**CCQM Isotope Ratio Working Group Annual report, June 2020**

**Background:**

In April 2017, the CCQM established a task group to study the metrological state of isotope ratio measurements and formulate recommendations to the Consultative Committee (CC) regarding potential engagement in this field. The task group has delivered its report identifying the metrology needs in the field. The report was tabled at the April 2018 meeting of the CCQM which has decided about the establishment of dedicated working group address the needs identified.

*Terms of reference*

i. To progress isotope ratio measurement science and support measurement applications in this field by providing a permanent forum for NM/DIs to exchange information, advance capabilities and demonstrate comparability;

ii. To carry out Key Comparisons, and where necessary pilot studies, to critically evaluate and benchmark NMI/DI claimed capabilities and competences for isotopic ratio measurements in pure materials and complex samples providing demonstrable evidence of the validity and international

equivalence of measurement services offered to customers.

iii. To provide isotope ratio characterization and data treatment support to other WGs of CCQM.

iv To act as a focal point for stakeholder engagement with the user community, expert laboratories and other stakeholders;

v. To develop and then operate a process which enable the CCQM to review and update the list of reference materials that meet requirements to define or realize isotope ratio delta scales and any other isotope ratio related MRA traceability exceptions. Carry this out in close cooperation with stakeholders.

**Activities (April 2019-June 2020):**

*Meetings*

-2019 Fall meeting, Bern

CCQM IRWG held is mid year meeting in conjunction with GAWG in Bern, Switzerland, October 9 –10, 2019 hosted by the Federal Institute of Metrology METAS. The one day meeting involved 22 participants in person and several remote sessions with scientists at their home laboratories. As newly formed entity within the CCQM a large portion of the meeting was dedicated to road mapping and strategic discussion how to balance the five main prongs underpinning IRWG activities. Discussions have also started on issues related to measurement space in the light and heavy isotope fields.

Along with the working group meeting a joint GAWG-IRWG joint workshop was held on “Developments in Isotope Ratio Measurements for Gas Analysis” involving experts from the two working groups and invited experts. In three sessions the discussion was focused around:

i, advances gas reference materials for isotope ratio measurements;

ii, advances in SI traceable measurements; and

iii, advances in spectroscopy and field measurements

The workshop was followed by a field trip to High Altitude Research Stations Jungfraujoch.

-2020 Spring meeting, Paris

Because of the COVID travel restrictions face to face meetings were cancelled. The WG has agreed to continue with a series of short online meeting to cover the key points of the agenda for the spring meeting. The first call took place on June 2, 2020 with over 40 participants. High participation rate has been noted. The 2hrs meeting was used to reconnect the labs and gain a better understanding of their overall operational posture in these extraordinary times. The second half of the meeting the status of current comparisons were reviewed.

 -2020 Fall meeting, Berlin

Fall Meeting was cancelled due to the pandemic situation.

 *Comparisons*

Currently IRWG is involved / coordinating four comparisons. Two of these are already in the measurement stage and two are in the planning stages. All of these are impacted by the pandemic. As general rule for ongoing comparisons all reasonable accommodations have been afforded to the participating laboratories to enable completion of these studies.

 -CCQM-P204, CO2 Isotope Ratios (δ13C and δ18O) in pure CO2

“The pilot study CCQM-P204 is aimed at evaluating the level of compatibility of laboratories’ measurement capabilities to value assign isotope ratios in samples of pure CO2 gas, (δ13C vs. VPDB and δ18O vs. VPDB-CO2). It will also provide insight into the traceability chains and reference standards being employed to currently achieve these measurement results.”

All preparation by the piloting lab (BIPM Chemistry Laboratories) has been completed to execute this comparison. The pilot lab is already receiving the cylinders to be filled. Logistics complication has been noted. 12 NMIs/DIs and 4 expert labs have signed up to this pilot study.

 -CCQM-K167/P211 Determination of δ13C in vanillin

The measurement campaign of this comparison was launched in December 2019 with a planned completion date of March 30th 2020. This deadline was adjusted three times to accommodate covid related operational challenges, however at the time of the writing of this report all laboratories have completed the measurements and reported data with an overall delay of three months. It is expected that the frequent online meetings (as oppose to one or two annual meetings) will actually enable us to complete this study at or head of schedule

 - CCQM-P212 Coherence of δ13C CRMs; a CRM comparison

This study was run in parallel with CCQM-K167/P211. Timelines and completion rates are identical to that of CCQM-K167/P211.

 -CCQM-P213 Copper isotope ratio measurement in high purity materials

This comparison is currently underway. Samples has been distributed to participants in March 2020. Original reporting deadline was September 30, 2020 which has now been revised to December 31, 2020 due to covid operational constraints.

 -Sr isotope ratio measurement in rice flour

This is comparison planned for late 2021. Initial preparations are underway by the pilot laboratory. No covid impact so far.