable sponsorship support*

3) Meeting Location

- viii. *Suitability of venue for required parallel meeting and plenary sessions*
- ix. *Easy access (local international airport)*
- x. *Desirability of location*

4) Geographic Representation.

- xi. *automatic out of 5 based on how recently [if ever] ND was hosted in country*

Decision: The CG adopted the process and criteria for scoring at the meeting.

13. The adopted criteria will be sent to the proposers to allow them to update their proposals so that each of the criteria can be assessed from the provided submissions.

14. The modified proposals should be provided to the NEA **by 1 February 2022 00:00 Paris**. Following distribution by the NEA, each appraisal of the proposals will be due by 1 March 2022 00:00 Paris. The results will be summarised by the NEA Secretariat and discussed at the next CG meeting in April 2022 and the Chair will communicate the result to the Chair of WPEC in its May 2021 meeting.

New JEFF Meetings structure and documentation

15. The JEFF Secretariat, **Ms Daniela FOLIGNO** presented the new Nuclear Data Week structure. She highlighted that the objective of the reorganisation was to better serve the needs of the JEFF project and more efficiently expedite the release of the new library.

16. She noted that there were 13 Technical Sessions, each one organised by one or two Chairs. The new JEFF meeting structure with Session Chairs actively putting a program together and approaching the presenters was perceived to be very positive by all CG members. **Ms Daniela FOLIGNO** proposed that the Chairs become the point of reference of their topic within the JEFF community for a limited period of time. Nominations and/or rotations could be organised as required.

Decision: The CG agreed to continue with the present meeting structure.

Decision: Voluntary contributions will still be accepted, and the Session Chairs will integrate them into their sessions depending on the nature of the presentation.

17. The avoidance of parallel sessions was confirmed by the CG as both preferable and necessary in future meetings. For the one parallel session (Fusion), **Ms Daniela FOLIGNO** suggested that many of the presentations could be mixed in the plenary sessions for better integration. This would better inform the other JEFF members and ensure the Fusion members are better aware of the developments presented in the other sessions. The satellite EUROfusion project coordination meeting would continue to be either parallel to a session or be organised on a day when no JEFF sessions take place.

Decision: The CG supported the intention to integrate fusion scientific/technical presentations in the appropriate Technical Sessions.

Action: Inform the Session Chairs of the above decision and co-ordinate with them to place the April 2022 talks into the other sessions. (NEA)

18. The hybrid nature of the meeting was considered to be effective both by those that want to attend in-person and those that cannot be physically present for the full week. **Mr Tim WARE**, who attended the meeting virtually, commented that he felt involved during the whole week despite his remote participation and that he strongly supports this reorganisation.

19. **Mr Robert JACQMIN** noted that the focus of the Nuclear Data Week should remain the release of JEFF-4. He suggests collecting the main conclusions related to JEFF-4 from each session. **Mr Arjan PLOMPEN** noted that the "JEFF-4 Status Session" is already a good start and that this should be recorded in an official document that highlights outcomes and actions raised in the Technical Sessions.

Action: The Secretariat shall make the living spreadsheets containing the progress of the JEFF-4 project available to the community. (NEA)

Action: The Secretariat to prepare a secondary summary record on the highlights of the Technical Sessions as summarised in the Thursday session. (NEA)

20. **Mr Dieter LEICHTLE** noted that the NEA official website does not contain all of the JEFF/EFFDOCs in one location and that this makes it difficult to trace all relevant content. **Mr Michael FLEMING** apologised for the confusion about the web material. He explained that there was an attempt in 2020 and early 2021 to use cloud-based services. He made clear that it will not continue and that all material will be hosted on NEA servers. All JEFFDOCs will be made available immediately. A SharePoint system is being rolled out in Q1 2022 and a new strategy for data hosting will be prepared as part of this process.

21. **Mr Arjan PLOMPEN** noted, recalling the delay in preparation of the JEFF-3.3 paper, the importance of starting the documentation of a paper accompanying a new release in advance. He suggested to start drafting the document ahead of time, following the ENDF/B example. Any report or paper that is relevant to experiments, evaluations, or testing for the JEFF project should be made available to the NEA, if possible. The issue of documents in French or other languages was raised and **Mr Michael FLEMING** noted that the NEA could collect documents in the original language and, on a case-by-case basis, assist in the translation of non-English documents. The CG members agreed that these should be collected and stored in a centralised system, potentially using the NEA GitLab and 'JEFFlab' work areas. **Mr Arjan PLOMPEN** noted that documentation for the JEFF-4 reference publication(s) could and should be prepared as and when material is delivered to the project. **Mr Dimitri ROCHMAN** noted that a collaborative LaTeX drafting system such as Overleaf provides a convenient system for document preparation that could be more convenient for drafting with their sophisticated front ends and real-time document building. **Mr Arjan PLOMPEN** noted having had a good experience with the ShareLaTeX system. JEFF reports including the CG summary record will be prepared in MS Word, following NEA rules. JEFF docs remain PDF copies of presentations.

Action: The NEA Data Bank to prepare an appropriate environment for the preparation of the paper and investigate the use of dedicated LaTeX collaborative editing tools.

Action: Chair to setup the structure for the JEFF-4 publication according to the JEFF-3.3 template.

Creation of a JEFF CG-Bureau

22. **Mr Michael FLEMING** reported that, following the pre-CG meeting on the 6th of October 2021 [[NEA/MBDAV/DOC\(2021\)14](#)], the following three members were nominated by their MBDAV representative: Mr Oscar CABELLOS (Spain), Mr Dieter LEICHTLE (Germany), and Mr Dimitri ROCHMAN (Switzerland). The Chair of the CG, Mr Arjan PLOMPEN, is, as for any mandated body, also the Chair of the Bureau. **Mr Dieter LEICHTLE** appreciated the nomination but noted that he may not be able to fulfil the responsibilities of the Bureau. A suitable alternative may be sought, particular one that may represent the fusion energy community. **Mr Michael FLEMING** explained that proposals for additional members may still be made by written procedure.

Working Groups

23. **Ms Daniela FOLIGNO** clarified the difference between a Task Force and a Technical Working Group and proposed some potential topics that had been communicated to the Secretariat. **Mr Arjan PLOMPEN** noted that having Technical Sessions and Working Groups on the same topic could be confusing. He proposed the present set of sessions to be considered as the Working Groups with the present Chairs that organised the Technical Sessions of the November 2021 meeting. Actions defined by the Sessions/Working Groups will define an ad hoc set of project members to conclude the

action. He concluded by noting that this approach is both flexible and sufficiently structured, and that no further structure is necessary. The other CG members agreed with this approach and the current leadership of the technical Working Groups. **Mr Dieter LEICHTLE** suggested Task Forces/Working Groups to be established for the specific deliverables of the JEFF-4 mandate, namely the roadmap, the selection of a suite of benchmarks and on quality assurance. This idea was also welcomed. The practical implementation of these three Working Groups will be established in consultation with the NEA, the Bureau and interested CG members before the next JEFF meeting.

Action: The session leaders will draw up actions and follow up on their progress.

Action: The NEA will combine these actions in a roadmap in consultation with the Bureau and the CG. The first roadmap is one of the mandate deliverables.

April and November 2022 JEFF Meetings dates

24. **Ms Daniela FOLIGNO** listed the available dates for the next JEFF Meetings, including sessions for the next 18 months. The CG members agreed with the proposed dates and general approach of using the last week of April and the last week of November to avoid overlaps with key European holidays and the US Cross Section Evaluation Working Group (CSEWG) meetings. The NEA will make every effort to host these as hybrid events with participants joining the meeting at the NEA headquarters, although it will depend on the COVID measures in place at the OECD, in France, and in member countries more generally. The Secretariat will keep JEFF participants informed of the policies in place to help with logistics planning.

Decision: The next JEFF Meetings will take place on the following dates: 25-29 April 2022, 21-25 November 2022, and 24-28 April 2023.

Decision: The NEA will make every effort to offer hybrid meetings and will inform participants in advance of the meetings.

Action: At least four weeks in advance the NEA will decide if the then extant rules allow in-person attendance and if in-person attendance has sufficient interest to warrant a hybrid meeting.

Timeline, goals, and documentation for JEFF-4

25. **Mr Arjan PLOMPEN** summarised the main decisions taken for the next release of JEFF-4. The NEA will release the JEFF-4T1 test library as soon as possible to allow for an incremental verification, benchmarking and validation of JEFF-4 improvements. Key decisions taken include:

- JEFF-4T1 will include the files stored into the JEFF-Lab, with the exception of U-235, U-238 and Pu-239. These files are under review and will be released with the JEFF-4T2 test library scheduled for May 2022 (see below).
- JEFF-4T1 will systematically replace TENDL-2019 files in JEFF-4T0 with TENDL-2021. TENDL-2021 will be available before the end of the year. The replacement will include the γ , p, d and α -induced libraries besides the n-induced library.
- The exception to the previous point with TENDL-2021 are a number of suggestions recorded in the JEFF-Lab. The proposers will consult with **Mr Dimitri ROCHMAN**, Chair of the Evaluation Working Group, for adopting these suggestions in a precursor of TENDL-2022. These precursors can then be part of JEFF-4T1. Otherwise, the suggestions will be adopted for JEFF-4T2.

- The NEA Data Bank will prepare an Excel table with the detailed decisions for JEFF-4T1. The table will compare with the current version T0 and JEFF-3.3. The table will first be setup for the n-induced library and then for the γ , p, d, α -induced libraries. Reviews of these tables will take place with CG members before the release of JEFF-4T1.
- A tentative date for completion of the JEFF-4T1 is 1 February 2022. The NEA will confirm if this is manageable in January 2022.
- ACE formatted files will be available for testing, as well as several other processed data formats.
- The NEA will investigate with CCFE if a processing pipeline can be set up in time for files formatted for FISPACT-II and host a technical meeting on the preparation of activation library files. This will speedup feedback for decay heat and other activation/transmutation testing.

Decision: The NEA will release JEFF-4T1 as soon as possible, based on the decisions taken by the JEFF-CG.

26. The NEA will release the JEFF-4T2 test library in May 2022. The main driver for this test release is updating the major actinides U-235, U-238 and Pu-239. Important changes include both the resonance ranges and the fast ranges for these isotopes.

Decision: The NEA will release JEFF-4T2 as soon as the primary actinides are released, scheduled in May 2022.

27. The JEFF-4 compliance with the Standards should be verified. The status of the Standards for light nuclei (H-1, Li-6, B-10, C) should be investigated and the latest Standards evaluations should be adopted in JEFF. Au-197 already meets the standard in JEFF-3.3 and should be kept in JEFF-4. The Standards of U-235, U-238, and Pu-239 fission, U-238 capture, as well as the thermal constants, should be adopted as closely as possible.

Decision: Verification and adoption of the latest Standards evaluations in JEFF-4 is a requirement for the library release.

28. The JEFF-4 compliance with IRDFF should be verified. Most of the IRDFF recommended cross sections are already part of TENDL through a fitting procedure implemented in T6. Verification is necessary to identify which of the TENDL cross sections are not taken from IRDFF, and how the compliance is ensured for files that are not taken from TENDL. Important examples are Fe-54, Fe-56 and Ni-58, although a study is required to verify the agreement.

Decision: In collaboration with TENDL authors and the IAEA, the NEA will verify the JEFF-4 compliance with IRDFF-II.

29. A JEFF-4 activation file should be prepared. For JEFF-3.3, the activation file was a library processed from the main neutron transport file. However, the processing was not smooth and significant additional work was needed to obtain an acceptable solution. For that reason, an activation file will be prepared for the final release of JEFF-4 in order to avoid potential processing errors that could be made by the users. If prior testing is needed, the concerned participants should agree on how to arrive at the relevant test releases.

Decision: An activation file should be prepared for the final release of JEFF-4 and the NEA will prepare a technical meeting on this topic.

30. Incremental verification, benchmarking and validation should be performed for the fission yields file. The thermal fission yields' files for U-235 and Pu-239, are scheduled for completion in 2022 and 2023, respectively, and will not be included in JEFF-4T1. The inclusion in JEFF-4T2 and further test releases require consideration by the CG.

Decision: Inclusion of the thermal fission yields' files for U-235 and Pu-239 in JEFF-4T2, if prepared in reasonable time after the main actinide evaluations.

31. Concerning the JEFF-4 uncertainties and covariances:
- The CG reasserted the importance of complete, good quality covariance data for all the evaluations. A Working Group/Technical Session is dedicated to this topic.
 - The CG decided to include random files in its release to enable uncertainty estimation based on the use of the Monte Carlo technique.
 - Consistency between the covariances and the random files should be ensured, with random file generation processes recorded along with scripts and/or computer codes used to the greatest extent possible. Well-known systems such as the SANDY code could be integrated into JEFF-Lab pipelines. A special technical meeting would assist in progressing this work.
 - Uncertainty estimation by covariances and/or random files should include aspects such as thermal scattering, delayed neutrons, nu-bar, fission spectra, fission yields and decay data to ensure completeness of uncertainty quantification. Examples such as the JEFF-3.3 Pu-240 evaluation demonstrate the importance of complete covariance evaluation.

Decision: Inclusion of random files in the release of the JEFF-4T1 and subsequent releases.

Action: Covariance Working Group/Session leaders should define the goals, deliverables and timing to meet the above objectives. The NEA will arrange a technical working session on random file generation.

32. Concerning the ability of handling inputs from other library projects, the CG acknowledged valuable alternatives to evaluations in JEFF-4T0 and future test releases may come from other file projects and will keep an open mind towards adopting solutions from these other projects that may enhance JEFF-4 performance.

33. Examples include files from the IAEA INDEN, photonuclear and medical projects. For charged-particle induced reactions, attention should be focused on the JENDL and ENDF projects. For IRDFF and Standards, see above. In particular, the JEFF project may benefit from the inclusion of improved light nuclei evaluations.

34. The close collaboration with the TENDL project is clear from the overall discussion at the CG, with many files being taken directly from the TENDL-2021 library that is in preparation.

35. Shortly after the JEFF CG meeting, **Mr Arjan KONING** noted the upcoming JENDL-5 release to the JEFF-CG chair and highlighted that JEFF-4 may draw from JENDL-5 as appropriate.

36. It was noted that industrial testing would be valuable for JEFF-4 to ensure the library meets the needs of primary nuclear data user groups and key stakeholders. In the JEFF stakeholder meetings, several stakeholders from either industry or closely linked users expressed an interest in a JEFF library that performs well for their application. For this purpose, it is important that testing provides feedback prior to release.

37. The CG discussed the possibility of providing a test release in early 2024. Enough time should be allocated to the return of feedback, so that potential changes can be made in JEFF-4.0 before its release. For that reason, the CG will need to announce this intention well ahead of time to these stakeholders. A letter can be drafted, early 2023, to this effect if by that time the CG has confidence that a significant quality test library can be issued by January 2024. Such a test library would need the new Decay Data and Fission Yields sub libraries ready by the same due date (January 2024). This implies advancing the schedule proposed of the FY library by six months. The FY Working Group will investigate if this is realistic. At this point, it would be realistic for the U-235 and Pu-239 thermal fission FY files.

38. A similar consideration for the activation file is appropriate and for the other sub libraries (γ , p, d, and α -induced transport and reaction libraries). This implies issuing a test release by January 2024. Covariances should be of adequate quality and completeness in the January 2024 test release.

Action: The FY Working Group should investigate the possibility of an early release of the U-235 and Pu-239 thermal FY files.

Action: If the above action gives a positive outcome, the CG will draft a letter addressed to the industrial partners.

39. JEFF-4 might be released in the GNDS format using the version 1.9 and/or 2.0 Standards. The NEA will investigate if a processing pipeline with FUDGE can be set up to process new (test) releases to GNDS format. Support is available from the GNDS project chair. This has the benefit of allowing users to develop their own handling of the JEFF library in GNDS format. This provides the JEFF project with processing feedback from FUDGE.

Action: The NEA should investigate if FUDGE can be implemented into the processing pipeline for the release of JEFF-4.

40. Concerning the JEFF-4 Fe-56 file, the evaluation Working Group should investigate the various methods for improving the evaluated neutron transport file. Coordination of the different approaches is necessary. Goals should be clear as well as deliverables and their timing.

Action: The evaluation Working Group should identify the deliverables and define the timing for the improvement of the Fe-56 file.

41. JEFF-4 photon emission in the neutron transport library should be verified. As with JEFF-3.3, the interested project members should verify that the photon emission by neutron inelastic scattering and neutron capture is adequately represented.

Action: Verification of the photon emission in the neutron transport library.

42. JEFF-4 delayed neutron yields should be verified. The Fission observables Working Group is aware of this issue and has an activity aiming for the inclusion of improved delayed neutron yields in the neutron transport library.

Action: Verification of the delayed neutron yields in the neutron transport library.

Close of the meeting

43. The Chair, **Mr Arjan PLOMPEN**, thanked the participants, the Technical Session Chairs, and the NEA Secretariat for their efforts to make this first hybrid JEFF nuclear data week a success. No other business was raised, and the meeting was closed.

Appendix 1. List of Participants

- Jose Ignacio MARQUEZ DAMIAN, Argentina
- Helmut LEEB, Austria
- Alexey STANKOVSKIY, Belgium
- Arjan PLOMPEN, European Commission
- Cyrille DE SAINT JEAN, France
- Robert JACQMIN, France
- Mark A. KELLETT, France
- Luiz Carlos LEAL, France
- Gilles NOGUERE, France
- Olivier SEROT, France
- Dieter LEICHTLE, Germany
- Arjan KONING, IAEA
- Maurizio ANGELONE, Italy
- Michael FLEMING, NEA
- Daniela FOLIGNO, NEA
- Steven VAN DER MARCK, Netherlands
- Ivan Alexander KODELI, Slovenia
- Gasper ZEROVNIK, Slovenia
- Alejandro ALGORA, Spain
- Oscar CABELLOS DE FRANCISCO, Spain
- Dimitri ROCHMAN, Switzerland
- Mark GILBERT, United Kingdom
- Robert W. MILLS, United Kingdom
- Olga VILKHIVSKAYA , United Kingdom
- Tim WARE, United Kingdom

Appendix 2. Agenda

26 November 2021

Duration	CEST	Topic	Speaker
00:10	8:30	Opening remarks	A. Plompen
00:05	8:40	Adoption of the agenda	A. Plompen
00:05	8:45	Adoption of the CG April 2021 summary record	A. Plompen
00:15	8:50	Administrative items and feedback from MBDAV and NEA SC	M. Fleming
00:15	9:05	Process and criteria for ND2025 host	M. Fleming
00:20	9:20	New JEFF meeting structure	D. Foligno, All
00:30	9:40	Creation of a JEFF-CG bureau	M. Fleming
00:30	10:10	Break	
01:40	10:40	Timeline, goals, and documentation for JEFF-4	A.Plompen, All
00:35	12:20	Working Groups (deliverables, members, timelines, Chairs)	D. Foligno, All
00:05	12:55	April and November 2022 JEFF Meetings dates	D. Foligno
	13:00	Close	