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## Conformity Assessment in Nuclear Material and Environmental Sample Analysis

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Safeguards conclusions are based to a large extent on comparison of measurement results between operator and safeguards laboratories. Measurement results must state traceability and uncertainties to be comparable. Recent workshops held at the IAEA and in the frame of the European Safeguards Research and Development Association (ESARDA), reviewed different approaches for Nuclear Material Balance Evaluation (MBE). Among those, the “bottom-up” approach requires assessment of operators and safeguards laboratories measurement systems and capabilities. Therefore, inter-laboratory comparisons (ILCs) with independent reference values provided for decades by JRC-IRMM, CEA/CETAMA and US DOE are instrumental to shed light on the current state of practice in measurements of nuclear material and environmental swipe samples. Participating laboratories are requested to report the measurement results with associated uncertainties, and have the possibility to benchmark those results against independent and traceable reference values. The measurement capability of both the IAEA Network of Analytical Laboratories (NWAL) and the nuclear operator’s analytical services participating in ILCs can be assessed against the independent reference values as well as against internationally agreed quality goals, in compliance with ISO 13528:2005. The quality goals for nuclear material analysis are the relative combined standard uncertainties listed in the ITV2010. Concerning environmental swipe sample analysis, the IAEA defined measurement quality goals applied in conformity assessment. The paper reports examples from relevant inter-laboratory comparisons, looking at laboratory performance according to the purpose of the measurement and the possible use of the result in line with the IUPAC International Harmonized Protocol. Tendencies of laboratories to either overestimate and/or underestimate uncertainties are discussed using straightforward graphical tools to evaluate participants’ results, e.g. ‘Naji plots’. Finally, we explore the possibility to evaluate laboratories’ performances over time and to use conformity assessment to support the safeguards “bottom-up” MBE approach.

### Country or International Organization

EC - Joint Research Centre - Institute for Reference Materials and Measurements

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