

Report on Status of SG46

May, 2018

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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.
- Analyzing C/E by isotope, reaction, and energy range in order to point out compensation effects (based on low uncertainty, sensitivity coefficients, and χ^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.

Intermediate Meeting November 2018

- **Launch of new Target Accuracy Requirements exercise.**
- **Models of the 750MWe JSFR core (Kenji YOKOYAMA, Japan).**
- **Marginalized Likelihood Optimization (Henrik SJÖSTRAND, Sweden).**
- **Example of a Bayesian Monte Carlo (BMC) Technique (Oscar CABELLOS DE FRANCISCO, Spain).**
- **Continuous energy sensitivities with CONRAD/TRIPOLI-4 (Cyrille DE SAINT JEAN, France)**
- **Recent developments and enhancements of the APIA methodology (Sandro PELLONI, Switzerland).**
- **On Using Statistically-Uncertain Sensitivities from Monte Carlo Codes in GLLS (Daniel SIEFMAN, Switzerland).**
- **Step toward to a comprehensive roadmap for BEPU and experimental V and UQ (Evgeny IVANOV, France)**

AGENDA 25 JUNE 2015

Start	End	Topic	Participant(s)	Country
14:00	14:30	Welcome and review of actions	Massimo SALVATORES, Guisepe PALMIOTTI	France, USA
Target Accuracy Issues (I)				
14:30	15:30	Guidelines, objectives and working methods	Massimo SALVATORES, Guisepe PALMIOTTI	France, USA
15:30	16:00	Proposal of Target Accuracy for ADS Neutronics Design	Kenji YOKOYAMA	Japan
16:00	16:20	Contribution on ALFRED and possibly on other HLM cooled systems	Donato-Maurizio Castelluccio	Italy
16:20	16:35	Coffee Break		
16:35	17:00	Joint CIEMAT and UPM contribution: ASTRID, ALFRED and MYRRHA	Pablo ROMOJARO	Spain
17:00	17:20	MYRRHA	Ivo KODELI	Slovenia
17:20	17:40	Interest in SFR and MYRRHA	Haicheng WU, Cingkai HUO	China
17:40	18:00	Initial summary of what is available, what is missing, how to fill gaps, assignments, preliminary plan and schedule	All	

AGENDA 20 June 2019

Start	End	Topic	Participant(s)	Country
Target Accuracy Issues (II)				
09:00	09:25	Update on HPRL status and discussion of SG-26 entries	Emmeric DUPONT	France
09:25	09:50	Status of the JEFF project and interests in subgroup 46	Arjan PLOMPEN	EC
09:50	10:10	Written contribution discussed	Evgeny IVANOV	France
10:10	10:20	Reminder on sensitivity profiles (SFR, MSR)	Fabrizio Gabrielli	Germany
10:20	10:35	NEA resources available in support of the activity	Ian HILL	NEA
10:35	10:50	Coffee Break		
10:50	11:30	Wrap-up on target accuracy issues	Massimo SALVATORES, Guiseppe PALMIOTTI	France, USA
Assimilation methods and issues				
11:30	12:00	Trends on major actinides from an integral data assimilation	Gerald RIMPAULT	France
12:00	12:30	Another Use of Integral Experiments for Nuclear Data Validation: Bias Factor Methods	Guiseppe PALMIOTTI	USA
12:30	14:00	Lunch Break		
14:00	14:30	A new paradigm for future evaluations	Michal HERMAN	USA
14:30	14:55	Treating inconsistent data in integral adjustment using Marginalized Likelihood Optimization	Henrik SJÖSTRAND	Sweden
14:55	15:20	Adjusting GEF Model Parameters with Post Irradiation Examination Experiments	Mathieu HURSIN, Daniel SIEFMAN	Switzerland
15:20	16:00	Discussion and any other contribution on assimilation methods	All	
16:00	16:20	Coffee Break		
16:20	17:00	Relation with other WPEC subgroups, next meeting, wrap-up	All	

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Summary of Actions

- Target Accuracy Requirements:
Action on K. Yokoyama: ADS proposed by JAEA (to be discussed and make recommendations based on analysis performed), coordinate with proposed target accuracies as proposed by E. Ivanov (see below).
- Committed to provide models (possibly R-Z): Pablo ROMOJARO (MYRRHA, ESFR, ASTRID, and ALFRED), ENEA (ALFRED, LFR WESTINGHOUSE). Kodeli (MYRRHA), JAEA ADS (?). SG26 and SG33 (available on reports and website). Available models from SG26 and from F. Gabrielli (benchmarks of SFRs and MSR)
- People providing models will provide list of integral parameters (to be discussed if complete), sensitivities, and uncertainty analysis. Based on uncertainty analysis a recommended list of isotopes for TAR will be provided (by next meeting)
- Format for sensitivities: SG33. Uncertainty tables following recommendations made in SG33.
- Kodeli has committed to provide delayed neutron covariance data matrix.
- List of reactions for sensitivity: capture (includes: (n,γ) , (n,α) , (n,p) , etc.), fission, ν , χ , elastic, inelastic, μ
- Action on SG46 to provide enlarged list of benchmarks (upon request of A. Plompen). In particular fuel cycle installation related target accuracies to be considered (All). To get feedback for next meeting in order to finalize the list of considered systems.
- Circulate TAR tables to a wider community (Code libraries developers, users of industry, safety authorities): O. Cabellos (lead), M. Hursin, A. Plompen. Get feedback to be finalized by the November 2019 meeting
- Action on P. Romojarro: To verify interest of adding the low Na void ASTRID-like system provided by F. Gabrielli. Also look to the SFR-UAM benchmarks to find out need to include them in the TAR exercise.
- Actions related to MSR:
 - I. Hill circulate TAR material to parties interested in MSR
 - C. Perfetti to investigate ORNL comments to TAR initiative. Suggest possibly a) which MOSART model to be put as priority b) to provide an extra benchmark closer to ORNL interest
 - Find out if C. Perfetti could take care of MSR system(s) for the SG46 TAR activity
 - Ask E. Ivanov to specify if his comments come from MOSART team requirements and if he could contribute to the TAR exercise for the MSR part
- Circulate for comments, suggestions the TAR material for VHTRs to the groups participating to HTR benchmarks (I. Hill)
- M. Hursin will provide methods used at PSI to provide uncertainties to regulators
- Provide feedback on interest of experiment correlation to IRPHE (Secretariat)
- All: consolidate commitments to contribute to the TAR exercise by next meeting
- K. Yokoyama to provide papers to G. Palmiotti which illustrate the equivalence of different bias factors methods and their equivalence to the extended adjustment method
- M. Herman to circulate a paper on the proposed new paradigm for evaluation for comments, suggestions (e.g. use of stress tests), criticism etc., in order to have a discussion at the next November SG46 meeting, aiming to the preparation of an agreed document with options, potential time scale for implementation, tools to be preferred etc.

Future Actions and Conclusions

- **The subgroup is already very active and many, very useful, contributions have been produced by the participants.**
- **Actions will continue on:**
 - **Target Accuracy Requirements**
 - **New developments in adjustment techniques**
 - **Performing adjustments**
 - **Selection of Experiments**
 - **Collaboration with SG44**
 - **New paradigm for future evaluations**
- **Next meeting at end of November**