<div style="border:1px solid black; padding:10px;">

Summary Record of the 1st Meeting of the WPEC Subgroup 33 on

Methods and issues for the combined use of integral experiments and covariance data

Port Jefferson, USA, 24 June 2009

</div>

Introduction

1.   The subgroup coordinator, **M. Salvatores**, opened the meeting and welcomed the participants. A list of participants is given in the Annex. The meeting agenda was adopted. The list of potential subgroup members was reviewed and it was agreed to add M. Herman, R. Jacqmin, G. Manturov, K. Parsons and A. Plompen as members of the subgroup. G. Palmiotti was designated co-coordinator of the subgroup, together with M. Salvatores.

Presentations

2.   **M. Salvatores** started by recalling the outcome of the WPEC Subgroup 26 on "Nuclear Data Needs for Advanced Reactor Systems" and the justification for the setting up of Subgroup 33 to review different approaches and practices currently in use for performing data adjustments. The definition of the project and the proposed activities were outlined. The work of the subgroup will cover a review of current methods and practices for data adjustments, a definition of test cases and input data to be used in the evaluation of the pre-selected methods, and an analysis of the results with the goal of recommending a general methodology for data assimilation and of assessing the needs for additional experiments.

3.   **M. Ishikawa** was not able to participate in the meeting, but contributed a paper describing "Recent Application of Nuclear Data to Fast Reactor Core Analysis and Design in Japan". **C. Nordborg** informed the participants that the NSC had recently decided to establish an expert group on "Integral Experiments for Minor Actinide Management". It was agreed to maintain a close cooperation with that expert group by cross-participation of the chairs/coordinators in each others' meetings.

4.   **G. Palmiotti** presentation some of the data adjustment activities at INL, covering capabilities for computing sensitivity coefficients and methodologies for nuclear data adjustments. He also provided a number of examples of the global adjustment technique applied to the uncertainty reduction on the criticality of the Advanced Burner Reactor (ABR). It was shown that a detailed multi-group energy treatment, to account for spectrum transients at interfaces, dramatically improves the agreement with a reference continuous energy Monte Carlo calculation. A collaboration between INL and BNL for performing a consistent data adjustment on basic nuclear parameters (optical model, and resonance parameters) using integral experiments has started.

5.   **A. Plompen** reminded the participants of the existence of the NEA high priority request list (HPRL) for nuclear data and the need to provide the WPEC subgroup in charge of this list with indications of nuclear data deficiencies derived from nuclear data adjustment activities.

6.   **R. McKnight** informed the participants that Won Sik Yang planned to participate in the work of the subgroup using the well established ANL methods for data adjustment.

7.   **C. de Saint Jean** presented the work at CEA Cadarache to estimate covariances on nuclear model parameters using the code CONRAD. He showed for example the necessity to re-analyse experiments from raw data with proper systematic uncertainty description in order to obtain good covariance data and described retro-active techniques for generating a covariance matrix from already evaluated resonance parameters. He also showed the importance of using clear integral experiment in the evaluation process.

8.   **M. Salvatores** highlighted the fact that classical data adjustment methods were based on adjustments of multi-group data for specific applications. Improvements could be realised by correlating the uncertainties of some basic parameters, characterising neutron cross-sections, with the discrepancy between calculations and experimental values for a large number of clean, high accuracy integral experiments. It was also noted that recent advances in reaction modelling and transport calculations, combined with sensitivity analyses methods, offer a unique possibility to obtain feedback on parameters of nuclear reaction models.

9.   **P. Oblozinsky** described the outcome of an effort to produce initial estimates of physics parameters and covariances for Na-23, as well as sensitivities in 33-groups. The work had recently progressed with the establishment of a specific 41-group structure and the calculation of sensitivities to 40 different parameters. The result would be sent to INL for use in adjustment applications. **M. Pigni** supplemented the report by showing the differences between ENDF/B-VII and the cross sections calculated by EMPIRE, as well as plots of the covariances.

10.   **D. Rochman** presented the Monte Carlo method developed at NRG Petten to calculate ENDF formatted files based on random variation of the input parameters to the TALYS code and the subsequent calculation of k_{eff} benchmarks using MCNP. Examples of the method were given for a few minor actinides.

Proposal

11.   **G. Palmiotti** presented a proposal for a work programme with the goal of assessing the results of nuclear data adjustments when using a common set of integral experiments with different data adjustment methodologies. The impact of using different starting cross-sections and/or different covariance matrices will also be investigated.

12.   It was proposed that each participant will use his/her own nuclear data library and covariance data, a common multi-group structure (33 groups), a limited list of isotopes and reactions to be adjusted, a common list of integral experiments, a proposed target design where uncertainty have to be reduced, and finally a proposed list of integral parameters for which uncertainty has to be calculated.

13.   At the end of the exercise each participant will provide a set of multi-group adjusted infinite dilution cross-sections and possibly the new associated covariance matrix. The old and new covariance matrix should be used for computing the initial and reduced uncertainty on the target design for the integral parameters of interest. If consensus is reached, feedback would be provided to the different evaluation projects on which isotope, reaction, and energy range needs to be improved.

14.   In parallel with that major activity, progress will be reported on new methods addressing the adjustment of basic physics parameters (CEA, INL etc.)

Actions

1. All participants	To provide the two subgroup co-coordinators (massimo.salvatores@cea.fr, Giuseppe.Palmiotti@inl.gov) and the NEA (yolanda.rugama@oecd.org) with answers to the following six questions before the end of August 2009:

1. Does the proposed exercise make sense? Signal any general comments or suggestions!
2. Who from your organisation will actively participate in the work of the subgroup?
3. Are the proposed experiments adequate or should we have more/less/different experiments?
4. Is the proposed 33-group structure acceptable?
5. Should the reference system be limited to ABR or should we include more designs/experiments?
6. Is the proposed list of isotopes sufficient?

2. JAEA (Ishikawa) *IPPE (Manturov)* *CEA (de St-Jean)* *ANL (W.S. Yang?)* *INL (G.Palmiotti)* *NRG (D.Rochman)* *China (?)*	To provide, before 15 January 2010, the co-coordinators (copy NEA) with a paper describing the adjustment methodology used in each laboratory.
3. G. Palmiotti *C. de St-Jean* *M. Ishikawa*	To critically review of the above mentioned papers describing the different adjustment methodologies and to write a report of the findings by the end of June 2010.

Time-schedule

14. The following time-schedule for the subgroup deliverables was agreed:

Second half of 2009:	1. Provide feedback on the specifications for the benchmarking of adjustment methods and 2. Finalise the specifications for the benchmarking of adjustment methods 3. Write papers on the different adjustment methodologies used.
First half of 2010:	1. Start the benchmarking of adjustment methodologies. 2. Review and document the pros and cons of the different adjustment methods used, based on the submitted papers (see above).
Second year	Complete the adjustment exercise and compare results
Third year	Complementary analysis and write the final report.

Next meeting

15. It was agreed to hold the next meeting of the subgroup in Paris, France in connection with the JEFF meeting scheduled for 25 – 27 November 2009. It was tentatively indicated that the successive meeting could be held at ND 2010 in Korea.

ANNEX

Participants at the 1st meeting of WPEC Sg33

Port Jefferson, USA, 24 June 2009

G. Aliberti	USA	
M. Herman	USA	
A. Ignatyuk	Russia	
R. Jacqmin	France	
J. Katakura	Japan	
C. Mattoon	USA	
R. McKnight	USA	(Monitor)
C. Nordborg	NEA	(Secretary)
P. Oblozinsky	USA	
G. Palmiotti	USA	(Co-coordinator)
M. Pigni	USA	
A. Plompen	IRMM	
C. de Saint Jean	France	
M. Salvatores	France/USA	(Co-coordinator)
D. Rochman	Netherlands	
P. Talou	USA	
H. Yu	China	