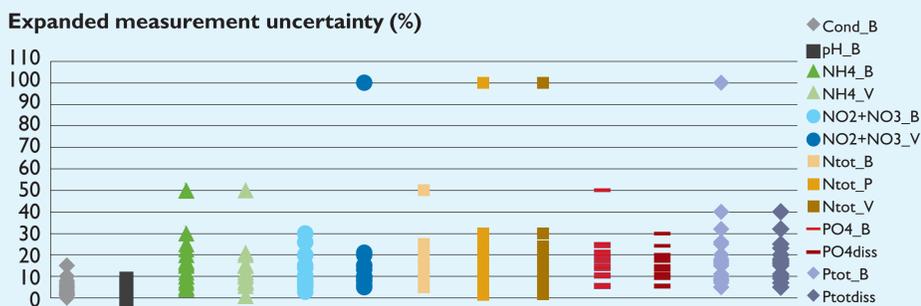


Improving Comparability of Analytical Results with Practical Software for Estimating Measurement Uncertainty



Introduction

Finnish Environment Institute (SYKE) is the metrological designated institute for chemical analyses from water environment and the national environmental reference laboratory in Finland. SYKE arranges proficiency tests for environmental laboratories and has noticed that measurement uncertainties reported by laboratories and their success in the proficiency tests are inconsistent. The laboratories generally report the uncertainties lower than their success indicates. Furthermore the scatter of the uncertainty estimates is high (Scheme 1) [1].



Need for Practical Tools

SYKE is actively developing practical tools for environmental laboratories to reduce measurement uncertainty and improve the quality and traceability of analytical results. One of the tasks under development is the practical software for estimating measurement uncertainty in environmental routine laboratories. By this user guiding software SYKE aims to affect the uncertainty estimates calculated by laboratories so that:

- ▶ Analytical results would become more comparable and more traceable
- ▶ Quality and reliability of information collected from waters would be improved
- ▶ More adequate interpretations and decisions from the state of the environment are made
- ▶ Additionally laboratories will be "educated", which will enhance their operational competence

◀ Scheme 1. Relative expanded uncertainties reported by participants in proficiency tests arranged by SYKE in 2010. B=Brackish water, V=Municipal waste water, P=Pulp and paper mill waste water

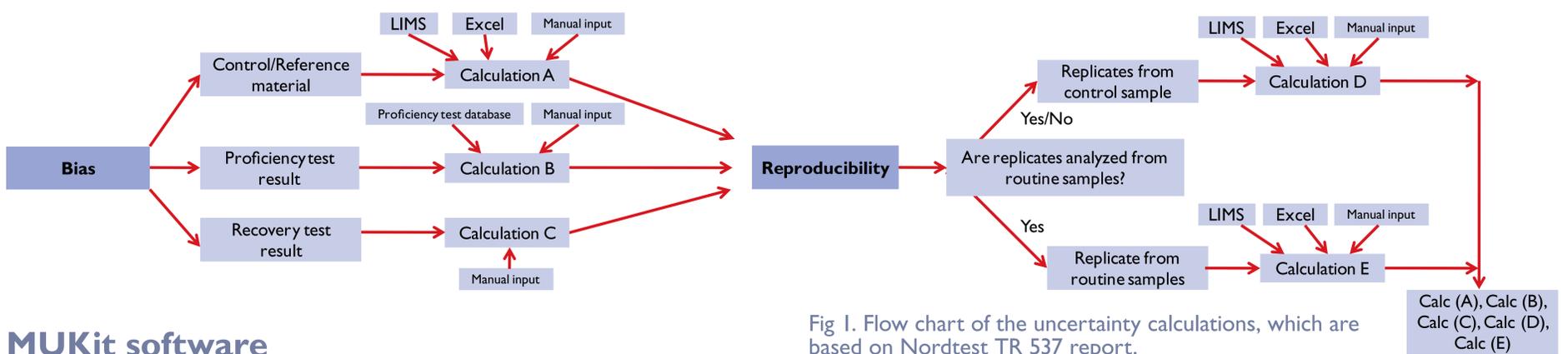


Fig 1. Flow chart of the uncertainty calculations, which are based on Nordtest TR 537 report.

MUKit software

Measurement uncertainty calculations performed by software are based on the guidance of NORDTEST Technical Report 537 (Fig.1) [2]. By use of the software public and commercial environmental testing laboratories may better manage measurement uncertainty evaluations of the analytical results. The software will allow laboratories straightforwardly calculate the measurement uncertainty using the results of

- quality control samples (e.g. from X-chart)
- routine samples replicates (e.g. from R-chart)
- recovery tests and
- proficiency tests.

If laboratories participate in proficiency tests arranged by SYKE, they may fluently use the results of proficiency tests to estimate their method bias. Both the user interface and the web service are implemented using Microsoft's tools and the .NET environment.

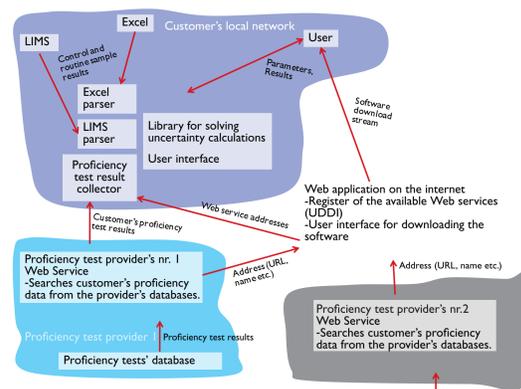
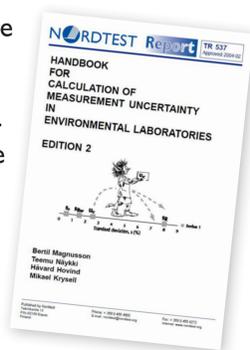


Fig 2. Structure of the MUKit software.

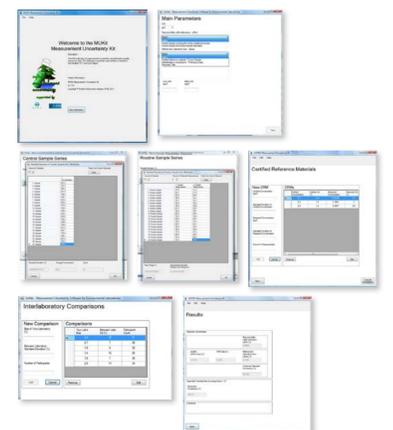


Fig 3. Preliminary view of the MUKit software.

Acknowledgements

Cleen Ltd, MMEA programme and Maa- ja vesiteknikan tuki ry. are acknowledged for financial support of this work.

References

1. I. Mäkinen, Accred Qual Assur 14 (2009), 35-41
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Present Stage and Future Plan

During summer 2011, SYKE is seeking interested participants as pilot laboratories for testing the software prior to publishing it. Before that SYKE is testing software features together with University of Tartu. The Final version will be presented in SYKE reference laboratory seminar in September 2011 (in Helsinki, Finland). Long term development of the uncertainty estimates of the laboratories in Finland will be monitored in connection with proficiency tests. The estimates are compared before and after the use of the software.



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