

Implementing an efficient approach to the planning of KCs and the approval of CMCs in the GAWG

1. Background

In order to plan future comparisons and to minimise the number of comparisons that will need to be repeated in the future, the GAWG has developed a strategy. This is based on a quantitative analysis of the results of all key comparisons carried out by the GAWG. It proposes that they can be divided into three groups:

- those covering the “core mixtures” listed below for which the performance of any particular NMI* is similar,
- those covering “natural gas”, and
- those that present a specific “analytical challenge” for which performance by any particular NMI is not strongly linked to the performance for other compounds and concentrations.

Core mixtures

CO, CO₂, O₂, methane, propane from 10 µmol/mol to 0.5 mol/mol
as binary components in N₂ and air
or in a CO/CO₂/O₂/propane multi-component mixture

NO, SO₂ from 100 µmol/mol to 0.5 mol/mol
as binary components in N₂ and air

This grouping takes account of the fact that measurements of some compounds may be “core” at higher concentrations, but may present an “analytical challenge” at lower concentrations. Hence we refer to “core mixtures” and not “core compounds”.

2. How Far the Light Shines (HFTLS)

Key comparisons carried out by the CCQM include a statement of HFTLS[#] in their report. This is used in the review of CMCs. Statements of HFTLS express the range of compounds, concentrations and matrices for CMCs that may be supported by the results of the comparison. The review of performance of NMIs in KCs described above suggests that some NMIs may be able to justify CMCs for a much wider range of compounds and concentrations than has previously been expressed in statements of HFTLS.

* In this document, NMI refers to NMI and DI.

How Far The Light Shines

3. Guidelines for introducing a “broad” HFTLS for selected GAWG KCs

- All KCs will continue to have an agreed statement of HFTLS in the report of the comparison. This statement of HFTLS may be used by any participant in the KC.
- KCs coordinated by the GAWG that cover the core mixtures listed above will have two statements of HFTLS: a simple statement that can be used for the revision of CMCs by any participant in the KC; additionally, there will also be a broad HFTLS that covers all of the core compounds and concentrations
Note: this will not apply to KCs operated by RMOs.
- NMIs may qualify to use the broad HFTLS in the review of their CMCs provided they meet certain criteria.

Criteria for an NMI to use a broad HFTLS for core mixtures

1. It must have participated in three KCs of core compounds / concentrations
Note 1.1: the same criterion applies to any new NMI requesting to use the broad HFTLS.
Note 1.2: the KCs must have been organised by the GAWG
2. It must continue to participate in at least one KC of core mixtures every 24 months, when available through the CCQM-GAWG.
Note 2.1: In some cases, the CCQM-GAWG may not organise a suitable comparison every 24 months. NMIs will not be penalised as a result of this.
3. CMCs should be judged with respect to the most recent performance in KC of a core mixture.
4. It must agree a quantitative link between CMCs and performance in KCs of core mixtures.
Note 4.1: A quantitative link like the one proposed by Maurice Cox (GAWG/09-07) is essential for an efficient process.
5. It must have a quality system and a measurement capability that covers all of the core mixture.

- If an NMI ceases to meet these criteria for submitting core CMCs, it must re-submit all core CMCs within established HFTLS statements.

GAWG 10_79 (revised following 24th GAWG)

4. Comparisons of core mixtures

The 24th GAWG agreed that the following Key Comparisons addressed core mixtures

KC	Compound	Concentration
CCQM - K1a-d (1998)	binary mixtures in N ₂	
	CO, CO ₂ , NO, SO ₂	1000 & 100 ppm
	CO	6%
	CO ₂	15%
CCQM -K3 (1998)	vehicle emission multi-component	
	CO	3%
	CO ₂	13.5%
	propane	0.2%
CCQM -K52 (2006)	CO ₂ / air	380 ppm
CCQM -K53 (2006)	O ₂ / nitrogen <i>preparative</i>	100 ppm
CCQM -K76[#] (2010)	SO ₂ / nitrogen	100 ppm

5. Implementation through the KCWG

NMIs that meet the criteria listed in Section 3 may apply for CMCs for core mixtures through the annual review process.

The column “links to Appendix B” should list the three KCs (from the Table in section 4) that are being used as evidence. As indicated in criterion #3 in Section 3, the uncertainty of all CMCs for core mixtures should be judged with respect to the performance in the most recent KC of a core mixture.

[#] The results of CCQM-K76 will not be available for CMC review in Cycle XII (2011).