SPEAKER / PRESENTATION INFORMATION

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Biography	T. Ivanova, PhD is an R&D staff member in Criticality Assessment Study and Research Department at IRSN. Prior to joining the IRSN, she worked as senior researcher for IPPE, where her responsibilities included uncertainty assessments for SFR design studies, validation of the nuclear cross-section library, design, evaluation of integral experiments performed on BFSs and KOBRA facilities, and development of tools for uncertainty quantification and code validation. She joined IRSN in 2005 and has since been involved in calculation, analysis, and evaluation of integral experiments and the development of S/U capabilities for validation of criticality codes. Dr. Ivanova is a participant in ICSBEP and IRPhEP and chairman of the OECD/NEA EG Uncertainty Analysis for Criticality Safety Assessment.		
Title	***Uncertainty Assessment for Criticality Safety Studies: An Overview of Techniques***		
Abstract	To establish subcritical limits for a design system containing fissile materials, it is required to validate the criticality code to be used. Uncertainties inherent in the validation study are caused by several factors that can be grouped into the following classes: numerical approximations in the neutron transport code, uncertainties in basic nuclear data, and uncertainty of the representative experiments. A key point of the validation procedure is to propagate the uncertainties and any bias of the calculation method to the calculated k_{eff} of the design system. The variation of criticality safety assessment rules that are adopted in different countries results in diverse approaches for validation of criticality computations. Rigor of the techniques currently used is sometimes constrained by engineering judgment when selecting the experiments and establishing the area of their applicability. Definition of bias and the bias uncertainty often employs simple statistical analysis. These limitations make the predicted accuracy reliant on subjective judgments that make it difficult to predict the bias for systems that have no or few similar benchmark experiments. Improvements in methodology and tools for criticality validation should make it possible to optimize safety margins, i.e., accurately predict the k_{eff} bias and the bias uncertainty and provide better validation of criticality calculations. This becomes even more relevant, considering that new concepts are to be developed for future generation fuel cycles. There certainly will be a need not only to achieve an adequate level of criticality safety but also to achieve the economic optimization of large-scale, long-term materials handling operations. The Expert Group on Uncertainty Analysis for Criticality Safety Assessment (EG UACSA) was established within the OECD/NEA Working Party on Nuclear Criticality Safety in December 2007 to exchange experiences from different countries in uncertainty assessment for criticality safety studies. Since its creation, the EG has been focused upon the techniques for criticality code validation.		

	A report providing a description of state-of-the-art methodologies and results of benchmark-exercises aimed at testing the capabilities of these methodologies to predict the k_{eff} bias and the bias uncertainty will be written by EG participants. Based on contributions to the report, this workshop presentation will summarise how different methodologies address these and other relevant questions: • What degree of correlation between the experiment and the application is necessary to validate the application area? • What parameters are to be chosen for quantification of the correlation? • How many experiments are needed to verify an application? • How are correlations between the experimental uncertainties taken into account? • How are the above discussed uncertainties propagated to the final results of the validation study? • How is convergence of the validation procedure determined? The presentation will also focus upon the necessity to provide and use in practice more formal validation procedures to better face the coming nuclear renaissance. It will discuss how and which validation procedure should serve in defining the experimental needs for the advanced fuel cycle and in designing integral experiments.