



Joint FAO/IAEA Division of Nuclear  
Techniques in Food and Agriculture  
and FAO/IAEA Agriculture and Bio-  
technology Laboratory, Seibersdorf

# Food & Environmental Protection Newsletter

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## To the Reader

The Food and Environmental Protection Subprogramme is pleased to report on its continuing efforts with the FAO and the IAEA to protect human health and improve food safety by providing research, technical support and training leading to the development and application of international standards that facilitate agricultural trade. These activities are primarily related to the implementation of traceability systems and analytical techniques to control food contaminants, the use of ionizing radiation to control food bacteria and harmful insect pests, and the management of nuclear and radiological emergencies affecting food and agriculture.

The Feature Article in this edition of the newsletter relates to a project that is building a sustainable network to improve food safety and quality using nuclear related technology. This three-year project was initiated in March 2012 and is funded under the Peaceful Uses Initiative (PUI), which supports the IAEA in facilitating greater access for Member States to peaceful applications of nuclear technology.

In regard to the year ahead, the subprogramme is organizing an International Symposium entitled "Food Safety and Quality: Applications of Nuclear and Related Techniques". The symposium will take place at the IAEA Headquarters in Vienna, Austria from 10–13 November 2014 and we extend our warm invitation to scientists, laboratory analysts, policymakers, regulators, food producers and others concerned with food safety and quality as well as with the integrity of the food supply chain,



International Atomic Energy Agency

who are all welcomed to participate in the symposium. More information on the symposium is available in the Forthcoming Events section of this newsletter.

In relation to our Food and Environmental Protection Laboratory (FEPL), a new capital investment project to support the renovation and modernization of the laboratories of the Agency's Department of Nuclear Sciences and Applications (NA laboratories) at Seibersdorf has been included in the Agency's 2014–2015 Programme and Budget. The aptly named “**ReNuAL**” project (**Renova**-tion of the IAEA **Nuclear Applications Laboratories**) represents an important initiative for FEPL, which is one of five FAO/IAEA laboratories addressing issues related to food safety and security at the NA laboratories complex.

It is a little over 51 years since the NA laboratories were established in Seibersdorf and the ReNuAL project represents the first comprehensive renovation and thorough upgrading of equipment at these facilities. The initiative will enable FEPL to continue to carry out its activities with appropriate space and equipment as required to fully provide for the laboratory's future in meeting the needs of our Member States. It is envisaged that Member States will increasingly be challenged to expand food production and availability to meet the demands of a growing global population. Part of the demand will be met by a rise in the trade of agricultural products amongst countries, and food authenticity, safety and quality will be of the utmost concern.

The goals of ReNuAL are to: redesign and expand the current infrastructure to improve the efficiency and effectiveness of laboratory operations and services in order to better meet the current and future requirements of Member States; ensure that the NA laboratories in Seibersdorf are a vibrant research and training institution in the future, and; continue to attract highly qualified scientists and other staff committed to advancing applied nuclear sciences to serve the needs and interests of Member States. In particular, the NA laboratories will continue to seek to serve as a hub for growing networks of Member State laboratories in the respective thematic areas as a means to enhance their sustainability; address emerging issues (for example, the impact of population growth and adaption to climate change); foster the development of new nuclear applications, products and services, and; increase capacity-building activities by providing hands-on training.

On a more personal note regarding our staff, it is very rewarding to be able to congratulate Marivil Islam on attaining the degree of Doctor of Philosophy. Whilst working as a staff member in the FEPL, Marivil

performed the research for her doctoral thesis on the behaviour of veterinary antiparasitic drugs in the environment.

In addition we all extend a warm welcome to two new members of staff; Ms Laura Natalia Fernandez Cedi and Mr Lan Chen. Natalia joined the Food and Environmental Protection Laboratory as an intern in September 2013 and brings qualifications in food engineering and previous UN experience as an intern in UNIDO to the FEPL. During her internship she will work on food traceability and authenticity methodology using a metabolomics approach and will contribute to the support provided by FEPL to the RALACA Laboratory Network. Mr Lan Chen began work at Headquarters in November as a consultant with experience in international relations as well as qualifications in agricultural production including silviculture. He previously worked in the International Cooperation and Exchange Office at the Fujian Agriculture and Forestry University in China. Lan is assisting the subprogramme in many areas but is mainly involved in organizing the International Symposium “Food Safety and Quality: Applications of Nuclear and Related Techniques”.

In closing, we also say goodbye to two members of staff; Mr Nima Mashayekhi Tabrizi and Mr Nasir Rathor. We congratulate Nima on his recent promotion and move within the Joint Division to work with colleagues in the Insect and Pest Control Subprogramme. Finally, but by no means least, we all extend our very best wishes to Nasir Rathor, who retired from The Agency in December 2013. Nasir was a stalwart of the Food and Environmental Protection Laboratory (formerly the Agrochemicals Unit) at Seibersdorf, and over his 24 years of service gained the respect and friendship of many staff members, TC fellows, training course participants and other contacts both within and outside IAEA. Over that period, he built up a vast knowledge of the instrumentation, procedures and technical aspects of the laboratory and its work areas, including fields such as pesticide residues analysis, radiotracer techniques, gas and liquid chromatography-mass spectrometry and many more. Nasir's expertise and personality will be sorely missed in FEPL, and whilst wishing him a peaceful and happy post-IAEA life, we hope that he will pay frequent visits to his many friends at Headquarters, FEPL and Seibersdorf in general - and perhaps help us to solve some problems in the lab occasionally!

Best wishes to you, our readers, and to your families for a happy, healthy and prosperous New Year.

Sincerely,

*Carl M. Blackburn*  
*Acting Section Head*

# Staff

**Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture,  
Vienna International Centre, Wagramer Strasse 5, P.O. Box 100,  
A-1400 Vienna, Austria  
Telephone: +43 1 2600 + extension; Fax: +43 1 26007;  
Email: [Official.Mail@iaea.org](mailto:Official.Mail@iaea.org)**

Name	Title	Email	Extension
Liang, Q.	Director	<a href="mailto:Q.Liang@iaea.org">Q.Liang@iaea.org</a>	21610

## Food and Environmental Protection (FEP) Section

Name	Title	Email	Extension
Byron, D.H.	Section Head	<a href="mailto:D.H.Byron@iaea.org">D.H.Byron@iaea.org</a>	21638
Blackburn, C.M.	Food Irradiation Specialist	<a href="mailto:C.Blackburn@iaea.org">C.Blackburn@iaea.org</a>	21639
Sasanya, J.J.	Food Safety Specialist (Veterinary Drug Residues)	<a href="mailto:J.Sasanya@iaea.org">J.Sasanya@iaea.org</a>	26058
Viitaniemi, K.	Team Assistant	<a href="mailto:K.Viitaniemi@iaea.org">K.Viitaniemi@iaea.org</a>	26061
Chen, L.	Consultant	<a href="mailto:Lan.Chen@iaea.org">Lan.Chen@iaea.org</a>	21672

## Food and Environmental Protection Laboratory (FEPL) A-2444 Seibersdorf, Austria

Name	Title	Email	Extension
Cannavan, A.	Laboratory Head	<a href="mailto:A.Cannavan@iaea.org">A.Cannavan@iaea.org</a>	28395
Frew, R.	Food Safety Specialist (Traceability)	<a href="mailto:R.Frew@iaea.org">R.Frew@iaea.org</a>	28326
Maestroni, B.M.	Food Scientist	<a href="mailto:B.M.Maestroni@iaea.org">B.M.Maestroni@iaea.org</a>	28398
Jandrić, Z.	Analytical Chemist	<a href="mailto:Z.Jandric@iaea.org">Z.Jandric@iaea.org</a>	28373
Rathor, M.N.	Laboratory Technician	<a href="mailto:N.Rathor@iaea.org">N.Rathor@iaea.org</a>	28397
Abraham, A.	Laboratory Technician	<a href="mailto:A.Abrahim@iaea.org">A.Abrahim@iaea.org</a>	28327
Islam, M.	Laboratory Technician	<a href="mailto:M.Islam@iaea.org">M.Islam@iaea.org</a>	28394
Fernandez Cedi, L.N.	Intern	<a href="mailto:L.Fernandez-Cedi@iaea.org">L.Fernandez-Cedi@iaea.org</a>	28393
Wimberger, T.	Team Assistant	<a href="mailto:T.Wimberger@iaea.org">T.Wimberger@iaea.org</a>	28267
Massinger, B.A.	Team Assistant	<a href="mailto:B.Massinger@iaea.org">B.Massinger@iaea.org</a>	28259



## Feature Article

### **Sustainability of Capacity Building Activities to Improve Food Safety and Quality through Nuclear Technology and Networking**

Technical Officer: B. Maestroni

Access to food control laboratories and related services represents a minimum requirement to generate monitoring data for food risk management activities within a nation. Along with its analytical work and component services, each laboratory has the opportunity to undertake a more active role in promoting and facilitating food safety and food quality at many points along the production and supply chain. Provided that their internal mandate allows it, laboratories can address issues such as risk assessment, design of risk-based monitoring programmes, sampling, interpretation of analytical results in the wider context of the food chain, outreach to decision makers, and also research and development activities. Implementing such a broad and multidisciplinary approach requires a step by step process with the involvement of stakeholders and a commitment to continuously build capacity through networking and learning.

Currently, outsourcing analytical services and the use of private analytical laboratories through temporary contractual agreements are the only practical options available to some developing countries, and at times these arrangements prove to be unsustainable or impractical. A more sustainable and recommended approach is to establish national accredited laboratories and invest in their long term activities both as a focal point for analytical expertise and as part of a system for the control of food nationally and as traded through imports and exports.

The Food and Environmental Protection Laboratory (FEPL) was successful in a competitive bidding process for funding from the USA under the Peaceful Uses Initiative (PUI). The PUI objective is to support the IAEA in facilitating greater access for Member States to peaceful applications of nuclear technology. In this context a three-year project on “Sustainability of capacity building activities to improve food safety and quality through nuclear technology and networking” started in March 2012. The objective of this project is to ensure food safety and quality while addressing the sustainability of technical capacity, laboratory infrastructure and regional/interregional networking.

The project has taken a step forward in encouraging interactions between the laboratories and multiple stakeholders, thereby providing essential feedback and advice to help build the analytical capacity to help assess and manage risks, and also to help growers improve their production practices. The project has been designed to embrace several activities in developing countries aiming

to build infrastructure for the intervention of donor organizations to facilitate the implementation of food control systems and ultimately to contribute to enhanced food safety and quality. The project follows a modular approach, applying successful strategies adopted in other countries and coordinating donor resources to accelerate the commissioning of laboratories and state of art analytical equipment.

The project supports targeted capacity building in an attempt to ensure sustainability. The establishment of laboratory quality systems and the attainment of ISO 17025 accreditation are key parameters for the long term self-sustainability of activities in Member States to enhance food safety and quality. The expected project outcomes include:

- (1) State of the art food control laboratories, including methodologies to address identified gaps in food control systems, commissioned and fully operational.
- (2) Networks of laboratories and affiliated/donor/technical cooperation agencies established and recognized internationally.
- (3) Analytical strategies and integrated monitoring initiated in several countries to share and ensure adequate risk management decisions.
- (4) A recognized platform, including a financial mechanism to ensure sustainability of capacity building activities, in place in several countries.

This project emphasizes the comparative advantages of using nuclear and related technologies. All project participants are encouraged to work cooperatively on the core programme using both nuclear and complementary technologies. For example, laboratories use stable isotope technology in liquid and/or gas chromatography coupled to mass spectrometry, radiotracer techniques in food and contaminant analysis, fallout radionuclide techniques in contaminant transport evaluations, and sterile insect technique in the prevention and control of vector diseases in area wide agricultural production.

One of the main project goals is to address regional/interregional networking. To this end the project has already achieved its first output, which is the creation of a regional network of laboratories in Latin America and Caribbean countries. The Red Analitica de Latino America y el Caribe (RALACA, <http://red-ralaca.net>) is a non-profit network of laboratories and associated institutions that aims to enhance regional capabilities to target food safety and environmental sustainability. Information sharing is key to enhancing regional opportunities. For example, through the RALACA, project participants are applying proven technical solutions and efficient information and communication technologies to allow countries with limited existing capacity to quickly begin their training, drawing upon regional capacity and facilitating

the transfer of knowledge, experience and technology from well-established to less well established laboratories.

The RALACA model is being used to create similar networks in other regions of the world, with the goal of forming a global network. Further information on the RALACA network can be found in a separate article in this issue of the newsletter.

The RALACA welcomes the support of donor and/or technical cooperation agencies so that it is able to generate viable research proposals for the region and address local challenges through an integrated and sustainable strategy (for further information contact [board@red-ralaca.net](mailto:board@red-ralaca.net)).

As of December 2013, eight train-the-trainers courses and workshops for regulators and policy-makers have been held at different locations in Africa, Latin America and Europe, with approximately 160 scientists from developing countries participating in training activities directly related to various aspects of food safety, quality and control. The training activities held from the start of the project to date are summarized below.

#### **Interregional Training Meeting on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability, Gaborone, Botswana, 28 October–1 November 2013**

This workshop was held at Botswana's National Veterinary Lab (BNVL) with the participation of 40 representatives from 20 countries in Africa. A detailed report can be found in this issue of the newsletter.

The workshop was the first one in the African region, and takes up the idea of expanding the RALACA example to other world regions.



*Interregional Training Meeting on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability, Botswana National Veterinary Lab (BNVL), Gaborone, Botswana.*

#### **FAO/IAEA/ICA Regional Workshop on Effective Monitoring of Food Contaminants – Sampling, Method Validation and Quality Control, Bogotá, Colombia, 20–24 May 2013**

The FAO/IAEA Food and Environmental Protection Laboratory (FEPL) in collaboration with Instituto Colombiano Agropecuario (ICA) organized a workshop on “Effective Monitoring of Food Contaminants – Sampling, Method Validation and Quality Control”. The workshop was held at the analytical laboratory of the ICA with the participation of 30 representatives from 11 countries in Latin America and the Caribbean, namely Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Paraguay, Peru and Uruguay.



*FAO/IAEA/ICA Regional Workshop on Effective Monitoring of Food Contaminants – Sampling, Method Validation and Quality Control, Bogotá, Colombia, 20–24 May 2013.*

The presentations given at the workshop covered various aspects related to the effective monitoring of food contaminants, with presentations on sampling strategies and statistical approaches, quality assurance and quality control measures, method validation, advanced analytical strategies and matrix effects, sampling programmes in the USA and the EU, and integrated monitoring, including the role of nuclear technologies. Practical laboratory sessions were held in the Instituto Colombiano Agropecuario (ICA) on the QuEChers method for the analysis of the pesticides chlorpyrifos, fipronyl and methomyl in physalis, tomato and paprika, identification and confirmation of residues by liquid chromatography-tandem mass spectrometry, and estimation of matrix effects. A feedback report indicated that all participants assessed the regional workshop as excellent. Instructors were from ICA and the Universidad de Colombia (Colombia), the EU-Reference laboratory for fruits and vegetables and the University of Almeria (Spain), Intendencia de Montevideo and the Universidad de la Republica (Uruguay), USDA (USA), and from the private sector - Phenomenex and Agilent Technologies (USA). Participants in the workshop can access all of the presentations at the RALACA web site: <http://red-ralaca.net>. Registration is required.



**FAO/IAEA Interregional Train-the-Trainers Workshop on Integrated Analytical Techniques to Control Contaminants in Food, FAO/IAEA Food and Environmental Protection Laboratory, Seibersdorf, Austria, 25 February–8 March 2013**

This workshop was held at the Food and Environmental Protection Laboratory at Seibersdorf with the participation of twenty one developing country scientists from 15 different countries: Argentina, Belize, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Lebanon, Nicaragua, Panama, Paraguay, Peru and Uruguay. Twelve external lecturers also contributed to the workshop, from various institutes in Europe and Latin America, the European Commission, analytical instrument manufacturers and the FAO.



*FAO/IAEA Interregional Train-the-Trainers Workshop on Integrated Analytical Techniques to Control Contaminants in Food.*

The objective of this workshop was to present a range of nuclear and related technologies for the control of contaminants in food in an integrated way, with a special focus on pesticides. The workshop covered various aspects related to farm-to-fork food safety systems, with lectures on food contaminant control, traceability and authenticity techniques, good agricultural practices (GAP), advanced analytical methodologies for residue analysis, quality systems and food control quality infrastructure, and nuclear technologies to support food control. Practical demonstrations focused on advanced analytical instrumentation such as high resolution/accurate-mass mass spectrometry, laser based spectroscopy, gas and liquid chromatography coupled to mass spectrometry, and isotope ratio mass spectrometry. Practical sessions were also held on method validation using the QuEChERS (Quick, Easy, Cheap, Effective, Rugged, Safe) multiresidue procedure as an example, bioassays and biomonitoring, and radiotracer techniques. Feedback from the participants indicated that the capacity building event was well appreciated. Participants of the workshop can access all of the presentations at the RALACA web site: <http://red-ralaca.net> Registration is required.

In addition to the recent training activities above, five training events were held in 2012. Three regional training workshops for scientists from Latin America and the Caribbean were held in 2012. A training workshop on

“Liquid Chromatography coupled to mass spectrometry (LC-MS/MS) and control of contaminants in food” was held in Panama City, Panama, from 17–27 April 2012 at the laboratory “Laboratorios de Residuos Tóxicos en Carnes y Control de Residuos de Plaguicidas en Plantas y Productos Vegetales” of the Ministerio de Desarrollo Agropecuario de Panama (MIDA). The workshop was organized in collaboration with the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) and the MIDA and was attended by 18 scientists from seven countries. A second workshop, jointly organized by the FEPL in collaboration with OIRSA and the Belize Agricultural Health Authority (BAHA), on “Food Safety: From Farm to Fork” was held in Belize City from 27–31 August, with the participation of 24 representatives from 11 countries in the region. The workshop covered various aspects related to the farm-to-fork food chain, including good agricultural practices, pesticide registration, compliance with Codex Alimentarius maximum residue limits, quality assurance and quality control measures, ISO17025 requirements and advanced analytical strategies, including the use of nuclear and related techniques. Special emphasis was given to the role of the analytical laboratories in the farm to fork food chain. A third regional workshop on “Integrated analytical approaches for food traceability and contaminant control” was held in Montevideo, Uruguay, from 5–9 November with the participation of 14 representatives from eight countries in the region.



*FAO/IAEA Regional Workshop on Integrated Analytical Approaches and Food Safety, Montevideo, Uruguay, 5–9 November 2012.*

Two interregional train-the-trainers workshops were held in the FEPL in 2012. The first, a workshop on “Food Safety: From Farm to Fork”, was held from 29 June–2 July 2012. Twenty-one scientists from 11 countries attended the workshop, which was held immediately following the European Pesticide Residues Workshop (EPRW), taking advantage of the attendance of many developing country scientists at that conference. The objective of the workshop was to provide advice and guidance to developing country scientists to assist in setting up contaminant/residue monitoring programmes for food, with a special focus on pesticides. The workshop covered

various aspects related to farm-to-fork food safety systems, with lectures on sampling, good agricultural practices, advanced analytical methodologies for residue analysis, targeted and untargeted screening, method validation, quality control procedures for pesticide residue analysis, requirements of the ISO17025 standard with a focus on uncertainty, data interpretation and monitoring aspects. Practical demonstrations were held at the FEPL with a focus on advanced analytical instrumentation such as high resolution/accurate-mass mass spectrometry, method validation using the QuEChERS (Quick, Easy, Cheap, Effective, Rugged, Safe) multiresidue procedure, and radiotracer techniques.



*Interregional Train-the-Trainers “FAO/IAEA Food Safety Workshop: from Farm to Fork”, FAO/IAEA Food and Environmental Protection Laboratory, Seibersdorf, Austria.*

The second event held at the FEPL in 2012 was an inter-regional workshop on “Radiotracer Techniques for Food Contaminant Control”, 27 September–5 October 2012. The workshop had 15 participants, representing

nine countries. Sampling for decision making was the main topic of the first two days of the workshop. A theoretical background was presented on statistics, graphics preparation, presentation of results, defining decision rules, random/composite/systematic/stratified sampling, and chain of custody, and a practical exercise was carried out to better understand the differences between the types of sampling approaches. The main topic for the remaining days was the use of radiotracers in food safety control, focusing on laboratory safety, basics of radiotracers, measurement units, radiotracer use in the control of food contaminants, autoradiography, liquid scintillation counting, bound residues, and the use of the biological material oxidizer.



*FAO/IAEA Interregional Train-the-Trainers course on “Radiotracers Techniques for Food Contaminant Control”, FAO/IAEA Food and Environmental Protection Laboratory, Seibersdorf, Austria.*

## Forthcoming Events

Research Coordination Meetings			
Meetings	Dates	Venue	Technical Officer
<b>Fourth RCM on the Development of Radiometric and Allied Analytical Methods to Strengthen National Residue Control Programmes for Antibiotic and Anthelmintic Veterinary Drug Residues</b>	<b>14–18 April 2014</b>	<b>Natal, Brazil</b>	<b>Sasanya, J.J. Cannavan, A</b>
<b>Second RCM on the Implementation of Nuclear Techniques to Improve Food Traceability</b>	<b>26–30 May 2014</b>	<b>Lisbon, Portugal</b>	<b>Frew, R. Cannavan, A.</b>

<b>Fourth RCM on the Development of Generic Irradiation Doses for Quarantine Treatments</b>	<b>2–6 June 2014</b>	<b>Vienna, Austria</b>	<b>Blackburn, C.M. Byron, D.H.</b>
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## Training Courses/Workshops

<b>Workshop on Application of Quality Assurance and Control in Analytical Laboratories to Address Food Safety and Quality</b>	<b>10–21 November 2014</b>	<b>Seibersdorf, Austria</b>	<b>Maestroni, B.M.</b>
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## International Meetings/Conferences

<b>Meetings</b>	<b>Dates</b>	<b>Venue</b>	<b>Technical Officer</b>
<b>Fifth ConvEx-3 Evaluation Meeting</b>	<b>11–12 February 2014</b>	<b>Vienna, Austria</b>	<b>Byron, D.H.</b>
<b>First Session of the Codex Committee on Spices and Culinary Herbs</b>	<b>11–14 February 2014</b>	<b>Kochi, India</b>	<b>Blackburn, C.M. Byron, D.H.</b>
<b>International Experts Meeting on Radiological Protection after the Fukushima Daiichi Nuclear Power Plant Accident</b>	<b>17–21 February 2014</b>	<b>Vienna, Austria</b>	<b>Byron, D.H. Blackburn, C.M.</b>
<b>Eighth Session of the Codex Committee on Contaminants in Foods</b>	<b>31 March–3 April 2014</b>	<b>TBD, Netherlands</b>	<b>Sasanya, J.J.</b>
<b>ASSET 2014 - Second Food Integrity and Traceability Conference</b>	<b>8–10 April 2014</b>	<b>Belfast, UK</b>	<b>Cannavan, A.</b>
<b>46th Session of the Codex Committee on Pesticide Residues</b>	<b>5–10 May 2014</b>	<b>TBD, China</b>	<b>Sasanya, J.J. Corley, J</b>
<b>Seventh Competent Authorities Meeting</b>	<b>19–23 May 2014</b>	<b>Vienna, Austria</b>	<b>Byron, D.H.</b>
<b>36th Meeting of the Radiation Safety Standards Committee (RASSC)</b>	<b>16–20 June 2014</b>	<b>Vienna, Austria</b>	<b>Blackburn, C.M. Byron, D.H.</b>
<b>37th Session of the Joint FAO/WHO Codex Alimentarius Commission</b>	<b>14–18 July 2014</b>	<b>Geneva, Switzerland</b>	<b>Byron, D.H.</b>
<b>International Association for Food Protection Annual Meeting</b>	<b>3–6 August 2014</b>	<b>Indianapolis, USA</b>	<b>Sasanya, J.J.</b>
<b>13th IUPAC International Congress of Pesticide Chemistry</b>	<b>10–14 August 2014</b>	<b>San Francisco, USA</b>	<b>Maestroni, B.M.</b>
<b>International Symposium on Food Safety and Quality - Applications of Nuclear and Related Techniques</b>	<b>10–13 November 2014</b>	<b>Vienna, Austria</b>	<b>Byron, D.H. Cannavan, A.</b>



Meetings	Dates	Venue	Technical Officer
<b>37th Meeting of the Radiation Safety Standards Committee (RASSC)</b>	<b>10–14 November 2014</b>	<b>Vienna, Austria</b>	<b>Blackburn, C.M. Byron, D.H.</b>
<b>10th European Pesticide Residue Workshop</b>	<b>TBD</b>	<b>TBD</b>	<b>Maestroni, B.M.</b>

## **International Symposium on Food Safety and Quality: Applications of Nuclear and Related Techniques, IAEA Headquarters, Vienna, Austria, 10–13 November 2014**

Technical Officer: Andrew Cannavan

The International Symposium will take place at the IAEA Headquarters in Vienna, Austria from 10–13 November 2014. The formal announcement, call for papers, participation form, grant application form and more detailed information on the symposium are now available at the following dedicated web-link, which will be updated regularly:

<http://www-pub.iaea.org/iaeameetings/46092/Food-Safety-and-Quality>

The symposium will include a wide range of topics involving nuclear techniques in food and agriculture; not only food irradiation but also analytical technologies for food authentication, traceability and contaminant control. Related issues such as climate change, emerging opportunities and threats to the integrity of the food supply and potential control techniques will be covered, as will issues such as chemometrics and guidelines for consumer protection and international trade.

The symposium will:

- Bring together experts in the field to present contemporary and novel applications, identify gaps and discuss future perspectives and opportunities;
- Provide a forum for interdisciplinary networking between professionals from different backgrounds, including industry, national institutes, academia, and public and private bodies;

- Facilitate a broad understanding of the topics involved; and
- Promote peaceful applications of nuclear technologies. The organisers send a warm invitation to scientists, laboratory analysts, policymakers, regulators, food producers and others concerned with food safety and quality as well as with the integrity of the food supply chain, who are all welcomed to participate in the symposium.

Facilities will be available for commercial vendors' displays/exhibits during the symposium and interested parties should register their interest by sending an email to the following:

- [FEP-Symposium-2014.Contact-Point@iaea.org](mailto:FEP-Symposium-2014.Contact-Point@iaea.org)



## Past Events

### **The Joint 35th Meeting of the Radiation Safety Standards Committee (RASSC), Vienna, Austria, 20–21 November 2013**

Technical Officers: David H. Byron/  
Carl Blackburn/James Sasanya

The 35th meeting of the Radiation Safety Standards Committee (RASSC) was held jointly with the 36th meeting of the Waste Safety Standards Committee (WASSC) at the IAEA Headquarters. The Technical Officers provided contributions to the RASSC three year report (2011–2013) on behalf of the Joint FAO/IAEA Division and activities involving international standards related to food and water contaminated with radionuclides. As regards the latter, a working paper providing information and analysis on the different international standards was considered by meeting participants. It was suggested that the document could be extended to provide suggestions and/or clarifications to support regulators and guide public health decisions in addition to facilitating international trade. Member States acknowledged the difficulties in this area and particularly in regard to different diets and also regulatory approaches worldwide.

### **Visit to the IAEA by Scientists and Journalists from the Republic of Korea interested in Strengthening Food Security and Food Safety /Quality**

Technical Officer: James Sasanya

On 22 November 2013, the Food and Environment Protection subprogram received a team of six guests from the Republic of Korea, in line with their efforts to enhance food security and safety/quality. The delegation included scientists and a publicist based at the Advanced Radiation Technology Institute (ARTI), Korea Atomic Energy Research Institute (KAERI) and journalists from; YTN-TV, Digital Times and Choongchong Today. The delegation was led by Dr Bo-Keun Ha from the ARTI and accompanied by IAEA's Press and Public Information Officer Mr Mohammed Hassan Amasha.

The delegation were keen to find out more about the FEP subprogram and the technical officer gave an overview of current activities and future plans that focused on food traceability, irradiation and emergency preparedness and response. The ARTI/KAERI are the Agency's collaborating center for radiation processing, including food irradiation and the journalists were particularly interested in the subprogrammes Coordinated Research Project (CRP) on the "*Development of Irradiated Foods for the Immunocompromised Patients and other Potential Target Groups*". The CRP on the "*Development of Radiometric and Allied Analytical Methods to Strengthen National Residues Monitoring Programs for Antibiotic and An-*

*thelmintic Veterinary Drug Residues*", was also discussed in detail. The active role of the ARTI/KAERI in providing support and training to Member States through the Collaborating Center initiative and through participation in Technical Cooperation Projects was also highlighted, as was the Republic of Korea's contribution to the Peaceful Uses Initiative (PUI) fund.

### **Interagency Meeting on International Basic Safety Standards (BSS) in Vienna, Austria, 18 November 2013**

Technical Officers: James Sasanya

A meeting of the task group on implementation of International Basic Safety Standards (BSS) was held on 18 November 2013 at the Vienna International Centre (VIC), Austria. A paper is being produced on a strategy to assist Member States to implement BSS and covering the period 2015–2020. In addition, discussions also included 2009–2014 implementation actions such as the coordination of activities between cosponsoring organizations at forthcoming events (including IAEA meetings scheduled to be held in China, Russian Federation, North America, Africa and Brazil). Training materials continue to be developed and reviewed in line with the new Basic Safety Standards and experts from various Member States will be invited/consulted to support these and other BSS related initiatives.

### **Meeting of the Inter-Agency Committee for Radiation Safety (IACRS), Vienna, Austria, 18 November 2013**

Technical Officers: James Sasanya

An extraordinary meeting of the Inter Agency Committee for Radiation Safety (IACRS) was held on the morning of 18 November 2013 in order to consider and if appropriate, approve updated Terms of Reference. Revised ToRs were approved with minor amendments and will be in effect by June 2014.

In the afternoon, the IACRS ordinary meeting was convened with Malcolm Crick (UNSCEAR) as chair. Work items mainly concerned the future of IACRS and included updates on activities from each participating organization. Discussions also covered the provision of a joint secretariat (IAEA and NEA) to service the meeting under the newly agreed Terms of Reference.

A framework paper on IACRS is being produced with the aim of raise awareness about IACRS and to enhance its work. The main role of the meeting is to facilitate information exchange and provide a forum for inter-agency collaboration. For example, this meeting also discussed activities related to radionuclide contamination in commodities including food, water, feedstuffs, commodities and

other materials. The next IACRS meeting is planned for Feb/March 2014.

## Expert Mission to the Chinese Academy of Agricultural Sciences, Beijing, China, 3–10 November 2013

Technical Officer: Russell Frew

Mr Frew travelled from 3–10 November 2013 to the Chinese Academy of Agricultural Sciences Institute of Quality Standards and Testing Technology for Agro-Products (IQSTAP) in Beijing, China. The purpose of this travel was to assist researchers at IQSTAP with the implementation of their analytical work for the TC project RAS5062 (Building Technological Capability for Food Traceability and Food Safety Control Systems Through the Use of Nuclear Analytical Techniques).

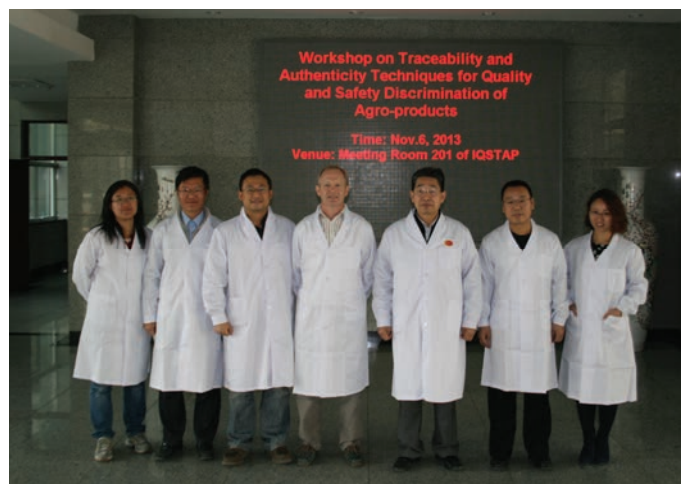
During the week in Beijing Mr Frew was able to provide:

- (1) Training of IQSTAP staff on the aspects of the setting up and operation of their newly installed IRMS system.
- (2) Training on carbon and nitrogen analysis; including sample preparation, trouble-shooting during an analytical run, the preparation and packing of sample conversion columns, the collection of high-quality data for carbon and nitrogen isotope ratios, and the processing of raw data including drift correction and calibration to international scales by normalisation with certified reference materials.
- (3) Training on the principles of hydrogen isotope ratio analysis of natural products, including the procedure of accounting for exchangeable hydrogen using a dual-equilibration approach, and training on the practice of preparation of samples for hydrogen isotope analysis.

The CAAS has placed a high priority on food traceability in its work plan. Much of this work was shown in a seminar organised by IQSTAP on “Traceability and Authenticity Techniques for Quality and Safety Discrimination of Agro-products”. This seminar was held on 6 November and was opened by Prof. Ye Zhihua, Director General of IQSTAP. Mr Frew provided the keynote address entitled “Stable isotope deltas: using nature's tiny signatures to make connections in food and forensics” which was followed by presentations from researchers from various Agricultural Science Academies (Beijing, Zhejiang, Yunnan, Hubei). The breadth of work being undertaken was evident with traceability and authentication projects on honey, tea, brassicas, beef and pork. While nuclear techniques are the mainstay, there are a wide range of complementary techniques being employed. These include metabolomics, molecular techniques, radio-frequency tagging and other spectroscopic techniques.

In addition to the work at IQSTAP, Mr Frew also visited Prof. Fengmao Liu at the Chinese Agricultural University (CAU) and made a presentation on IAEA work in the field of food traceability and authenticity. Prof. Liu is a

contract holder in CRP D52037 (Implementation of Nuclear Techniques to Improve Food Traceability) and provided an update on progress in that contract.



*The Symposium Organising Team with Mr Frew  
Beijing, China, 3–10 November 2013.*

This type of mission is highly effective in reinforcing and advancing the training provided by the larger courses held under the TC project, RAS5062. The opportunity to provide detailed instruction to a smaller group in their institute (i.e. on their equipment and samples) provides the best training outcomes. The opportunity to participate in the symposium and to make a presentation at the University enabled information on the technology and the IAEA programme to be disseminated to a wide audience.

## Interregional Training Meeting on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability, Gaborone, Botswana, 28 October–1 November 2013

Technical Officer: James Sasanya

Thanks to funding from the Peaceful Uses Initiative (PUI), a five-day training workshop on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability was conducted at Botswana's National Veterinary Lab (BNVL) to strengthen routine food safety control mechanisms (involving the use of nuclear and allied techniques to monitor chemical contaminants) and enhance public health through a total diet studies (TDS) approach to risk assessment in Member States. Total diet studies consider (in part) assessing levels of chemical/natural food contaminants in table ready foods. The technical officer participated in organizing and implementing the meeting and guiding discussions.

40 participants (mostly lab technicians, analytical chemists, lab heads and research scientists) from Algeria, Benin, Botswana, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, Senegal, Seychelles, South Africa, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe and the United Kingdom attended. The private sector, including Agilent, Chemetrix, SMMM, Separations South Africa and ABSCIEX were



also represented. Resource persons were from the UK, South Africa, the IAEA (the Joint FAO/IAEA) and BNVL.



*Participants at the PUI funded Interregional Training Meeting on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability, Botswana National Veterinary Lab (BNVL), Gaborone.*

In their welcoming remarks, the Director of BNVL, Dr Chandapiwa Marobola Raborokwe, and Dr Richard Keadire who coordinated the workshop, appreciated hosting the event with Agency support. They reported on the role BNVL plays in Botswana's economy in collaboration with the Agency. Botswana's AFRA coordinator, the Deputy Director of the Radiation Protection Inspectorate, Ministry of Infrastructure, Science and Technology, Mr Kabo Joseph Phutiesile, gave a presentation on "AFRA and extrabudgetary funding, challenges and opportunities" and called for efficiency in and ownership of AFRA programs. He challenged the participants to strengthen networking nationally, regionally and internationally.

The workshop focused on various analytical techniques applied in food safety/environmental health labs including, among others, the use of stable isotopes in LC/GCMS. Discussions included: chemical risk assessment; an introduction to TDS - dietary exposure assessment for different consumer groups; planning TDS and related studies; regulation of chemical food contaminants and implications on trade; meeting EU chemical food safety requirements; choosing analytical tests for TDS; emerging risks - environmental contaminants; overseeing TDS (and related food safety projects); demonstrating the analytical component of TDS (sampling, sample preparation and analysis); environmental contaminants and interpretation of related lab test results; quality systems in a food safety lab; solutions to problems in spectroscopy, chromatography, and mass spectrometry including implementation of technical/service support plans; and strategies that can enhance lab networks.

Other topics included targeted and non-targeted screening and quantitation of contaminants such as pesticides, mycotoxins, and allergens in food and beverages using

LCMS and QTrap technology. There were also discussions on instrument maintenance and trouble-shooting, standard operating procedures for LCMS instruments as well as challenges in sample preparation, multi-contaminant/residue analysis and recent technological advances. The interface between food safety labs and academia (its role in sustainable residue monitoring programmes) as well as collaboration/networking to enhance risk analysis, TDS and food safety/trade were also discussed.

There were also presentations on guidelines for residue monitoring, analytical method development and validation, lab management systems and opportunities/challenges associated with TDS and chemical residue analysis from a lab perspective.

The Deputy Director for Export/Import Traceability, Department of Veterinary Services, Ministry of Agriculture, Botswana, Dr Letlhogile Oarabile addressed the participants, thanking the Agency for supporting such scientific workshops and collaboration among MSs. He underscored the role of food safety labs in national economies. The sentiments were echoed by the Chief Scientific Officer, BNVL, Dr Thulie Colleen Losho as well as the Director of Radiation Protection (also the NLO for Botswana), Mr Thapelo Otukile who, at the closure of the event, welcomed the spirit of networking among MSs and the promotion of the application of nuclear techniques in food and environmental disciplines.

To help improve the implementation of future related activities, participants evaluated the workshop on a scale of 1 (lowest) -10 (highest). The scores are indicated below in parentheses against each question: Administrative and technical arrangements (8.68); Organization of the workshop including logistics (8.4); Location/venue/hospitality (8.72); Relevance of the workshop (8.4); Workshop/lecture theme (s) (8.12); Presentation/dissemination of the workshop content (8.04); Constitution/composition of participants including lecturers and facilitators (8.44); Length of the workshop (7.24); Length of lab demonstrations/discussions (5.68); Facilitation of lab activities and lab tour (7.52); Response to questions asked during presentations/lectures (8.72); Interaction during and between lectures/discussions (8.4); The involvement of stakeholders such as industry (7.8); Representation of local participants (8.44).

On the main benefits from the workshop, the participants identified TDS, method development/validation, networking, increased awareness on food safety (including instrumentation) and sharing of knowledge. On the challenges encountered and suggested remedies, participants felt the workshop content was intense and that an extended period would help. It was considered that the workshop was well organized overall, but could be improved by having longer practical times (and associated planning). Some participants recommended reducing the technical content and encouraging more presentations from participants (local/regional). On pro-

spects/opportunities for lab/institutional networking/collaboration, participants characterized this as an excellent opportunity and indeed many initiated or enhanced networks.

The participants felt food safety labs are vital to national/international public health initiatives and require more financial support and autonomy. They concluded that workshops such as the one held in Botswana are extremely important and should be held more regularly to enhance networking. Each lab shared information on their infrastructural and human resources to guide/inform networking and problem solving among Member States. Networking between African and UK institutions such as the Food Standards Agency (FSA) and the Food and Environmental Research Agency (FERA) as well as academic institutions such as UNISA, South Africa, was encouraged.

Many participants used the workshop to discuss ongoing/upcoming national/regional TCPs. They felt challenged to initiate food consumption surveys to generate data needed for TDS. The Agency's support to MS in their efforts to improve their economies and livelihoods was greatly appreciated. Each country received a copy of the "Joint FAO/IAEA Manual on sampling procedures to detect mycotoxins in Agricultural Commodities".

Previous and ongoing IAEA support to Botswana in the area of food safety, e.g. through TC project BOT5006, has helped strengthen the BNVL's capability to the extent that the lab now performs to international standards. Six of the lab's analytical methods have been accredited by the South African National Standards System (SANAS). Thus BNVL staff members contributed as resource persons at the workshop.



*Participants conducting experiments at the Training Meeting on Quality Assurance/Control of Analytical Methods for Food Contaminants and Traceability guided by BNVL staff.*

The BNVL lab personnel can now share sound technical information with peers given some of the state-of-the-art analytical tools, such as the 4000 series QTRAP LCMSMS, and including the use of stable isotopes in residue monitoring. As identified by the workshop participants, BNVL could henceforth play a vital role in inter-

lab studies and provide support to other labs in the region, becoming a vital training hub.



*Participants conducting experiments based on a QTRAP LCMSMS at BNVL under the guidance of BNVL staff.*

With Agency support, the lab now analyzes up to 40,000–50,000 samples a year and is on course to eliminate costs of subcontracting analytical tests to the UK (~200,000 Euros annually) by the year 2016 as the lab capacity grows or is enhanced.

In conclusion, the workshop was conducted as planned and involved participants from 21 countries mainly from Africa. Also QA/QC knowledge and awareness with regard to traditional/routine residue monitoring programs and a TDS approach as a key risk assessment tool to ensure public health were enhanced. Strategies to apply knowledge acquired from the workshop were identified, including use of existing national and regional collaboration as a way to share information/expertise. The participants felt challenged to improve their national residue monitoring plans and to start/lead public health initiatives such as TDS. The IAEA support, including through initiatives such as the PUI, for national/regional/interregional food safety/public health programs was greatly appreciated.

The host (BNVL) with government and agency support over the years now performs according to international standards, thus improving its credibility. The venue was well appreciated by the participants. The participants have initiated further collaboration with BNVL and among themselves.

## **The 21st Session of the Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF), Minneapolis, Minnesota, USA, 24–30 August 2013**

Technical Officer: James Sasanya

The 21st CCRVDF session was held in Minneapolis, Minnesota from 24–30 August 2013. The technical officer represented the Joint FAO/IAEA Division, including participation in the following working group and related committee meetings: Risk analysis policy and ex-



trapolation of maximum residue limits (MRLs) of veterinary drugs to additional species and tissues; Priority list of veterinary drugs requiring evaluation or re-evaluation by the Joint FAO/WHO Expert Committee on Food Additives (JECFA); “Concern form” for CCRVDF; Guidelines on performance characteristics for multi-residue methods; Risk management recommendations or residues of veterinary drugs for which there is no acceptable daily intake (ADI) and/or maximum residue limits (MRLs).

Discussions were held regarding guidelines for the establishment of MRLs or other limits in honey at the plenary. On agenda item 3, “Matters arising from the FAO/WHO and from JECFA”, the delegations were informed by the technical officer of the Joint FAO/IAEA Division’s activities relevant to CCRVDF and the CAC that include support for Member States to ensure food security and boost economic growth through various technical cooperation and Coordinated Research Projects. Aims, work done and plans under the CRP on “*Development of Radiometric and Allied Analytical Methods to Strengthen National Residues Monitoring Programs for Antibiotic and Anthelmintic Veterinary Drug Residues*” were highlighted. Member State concerns (discussed within the CRP) such as the implications of decreasing analytical method detection limits; the need for fundamental discussions regarding substances/contaminants with zero tolerance levels and the issue of the transfer of veterinary drugs from feed to animal to the environment as an important issue worth evaluating were all raised before the committee.



*The 21st session of the Joint FAO/WHO Codex Committee on Residues of Veterinary Drugs deliberating on Matters arising from the FAO/WHO (including the Joint FAO/IAEA) and the Joint Expert Committee on Food Additives (JECFA).*

Planned Joint Division activities of relevance to CCRVDF were also announced, such as the initiation of a new five-year CRP (Development and Strengthening of Radio-Analytical and Complimentary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products) in recognition of the global prominence of aquaculture today.

The delegations were also informed of the Joint Division’s support for the development of protocols to ensure quality control/quality assurance of trypanocidal drugs in sub-Saharan Africa through an alliance of The FAO, International Federation for Animal Health, Global Alliance for Livestock Veterinary Medicine, the IAEA and Manchester Metropolitan University (MMU).

The committee was encouraged by the Joint Division’s continued role in informing Member States of Codex guidelines as a way to strengthen national residue monitoring programs in line with CAC/GL 71-2009 and efforts of the working group on guidelines for performance characteristics for multi-residue analytical methods. The technical officer also contributed to discussions on the effectiveness of CCRVDF sessions, including challenges faced and opportunities/mechanisms to improve performance. Like other Codex meetings, the 21st CCRVDF presented an opportunity for the Joint Division to meet individual Member State delegations and organizations and discuss interests in Agency programmess including TCPs and CRPs as well as collaborations.

The committee expressed its appreciation for the continued support of the Joint Division through its TCPs and CRPs, amongst other activities, and especially for work on the development and update of the FCRIS database. The Joint division was requested to continue supporting the database, including detailed validation data particularly for the benefit of developing Member States as this would help reduce costs of and time for method validation.

Various delegations expressed gratitude for the Joint Division’s/IAEA support of their residue monitoring programmess. For example, the Costa Rican delegation, as coordinator of the Codex Committee for Latin America and the Caribbean (CCLAC), in particular voiced their sincere appreciation. This was documented in conference room document twenty two (CRD 22) of the 21st CCRVDF.

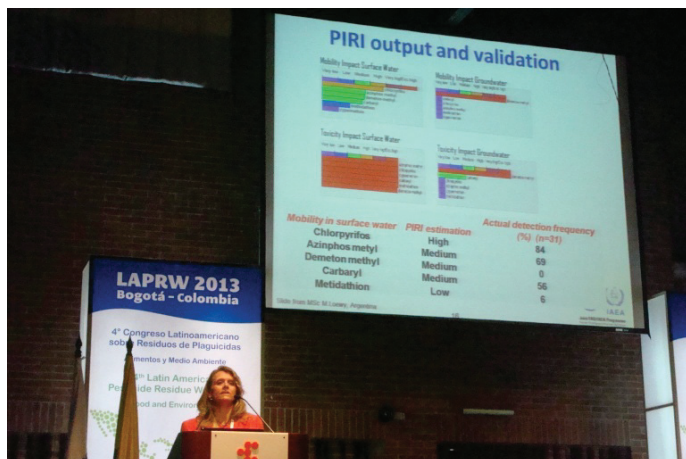
### **International Conference: Fourth Latin American Pesticide Residue Workshop (LAPRW) - Food and the Environment, 26–29 May 2013**

Technical Officer: B. Maestroni

The Universidad Nacional de Colombia and the Sociedad Colombiana de Ciencias Químicas organized the fourth Latin American Pesticide Residue Workshop (LAPRW) - Food and the Environment - that took place in Bogotá from 26–29 May 2013. The topics covered at the conference included pesticide residue analysis in food, tissues and environmental samples, trends in analytical techniques and methodologies, latest developments on chromatographic techniques coupled to mass spectrometry, issues in risk assessment and toxicology, pesticide and other contaminant monitoring studies, quality assurance and quality control, accreditation, proficiency testing,



regulatory issues, and maximum residue limits (MRLs) and their harmonization.



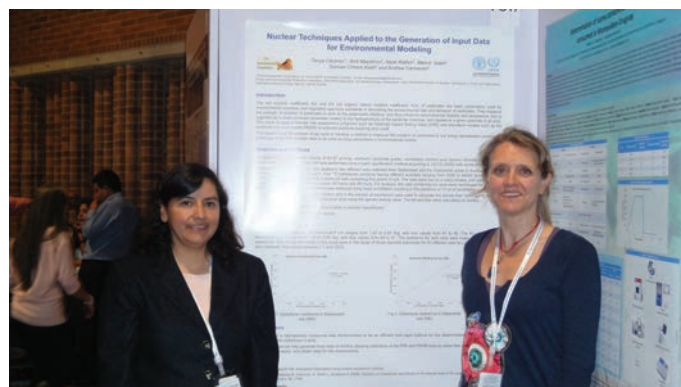
Ms B. Maestroni giving an oral presentation on the work of the RALACA network of laboratories at the LAPRW.

During the congress, the technical officer gave an oral presentation entitled "Integrated analytical approaches to assess indicators of the effectiveness of pesticide management practices at a catchment scale". This represented an occasion to present to a wide technical audience the work of the Red Analítica de Latino America y El Caribe (RALACA) network of laboratories, which was established with the Joint FAO/IAEA Division support. The presentation was well received by the public.

In addition, the representatives of Argentina, Brazil, Chile, Costa Rica, Panama and the Joint FAO/IAEA Division presented the following posters:

- Integrated Assessment of Environmental Pollution by Pesticides in the upper Valley of Rio Neuquén: Patagonia. Argentina. (Macchi P, Dufilho C, Savini M, Monza L, -Latini L, Indaco M, Loewy M).
- Evaluation of environmental impacts caused by the application of insecticides on orange crop (Vieira E, Ferreira R, Santos C, Luchini L).
- Determination of pesticides adsorption isotherms in Chilean soils using isotopic techniques. (Parada A, Nario A, Vileda X, Miranda B; Copaja S)
- Integrated analytical approaches to assess indicators of the effectiveness of pesticide management practices at the micro catchment La Mula, Guanacaste-Costa Rica (Carazo E, Perez G, Masis M, Chin J, Ruiz K, Alpizar M, Arias V, Messing P, Maestroni B, Ferris I)
- Implementation of Good Agricultural Practices (GAP) in the production of fruits in the Machuca-Jesus María watershed, Costa Rica based on analytical laboratory results (Carazo E, Masis M, Perez G, Matarrita J, Fonseca E, Chin J, Alpizar M, Arias V, Maestroni B, Ferris I).
- Optimization of a method using direct LC-MS/MS injection for determination of pesticides in surface water. (Checa B, Coronado E, Fuentes J, Serrano M, Aparicio L, Quesada K, Bocanegra, J).

- Nuclear techniques applied to the generation of input data for environmental modeling (Cáceres T, Maestroni B, Rathor N, Islam M, Chem-Kieth S, Cannavan A).



Ms Tanya Cáceres and Ms B. Maestroni presenting a poster on nuclear techniques applied to the generation of input data for environmental modelling.

The poster presented by Mr Greivin Perez from Costa Rica on "Integrated analytical approaches to assess indicators of the effectiveness of pesticide management practices at the microcatchment La Mula, Guanacaste Costa Rica", was awarded the prize for the best poster of the conference. Mr Perez, a former trainee in the Food and Environmental Protection Laboratory at Seibersdorf, gave a five minutes presentation about the team's work and accepted the award on behalf of the Costa Rica/RALACA team.



Mr S. Lehotay presenting the CICA/RALACA team with the best poster award for the poster, "Implementation of Good Agricultural Practices (GAP) in the production of fruits in the Machuca-Jesus Maria watershed, Costa Rica, based on analytical laboratory results"

## International Conference: International Meeting on Radiation Processing (IMRP 2013), Shanghai, China, 4–8 November 2013

Technical Officer: Carl Blackburn

The quickening change of pace in the development of the radiation processing industry as a whole can make it difficult to keep up to date with new names, new faces and new opportunities. With food irradiation and especially phytosanitary treatments, gaining more interest in many regions of the world, this IMRP proved to be an excellent forum to present views on the future development of food

irradiation and discuss and understand the challenges faced by the radiation processing industry.

This was the 17th IMRP, which is held every two years and serves as the global forum of the radiation processing community. Lectures from senior scientists, policy makers, regulators and industry executives provided broad perspectives on current applications and future trends; this included an invited lecture by the Technical Officer on food irradiation in an opening key-note session; "Radiation Processing Technology Needs of the Future".

Many premier radiation processing industries are located in the vicinity of Shanghai and the 2013 IMRP meeting was able to capitalize on this by arranging pre- and post-conference technical tours of X ray, electron beam and gamma irradiation facilities. The meeting itself comprised several lecture sessions and open forum discussions with a whole series of parallel session devoted to food irradiation. In addition there was a large exhibition

by service and technology providers and the meeting included scientific posters and technical side events.

The organizing committee and hosts were successful in their efforts to provide an enjoyable and informative event with lots of opportunities to network and learn more about advances in radiation processing. Of particular note to the Technical Officer was the full attendance at the lecture sessions devoted to food irradiation. It was a pleasure for the Technical Officer to take part and a great honor to be invited to address the conference in plenary, to chair a session on food irradiation and to also assist in the judging of the scientific posters. This 17th meeting was the second organized by the Industrial Irradiators Association (IIA) and was held in cooperation with the IAEA and sponsored by several different companies and organizations from the radiation processing sector.

## Coordinated Research Projects

### **Third Research Coordination Meeting (RCM) of a Coordinated Research Project to Develop Irradiated Foods for Immuno-Compromised Patients and Other Target Groups, Jeongeup, Republic of Korea, 9–13 September 2013**

Technical Officer: Carl Blackburn

The Research Coordination Meeting (RCM) was hosted at the IAEA Collaborating Centre for Radiation Processing including food irradiation, at the Korea Atomic Energy Research Institute, Advanced Radiation Technology Institute in the Republic of Korea. The meeting was chaired by Ju-Woon Lee and Jayne Woodside agreed to be the rapporteur.

The CRP comprises a network of 17 participating institutes involving 16 Member States. All were able to participate, with one contributing by video link from their home country. There are 16 research groups developing irradiated foods for hospital patients, seven of these research groups are also developing meals for other target groups, mainly emergency rations, and one research group is focusing specifically on developing irradiated foods with an extended shelf life that can be stockpiled and stored under ambient temperatures for prolonged periods, ready for use as emergency rations in an earthquake zone.

This research is directly relevant to 23 research thesis and dissertations in participating laboratories. Brochures and factsheets have been produced for medical practitioners and hospital patients in Argentina, China, Indonesia, Pakistan and the Philippines. A video featuring this work

in Indonesia is available on-line and CRP participants are publishing their results in scientific journals.

Excellent progress has been achieved so far in research that is seeking to increase the variety, availability and acceptability of foods for immuno-compromised hospital patients and other target groups. Most of the CRP participants are working in partnership with health care professionals to develop food for patients. In total, participants have been working with healthcare specialists in as many as 35 different hospitals. Also, some participants have been collaborating with others to develop foods for other specific target groups, for example, agencies responsible for the provision of emergency food aid. The CRP is generating data on the acceptability of irradiated fresh foods and ready-to-eat menu meals including ethnic foods and "moral-boosting" foods such as ice cream. Research data includes quantitative information (microbiological safety, nutritional and organoleptic properties) and it is hoped that the results of "pilot-scale studies" will provide more information, especially on qualitative factors associated with improving the range of available foods for patients (e.g. psychological well-being, quality of life).

Microbiological criteria for these special foods have been developed based on the bacterial organisms of importance and dietary requirements as related to different groups of people. There has been interest in the medical community where the CRP has helped focus attention on irradiated foods. In the long term a successful project will improve the acceptance of irradiated foods by the healthcare and regulatory communities with a view to further stimulate commercial interest.

The majority of participants are working in partnership with appropriate collaborating organizations, for example, by developing collaborations with hospitals and seeking ethical approval for testing with patients. Partic-



ipants have been conducting laboratory studies on the microbiological, physical and chemical, packaging and sensory aspects of radiation processing. Based on the research findings to date, the participants conclude that irradiation technologies can meet the criteria established by the CRP as well as the needs of the hospital and other target groups. Three participating organisations have already carried out acceptability testing with patient groups, and research groups have carried out microbiological, nutritional and organoleptic analysis of irradiated foods, with sensory testing involving healthy volunteers. All are also engaging in promotional/educational activity to increase awareness of irradiated food.

### **First RCM of the Coordinated Research Project on Accessible Technologies for the Verification of Origin of Dairy Products as an Example Control System to Enhance Global Trade and Food Safety, Vienna, Austria, 26–29 November 2013**

Technical Officers: Russell Frew and Andrew Cannavan

The first Research Coordination Meeting (RCM) for the Coordinated Research Project (CRP) on Accessible Technologies for the Verification of Origin of Dairy Products as an Example Control System to Enhance Global Trade and Food Safety was held at the Vienna International Centre, Vienna, from 26–29 November 2013.

This new CRP aims to address issues concerning verification of origin of foodstuffs using nuclear and related techniques. Globalisation and the increasing complexity of trade in food provide opportunities and risks to Member States. There are increasing opportunities for those states that produce high-quality, safe food to obtain a premium price for it. The risks are associated with inadvertent or fraudulent mislabelling of products causing damage to the brand. This is of particular importance when food safety is compromised. The consequences include lower prices or even loss of market access for the Member State. When food safety is compromised it is imperative that the traceability system can rapidly and robustly identify the origin of the risk enabling it to be removed from the supply chain.

This CRP will address some of the challenges that developing countries are facing in ensuring food traceability. It will develop a complete end-to-end system, using dairy milk, which has been recently involved in fraud issues endangering the public health (cases of melamine in milk), as an example commodity. Dairy is a priority commodity due to its simple processing procedures, high level of trade, and use as an ingredient in sensitive products such as infant formula. This system will then be available as a template that can be transferred to other commodities as required. The immediate benefit to laboratories will be the implementation and application of

state-of-the-art nuclear technologies for determining the provenance of foodstuffs.

Food safety and quality are vital aspects of food security. The food supply is vulnerable to a range of food hazards (microbiological, chemical, physical) that may arise at any stage of the food supply chain. The dramatic increase in the volume of global trade and complexity of supply chains over recent decades has caused a number of issues around food authenticity and safety. Commodities that attract premium prices are subject to fraud such as adulteration or counterfeit. This poses serious health risks due to the unknown origin of the counterfeit.

In addition to well publicized food safety incidents such as aflatoxins in maize, dioxins in pork, melamine in dairy products, and Salmonella in peanuts, new hazards and risks are continually emerging. These may be related to unintentional contamination with, e.g., food additives or microbes, or intentional contamination (adulteration for economic fraud or with the intent to harm consumers). Other issues may also pose threats to food safety which are not yet well understood or characterized, for example, the effects of climate change on food production, or emerging technologies such as the use of nanoparticles in food.

Questions concerning origin are among the first to be asked when a food safety incident arises. In addition, consumers in key markets are increasingly concerned with the origin of their food and are willing to pay more if they can be assured of its origin.

One of the primary tools for ensuring food safety is a traceability system. These are paper-based systems that pass information along with the commodity. This provides the consumer with confidence that the product they are purchasing comes from a supplier with the appropriate food safety and quality measures. All such systems are subject to failure either inadvertently or deliberately (fraud). The incidence of fraud is difficult to measure but estimates from the EU TRACE project suggest levels of 15–20% are likely in the European market.

It is recognized that there is a need for a system to verify the origin of food and hence audit the traceability control systems. Nuclear techniques have been shown to be very effective in authenticating food products (i.e. detection of adulteration or counterfeit), and in discriminating foods from different geographical origins. These systems have the potential to provide verification of information-based traceability systems and provide information on the integrity of the food product itself.

Despite many studies that demonstrate its usefulness, there has been very limited uptake of this technology to date. The reasons for this include:

- The high cost to entry as a lot of background information needs to be collected using expensive (and often slow) analytical techniques.



- The interpretation of the data and the level of certainty attainable have been hampered by the limited availability of reference data lack of standardized, robust, and accessible multi-variate and spatial data analysis tools.
- Most of the stakeholders (regulators, producers) are unaware of the capabilities of this technology and so it has not gained widespread acceptance.
- The current bespoke nature of the technology requires a high level of expertise for implementation.

Recent developments in instrumentation (e.g. laser-based analysers for light isotopes and trace metals) reduce analytical costs considerably and may facilitate accessible systems and uptake. However, while a multi-isotope/element approach with sufficient data of high quality can provide very high levels of certainty in assigning origin, the more limited data obtained from the new technologies needs to be assessed/verified to determine the fitness for purpose of these approaches.

This CRP aims to bridge gaps by developing and demonstrating an end-to-end system for verification of origin using nuclear and complimentary techniques. Ultimately the users of this technology will be food producers, regulators and policy-makers within the Member States. Thus the technology needs to be implementable as a whole system that is robust in the hands of people with a wide range of expertise (turn-key), does not impose undue costs and will be accepted by regulators and consumers in the markets.

It is expected that the results of this project will assist producers to better communicate the qualities and attributes of different food commodities. In addition, verifying the integrity of food can reduce trading blocks and prevent fraud in the form of false descriptions, counterfeits, substitutions and adulteration. Thus food safety and global trade will be enhanced.

Others to benefit from this project will be the analytical service and science providers in the participating countries who will receive training and experience in the development and implementation of the technologies. They will also benefit widely from the networking opportunities and interactions with international researchers.

The first Research Coordination Meeting provided the opportunity for the contract and agreement holders to get together to plan the programme details. Contract holders from Argentina, China, Lebanon, Lithuania, Morocco, Poland, Russian Federation, Singapore, Slovenia and

Sri Lanka were ably supported by agreement holders from USA, UK and New Zealand.



*Participants of the first RCM at the IAEA, Vienna, Austria.*

Each of the participating contract holders presented their individual work plans for the CRP. In addition the agreement holders made presentations on previous related work and the possibilities for future development in the course of this CRP. It was evident that there was a high degree of coherence in the planning of the research leading to very fruitful discussion on the coordination of the overall research programme.

The significant outcomes from the meeting were:

- Identification of standard operating procedures for sampling and analysis that need to be collated as a resource for the group.
- The high importance of quality control and quality assurance for the project particularly in light of the need for comparison of data from numerous laboratories in the spatial interpretation. There is a lack of suitable reference materials and so several target material were identified for development as QA standards initially. These materials may ultimately become reference materials through the activities of this CRP and with the support of the IAEA.
- A schedule of proficiency test was developed. This will be coordinated by the IAEA and it is expected that all contract holders will participate.
- Identification of a set of core samples to be collected, and analyses to be conducted, by each contract holder. The results arising from these activities are to be available to the group as a dataset to which they can reference their data.

# Technical Cooperation Projects

Country/Region	Project No.	Title	Technical Officer
Afghanistan	AFG5005	Study Food Irradiation as a Solution to Food Security Issues	Blackburn, C.M. Byron, D.H.
Angola	ANG5009	Enhancing Veterinary Drug Laboratories for the Quality Control of Local Milk Production to Improve Public Health Checks	Sasanya, J.J. Cannavan, A.
Belize	BZE5005	Providing Technical Assistance and Training for Upgrading National Laboratory Capacity	Maestroni, B.M. Jandrić, Z.
Benin	BEN5008	Establishing Enhanced Analytical Capability to Comply with International Standards for the Evaluation and Control of Veterinary Drug Residues in Food of Animal Origin	Sasanya, J.J.
Bolivia	BOL1009	Introducing Radiation Processing Technology	Sabharwal, S. (NAPC) Blackburn, C.M.
Botswana	BOT5006	Establishing a Laboratory for Monitoring Residues of Veterinary Drugs in Food of Animal Origin to Protect Public Health and Enhance International Trade Through Utilization of Nuclear and Related Analytical Techniques	Cannavan, A. Jandrić, Z. Sasanya, J.J.
Chile	CHI1019	Establishing the Origin of Heavy Metal Contamination in Water and Soil	Fajgelj, A. (NAEL) Padilla A.R. (NAPC) Cannavan, A.
Chile	CHI5049	Determining Veterinary Residues and Contaminants in Agricultural and Animal Products for Human Consumption	Cannavan, A. Jandrić, Z. Sasanya, J.J.
China	CPR5018	Building Technological Capacity for Food Traceability and Testing of Pesticide Residues in Food	Cannavan, A. Frew, R.
China	CPR5021	Facilitating the Application of Electron Beam for Food Irradiation	Blackburn, C.M. Byron, D.H.
Costa Rica	COS1007	Establishing Gamma Irradiation Capabilities at the Costa Rican Institute of Technology (ITCR) for the Use of Radiation Processing Technology	Blackburn, C.M. Byron, D.H.
Costa Rica	COS5029	Strengthening of Good Agricultural Practices (GAP) for Food Safety and Security and Environmental Protection	Maestroni, B.M. Nguyen, M.L. Dercon, G.
Ecuador	ECU5027	Improving Food Security and Environmental Sustainability by Monitoring Wetlands as Indicators of Good Agricultural Practice in Palm Oil Production	Maestroni, B.M.

Country/Region	Project No.	Title	Technical Officer
Indonesia	INS5040	Supporting the National Mycotoxins Reduction Programme and Enhancing the National Reference Laboratory of the Indonesian Research Centre for Veterinary Science (BBALITVET)	Sasanya, J.J. Cannavan, A.
The Former Yugoslav Republic of Macedonia	MAK5007	Assessing and Enabling the Implementation of Food Irradiation Technologies	Blackburn, C.M. Byron, D.H.
Malaysia	MAL5029	Applying Mutation Breeding and Optimized Soil, Nutrient and Water Management for Enhanced and Sustainable Rice Production	Lagoda, P. Nguyen, M.L. Nielen, S. Blackburn, C.M.
Mongolia	MON5019	Enhancing Analytical Equipment for Animal Disease Prevention, Diagnosis and Surveillance	Sasanya, J.J. Cannavan, A.
Morocco	MOR5033	Using Nuclear Techniques to Support the National Programme for the Generic Improvement of Annual and Perennial Plants and to Develop Agricultural Production	Nguyen, M.L. Blackburn, C.M. Sarsu, F.
Nigeria	NIR5037	Applying Nuclear and Related Techniques to Characterise Chemical Contaminants in Food for Risk Assessment and Management of Toxic Pollutants and Residues in Food, Feedstock and Water Resources through Training of Analytical Scientists	Sasanya, J.J. Maestroni, B.M.
Pakistan	PAK5048	Strengthening Capabilities to Monitor and Control Veterinary Drug Residues in Foodstuffs	Sasanya, J.J.
Panama	PAN5021	Enhancing Analytical Capability to Evaluate and Control Use of Veterinary Drugs through Residue Monitoring and Diagnostic Toxicology	Sasanya, J.J. Cannavan, A.
Peru	PER5031	Improving and Strengthening Industrial Irradiation Techniques with an Emphasis on Agro-industrial Applications	Blackburn, C.M. Sabharwal, S. (NAPC)
Africa	RAF5067	Establishing a Food Safety Network through the Application of Nuclear and Related Technologies	Sasanya, J.J. Cannavan, A.
Asia	RAS5057	Implementing Best Practices of Food Irradiation for Sanitary and Phytosanitary Purposes	Blackburn, C.M. Byron, D.H.
Asia	RAS5062	Building Technological Capacity for Food Traceability and Food Safety Control Systems through the Use of Nuclear Analytical Techniques	Frew, R. Cannavan, A. Maestroni, B.M. Jandrić, Z.
Latin America	RLA5059	Harmonizing Official Control Laboratories to Analyse Chemical Contaminants in Food and Feedstuffs (ARCALCXXII)	Sasanya, J.J. Cannavan, A.



Country/Region	Project No.	Title	Technical Officer
Latin America	RLA5060	Harmonizing and Validating Analytical Methods to Monitor the Risk of Chemical Residues and Contaminants in Foods to Human Health (ARCALCXXVIII)	Sasanya, J.J. Maestroni, B.M.
Latin America	RLA 5061	Supporting Quality Management for the Assessment and Mitigation of Impacts of Contaminants on Agricultural Products and in the Environment (ARCALCXXIV)	Maestroni, B.M.
Latin America	RLA9072	Supporting a Database of Values of Radioactivity in Typical Latin American Food (ARCALCXXIX)	Blackburn, C.M. Byron, D.H.
Sri Lanka	SRL5043	Supporting the Operation of a Gamma Irradiation Facility for Preservation of Food, Sterilization of Medical Products and Quarantine of Fruits	Blackburn, C.M. Sabharwal, S. (NAPC)
Sudan	SUD5035	Establishing a Laboratory for Monitoring Veterinary Drug Residues and Prohibited Substances in Livestock and Livestock Products through Application of Nuclear and Related Techniques to Protect Public Health	Sasanya, J.J. Cannavan, A.

## TCP RLA5059, Harmonizing Official Control Laboratories to Analyse Chemical Contaminants in Food and Feedstuffs

Technical Officer: James Sasanya

### Latin American Meeting on Establishing Method Validation Criteria and Measurement Uncertainty La Habana, Cuba, 1–5 July 2013

An RLA5059 project meeting was hosted by the counterpart institute, The Centre for Applied Technologies and Nuclear Development (CEADEN) at Hotel Riviera, La Habana, Cuba. This was to help establish and harmonize procedures for analytical method validation and calculation of measurement uncertainty. Twenty-two participants from the project counterpart institutions attended

Discussions centered on challenges associated with laboratory quality management systems and analytical method development/validation including measurement uncertainty. Counterpart performance was reviewed, including provision of updates/feedback. Chile and the IAEA provided resource persons to conduct lectures and guide discussions.



*Participants at the Latin American Meeting on Establishing Analytical Method Validation Criteria and Measurement Uncertainty.*

### Final Coordination Meeting for RLA5059, Panama City, Panama, 2–6 December 2013

The final Coordination Meeting for the ARCAL regional project RLA5059 was recently held at the Hotel Riande, Panama City, Panama, organized by the local counterpart Dirección Nacional de Salud Animal, del Ministerio de Desarrollo Agropecuario. The technical officer also attended to provide input/guidance and steer discussions on consolidating and sustaining a regional network of food safety laboratories as well as reviewing lessons learnt and discussing way forward with regard to overall Latin America/ARCAL framework.

The meeting discussed achievements of the project including strategies to consolidate gains, lessons learnt, and future plans. A detailed final report was written and new concrete ideas developed.

RLA5059 has resulted in enhanced capacity development and harmonized analytical methods/techniques as well as networking through several meetings, fellowships, scientific visits and expert missions. The counterparts are able to train/educate each other, as a measure of a critical mass of competent laboratory personnel. Nine of the



*Participants at the Final meeting of the ARCAL Regional Project RLA5059 held at Riande Hotel, Panama City.*

countries have attained laboratory accreditation in various aspects while 12 have fully functional national residues programs using both tailored nuclear and non-nuclear complimentary screening and confirmatory techniques that comply with international standards. Costs for subcontracting analytical services to third countries have now been reduced in many countries. Five laboratories in Argentina, Chile, Ecuador, Peru and Uruguay are now the project's reference laboratories and centres of excellence, training and facilitating other Member States both within and outside the region. Chile's Servicio Agrícola y Ganadero; Subdepartamento de Química Ambiental y Alimentaria (SAG), for example, has helped host trainees from Angola (Scientific Visit and Fellowships) in the field of residue monitoring under a national TC project. Subsequently, SAG and The Instituto de Investigacao Veterinaria, Angola recently signed a formal collaborative agreement to promote food safety between the two sister Member States.

Furthermore, work done under the regional project receives recognition among peers during presentations at relevant international conferences. For example, a multi-residue method for banned/prohibited compounds (by many global trading partners) developed under the project recently drew a lot of interest during the sixth International Symposium on Recent Advances in Food Analysis held in Prague, Czech Republic from 5–8 November 2013. The symposium brought together 900 scientists from 63 countries (from five continents) many of which

are IAEA Member States (see separate article in this issue of the newsletter).

To continue supporting harmonized analytical procedures and shared knowledge in the region, the participants received a number of textbooks for chemical/natural contaminant analysis in food and environmental samples.

## **Final Coordination Meeting of TCP RLA5061, Panama City, 18–22 November 2013**

Technical officer: Britt Maestroni

Regional project coordinators from 14 countries in Latin America and the Caribbean (LAC) convened to discuss the results of TCP RLA5061 in Coclee, Panama City from 18–22 November 2013. The meeting was the culmination of three cycles of multi-disciplinary and multi-stake holder projects that aimed to harmonize analytical approaches and apply them in cooperation with international and regional organizations, national and local bodies and especially farmers and other land managers or their representatives.

The overall objective of the RLA5061 project was to establish internationally recognized quality management systems in participating laboratories for the sustainable monitoring of representative agriculture catchments in the region and for the generation of analytical results. The data produced can have a direct influence on policy decisions and changes in regulations governing food safety and environmental management. Taking data to policy requires advocacy and that was the challenge set for the region under RLA5061.



*Participants of the final meeting of Technical Cooperation Project ARCAL RLA5061.*

During the project more than 26 quality audits were performed on the network laboratories. At the time of writing, three of the laboratories are about to receive accreditation under ISO17025. A total of 17 modified pesticide management practices were implemented in eight different catchments; more than 110 monitoring campaigns were undertaken during the project by the laboratories;



116 national workshops were organized with the local stakeholders to discuss the impact of contaminants in the catchments and provide feedback on the laboratory results; and 16 pesticide fate models were generated in nine catchments. Although the outputs from the project were very significant and a lot of data have been produced and collected, no risk models have been generated to date. More than 90 people were trained in analytical methodologies, 25 people were trained on bio-indicators, 591 new standard operating procedures were written in the laboratories; 23 proficiency testing rounds were successful and 65 analytical methodologies, including methods for pesticide, heavy metals, chemical water, soil and air parameters were developed and validated in the laboratories.

The project resulted in the strengthening of the laboratory network with the participation of all laboratories in the Red Analitica de Latino America y el Caribe (RALACA) network (<http://red-ralaca.net>). The sustainability of the project is greatly enhanced by the RALACA working committees that are currently developing the next biennium work plans.

The technical officer coordinated the smooth implementation of the meeting and ensured that discussion groups were established to organize the vast amount of information into a systematic analysis of regional outputs and outcomes. The technical officer helped in compiling a draft final project report which will be edited by the regional project coordinator for submission to the ARCAL board. The report includes both national and regional achievements, and also some recommendations raised by the meeting participants. The technical officer gave a presentation of the web page that was prepared for the RALACA network of laboratories.

## Training Workshop on Screening for Antimicrobial Residues in Food of Animal Origin under TCP INS5040, Bogor, Indonesia, 17–20 June 2013

Technical Officer: James Sasanya

A training workshop on screening tests for antimicrobial residues in food of animal origin was conducted under the IAEA TCP INS5040, which aims to support and enhance the capability of the National Reference Laboratory of the Indonesian Research Centre for Veterinary Science (IRCVS or BBALITVET) to contribute to national residue monitoring programmes.

In line with Indonesia's efforts to support laboratory/institutional networking, including sharing of resources, the workshop was attended by 41 participants from various institutions including IRCVS, The National Quality Control Laboratory for Livestock Products (NQCLLP or BPMPP), The Disease Investigation Centres BPPV and BBVET, The National Veterinary Drug Assay Laboratory (NVDAL or BBMSOH), and The Directorate for Veterinary Public Health (Dit. Kesmavet).

The event was hosted by BPMPP but co-planned with BBALITVET and supported by the IAEA.

The training included lectures and laboratory demonstrations on: Basics of screening tests; types of common screening tests; recent advances; a comparative assessment of screening and confirmatory techniques; sample preparation, associated challenges and issues; availability of methods; and validation of methods.



*Participants and experts conducting lab experiments at the TCP INS5040 Training Workshop.*

Discussions were also held on how Indonesia and other non EU Member States can meet EU food safety requirements to ensure that exports are not rejected.



*The Indonesian Research Centre for Veterinary Science (IRCVS or BBALITVET) reports on the IAEA funded training workshop on screening antimicrobial residues in food of animal origin<sup>1</sup>*

<sup>1</sup> (<http://bbalitvet.litbang.deptan.go.id/eng/index.php/component/content/article/70-bbalitvet-news/530-the-training-workshop-on-screening-methods-for-veterinary-drugs-residues?tmpl=component&print=1&page>).

The participants and resource persons characterized the workshop as very successful. Each participant received a certificate and copies of all presentations given at the workshop. Such in-country workshops provide mass training opportunities; in this case 41 participants attended. However, longer training periods were recommended. Various screening tools/techniques were used and the knowledge is being applied (including use of a recently procured HPLC-DAD/FL under the TCP INS5040). This would complement confirmatory analytical tools (if purchased) such as LCMSMS to meet requirements of the international market for effective monitoring of banned/prohibited substances. International trade in food-stuffs would therefore be enhanced.

### **RAS5057 IAEA/RCA Senior Executive Meeting on Best Practices for Applications of Irradiation as a Sanitary and Food Quality Treatment, Kuala Lumpur, Malaysia, 28–31 October 2013**

Technical Officer: Carl Blackburn

The executive meeting was hosted by Nuclear Malaysia. All 17 Member States who are signatories to the Asia and Pacific Regional Agreement were represented with 35 participants and 10 observers, and Mr Yves Henon as an IAEA expert consultant. The meeting created awareness and facilitated the exchange of information and views on the best practices for sanitary and food quality applications. It was attended by food irradiation specialists and senior food policy officials / regulators.

The meeting stimulated awareness of irradiated food and associated technologies. It did this through information exchange and fostering collaborations with a view to furthering and enhancing national and trans-boundary trade in irradiated food. Senior policy / regulatory officials were provided with the opportunity to discuss issues with food irradiation specialists and consider both food irradiation and irradiated food and "best practice" as regards the application of ionizing radiation as a food treatment on a national and inter-national basis. In addition to briefings on the commercial use of food irradiation the participants were assisted in their deliberations of radiation processing technologies and commercial applications through participation in group "syndicate exercises".

Earlier Joint FAO/IAEA activities in the region produced Guidelines for the Audit and Accreditation of Irradiation Facilities used for Sanitary and Phytosanitary Treatment of Food and Agricultural Products and a draft Good Irradiation Practice (GIP) Manual for Sanitary, Phytosanitary and Other Applications of Food Irradiation. These documents provided a solid platform from which to discuss the issues associated with the regulation and commercialization of irradiated food. A report of the meeting is available on request.

### **RAF5067 Regional Meeting/Workshop on Application of Developed Capacity in Nuclear and Related Analytical Techniques to Analyze Nationwide Food Samples, Mauritius, 10–14 June, 2013**

Technical Officer: James Sasanya

A meeting/workshop was held at The Agricultural Research and Extension Unit (AREU), Food and Agricultural Research Council (FARC), Mauritius under the AFRA regional TCP RAF5067, "Establishing a Food-Safety Network through the Application of Nuclear and Related Technologies". The workshop was coordinated by the local counterpart Ms Nirmala Levi Ramburn. Overall the event aimed at strengthening the application of nuclear and complimentary analytical techniques in routine food safety control programs and also provided an opportunity to evaluate and plan for RAF5067.

The specific workshop objectives were namely : to apply radio receptor assay and chromatographic analytical techniques developed/optimized under RAF5067 for analysis of nationwide food samples using Mauritius as a case study, including understanding the country's food safety regulatory framework; to share relevant experiences among RAF5067 Member States and identify opportunities to harmonize laboratory techniques/operation; to strengthen AFRA laboratory networking for food safety and consumer protection; and to discuss project progress and provide feedback.

Twenty participants from eight countries (Botswana, Ethiopia, Mauritius, Namibia, South Africa, Republic of Tanzania, Uganda and Zimbabwe), mostly personnel from food safety/control laboratories of mandated institutions in the respective countries, attended the workshop. Resource persons included a number of local participants and others from The Netherlands, UK and Turkey.

The Director of AREU, Mr Teeluck, a representative of Africa Division, Department of Technical Cooperation, the IAEA and the event coordinator addressed the participants highlighting the importance of food safety and laboratory networking in the region. Participants also presented on the status of the RAF5067 project in their respective countries including way forward.

Laboratory sessions included the installation of a Charm II radio receptor assay apparatus in the Food Technology Laboratory, demonstrating how the tool functions, and sample preparation/analysis of antibiotics (gentamicin and neomycin) in milk. This was followed by analysis of tetracycline residues in chicken tissue, aflatoxin in animal feed and pesticide residues in vegetables. The different steps in sample preparation and determination of control points for identification of positive/negative presence of contaminants were demonstrated. Data interpretation and use of the system software programme were explained.



In order for participants to appreciate the advantages and disadvantages of each technique, staff from the Food Technology laboratory demonstrated the use of the GCMSMS and shared relevant data on pesticides residues in vegetables. These were compared with Charm II system results. It was confirmed that the Charm II can be used as a pre-screening tool, however if a contaminant is found to be present then confirmation and quantification of the analyte is required using other nuclear techniques for example, GC-ECD, GC/MS, and LC/MS/MS etc as may be applicable.



*Participants in the RAF5067 Regional Meeting/Workshop on Application of Developed Capacity in Nuclear and Related Analytical Techniques to Analyze Nationwide Food Samples.*

Event outputs were namely: the Charm II radio receptor assay tool was demonstrated for the screening of veterinary drugs (neomycin, gentamycin and tetracyclines), aflatoxins and pesticides; fruitful discussions were held on the use of the Charm II system including interpretation and use of the supplied methods of analysis/protocols, sample storage, preparation, and extraction; demonstration of how the system can be used to analyse antibiotics in milk (Gentamicin and Neomycin), tetracycline in chicken tissue, aflatoxins in animal feed and pesticide residues in vegetables.

The workshop/meeting noted the need for additional capacity building including basic training in maintenance/repair of different analytical equipment. They also noted a need to establish a network for proficiency testing schemes for different contaminants in food and animal products to reduce the problem of high cost of accessing certified reference materials and PT matrix.

Some milestones achieved in the meeting included interaction of scientists and laboratory personnel from different backgrounds within the region including regulatory and research sectors as well as discussing challenges and shortcomings in the testing sector. Participants were also advised on choice of suitable analytical techniques for various applications and on the tools available on the market.

Overall, the following achievements were registered: A Charm II radio receptor assay tool was procured for Mauritius, installed in the Food Technology Laboratory at Reduit and used to demonstrate the analysis of antibiotics, pesticides and mycotoxins in poultry meat, vegetables and animal feeds, respectively; capacity was built/enhanced in the application of radio receptor assay and chromatographic analytical techniques for 20 participants from eight African countries; awareness was created on the under-utilization of cheap and efficient techniques (e.g. TLC and microbiological assays) for countries with limited resources; common challenges and the strategy to tackle/overcome them were identified.

The meeting/workshop recommended the following: (a) In order to design effective control programs, it is necessary to compile robust data on national usage of veterinary drugs and pesticides; (b) policy makers/senior managers should be made aware of analytical and regulatory requirements; (c) Member States should consider all techniques for analysis of trace levels of contaminants within available resources (e.g. TLC and microbiological assays); (d) instigating farmers and consumer awareness at national level; (e) continuous communication among the project counterparts and stakeholders; (f) National Coordinators Meeting to discuss and propose means of maintaining after sales service and maintenance of the analytical equipment; (g) initiating a regional PT Scheme for pesticide/vet drug residue analysis in appropriate matrices; (h) counterparts consider as a matter of priority, acquisition of analytical standards at national and regional level.

All the participants acknowledged the IAEA support that enabled them attend this AFRA meeting/workshop and appreciated the resource persons for their fruitful contributions.



*Participants in the RAF5067 Regional Meeting/Workshop in Mauritius, analyzing food contaminants in various food samples using a radio receptor assay tool.*

# Food and Environmental Protection Laboratory, Seibersdorf

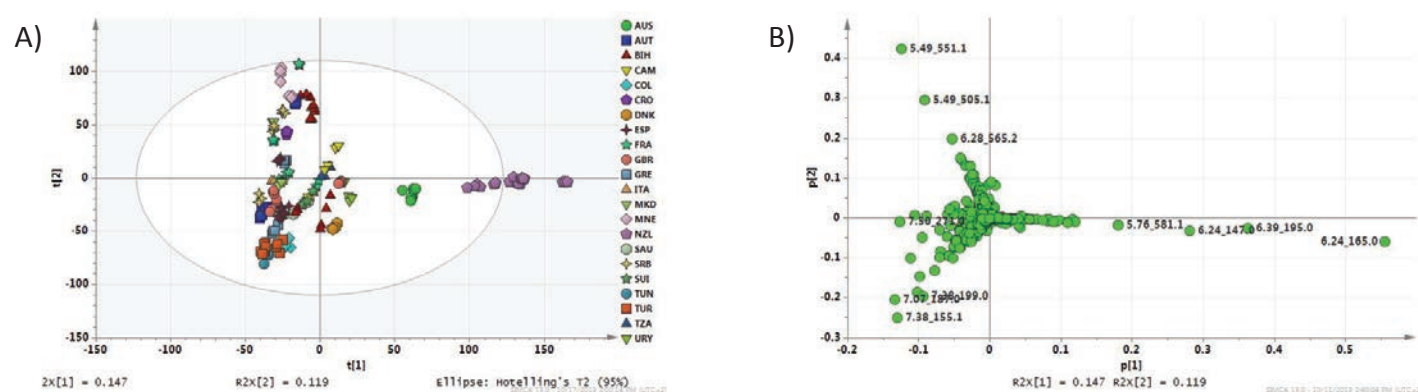
## Classification of Honey of Various Floral and Geographical Origins Using UPLC-QToF MS and MVA

Technical officer: Zora Jandrić

The health benefits of honey have long been recognised. Some honey types (specific botanical and/or geographical origin) have enhanced medicinal and nutritional qualities and thus command a premium price over other types. Therefore, honey is one of the most common food commodities to be subject to mislabelling fraud, and this has become an issue of international scale in terms of authenticity and quality control.

An untargeted metabolomics method was developed for the classification of honey of various floral and geographical origins using ultra-performance liquid chromatography-quadrupole time of flight mass spectrometry (UPLC-QToF MS) to support Member States that trade honey. Evaluation of data by multivariate data analysis allowed the discrimination of New Zealand and Australian honey from honeys originating in other countries (Fig. 1A).

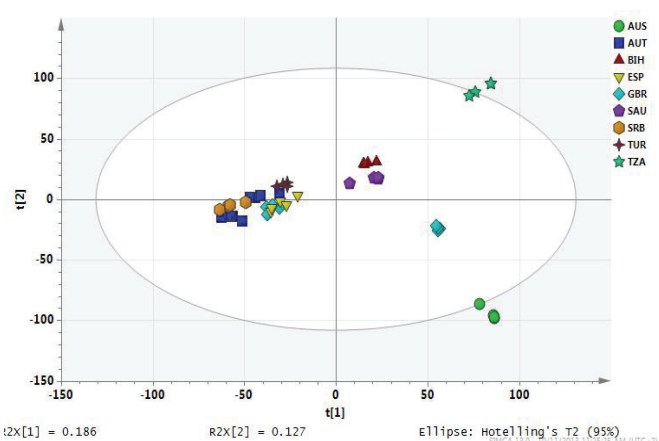
Characteristic markers contributing to the segregation of different honey types were selected using a loadings plot (Fig.1B).



**Figure 1.** PCA clustering: (A) Scores plot of honeys (uni- and polyfloral) obtained from: Australia (AUS), Austria (AUT), Bosnia and Herzegovina (BIH), Cambodia (CAM), Columbia (COM), Croatia (CRO), Denmark (DNK), Spain (ESP), France (FRA), Great Britain (GBR), Greece (GRE), Italy (ITA), Macedonia (MKD), Montenegro (MNE), New Zealand (NZL), Saudi Arabia (SAU), Serbia (SRB), Switzerland (SUI), Tunisia (TUN), Turkey (TUR), Tanzania (TZA), and Uruguay (URY). The ellipse represents the 95% confidence region for Hotelling's  $T^2$ ; (B) Loadings plot.

It was also possible to differentiate between some unifloral honeys of various geographical origins (Fig. 2). Reliable classification was obtained for honeys from AUS, TZA (miombo), GBR (moor), BIH (Salvia officinalis), and SAU (sidr), while honeys from AUT (acacia, sunflower), ESP (thyme), GBR (borage), SRB (acacia), and TUR (pine) were grouped together ( $R_{cum}^2=0.83$ ;  $Q_{cum}^2=0.56$ ) (Fig. 2). The clusters of acacia honey from AUT and SRB overlapped.

The results demonstrate the potential of this methodology for the differentiation and classification of honeys traded between countries. Work is ongoing in FEPL to further elaborate and validate the methodology. The application of such methods may represent an effective means to help combat fraud, protect the economic interests of Member States trading honey, and ensure that consumers are getting the products with nutritional and medicinal qualities that they are paying for.



**Figure 2.** PCA clustering: Scores plot of polyfloral honeys obtained from: AUS, AUT, BIH, ESP, FRA, GBR, NZL, SAU, SRB, TUR, and TZA. The ellipse represents the 95% confidence region for Hotelling's  $T^2$ .



## Sixth International Symposium on Recent Advances in Food Analysis, Prague, Czech Republic, 5–8 November 2013

Technical Officer: Andrew Cannavan

The International Symposium on Recent Advances in Food Analysis (RAFA) is a biennial event, held in Prague, Czech Republic. The sixth symposium in the series was held from 5–8 November 2013. The symposium covered a wide range of topics including recent advances in analytical and bioanalytical technologies, emerging food-related issues, risk assessment, food authenticity and fraud, and analysis of nanoparticles, residues and natural contaminants. The second European Ambient Mass Spectrometry Workshop and several vendor workshops were also included in the agenda. The symposium had approximately 900 registered participants from more than 60 countries worldwide.

The Head of the Food and Environmental Protection Laboratory (FEPL) participated in the symposium and presented a poster entitled ‘Classification of New Zealand Honey by Mass Spectrometry and Chemometrics’. This research, performed in the FEPL under the project ‘Traceability to improve food safety and quality and enhance international trade’, demonstrated that untargeted metabolomics analysis can be used to differentiate between honeys of different floral origins, including those that cannot currently be differentiated reliably by any other method. This is an important step forward in the development of methodology to protect product authenticity and combat fraud, which is a very costly problem in many countries, both developing and developed. The poster raised a lot of interest and discussion amongst symposium participants.

Several posters were presented by project counterparts and former trainees at Seibersdorf, including posters on the validation of a GC-SIM-MS method for the determination of dithiocarbamate fungicide residues in fruits and vegetables by the Centro de Investigación en Contaminación Ambiental (CICA) in San José, Costa Rica (an IAEA Collaborating Centre), the evaluation of the behaviour of different dispersive solid phases in the analysis of pesticide residues in tomatoes consumed in Uruguay by counterparts in the Laboratorio de Bromatología in Montevideo, Uruguay, and a screening/confirmatory method for  $\beta$ -agonists in urine samples using HPLC/MSMS from DILAVE, Montivideo, Uruguay.

The information exchange in the field of food analysis at the symposium was extremely useful. The participants included key figures in the fields of food safety and food control. A number of individuals who had previous or current interactions with FEPL through TCPs, CRPs, or as participants in training workshops were present. The event provided an opportunity for mutual updating of information and maintenance and extension of contact networks.

The symposium provided an effective forum for creating awareness of the activities of the Agency in food safety and consumer protection, for keeping abreast of technical and regulatory developments, and for the interchange of information and ideas. There was considerable interest in the work of the Agency in food traceability and authenticity, including opportunities for potential collaboration with several institutions. Participation in this symposium was of direct benefit to the work of FEPL and, ultimately, to the Member States.



*Two of the RLA5059 project members presenting an analytical method “A screening/confirmatory method for  $\beta$ -agonists in urine samples using HPLC/MSMS” at the sixth International Symposium on Recent Advances in Food Analysis.*

## Annual Meeting of the Association of Official Analytical Chemists International (AOAC), Chicago, USA, 25–28 August 2013

Technical Officer: Andrew Cannavan

AOAC INTERNATIONAL is a globally recognized, independent, not-for-profit association with over 3,000 members worldwide and 14 international sections representing four continents and more than 90 countries. Major topics covered in the 2013 Annual Meeting and Exposition included food authenticity and the control of residues and contaminants in food.

The Head of the Food and Environmental Protection Laboratory (FEPL) was invited to present a lecture in one of the meeting sessions, a symposium entitled “Antibiotics in the Chain”, which was chaired by Dr Linda Stolker from the RIKILT Institute of Food Safety in the Netherlands. The lecture focused on the possible uptake of antibiotics by plants and their recycling in the food chain and consequent issues with respect to food safety and the development of antibiotic resistance in human pathogens. The data presented was based on work performed using radiotracer techniques and mass spectrometric analytical methods at Seibersdorf and in IAEA CRPs to provide data and information for risk management with respect to the presence of antibiotic residues and other chemical contaminants in the food supply.

chain. The presentation prompted questions and discussion especially on innovative research, initiated through an IAEA CRP and followed up in collaboration with the RIKILT Institute, demonstrating the natural production of the antibiotic chloramphenicol and its transfer to plants. The results have significance for both consumer protection and international trade in animal derived foods since chloramphenicol residues in foods have been a major cause of trade disruptions over the past decade.

A second invited speaker in the “Antibiotics in the chain” symposium was Dr Jin-Wook Kwon, of the Ministry of Food and Drug Safety in the Republic of Korea. Dr Kwon’s presentation on the fate and occurrence of antimicrobials in the environment included the results of work carried out as a contract holder under the IAEA CRP “Development of radiometric and allied analytical methods to strengthen national residue control programs for antibiotic and anthelmintic veterinary drug residues”.

The Head of the FEPL also presented a poster on work done at Seibersdorf on novel and transferable methodology for the assessment of fruit juice authenticity, carried out under IAEA Project 2.1.3.2, Traceability to improve food safety and quality and enhance international trade. There was a lot of interest in the poster, including discussion and requests for further information.

Discussions outside plenary included possible collaboration with the US Food and Drug Administration on method development and capacity building in the field of food authenticity and traceability, identification of potential current and future technologies relevant to IAEA Technical Cooperation Projects, and the development of international standards through Codex Alimentarius.

The focus of the AOAC Annual meeting on methods and systems for food authenticity and traceability provided excellent validation of the programmatic direction of the Food and Environmental Protection Subprogramme. There is a need in both the developed world and the developing world for analytical methodology to assist in implementing and verifying food traceability/authenticity mechanisms as components of food safety and quality control systems, which are in turn vital aspects of food security. There is a growing focus on the development of such analytical methodology in many developed countries, and the FAO/IAEA Joint Division plays a vital role in developing, adapting and making the technology and methods accessible to less developed countries in order to enhance consumer protection and international trade. This role was recognised and endorsed in discussions during the AOAC meeting.

## **Red Analítica de Latino America y el Caribe (RALACA) Network of Laboratories:**

Technical officer: Britt Maestroni

The IAEA, through the Joint FAO/IAEA Division, has been supporting Institutions in Latin America and the Caribbean for many years through FAO/IAEA training workshops, IAEA Technical Cooperation Projects, and Coordinated Research Projects. One result of this work is the implementation of a regional network of laboratories, which is called Red Analítica de Latino America y el Caribe (RALACA) network of laboratories. In 2012 the Food and Environmental Protection Laboratory (FEPL) was successful in a bid for funding from the USA under the Peaceful Uses Initiative (PUI). In this context a three-year project on “Sustainability of capacity building activities to improve food safety and quality through nuclear technology and networking” started in March 2012.

The objective of this project is to ensure food safety and quality while addressing the sustainability of technical capacity, laboratory infrastructure and regional/interregional networking. The project has already achieved its first output, which is the creation of a regional network of laboratories in Latin America. RALACA is a non-profit network of laboratories and associated institutions that brings together analytical laboratories to enhance regional capabilities to target food safety and environmental sustainability.

The history of the laboratory network dates back to 2006, when representatives from nine analytical laboratories met in Mendoza, Argentina to start planning a regional project funded by the International Atomic Energy Agency (IAEA) on ‘Strengthening Laboratory Capacity to Assess the Implementation of Good Agricultural Practices (GAP) in the Production of Fruit and Vegetables in Latin America’ (IAEA RLA5050). The goal was to strengthen the analytical laboratory by establishing integrated capabilities to assess good agricultural practice (GAP) thus complementing existing random end-product testing with geo-referenced monitoring of high impact rating pesticides in water entering and leaving selected subcatchments. The initial network of nine laboratories adopted a modular approach to address pressing non-point source contamination problems and a way to improve environmental and food safety that has regional applicability with concomitant health, trade and economic benefits. A “black box” monitoring strategy (inputs and outputs monitored, with no focus on mechanisms within the system) was deployed by Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, and Uruguay to monitor indicators of good agricultural practice (GAP) and compliance with maximum residue limits (MRLs). The approach involved integrated biological and chemical monitoring of water quality at a landscape scale using harmonized protocols and georeferenced sampling.



Communication channels were established by meetings with stakeholders, thus improving chances for sustainable monitoring and providing objective indicators for area-wide pest management strategies. Where possible, harmonized approaches were used from a related IAEA Co-ordinated Research Project on “Integrated Analytical Approaches to Assess Indicators of the Effectiveness of Pesticide Management Practices” (IAEA CRP D5.20.35) and recommendations from “Perfil Estratégico Regional para América Latina y el Caribe 2007–2011”. Follow up IAEA projects on “Implementing a Diagnosis System to Assess the Impact of Pesticide Contamination in Food and Environmental Compartments at a Catchment Scale in the Latin American and Caribbean (LAC) Region” (IAEA RLA/5/053) and “Supporting Quality Management for the Assessment and Mitigation of Impacts of Contaminants on Agricultural Products and in the Environment” (IAEA RLA/5/061) took the approach steps further by obtaining information about relevant pesticide processes in the subcatchments and pesticide loads to the environment. Laboratory capabilities were enhanced in several areas including analytical methods, radioisotope techniques, mass spectrometry, data interpretation, sampling procedures, bio-monitoring, pesticide transport processes, catchment modelling, and in feeding back laboratory results to stakeholders while supporting farmers’ communities.

From an initial set of nine laboratories the network expanded to include representatives from 16 countries in Latin America and the Caribbean. Many more are expected in the near future.

In 2012, under the PUI project, the network decided to adopt the name RALACA, an acronym for analytical network for Latin America and the Caribbean (Red Analítica de Latino America y el Caribe).

RALACA is composed of analytical laboratories belonging to the Latin America and the Caribbean region. Additional members are analytical laboratories from other regions in the world that have demonstrated technical excellence and can contribute with an advisory role. Also, other Institutions that do not have a direct analytical work, but are related to the food control system in the Member States can be incorporated as members in RALACA.

The incorporation of the countries into RALACA is voluntary. Agreement to participate in any activity commits the Laboratories and the Institutions to comply with the relevant programme. RALACA organizational structure is made up by the Board, the Committees and the Advisory group.

To date the work of RALACA is implemented through the Committees:

- Committee on Laboratory Analytical Services (LAS)
- Committee on Field Analytical Services (FAS)
- Committee on Quality Assurance and Quality Control (QA/QC)

- Committee on Contaminants and Residues (CR)
- Committee on Water, Soil and Environment (WSE)
- Committee on Research and Academia (RA)
- Committee on Statistics, Uncertainty, Calibrations, Traceability (SUCT)
- Committee on Biomonitoring (BM)
- Committee on Bioassays (BS)
- Committee on Analytics, methods, Proficiency Testing (APT)
- Committee on Modelling (MOD)
- Committee on Use of Nuclear Technology (NT)

The RALACA working committees are currently developing the next biennium work plans, and they will be soon available for comments and submissions.

The RALACA network recognised that its effectiveness would be enhanced by the establishment of an independent web site, and, in 2012, with financing from the PUI project, the Joint FAO/IAEA Division awarded an IAEA contract for the preparation of a web site for RALACA. The web site address is <http://red-ralaca.net>.



A screen shot of the RALACA web page (<http://red-ralaca.net>)

The experience gained in setting up and adopting RALACA as a working tool for the laboratories is unique: through the PUI project this concept will be exported to other continents and regions to create awareness about the importance of working in a network of peers. RALACA offers the opportunity to work in a multidisciplinary context, where challenges are shared amongst dedicated committees and addressed collectively using expertise from multiple disciplines and experts. RALACA is gaining international recognition. The work of RALACA was presented at the fourth Latin American Pesticide Residue Workshop that took place in Bogotá,



Colombia, from 26–29 May 2013. Planning is on-going for RALACA papers to be presented at the 2014 IUPAC meeting in San Francisco, California, and the 2014 FAO/IAEA International Symposium on Food Safety and Quality: Applications of Nuclear and Related Techniques in Vienna, Austria.

RALACA welcomes the support of donor and/or technical cooperation agencies to be able to generate viable research proposals for the region and address local challenges through an integrated and sustainable strategy. For further information contact [board@red-ralaca.net](mailto:board@red-ralaca.net).

## Global Food Safety Partnership

Technical Officer: Andrew Cannavan

The GFSP is an innovative public private partnership facilitated by the World Bank, dedicated to improving the safety of food worldwide, focusing on middle income and developing countries. The mission of the GFSP is to improve food safety through capacity building in low and medium income countries in order to improve public health, facilitate trade, accelerate economic growth, and alleviate rural poverty.

More than 150 participants from over 50 organizations convened at the Second Annual GFSP Conference in Singapore, from 9–13 December 2013, to report on the GFSP's first year of progress, refine operational matters, and review future actions to scale up the world's response to food safety challenges.

The Conference was opened by the Singapore Minister of State for National Development, Mr Desmond Lee, who announced that Singapore is prepared to become a formal GFSP partner. The Conference was moderated by World Bank Agricultural Environmental Services Director Juergen Voegelé, who confirmed the World Bank Group's continued strong support for the GFSP. The Singapore Agri-food and Veterinary Authority hosted the Conference, with CEO Tan Poh Hong providing a warm welcome to the participants. Keynote addresses were provided by China FDA Vice Minister Teng Jiakai, FAO Assistant Director General for Agriculture and Consumers Protection Ren Wang, US FDA Deputy Director for International Affairs Julie Moss, Grocery Manufacturers Association Senior Vice President for Science and Regulatory Affairs and Chief Science Officer Leon Bruner, and Food Industry Asia Executive Director Bev Postma.

The Conference reflected high level dialogue and strong commitment to the GFSP mission. Participants emphasized that the GFSP represents a new and needed para-

digim for collaboration across the public, private and service provider sectors, recognizing that partnership among all stakeholders is essential to scaling up the world's response to food safety challenges. The GFSP evolved from a cooperation initiative between The World Bank Group and the Asia Pacific Economic Cooperation (APEC) Food Safety Cooperation Forum (FSCF) into a global partnership.

The activities of the GFSP are facilitated through Advisory Working Groups (WGs) consisting of experts from public and private sectors and service providers, which provide technical input and expertise in the design and delivery of the GFSP's work program. The WGs are facilitated by Massey University and the GFSP Secretariat and will provide critical guidance to the Secretariat during the first five-year period of the project. The Head of the FEPL is a member of the Food Safety Technical Working Group (FSTWG). A meeting of the FSTWG was hosted by UNIDO in Vienna, from 10–11 October 2013, at which the terms of reference for the group were discussed and agreed and work was commenced on elaborating the mechanisms through which the WG would act. These mechanisms were further elaborated and finalised at the second Annual Conference.

It is expected that participation in the GFSP will enable identification of synergies with FAO/IAEA projects to the greater benefit of project counterparts and Member States in the field of food safety

## FEP Laboratory Staff

This is an eventful period for staff changes in FEPL. Details are already given in the letter to the reader in this issue of the newsletter, but briefly, Mr Nasir Rathor retired on 31 December after 24 years service in the laboratory. Nasir was a mainstay of the FEPL, and will be sorely missed. We wish Nasir all the very best for his retirement and hope to see him frequently in the future.

Ms Laura Natalia Fernandez Cedi joined the Food and Environmental Protection Laboratory as an intern in September 2013. During her internship she will work on food traceability and authenticity methodology using a metabolomics approach and will contribute to the support provided by FEPL to the RALACA Laboratory Network.

Ms Marivil Islam rejoins FEPL after a four-month break. Our congratulations to Marivil on attaining the degree of Doctor of Philosophy, after successfully defending her thesis, the work for which was performed in FEPL, in December.

# Publications

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