



# **BIPM Capacity Building & Knowledge Transfer programme**

## **2019 “Metrology for Safe Food and Feed - Organic Analysis and Standards” Workshop**

### **Workshop Syllabus**

4-6 November 2019

Riyadh, Saudi Arabia

## **The BIPM CBKT team contact details**

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## **1. Workshop details**

Time and Location

November 4 – 6, 2019

09:00 – 14:30

Venue: Riyadh, Saudi Arabia

## **2. Summary**

The 2019 “Metrology for Safe Food and Feed - Organic Analysis and Standards” Workshop, an activity undertaken as part of the ‘Metrology for Safe Food and Feed Programme’ of the BIPM Capacity Building and Knowledge Transfer work programme, will provide participants with an overview of best practice for the provision at the national and regional level, and integration at the international level, of a harmonized system of higher-order measurement services and reference materials supporting and sustaining routine laboratory analytical services that monitor food safety and livestock, crop and plant health. It will outline the metrological approach to establishing the equivalence and traceability of analytical results and their compliance with the requirements of national and international standards.

The workshop will cover the framework by which National Metrology Institutes (NMIs) and Regional Metrology Organizations (RMOs) demonstrate the equivalence of their measurement capabilities, reference standards and measurement services. Case studies will provide examples in areas critical for food quality and safety by describing the development, application and equivalence of certified reference materials, higher-order reference methods and calibration services in this area.

The targeted attendees are managerial and technical staff of analytical laboratories that currently provide or wish to develop and strengthen reference measurement services in food and feed analysis within the GULFMET stakeholder community. It will also be relevant to persons interested in the general development of activities in chemical metrology within the GULFMET RMO.

Workshop content will start from an overview of metrology and the role of the BIPM in support of the worldwide delivery of the International System of Units and continue through the implementation of the CIPM Mutual Recognition Arrangement (MRA) to describe activities and how services are delivered at the NMI and RMO level for the provision of higher-order reference measurements that underpin accurate, comparable routine testing for the safety of food and animal feed.

The content of the workshop will focus on:

- a) metrology in chemistry and the role of the BIPM, CCQM, RMOs and NMIs
- b) production and use of Certified Reference Materials (CRMs) and primary calibrators to support the reliability and comparability of routine food analysis
- c) measurement infrastructure that supports reference measurement services
- d) the role of reference measurement services in ensuring individual laboratory compliance with relevant international accreditation standards (ISO 17025, ISO 17034 and ISO 17043)
- e) case studies of the production and application of CRMs and of the provision of reference measurements to underpin analytical services for:
  - nutrient and trace metal content
  - pesticides and drug residues
  - mycotoxin contamination
  - food supplements and adulterants

The workshop will consist of a series of lectures by experts in each of these areas accompanied by group discussions.

### **3. Learning outcomes**

#### ***General Objectives***

Workshop will enable participants to understand the technical and logistical challenges for the development of an integrated, harmonized infrastructure for chemical measurement in the area of food analysis and its importance in the delivery of traceable, comparable, internationally-recognized measurement results.

This workshop will enable stakeholders with interest or activities in the food analysis sector to:

- understand the role and correct application of CRMs and primary reference measurement procedures in the delivery of reliable routine test results;
- appreciate the technical requirements and challenges for the development and production of CRMs in the food analysis sector;
- identify the challenges and needs for activities to support and benchmark measurement capabilities in food analysis within GULFMET;
- develop a policy for the participation of GULFMET in relevant CCQM Working Group programs and activities;

For those participants coming from institutes where the development of reference capabilities in this area is in the preparatory stages, the workshop will provide case

studies and technical guidance that can assist in developing a strategy for the delivery and support of national reference services in food measurement.

#### **4. Learning and lecturing activities**

The workshop is structured to provide participants the desired learning outcomes. In order to ensure that participants gain the maximum benefit, a climate of inquiry and dialogue will be encouraged between the participants and lecturers (both inside and outside the lecture room), with discussion sessions planned during each session and the development of a summary report which identifies practical actions for the realization of target outcomes from the workshop.

##### ***Lecturers***

The lectures will be given by established experts in the area, selected from the BIPM and NMIs with active programmes in organic analysis. Staff from the BIPM will deal primarily with the delivery of the SI, the current operation of the international metrology infrastructure and the role of primary reference measurements. Byungjo Kim (KRISS) and John Warren (LGC) will pass on their knowledge and experience of the provision of reference measurement services in food analysis. The presentations by Alper Isleyen (TUBITAK-UME) will focus on the needs and challenges of a laboratory undertaking an active program of the production and delivery of CRMs and proficiency testing services in this area.

Lecturers will explain procedures and processes, but more importantly, they will give their personal perspective on the context and drivers related to their specific areas.

#### **5. Workshop presentations**

Presentations and some reading materials will be available on the restricted access CBKT working page of the BIPM website. Login and password details will be sent after the workshop.

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## **6. Activity and Participation**

Effective learning can only take place when everyone actively participates and freely expresses his/her ideas as well as being enthusiastic and well prepared. Ask, share, and challenge! All attendees must respect the lecturers and other participants, and behave appropriately.

## 7. Workshop schedule

The content may change marginally.

<b>Day 1 [Nov. 4]</b>	
<b>08:30 - 09:00</b>	<b>Registration</b>
<b><i>Metrology and Traceability for Food Analysis Measurement Services</i></b>	
<b>09:00 - 10:30</b>	<ul style="list-style-type: none"> <li>- Opening, introduction and workshop outline (S. Westwood)</li> <li>- Introduction to international metrology (S. Westwood)</li> <li>- CCQM and RMO activities supporting food analysis (J. Warren)</li> <li>- Survey of NMI measurement services for food analysis (B. Kim)</li> </ul>
<b>10:30 - 10:45</b>	<b>Coffee Break</b>
<b><i>Certified Reference Materials and Primary Calibrators for Food Analysis</i></b>	
<b>10:45 - 12:00</b>	<ul style="list-style-type: none"> <li>- Reference Materials in Method Validation and Traceability (R. Josephs)</li> <li>- Organic Purity assignment: Mass Balance methods (S. Westwood)</li> <li>- Organic Purity assignment: quantitative NMR methods (J. Warren)</li> </ul>
<b><i>Primary Reference Materials and Primary Calibrators for Mycotoxins</i></b>	
<b>12:30 - 13:30</b>	<ul style="list-style-type: none"> <li>- Primary reference materials for mycotoxin analysis (S. Westwood)</li> <li>- Production of mycotoxin calibrator materials and solutions (B. Kim)</li> <li>- BIPM CBKT programme on Mycotoxin Metrology (R. Josephs)</li> </ul>
<b>13:30 - 14:30</b>	<b>Lunch Time</b>
<b>Day 2 [Nov. 5]</b>	
<b><i>Establishing an Organic Analysis Metrology Laboratory for Food Analysis</i></b>	
<b>08:30 - 10:00</b>	<ul style="list-style-type: none"> <li>- Equipping a laboratory for calibrant characterization (R. Josephs)</li> <li>- Equipping a laboratory for matrix material characterization (B. Kim)</li> <li>- Accreditation to ISO 17034 for CRM production (A. Isleyen)</li> </ul>
<b>10:00 - 10:20</b>	<b>Coffee Break</b>
<b><i>Case Study: Matrix CRMs for Food Analysis</i></b>	
<b>10:20 - 12:00</b>	<ul style="list-style-type: none"> <li>- Isotope Dilution MS – a reference method in food analysis (J. Warren)</li> <li>- Equipping a laboratory for food CRM production (A. Isleyen)</li> <li>- Production of CRMs for mycotoxins in food (B. Kim)</li> </ul>
<b><i>Case Study: Proficiency Testing for Food Analysis</i></b>	
<b>12:30 - 13:30</b>	<ul style="list-style-type: none"> <li>- Proficiency Testing (PT) schemes and ISO 17043 (S. Westwood)</li> <li>- Characterizing samples for PT schemes on Food Analysis (R. Josephs)</li> <li>- Assigning reference values for assessing PT results (J. Warren)</li> </ul>
<b>13:30 - 14:30</b>	<b>Lunch Time</b>
<b>14 :30 - 16 :00</b>	NMCC – SASO laboratory visit

## Day 3 [Nov. 6]

### *Case study: Reference Services for Pesticides and Residue Testing in Food and Feed*

<b>08:30 - 10:00</b>	<ul style="list-style-type: none"><li>- Regulatory and analytical needs for residue testing (S. Westwood)</li><li>- Calibrants and matrix materials for pesticide residue testing (J. Warren)</li><li>- Regulatory and analytical needs for mycotoxin testing (R. Josephs)</li></ul>
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<b>10:00 - 10:20</b>	<b>Coffee Break</b>
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### *Case Study: Reference Services for Contaminant Testing in Food and Feed*

<b>10:20 - 12:00</b>	<ul style="list-style-type: none"><li>- CRM for trace metal content and adulterants in food (A. Isleyen)</li><li>- Regulatory and analytical needs for food supplement testing (B. Kim)</li></ul>
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### *Summary of Workshop*

<b>12:30 - 13:30</b>	<ul style="list-style-type: none"><li>- Final discussions, summary of workshop, recommendations for future actions (S. Westwood)</li></ul>
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<b>13:30 - 14:30</b>	<b>Lunch Time</b>
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## 8. List of Lecturers and affiliation

### *Steven Westwood, BIPM, Sèvres*



Steven Westwood is a Principal Research Chemist in the Organic Analysis program of the BIPM Chemistry Department. He obtained his undergraduate degree at the University of Adelaide and a PhD in synthetic organic chemistry at Cambridge University, working on the biosynthesis of Vitamin B<sub>12</sub>. After postgraduate research and teaching in organic chemistry at the University of Wisconsin, the Australian National University and the University of Sydney he joined the Australian Government Analytical Laboratory, subsequently incorporated into what is now the National Measurement Institute Australia, where he became the team leader of the Pure Substance Reference Material group. He coordinated the production and dissemination of high purity organic reference materials that continue to be used worldwide in anti-doping, forensic and pesticide residue analysis. In 2004 he joined the BIPM where he is currently responsible for the delivery of the Organic Analysis work program within the BIPM Chemistry Department. He is a member of the CCQM Organic Analysis and Isotope Ratio Working Groups, the ISO Reference Materials Committee (ISO-REMCO), the Drugs Working group of the Joint Committee for Traceability in Laboratory Medicine (JCTLM). From 2009 to 2018 he was an invited member of the World Anti-Doping Agency (WADA) Laboratory Expert Group. He has also been a Technical Assessor for ISO accreditation for Reference Material production for NATA, TÜRKAK and UKAS.

### *Byungjoo Kim, KRISS, South Korea*

Dr. Byungjoo Kim is currently a principal research scientist at the Center for Analytical Chemistry and Research Coordinator of Food-Safety Metrology in Korea Research Institute of Standards and Science (KRISS), Daejeon, Korea. He received his B.Sc. (1988), M.Sc. (1990) degrees in chemistry from Seoul National University, and Ph. D. (1995) in chemistry from Brown University, Rhode Island, USA. He held the position of Post-Doctoral Research Associate at the Department of Chemistry, University of California, Santa Barbara from January 1995 to December 1996. He joined KRISS as a senior research scientist in January 1997 and has worked there since then. Since he joined KRISS, his research was focused on establishing national standard system in organic analysis area, including setting methodologies for preparation/verification of primary standard solution, purity assay, isotope dilution mass spectrometry (IDMS) based on GC/MS and LC/MS. His research is focused in charge of the establishment and the maintenance of national measurement standards the organic analysis in food, environmental, pharmaceutical, and industrial applications. He was the project leader of the five-year KRISS nutrient metrology program (2014 - 2018). Currently, he is in charge of coordinating research programs for establishing metrology in food safety area inside KRISS.



### ***Ralf Josephs, BIPM, Sèvres***

Ralf is a Principal Scientific Official in the Organic Analysis Group of the Chemistry Department of the International Bureau of Weights and Measures (BIPM) situated in the vicinity of Paris, France. He has been an analytical chemist at the BIPM for over 10 years with expertise in the purity determination of organic pure substances with relevance to clinical chemistry, food (contaminants) analysis, environmental analysis, forensics and pharma. Ralf is author and co-author of more than 80 peer-reviewed scientific publications.



He has the lead for the coordination of primary calibrator purity assessment comparisons, notably for larger organic molecules (peptides/proteins) and the Metrology for Safe Food and Feed in Developing Economies project within the framework of the BIPM Capacity Building and Knowledge Transfer programme.

Ralf has developed a broad background in establishing reference measurement methods and the production and characterization of certified reference materials, in particular for mycotoxins, during his previous positions as scientific officer at the EC-JRC-IRMM in Belgium and IFA-Tulln in Austria.

He is an active member of the Working Groups on Protein Analysis (PAWG) and Organic Analysis (OAWG) of the Consultative Committee for Amount of Substance - Metrology in Chemistry and Biology (CCQM). He is the BIPM observer to the Committee on Methods of Analysis and Sampling (CCMAS) of the FAO/WHO Codex Alimentarius Commission and member of the corresponding Inter Agency Meeting (IAM).

### ***Alper İşleyen, TÜBİTAK, Turkey***



Alper İşleyen graduated in 1998 from the Middle East Technical University (METU), Arts & Sciences Faculty, Department of Chemistry (Ankara, Turkey). In the same year, he started his M.Sc. and Ph.D. studies in the field of synthetic organic chemistry and completed in 2007. In between 1998 and 2005, he worked as a teaching and research assistant in METU, Arts & Sciences Faculty, Department of Chemistry and as a postdoctoral research associate in 2008 at the Washington State University, Department of Chemistry (Pullman, USA).

In 2009, he completed his military service duty as a chemical analysis specialist in Turkish Armed Forces Food Quality Control Laboratory (İstanbul, Turkey). In 2010, he started working as a senior research scientist in the TÜBİTAK UME Chemistry Group Laboratories. In 2012, at the EC JRC IRMM (Geel, Belgium), he was trained and conducted studies on reference material (RM) production and certification. He contributed to the establishment of the Reference Materials Laboratory, integration of the quality management system and accreditation according to ISO Guide 34 which later transformed into ISO 17034-“General Requirements for the competence of RM Producers”. He has been working as the Head of Reference Materials Laboratory since 2013. He has been involved in several RM projects and coordinated an EMPIR project (EU-H2020) in 2015-2018 which yielded 3 CRMs for environmental analysis in collaboration with 9 partners from 8 European countries. Dr. İşleyen’s 6 original research articles and 1 review article have been published in the international journals. He is also the coauthor of 7 CRM certification reports.

***John Warren, LGC Ltd, United Kingdom***

John Warren graduated in chemistry from Bath University before spending 25 years managing spectroscopy and analytical laboratories within the agrochemical and pharmaceutical industries. For the past 9 years he has been at the National Measurement Laboratory at LGC in the UK where he now heads the Organic Analysis team. His technical speciality is in the application of nuclear magnetic resonance to the characterisation of reference materials. His team at LGC are involved in research programs developing advanced measurement techniques for emerging measurement challenges while providing characterisation of reference materials for current applications under ISO17034 and ISO17025, primarily working in the food and clinical sectors. John is the convenor of the Bio and Organic Analysis Subcommittee (SCBOA) of the Technical Committee for Metrology in Chemistry (TC-MC) within Euramet and participates in many national and international reference standard committees.









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