

Report on the fifth meeting of the JCRB held on  
11-13 October 2000 at the BIPM

**Those present:**

T. J. Quinn	BIPM (chairman)
R. Kaarls	CIPM (secretary)
B. Inglis (representing H. Imae, JCRB representative)	APMP
K. Seta	APMP
Shi Changyan	APMP
V. Belotserkovsky (JCRB representative)	COOMET
P. Kneppo	COOMET
A. Pokhodun	COOMET
W. Schwitz (JCRB representative)	EUROMET
A. Wallard	EUROMET
L. Erard	EUROMET
H. Ugur (JCRB representative)	MENAMET
F. Hengstberger (JCRB representative)	SADCMET
F. Denner	SADCMET
I. Castelazo (JCRB representative)	SIM
H. Semerjian	SIM
C. Thomas (BIPM key comparison database)	BIPM
R. Watters (NIST international comparison database)	NIST

The draft agenda, document JCRB-5/0, and list of participants with their affiliation and co-ordinates are added as Annexes 1 and 2 to this report. The report follows the order of the agenda.

**1. Opening and welcome by the Chairman**

The chairman opened the meeting welcoming the representatives of the RMOs as well as Dr Claudine Thomas and Dr Robert Watters. The draft agenda was approved with the addition of a discussion on “rejection criteria” under point 5.2 and adding an agenda point 8a: discussion on Quality Systems. Dr Kaarls agreed to act as secretary to the meeting.

**2. Matters arising from the report of the fourth meeting of the JCRB held at NIST in March 2000**

The Report on the 4th meeting of the JCRB was approved.

With reference to this report the chairman mentioned the following points:

- Most of the agreed actions have been carried out;
- The CMC database has been developed further and is now nearly ready for implementation;
- The BIPM key comparison database, produced in collaboration with the NIST, has developed faster than expected and it is now clear that it can be maintained and further developed as necessary by the BIPM; it is already, *de facto*, decoupled from the NIST database which is increasingly being oriented more closely to the needs of SIM and the USA;
- A compilation of all procedures for the preparation and review of CMCs, including the internal RMO procedures is not yet ready; this will be done as soon as the definitive procedures of all the RMOs have been received.

Various other points arising from the report of the 4th meeting were left to be discussed later as they were on the agenda of the 5th meeting of the JCRB.

**3. Report by the Chairman on progress since the March meeting:**

- For the proper functioning of the JCRB, everyone is reminded on the content of Appendix E of the MRA describing the Terms of Reference of the JCRB;
- First results of key comparisons can now be found in the Appendix B; it includes the results of the CCQM key comparisons on gas mixtures, which have thoroughly been discussed, before they were put into Appendix B;

- Experience has shown that it is essential for two or three persons of the CC Working Group concerned with each key comparison go through the results in depth in order to avoid errors as much as possible; the pilot laboratory has to examine the results very carefully;
- The final presentation in Appendix B is decided by the chairman of the CC Key Comparison Working Group concerned and by the chairman of that CC;
- Some 300 key comparisons are now underway; these include also RMO key comparisons;
- With respect to Appendix C, several regional co-ordinators have now had meetings with each other; in particular they have discussed the harmonized list of Calibration Measurement Service Categories and Category Numbers;
- Lists of services in the following fields are now ready or nearly ready:
  - length
  - electricity and magnetism
  - ionizing radiation
  - chemistry (first agreement of draft document)
  - photometry (almost ready)
  - acoustics and vibration (well underway).

Once the list of services is fixed it should not be modified unless it is really necessary, as changes lead to a large amount of additional work for the NMIs;

- A harmonized inter-regional review process is very important; we now have seen two different ways of carrying out this review between the Length and the E&M areas, we must take care that procedures are compatible between different areas;
- In preparing the submitted data for input to Appendix C, the BIPM database coordinator, Dr Claudine Thomas, is faced with very different ways and sometimes incorrect ways of presenting uncertainty claims; harmonization is needed and a paper will be presented later during this meeting;
- A CD was distributed with the most recent CMC data on it, included were the documents received from the different regions for this meeting of the JCRB; the contents list of this CD is annexed to this report, see Annex 2.

#### 4. Reports by RMO representatives to the JCRB

The representatives of the RMOs to the JCRB reported on the progress made in their regions; they also mentioned difficulties faced and questions which arose during the review processes:

##### APMP

- APMP created a co-ordinating committee in order to be able to harmonize procedures of the different RMO technical working groups.
- A clearer procedure is needed with respect to the inter-regional review process. An easy, direct and flexible contact between the experts of the different regions is needed. However, the RMO management needs to know what is going on: who decides on what and when. It is also essential that the RMO representatives in the JCRB are fully informed on what is going on.

##### COOMET

- COOMET has now 12 member countries;
- COOMET is also concerned with legal metrology and accreditation;
- Slovakia, being a member of COOMET and EUROMET send its files in via EUROMET;
- So far, COOMET has not sent in any files that have fully passed the intra-regional review, but the files on CMCs in the field of electricity are almost ready and can be expected by the end of the year;
- VNIIM has problems with formulating the CMC file for thermometry since the harmonized service category list is not yet ready (action is with Dr Ono of NRLM, Japan).

The JCRB decided that the COOMET CMCs for electricity and length should be dealt with at the next meeting of the JCRB in March 2001; so COOMET is advised to follow the time schedule set for submission of data for that meeting (See document JCRB-5/3, attached as Annex 5).

##### EUROMET

- EUROMET counts 25 CIPM-MRA signatories among its members, representing some 80 institutes.
- EUROMET has adapted its procedures a little bit, in particular with respect to the chemical area, since several NMIs do not have their own chemical laboratory.
- So far EUROMET has listed about 11600 lines for entry into the Appendix C.

- EUROMET has noted that in the length area an extensive discussion has started on the procedures, while in the electrical area the emphasis has been on the examination of the submitted data for entry into Appendix C. A more harmonized approach is desirable, as well as criteria for the inter-regional examination of the CMC claims from the other regions.
- Taking into account the workload, a full examination of all the claims of another region is not realistic.
- EUROMET is not in favour of applying statistics when reviewing CMCs.
- The assessment of the quality systems of the NMIs has been planned now and will receive support from the European Commission under a special project "Initiation".

#### MENAMET

- MENAMET is still in a phase of development and not yet really operational;
- So far, the only country in the MENAMET region to have submitted CMCs (Turkey) has done so through EUROMET.

#### SADCMET

- SADCMET has now 3 associate members, namely Egypt, Kenya and Uganda.
- It is expected that several countries/economies in Africa will soon apply to become Associates of the CGPM;
- SADCMET CMCs have been reviewed by a regional task group and in addition by NML (Australia), NIST (USA) and NPL (UK).

#### SIM

- Only 6 NMIs from 6 countries are really participating in the CIPM-MRA.
- Two NMIs will have their quality systems accredited on the basis of ISO 17025; three NMIs will have a quality system in accordance with 17025 open for a peer evaluation and one NMI (NIST) will have a quality system comparable to ISO 17025. At NIST each Laboratory director will look after the way of evaluation of the quality system;
- During the SIM review of submitted CMCs no difficulties arose with respect to the best claims which were underpinned by the results of key and other comparisons. The question is, however, how far does the light shine. More guidance for the working group rapporteurs is needed.

### 5. Procedures for review and analysis of CMCs

On the basis of the reports by the regions several general procedures were discussed and the following conclusions were drawn:

The Chairman of the JCRB will write a letter to all the NMI directors asking for a clear statement about which single RMO is handling all their CMC-claims.

It is noted that implicitly the NMI should also actively participate in all the projects carried out by that region, since peers have to know each other and their facilities very well as part of the overall review process.

The JCRB decides to create a more detailed procedure, including all steps in the review process while making clear who is responsible for the different actions in the process. This is document JCRB-5/1 given in Annex 3 to this report.

The JCRB also decides to create a separate document with clear deadlines related to the steps in the inter-regional review process, this is document JCRB-5/3, given in Annex 5.

The JCRB is not in favour of giving special names (such as JCRL) to inter-regional groups of experts.

The JCRB re-stated its opinion on the meaning of the phrase in T.7 of the Technical supplement to the MRA: "The calibration and measurement capabilities referred to in this paragraph are those that are ordinarily available to the customers of an institute through its calibration and measurement services; they are sometimes referred to as "best measurement capabilities". The JCRB recommends that this sentence means simply what it says, that the CMCs should contain the capabilities of an NMI that are normally offered to their customers and which in general are published in the catalog of facilities of the NMI. So, one should not claim capabilities that may be offered under exceptional, time consuming and extra-ordinary expensive circumstances. The term "highest level of calibration" given in the glossary should not be taken to mean anything other than the highest level of calibration normally available to the customer (as in T.7).

### **5.1 Procedures within the RMOs**

The procedures for review and analysis of CMCs within the different RMOs have been considered.

### **5.2 Harmonization of procedures between RMOs**

The RMO review procedures do not necessarily have to be identical, but the principal criteria as formulated by T.J. Quinn in his letter of 24 November 1999 and adapted during this meeting of the JCRB (October 2000) have to be met. See document JCRB-5/1 in Annex 3.

All RMO documents related to review procedures should be publicly available so that the whole system is transparent and open. Each one should have a statement from the RMO saying that the document is complete and is compatible with other RMO documents.

When the RMO documents are all ready, they will be sent to the chairman of the JCRB and be published in one JCRB-document.

It is understood that inter-regional review does not mean that all the submitted CMCs of another region will be reviewed again. It is recommended that a small, carefully chosen, sample of the most critical CMCs from other RMOs should be reviewed and an overall decision be based on the results of this review. See also under point 5.3.

The RMOs may agree among themselves on how to divide the review process under the different RMOs.

Rejection of CMC claims is not a matter of applying statistical rejection criteria, but of good metrological common sense and mutual discussions between the regions concerned.

Unresolved problems should be brought to the attention of the JCRB and will be discussed by the JCRB.

No statistics will be applied in drawing final conclusions on the reliability and acceptability of the total of submitted CMCs;

### **5.3 Analysis of CMCs from other RMOs, results of meetings of experts in length, electricity and ionizing radiation held in September 2000:**

Experiences so far in the areas of length and electricity demonstrate that more guidance is needed in carrying out inter-regional review.

Therefore the existing procedure is expanded and more explanation is added (see JCRB-5/1 and 2, in Annexes 3 and 4).

## **6. CMCs in length and electricity, present status for entry into Appendix C**

The JCRB first of all congratulated all those who had been involved in the immense task of putting together the set of CMCs now nearly ready for entry into Appendix C.

The CMCs in length and electricity were discussed and approved for entry into Appendix C following the timetable of final examinations agreed. It is intended that they appear in the BIPM key comparison database in December for Length and January for electricity.

## **7. CMCs in other areas**

In looking more closely at the proposed lists, the JCRB emphasised again that as a matter of principle there should not be a separate category of so-called "top services". As far as possible all services should be considered together because the key comparisons do not give credibility just to those services directly linked to key comparisons. The JCRB recognised that in the beginning it may be necessary to review only a selection of services but this should not be established as a principle. See document JCRB-5/2 in Annex 4.

The term "top-level-services" should not be introduced.

The time schedule for submission of comments is slightly adapted and agreed. See document JCRB-5/3 in the Annex 5.

## **7.1 List of services**

(see item 3)

## **7.2 Present status of CMCs**

It is expected that the CMCs of the different fields will be submitted according to the time schedule annexed to the report of this meeting. See JCRB-5/3 in Annex 5. For Time and Frequency, Flow and Thermometry no dates have yet been set.

The JCRB noted that there is a need for further discussion to decide for some fields which part of the Appendix C is open to public access.

In the field of ionizing radiation the source of traceability should be visible to the public because it is of importance for the so-called secondary standards laboratories.

## **7.3 Format for chemistry CMCs**

The format for chemistry CMCs has been agreed by the CCQM and subsequently by the JCRB. A list of services in the field of chemistry has been produced but needs final agreement by the CCQM.

## **8. Future timetable for CMC approval for Appendix C**

The existing timetable for CMC approval was discussed and modified. It is given in JCRB-5/3 in Annex 5. In order to improve the mutual communication between the Technical Committee chairs of the different regions the chairman of the JCRB will compose a list of all TC chairs of the regions.

The RMO representatives to the JCRB are, therefore, asked to provide Dr Quinn before 15 November 2000 with the names, addresses, telephone, fax numbers and e-mail addresses of the persons concerned.

### **8a. Discussion on quality systems**

The evaluation of the quality systems of the NMIs was explained and discussed again by members of the JCRB. In several regions, accreditation is more or less required, or at least strongly recommended.

In the case that accreditation is not applied, a peer evaluation will take place. It is expected that this process will be completed in 2002.

It was decided that at a future meeting of the JCRB the RMOs will explain the procedures they apply for a continuous monitoring of the quality systems of their NMIs.

## **9. The BIPM key comparison database**

Dr Claudine Thomas made a presentation of the BIPM key comparison database. She proposed a design for Appendix C that was discussed and various modifications suggested. These will be implemented. The JCRB asked that the CMCs be presented by country and not by NMI; also that the options be presented of viewing the whole of a country's CMCs for a particular field or an individual CMC chosen from a menu.

### **9.1. Present situation**

A document was presented from Dr Thomas and Dr Quinn giving guidance for the format for stating measurement uncertainty in CMCs. Harmonization is necessary in order to avoid misinterpretation of the statements by the users of the database. The content of this document (given as Annex 6) was generally approved by the JCRB.

### **9.2. Developments underway**

As proposed, an extra column will be introduced indicating whether the stated uncertainty is a relative uncertainty or not.

Also, the lay-out for CMC claims such as AC/DC measurements is explained and agreed on the basis of the proposal mentioned in the annexed document. See Annex 6.

## **10. Chairman's Report to the CIPM**

Dr Quinn will orally report to the CIPM on the results of this meeting of the JCRB, at the meeting of the CIPM to take place on 19-20 October 2000. The report of the meeting of the JCRB will be sent to the CIPM afterwards.

## 11. Other business

The following points were discussed and agreed:

- Traceability of an NMI's standards to those of an other country is acceptable, assuming that the CMCs of that other NMI are recognised under the CIPM-MRA. This has to be verified during the review process.
- Traceability to an accredited laboratory in or outside one's own country is acceptable provided that this accredited laboratory is recognised under the ILAC-MLA. The traceability of the accredited laboratory has to be obtained from an NMI that is recognised under the CIPM-MRA. The whole traceability chain has to be verified as part of the review process.
- Dr Kaarls will discuss the coordination of references to the CIPM-MRA in ILAC documents, particularly the ILAC-MLA, during the General Assembly meeting of ILAC to be held in the week of 30 October 2000 in Arlington, VA, USA.
- It is recognised that in several countries a decentralised NMI exists. Traceability is therefore acceptable to laboratories officially designated by the NMI concerned or by the government of the country concerned and which form part of that distributed NMI and are designated to realize and maintain national measurement standards and capabilities for certain defined quantities and measurement ranges.
- It is suggested that the Working Group reviewing the Guide on Measurement Uncertainty (GUM) considers the possibility of adding a chapter on the calculation of uncertainty in the key comparison reference value. Dr Quinn will discuss this proposal with the Working Group (Note: at the meeting of the Working Group held at the BIPM in November 2000, the Group decided this was a detailed technical point that did not raise any principles that needed the action of the Working Group and thus the proposal was declined).
- In order to build up mutual confidence between the regions it is agreed that a representative of each region will be invited to attend the meeting of the General Assembly of the other RMOs or the other RMO Technical Committees dealing with the CIPM-MRA issues. The RMOs are asked to inform the chairman of the JCRB on the dates and places of the next meeting of their General Assemblies and other relevant Committee meetings as well as on the persons to contact. Dr Quinn will then distribute the list of meetings to the members of the JCRB.
- Again it is made clear that not all the CMC claims can be underpinned by the results of key comparisons. If doubts exists, however, every RMO may organise supplementary comparisons.
- With respect to entering details and results of RMO key and supplementary comparisons into the BIPM database, Dr Quinn refers to his letter of 8 June 2000 to the chairmen of the RMOs.
- All formal JCRB documents will be numbered as : JCRB-x/y in which x is the nth meeting of the JCRB and y is a serial number;
- The members of the JCRB expressed their great appreciation for the enormous amount of work carried out by Dr Thomas and supporting staff of the BIPM. Also Dr Watters and supporting NIST staff are acknowledged for their tremendous support to the development of the BIPM database.

**Note:** The Chairman has drawn up a list of archival JCRB which is given below in Annex 7.

**12. The next meeting of the JCRB** will be held on 8-9 March 2001 at NIST, Gaithersburg, Maryland., USA.

### Annexes

1. List of participants with their affiliation and co-ordinates
2. List with the content of the CD distributed at the 5th JCRB
3. JCRB Rules of Procedure for CMC entry into Appendix C, October 2000, designated document JCRB-5/1
4. JCRB Statement on CMC evaluation, 13 October 2000, designated document JCRB-5/2
5. Timetable for submission of CMCs to the JCRB for entry into Appendix C, 13 October 2000, designated document JCRB-5/3
6. Expression of uncertainties in the Calibration and Measurement Capabilities (CMCs) declarations of National Metrology Institutes, note for discussion by T.J. Quinn and C. Thomas, 10 October 2000
7. List of archival documents of the JCRB.