Subject field: METCHEM – Metrology in Chemistry

Annual Report

1- Introduction

This report covers an extended period between May 2003 and March 2004, in order to present the main activities and to discuss issues and outcomes encountered by the new chairmanship.
A new Chair person (Ph. Charlet, France) was elected in May 2003 at the last GA and a good continuity in the management of METCHEM was done by the past Chair person (EVA Déak, Hungary). A specific meeting to take over the chairmanship was held at OMH, in Hungary, in July 2003.

2- Most important issues and outcomes

2.1- Election of the new Chair

The change of Chair person has unleashed some understanding problems regarding the election between the two partners of METCHEM: EUROMET and EURACHEM. It was asked to clarify the nomination and voting procedure. Discussions have been led during the last few months and it was agreed to move towards a closer integration.
Links have then been strengthened between the two organisations and a paper has been published by the TC Chair in *Eurachem Newsletter n°24*, *Summer/Autumn 2003* ("*METCHEM A personal view of the new Chairman on the cooperation between EUROMET and EURACHEM*"). Different meetings have also provided the opportunity to members of both organisations to discuss the current understanding of representation of EURACHEM and EUROMET in METCHEM and the different topics (other than CMCs review) to be raised in priority by the Technical Committee.

After the election of the new TC Chair, the METCHEM site was transferred from NPL to BNM where it is now operating at*:* *www.bnm.fr* and then: *METCHEM web pages*.

2.2- Election of the Sub-Committee Convenors

In 2004, the convenors of the four Sub-Committees completed their four years mandates. Following the Rules of Procedures, new convenors had to be appointed for another term. Considering this election (new convenors and new TC Chair) could create a possible interruption in the current work of sub-committees, it was agreed, with the President of EUROMET and the Chair of EURACHEM, to ask the convenors to hold their mandate for another term. Three of them were willing to continue,

therefore another convenor has been elected during the METCHEM meeting in 2004, in the inorganic Sub-Committee.

2.3- Meetings

The 2003 annual METCHEM Technical Committee meeting was held in Bern, at METAS, on February 11th–13th. It has become customary that the four subcommittees hold their meeting the days before the plenary session, the convenors then report to the TC. The Technical Committee Plenary meeting was held on February 13th and was chaired by Eva Déak. 37 persons attended this session. The minutes of this meeting are available on the METCHEM web site.

In 2004, the Plenary METCHEM meeting was held at NCM, Sofia, Bulgaria, on February 12th and 13th . 43 persons attended the meeting. The four sub-committees met the previous days at the same place. Particular efforts were dedicated to the Organic Sub-Committee considered to be of major importance due to its link to societal issues (environment, food, health, etc.). Due to the successive resignation of two convenors, no activities have been undertaken during the past years. After different contacts and meetings between the Convenor and the TC Chair, specific actions and a survey were conducted to underpin concrete activities, aiming to involve experimented NMIs and NMIs from newly EU associated countries, in the organic field.
This year, the meetings of the four sub-committees were spread over two days in order to allow specialists to attend 2 or 3 SC meetings (instead of 1 or 2 when SC meetings are organized in parallel). This was very positive and every meeting gathered about 20 persons. This created stimulating exchanges, discussions and proposals.

During the Plenary Session, a forum was organised on the **"Strategies of NMIs to ensure adequate metrology capabilities to users"**. Four groups of discussions addressed specific aspects of the forum topics around a demonstration case. Each group then reported its findings and conclusions to the Technical Committee.
The four topics were: Distributed metrology systems; Training and Education; Research collaboration and Inter-laboratory comparisons.
It was concluded that such a forum is a valuable mean to address specific issues of common interest of NMIs and a good opportunity to create and stimulate exchanges between participants.

Next METCHEM meeting: 15-18 February 2005, CEM, Madrid, Spain.

2.4- Status of Projects and new co-operation developments

- On-going and completed projects:
527 Revision of the VIM will be completed shortly. Partners: IRMM, SP, EUROMET members.
589 Standards and calibration facilities for reactive gases includes a number of gases, most recently a study of ammonia. (This is now followed by 764). Partners: NPL, NMi, METAS, CMI.
638 Standards and calibration facilities for NO is at an advanced stage and has been linked to CCQM-K1c. Partners: NPL, NMi, IPQ, VTT-FMI, VNIIM, BAM.
693 Support programme for MiC for EU candidate countries (which is complementary to the PHARE programme). The aims are to promote understanding, assist in formulating vision/mission/strategy in the area of metrology in chemistry, spread best practice. This is achieved through a wide range of training activities, including fellowships at IRMM, participation in IMEP, workshops and seminars. Training

courses have been developed in co-operation with national contact points and trainers in eight candidate countries. A wider range of countries are also contributing to the ACADEMiC training forum.
696 Comparison of primary measurement procedures for pH involved determination of phthalate buffer by Harned cell. It provides a link to CCQM-K17. Partners: BNM-LNE, VNIIFTRI, PTB
708 Equivalency of standards and calibration facilities has been successful and used to underpin CMC claims. Partners: NIST, NMi,
724 Improvement of IDMS procedures for low S in fuel oil involved BAM, IRMM and LGC with the aim of eliminating discrepancies in their results. Scientists visited the different labs, shared experience and shared sample preparation facilities and will make joint publication. This was successfully achieved and it is planned to compare data with NIST.
760 pH determination of phosphate buffer by Harned cell. This was linked to #696 and involved an additional institute (NCM) with the same pilot laboratory (PTB). The results were excellent.
A large number of "old" reports have been uploaded on the EUROMET Website.

- Planned projects:
Four projects have recently been registered (760, 762, 763, 764) as "new projects", but they are actually in progress. They were not initially registered in the Euromet database Four completely new projects have been proposed. one from organic field: *PCBs and PAHs in solutions or extracts***,** and three from inorganic field: *Sulfur in fuel at lower levels*, *Trace metals in sewage sludge, Mono-elemental calibration solutions.*

A ***EUROMET workshop on Gas Purity*** was held at BNM-LNE in Paris, on September 7th and 8th . About 50 persons attended this meeting; specialists from some 12 NMIs gather to discuss state of the art on the determination of gas purity and current needs and also learn about new technologies, presented by the major international gas companies. Specialists of NMIs from other regions (SADCMET) also attended this workshop.

3- Problems/issues encountered

Apart from the understanding problems regarding the election of the TC Chair already mentioned, it was also observed a lack of "working rules" with the METCHEM partner EURACHEM, in some specific cases.
This was underlined, for instance, during the discussion regarding the election (or continuation of the mandate) of the SC convenors. The absence of *modus operandi* has complicated the task of the TC Chair for obtaining a consensus between partners on the name of possible candidates and also on a balanced representation of NMIs for convenorships distribution. It therefore happened that the personal strategic view of the TC Chair was expressed with difficulty.
It was also not easy for the TC Chair to clearly identify the representatives of EURACHEM at the Technical Committee. This complicates contacts and the transmission of information. EUROMET and EURACHEM partners are fully conscious of the situation and improvement will be obtained through tightened links.

A major problem was encountered regarding CMCs review with the other RMOs. A large number of CMCs have been presented for the inter RMOs meeting in April 2003 (Cycle IV). The minutes of this meeting were never released and since discussions and conclusions of the inter RMO meeting were not enough clear and

unambiguous, it was impossible, for months, to continue the discussion on CMCs claims which were coded under review after the meeting. This prevented the publication of the whole set of 226 CMCs in the BIPM database.
Furthermore, the TC chair faced up difficulties to find the right « negotiating partner » (CCQM, BIPM, JCRB ?) to get valuable information on the current situation. This created an uncomfortable position due to the inability of the TC Chair of giving a reliable answer to NMIs.

4- Mutual Recognition Arrangement

A large number of EUROMET NMIs are currently participating in CCQM activities and meetings and particularly in the pilot and key comparisons. Several European NMIs are coordinating current comparisons. For the classic fields of chemistry corresponding to the METCHEM sub-committees, 3 of the four CCQM Working Groups are chaired by a European Convenor. During the last CCQM organic WG, held at CENAM in Mexico, the METCHEM TC Chair presented an overview of the current and future activities of METCHEM in the Organic field.

In 2003 and beginning of 2004, a large part of the activities of the Technical Committee was devoted to the submission and review of the next CMCs Cycle (Cycle V). 108 new claims from 10 countries have been approved by EUROMET experts in the 4 Sub-Committees. These claims will be discussed at the next inter RMOs meeting in April 2004, at the BIPM.
In November 2003, 344 CMCs entries from EUROMET have been published in the BIPM database.
226 CMCs claims from the previous cycle (Cycle IV) have been kept in an “indefinite situation” (not published but not under review too) for months due to the lack of reliable information from the last inter RMOs meeting.

Valuable contacts with the other Regional Metrology Organisations and the CCQM were maintained at a high level (meetings, exchange of information, invitation to seminars and events, etc.) particularly under the impulsion of BIPM and the President of CCQM, Dr Robert Kaarls.

5- Research / Co-operation Trends

Project related to iMERA

During Summer 2003, under the impulsive force of Philippe Taylor at IRMM, a common reflection was initiated to identify the smart strategies to transfer metrology capabilities to end-users. This idea came up with the findings of the **EUROMET Project n°627, Support in Metrology in Chemistry to EU Candidate Countries**.

The objective was to identify concrete studies, projects or co-operations involving NMIs, where metrology principles and capabilities were disseminated to the field. These “cases” could correspond to demonstration exercises in order to underpin future research co-operations between NMIs, as suggested in the Skeleton iMERA 2004-2-17. After this preliminary step of identification of cases of straightforward metrology transfer, a further stage of this approach is to devise transfer models

through the “exchange of best practice in generic activities” between NMIs. This exactly corresponds to a Work Package proposed in the draft work program of iMERA.
This first idea led to the organisation of a forum discussion between NMIs at the last TC meeting, as mentioned previously. Four topics were identified to correspond to concrete strategies involving NMIs with end-users (field laboratories and industry), stake-holders, Proficiency Testing providers, Reference Laboratories and official bodies. They are: *Distributed metrology systems; Training and Education; Research collaboration and Inter-laboratory comparisons*. For each topic, a demonstration case was presented by a NMI. Based on this concrete case, the starting points for discussion was: definition of the problem; situation beforehand (how was it handled); what was done; how were obstacles overcome, and what are the benefits to all involved.

Regarding the topic: ***Distributed metrology systems***, the sound strategy to be put in place is already well devised (Philip Taylor et al.). Based on a concrete case, the strategy describes how to set up a metrology infrastructure for chemical measurement. In such a structure, the NMI appoints sectoral field laboratories which represent the best measurement capability inside the country for a specific measurement. These laboratories become National Reference Standard Holders for the specific service. In this system, an efficient communication between stake-holders has to be put in place. It involves the NMI, the National Reference Standard Holders and the end-users (industry, laboratories, government and accreditation bodies).
In distributed metrology infrastructures, the NMI should play a key role in cross sectoral transfer of knowledge, advice and coordination.

Conclusions were drawn from the discussion between NMIs during the forum and pinpoint some difficulties: the wide range of capability required, the difficulty of explaining the international metrology infrastructure, the problem of co-funding for the reference laboratories, and resistance to change. It was recommended that these problems can be overcome by a strategy including:
- clarify the NMI role
- interact with end-users and sector reference laboratories
- explain the benefits of designation
- promote trust between partners
- reserve some of the NMI budget for co-funding (e.g. 5%).
- Hire staff with broad experience of analytical chemistry
- Restrict international recognition to priority applications
- Adopt a stepwise approach to designation

The advantages of a distributed system were believed to include:
- Added value of NMI is clearer and is more related to social needs
- Easier to link partners to international forum
- Status of reference laboratories is improved
- More possibility to attract funding

It was therefore demonstrated that NMIs can co-operate to exchange best practice in knowledge and capability transfer activities. Then, it will be possible to elaborate models to set up a metrology infrastructure based on the needs of the field laboratories in the country, and therefore well adapted to NMIs of small and medium-size countries.

Philippe Charlet, March 2004