Summary Record of the 8th Meeting of the WPEC Subgroup 33 on

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

NEA, Issy-les-Moulineaux, France

29-30 November 2012

The subgroup co-ordinators, **M. Salvatores** and **G. Palmiotti**, opened the meeting and welcomed the participants (see Appendix 1). Apologies for absence were received from C. De Saint Jean (CEA, France), D. Rochman (NRG, Netherlands), S.-J. Kim (KAERI, South Korea) and H. Wu (CIAE, China). The proposed agenda was adopted with one more presentation by **B. Rearden** (ORNL, USA) on benchmark results. The final agenda is available in Appendix 2.

The status of planned actions was reviewed during the meeting and an updated list of actions is available at the end of this document (see section 6).

1. Presentations of new results/studies

T. Ivanova presented final IRSN results obtained with the in-house BERING code for the adjustment of ENDF/B-VII and COMMARA nuclear data using integral data (k_{eff} only) calculated with SCALE/KENOVa and sensitivity coefficients calculated with SCALE/TSUNAMI-3D in 238 groups. The sensitivity profiles were transferred on the 33 group structure and all results were carefully reviewed and compared with INL data.

W. Wang presented ongoing CNDC activities relative to S/U analyses and nuclear data adjustment on k_{eff}. The sensitivity coefficients were converted to the SG33 format and compared with ANL and JAEA data, but the verification & validation process is not completed yet. The adjustment method was implemented in a Matlab environment and preliminary adjustment results obtained using k_{eff} integral parameters were presented.

B. Rearden presented ORNL activities within the scope of SG33 mandate. The TSUNAMI-1D code calculated sensitivity coefficients, which were used by the TSURFER code to adjust nuclear data (ENDF/B-VII) and covariance data (ENDF/B-V) to minimize the difference between the calculated and experimental integral parameters. Adjustment results show that the ^{239}Pu and ^{238}U inelastic cross-sections are the most affected. Future work includes developing a generalized perturbation capability in TSUNAMI-3D and expanding the scope of this study to span many other systems, including several challenging problems with C/E values that are not close to unity.

There was unfortunately no participant from NRG and KAERI to report on new results/studies. **E. Dupont** will contact D. Rochman (NRG) and S.-J. Kim (KAERI) to check if they plan to provide benchmark adjustment results in the agreed format (action 1). Other participants (IRSN, CNDC, ORNL) agreed to send benchmark results (in SG33 format) to the NEA within a few weeks (action 2).

2. Comparison of sensitivity coefficients

S. Pelloni presented a comparison of sensitivity coefficients calculated by participants. This comparison shows a global consistency between participant results. However, some discrepancies were highlighted in a few cases, e.g. ^{239}Pu fission cross-section sensitivity to FLATTOP k_{eff} calculated by CEA, KAERI and IRSN or material structure cross-section sensitivity to ZPR6-7 and ZPPR9 C28/F25 spectral index by ANL. **M. Salvatores** recommended to focus on the most significant sensitivity coefficients and to contact ANL, CEA and KAERI to further investigate important discrepancies (action 3).

3. Presentation of benchmark results

E. Dupont briefly presented the information available on the SG33 web site and reminded the participants of the importance to send benchmark results in SG33 format to facilitate the comparison. He presented the comparison plots prepared for the discussion of adjustment results. **M. Salvatores** and **G. Palmiotti** proposed some improvements that should facilitate the comparison and recommended to prepare a similar comparison for integral C/E results (action 4). Participants reviewed results for the following five major cross-sections: ^{239}Pu and ^{238}U inelastic, ^{23}Na and ^{56}Fe elastic, ^{235}U capture. **M. Salvatores** proposed to summarise the preliminary conclusions of this review in a short note that will be circulated for comments (action 5).

4. Status of the deliverable - Review of material received and comments

M. Ishikawa invited participants' comments on draft chapters he prepared for the final report:

- Covariance data for cross-sections - Different sets used and main characteristics
- Stress tests and their impact
- Teaching example of adjustment methods features

M. Salvatores invited all SG33 members to review these chapters and other materials available on the subgroup web site and to send comments to chapter leaders as soon as possible (action 6). After further discussions, participants agreed to merge the former first three chapters into one and to include the former appendix A into the chapter on integral covariance data (Chapter 4 below). The new report outline is given below.

1. Introduction, Definition of Benchmark steps, Choice of Integral experiments and Target systems, G. Palmiotti, M. Salvatores
2. Sensitivity studies and issues, S. Pelloni
3. Covariance data for cross sections. Different sets used and main characteristics, M. Ishikawa
4. Integral experiment uncertainties and correlations, M. Ishikawa
5. Comparison of integral experiment initial C/E's, uncertainties and reference system uncertainties, G. Palmiotti
6. Adjustment procedures (short reminder of previous deliverable), E. Dupont
7. Adjusted data comparison and analysis. Role of "a-posteriori" covariance matrices. Display of selected results, C. De Saint Jean
8. Stress tests and their impact, M. Ishikawa
9. Recommendations, All
10. Conclusions, All

Appendix

A RZ Geometry Models of 1000 MWt ABR Core Concepts, ANL

B Models of the 600 MWe Fast Breeder Reactor (FBR) Core, JAEA
C Corrective factors, INL/JAEA
D Teaching example of adjustment methods features (Two groups example), M. Ishikawa
E Detailed benchmark results, E. Dupont

After some discussions, participants agreed to finalize the report by the end of January 2013 (action 7, action 8) and to present SG33 conclusions at the ND2013 conference (March 4-8, 2013) and at the next WPEC meeting (May 23-24, 2013).

5. Future activities

M. Salvatores and **G. Palmiotti** presented open issues on the use of cross-section adjustment and requested feedback from the participants on the need for another WPEC subgroup where experts (evaluators, experimentalists and data users) could discuss them. Participants agreed to contribute to activities related to the study of methods to provide feedback from nuclear and covariance data adjustment for the improvement of nuclear data files. **M. Salvatores** proposed to circulate a formal proposal that will be submitted to WPEC delegates (action 9).

6. Actions

1.	E. Dupont	To contact NRG and KAERI participants to check if they plan to provide benchmark adjustment results in SG33 format.
2.	IRSN, CNDC, ORNL, NRG, KAERI…	To send to the NEA, by the end of December 2012 the final results of the benchmark adjustment exercise (in SG33 format).
3.	S. Pelloni	To contact ANL, CEA and KAERI participants to further investigate significant discrepancies observed in the comparison of sensitivity coefficients.
4.	E. Dupont	To prepare comparison plots for integral C/E results.
5.	M. Salvatores	To circulate preliminary conclusions drawn from the comparison of adjustment results presented during the meeting.
6.	All	To review draft chapters of the final report as soon as possible and to send comments to chapter leaders by mid-January 2013 at the latest.
7.	G. Palmiotti, E. Dupont, C. De Saint Jean	To circulate as soon as possible and no later than mid-January 2013 a draft version of chapters 5, 6, 7 (see the report outline in section 4).
8.	Chapter leaders*	To circulate the final version of the chapter(s) under their responsibility by January 31, 2013.
9.	M. Salvatores	To circulate a new subgroup proposal for SG33 follow-on.
10.	E. Dupont	To update the subgroup web page with materials from this meeting and other participant contributions.

* See the report outline in section 4

Appendix 1

Participants to the 8th meeting of WPEC subgroup 33

NEA, Issy-les-Moulineaux, France

29-30 November 2012

M. Chadwick	LANL, USA	
E. Dupont	NEA, OECD	(Secretary)
M. Herman	BNL, USA	
M. Ishikawa	JAEA, Japan	
E. Ivanov	IRSN, France	
T. Ivanova	IRSN, France	
I. Kodeli	IJS, Slovenia	
R. McKnight	ANL, USA	(Monitor)
E. Mitenkova	IPPE, Russian Federation	
G. Palmiotti	INL, USA	(Coordinator)
S. Pelloni	PSI, Switzerland	
A. Plompen	JRC-IRMM, EC	
B. Rearden	ORNL, USA	
M. Salvatores	INL, USA – CEA, France	(Coordinator)
W. Wang	CIAE, China	

Appendix 2

Agenda of the 8th meeting of WPEC subgroup 33

NEA, Issy-les-Moulineaux, France

29-30 November 2012

Thursday, November 29 (13:30 – 18:00)

Welcome and objectives of the meeting (M. Salvatores)

1. Presentations of new results/studies

   IRSN (T. Ivanova)
   CIAE (W. Wang)
   ORNL (B. Rearden)

2. Comparison of sensitivity coefficients (S. Pelloni)

3. Presentation and discussion of benchmark results comparisons as compiled (E. Dupont)

   Discussion of issues related to formats, choice of "most important" reactions etc. (All)
   It is reminded that only solutions put in the agreed format will be handled in the comparisons

4. Status of the deliverable. Review of material received and comments. (All)

Friday, November 30 (9:00 – 12:30)

4. Further discussion on the deliverable and plans to finalize it (All)

5. Future steps: a final meeting needed? New proposals for future activity (new subgroup?) (All)