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To the Reader

The Food and Environmental Protection Subprogramme continues to strengthen our joint efforts with FAO to protect human health and facilitate international agricultural trade by providing technical support and training for the development and application of international standards. These activities are primarily related to the use of ionizing radiation, the control of food contaminants and the management of nuclear and radiological emergencies affecting food and agriculture.

Specifically, in the area of food irradiation, Subprogramme research activities have led to the adoption of three additional phytosanitary irradiation treatments at the most recent Fifth Meeting of the Commission on Phytosanitary Measures (CPM) of the International Plant Protection Convention (IPPC). These treatments are in addition to the eight irradiation treatments accepted by the IPPC in 2009, making a total of eleven internationally adopted post-harvest phytosanitary irradiation treatments for inclusion in the IPPC Standard on Phytosanitary Treatments for Regulated Pests. It has been confirmed at our first research coordination meeting (October 2009) held under the Coordinated Research Project (CRP) on the Development of Generic Irradiation Doses for Quarantine Treatments that the development of additional generic and specific doses for pests and pest groups of quarantine importance (29 insect species from 13 arthropod families) will eventually be submitted to the IPPC for the potential adoption of additional irradiation treatments.

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We are also pleased to report that our new Coordinated Research Project on Irradiated Foods for Immunocompromised Patients and other Potential Target Groups has recently been approved on the basis of a project proposal developed by a consultants meeting held in Vienna in November 2009. This project will research and ultimately promote the application of food irradiation to increase the range and variety of foods available for those with impaired immune systems (e.g. neutropenic patients) or patients who require other special foods, e.g. blended (nasogastric) hospital diets. It is anticipated that the first research coordination meeting will be held in Vienna from 23–27 August 2010.

In the area of food contamination, the Subprogramme has successfully attained the approval of a new Coordinated Research Project on the Implementation of Nuclear Techniques to Improve Food Traceability on the basis of a project proposal that was developed by a consultants meeting held in Vienna in March 2010. The project is designed to help developing countries ensure food safety and control, combat fraudulent practices in trade and address cultural and religious issues relating to food. The CRP will also assist laboratories in implementing sustainable analytical tools that permit independent verification of paper based traceability systems for food commodities. The CRP will utilise synergies and share experiences and data with other fields of work within the Agency that employ stable isotope measurements, including the Isotope Hydrology Section and Laboratory, the Soil and Water Management and Crop Nutrition Section and Laboratory, and the Animal Production and Health Section and Laboratory.

In this regard, qualified candidates are encouraged to apply to our recently announced new Food Safety Specialist (Traceability) position (Vacancy Notice 2010/061) at the Food and Environmental Protection Laboratory in Seibersdorf, Austria. It is envisioned that the selected candidate will assist us in our efforts to respond to Member State priorities in the application of nuclear technologies to meet their food security goals related to the traceability and authenticity of food commodities within the general context of improving food quality and safety and enhancing international trade in foods.

Within the context of FAO obligations related to food and agriculture as a full party to the IAEA Early Notification and Assistance Conventions, and in collaboration with our FAO colleagues in Rome, the Subprogramme has also successfully contributed to the publication of the revised 2010 version of the Joint Radiation Emergency Management Plan of the International Organizations (EPR JPLAN 2010), which becomes effective on 1 January 2010. The FAO is a full party and co-sponsor of the JPLAN, which provides the management tools for coordinating international organization arrangements in preparing for, and responding to, nuclear or radiological emergencies.

In view of FAO responsibilities under the JPLAN which stipulate that detailed inter-agency procedures should be maintained by the participating organizations, the Subprogramme also successfully led the most recent revision of the Cooperative Arrangements between FAO and IAEA in Response to Nuclear or Radiological Emergencies, which are expected to be published in July 2010.

In closing, we convey our heartfelt thanks and best wishes to Mrs. Marivil Islam, who successfully contributed to the work of the Subprogramme as an analytical chemist on method development for food contaminants and laboratory quality assurance/quality control in the Agrochemicals Unit at Seibersdorf May 2003–May 2010. It is hoped that Marivil will maintain her close contact and future collaboration with the Subprogramme.

Best wishes to you and your families for a safe, healthy and happy holiday this summer season.

Sincerely,

David H. Byron

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Feature Article

Preparedness and Response to Nuclear and Radiological Emergencies Affecting Food and Agriculture

Technical Officer: David H. Byron

Background

Preparedness and response to nuclear and radiological emergencies affecting food and agriculture is of growing importance in our joint international activities, particularly with regard to increasing the capabilities of FAO as a critical counterpart in defining and implementing agricultural countermeasures in response to such events. These FAO responsibilities are mandated through two major international conventions, namely, the *Convention on Early Notification of a Nuclear Accident* (Early Notification Convention), whereby the FAO is responsible to "…. advise governments on acceptable levels of radionuclides appearing in agricultural, fisheries and forestry products entering national and international trade", and through the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency* (Assistance Convention), whereby the FAO is responsible to "…. advise governments on measures to be taken in terms of the agricultural, fisheries and forestry practices to minimize the impact of radionuclides and to develop emergency procedures for alternative agricultural practices and for decontamination of agricultural, fisheries and forestry products, soil and water".

Collaborative activities under these Conventions helped to ensure the successful adoption of the revised Joint FAO/WHO Codex Alimentarius Commission *Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade*. Other ongoing FAO Headquarters (Rome) and Joint FAO/IAEA Division (Vienna) collaborative activities include the improvement of interagency emergency preparedness and response management procedures, the elaboration of agricultural countermeasures to mitigate immediate and longer term effects arising from radionuclide contamination, and the continued elaboration and revision of standards related to radiation protection of the public, including hazards arising from existing exposure situations and particularly related to food and agriculture. FAO also takes part in international emergency response exercises simulating nuclear emergencies to help improve preparedness, including ConvEx-3.

FAO Activities Related to Emergency Preparedness and Response

FAO helps member countries prepare and respond to the threat of radioactive contamination of food and the environment. In subscribing to the Early Notification and Assistance Conventions, the FAO is responsible for information sharing and prompt assistance in the case of nuclear or radiological emergencies. It shares UN responsibilities in planning response to actual, potential or perceived nuclear or radiological threats.

FAO Headquarters works with the Joint FAO/IAEA Division, and particularly with the Food and Environmental Protection Subprogramme, in preparing for and responding to nuclear or radiological emergencies. These efforts are coordinated by the Office of the Assistant Director General, Agriculture and Consumer Protection Department, Food Chain Crisis — Intelligence and Coordination Unit. The FAO Food Chain Crisis Management Framework was developed by FAO to improve the organization's ability to address food chain emergencies in a holistic and interdisciplinary manner, along with the need to strengthen internal and external partnerships. Coordination, prevention and early warning and response are the three components of the framework with a focus on animal health, plant protection and food safety.

In regard to nuclear and radiological emergencies, the Special Emergency Programmes Service of the FAO Emergency Operations and Rehabilitation Division has been assigned to coordinate FAO efforts at the Headquarters level through the Food Chain Crisis – Emergency Management Unit in liaison with the FAO Nuclear Emergency Crisis Network of Technical Experts (ECN), with members drawn from eleven units across the Organization representing technical and operational divisions and information specialists, in collaboration with the Joint FAO/IAEA Division.

Interagency Emergency Preparedness and Response Management Procedures and Agreements

Interagency Committee on Radiological and Nuclear Emergencies

Pursuant to the obligations placed on it by the Early Notification and Assistance Conventions, the FAO regularly participates in the Interagency Committee on Radiological and Nuclear Emergencies (IACRNE), whose purpose is to coordinate the arrangements of the relevant international intergovernmental organizations for preparing for and responding to nuclear and radiological emergencies.

The terms of reference of IACRNE are:

- To coordinate preparedness arrangements for response to nuclear and radiological emergencies by, inter alia, developing, maintaining and exercising the *Joint Radiation Emergency Management Plan of the International Organizations* (Joint Plan).
- To work towards coordinated and consistent international standards on preparedness and response to nuclear and radiological emergencies, and their practical implementation in Member States and States Parties to the Conventions, and to strongly encourage its

participating organizations to meet the relevant standards.
- To exchange relevant information among organizations concerning their respective plans, activities and harmonization of these plans.
- To identify new areas for interagency cooperation and to coordinate joint actions (including drills and exercises) related to preparedness and response for nuclear and radiological emergencies.
- To review the Joint Plan biennially and issue amendments as appropriate.

In view of ongoing collaborative work between the FAO and the Interagency Committee on Radiological and Nuclear Emergencies, it is anticipated that the FAO will be represented at the next 21st Meeting of IACRNE that will be held at WHO Headquarters in Geneva, Switzerland in June 2010.

Joint Radiation Emergency Management Plan of the International Organizations

It is recognized by organizations responsible for emergency response that good planning in advance of an emergency can substantially improve the response. Moreover, one of the most important features of emergency response plans is clear lines of responsibility and authority. With this in mind, the IAEA, international organizations that are party to the Early Notification and Assistance Conventions, and other relevant international organizations that participate in the activities of the Interagency Committee on Radiological and Nuclear Emergencies, have developed the *Joint Radiation Emergency Management Plan of the International Organisations* (Joint Plan).

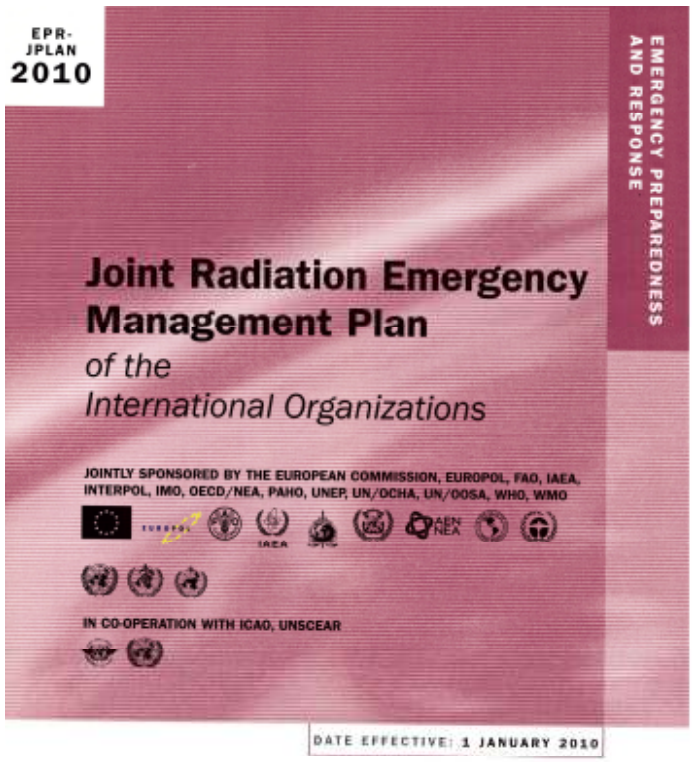
The Joint Plan describes the objectives of response; the organizations involved in response, their roles and responsibilities, and the interfaces among them and between them and Member States; operational concepts; and, preparedness arrangements. These practical arrangements are reflected in the various organizations own emergency plans, such as the *Cooperative Arrangements between FAO and IAEA in Response to Nuclear or Radiological Emergencies*. The Joint Plan does not prescribe arrangements between the participating organizations, but describes a common understanding of how each organization will act during a response and in making preparedness arrangements. Member States are also invited to use the arrangements described in the Joint Plan when providing relevant information about nuclear or radiological emergencies, in order to minimize the transnational radiological consequences and to facilitate the prompt provision of information and assistance.

Within the context of FAO obligations related to food and agriculture as a full party to the Early Notification and Assistance Conventions, and in collaboration with our FAO colleagues in Rome, the Food and Environmental (FEP) Subprogramme successfully contributed to the revision and publication of the revised 2010 version of the *Joint Radiation Emergency Management Plan of the International Organizations* (EPR JPLAN 2010), which became effective on 1 January 2010. The FAO is a full party and co-sponsor of the Joint Plan, which provides the management tools for coordinating international organization arrangements in preparing for, and responding to, nuclear or radiological emergencies.

Cooperative Arrangements between FAO and IAEA in Response to Nuclear or Radiological Emergencies

The *Cooperative Arrangements between FAO and IAEA in Response to Nuclear or Radiological Emergencies* (Cooperative Arrangements) were recently revised and it is expected that they will be signed by both FAO and IAEA with a view towards their implementation by 1 July 2010. The objective of the Cooperative Arrangements is to define coordinated actions between FAO and IAEA in response to nuclear or radiological emergencies affecting food and agriculture and to ensure that interagency procedures and communication channels are established and maintained. The Cooperative Arrangements also fulfil the requirements of the *Joint Radiation Emergency Management Plan of the International Organizations*.

The Cooperative Arrangements describe the basic response actions to be taken by FAO and IAEA in the case of a nuclear or radiological emergency affecting food and agriculture, specifically communication and information exchange, provision of technical advice and/or assistance, and public information.



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As indicated in the Cooperative Arrangements, the IAEA emergency response role is primarily in regard to facilitating information exchange, provision of assistance and public information. It also has a statutory function of establishing and applying safety standards for the protection of health and property. The IAEA fulfils its role in an incident or emergency through the Incident and Emergency Centre (IEC), which develops arrangements and procedures, trains staff, maintains equipment, maintains the Response Assistance Network (RANET), and carries out exercises and drills.

The FAO Nuclear Emergency Crisis Network of Technical Experts (ECN) evaluates and/or prepares recommendations on a preliminary impact assessment prepared by staff at the IEC. Activities are then implemented through the Food Chain Crisis — Emergency Management Unit within the Emergency Operations Service — Asia, Near East, Europe and Special Emergencies (TCES), which is the FAO operational focal point responsible for responding to nuclear and radiological emergencies.

Specifically, the FAO is responsible to:

- Have arrangements in place in the Joint FAO/IAEA Division (Vienna) and FAO Headquarters (Rome) to respond in a timely, appropriate and coordinated manner to an actual or potential nuclear or radiological emergency affecting food and agriculture.
- Be warned in advance of a developing situation that may require technical support and/or assistance so as to be ready to act on short notice.
- Provide information and advice to the IAEA on request.
- Keep the IAEA informed of technical advice/assistance requested by and provided to FAO decentralised offices, including countermeasures advised and/or taken.
- Maintain a 24-hour contact point for receipt from IAEA of notifications, advisory messages, requests for advice or assistance, and other information regarding nuclear or radiological emergencies.

While the IAEA is responsible to:

- Fulfil notification obligations to the FAO as a party to the Early Notification and Assistance Conventions.
- Fulfil commitments to the FAO as a cosponsor of the Joint Plan.
- The extent practicable, to develop a common understanding and coordinated approach in response to the emergency.
- Facilitate assistance to the requesting State(s).
- Keep the FAO informed of information/technical support requested by IAEA contact points related to food and agriculture.

International Exercises

International emergency response exercises and their effective evaluation are an essential tool for improving international emergency response arrangements. Over the past decade, many international nuclear emergency exercises have taken place, and much experience has been gained in the important fields of emergency preparedness and response management. It has been recognized that coordination and joint sponsorship of international nuclear emergency exercises can reduce the total number of exercises undertaken, helping to optimize resource utilization for both national and international organizations. Coordination can also extend the scope of the objectives addressed by such exercises, and national and international participants can profit from a broad range of proposed objectives. At the same time, results and analyses can be more effectively shared. The Interagency Committee on Radiological and Nuclear Emergencies, for which the IAEA provides the Secretariat, serves as a coordination point for these activities.

The purpose of the ConvEx-3 exercises is to test and evaluate the exchange of information and coordination of the international assistance during a major nuclear emergency. The ConvEx-3 exercises provide an opportunity to identify shortcomings in the national and/or international emergency response systems that might hamper the response aimed at minimizing the consequences of a nuclear accident. The first such jointly sponsored international nuclear emergency exercise took place on 22 and 23 May 2001, and was based on a French national level nuclear emergency exercise at the French Gravelines nuclear power plant. The second ConvEx-3 exercise was based on the Romanian national exercise at Cernavoda NPP and was conducted on 11 and 12 May 2005.

The third ConvEx-3 exercise in this series was based on a hypothetical accident at the Laguna Verde nuclear power plant (NPP) in Mexico on 9 and 10 July 2008. The exercise scenario was developed by the Laguna Verde NPP together with the National Nuclear Safety and Safeguards Commission (CNSNS) — the Mexican competent authority — within the framework of the IAEA *Emergency Notification and Assistance Technical Operations Manual* (ENATOM) arrangements for implementing the Early Notification and Assistance Conventions and validated in real time on the NPP Control Room Simulator.

The exercise was based on a severe nuclear emergency with serious transnational implications: ‘actual’ for few States, ‘potential’ for some and “perceived” for many. The following elements were included in the exercise scenario: (1) radioactive release into atmosphere, (2) medical and public health issues, and (3) specific interests in the “Accident State” and other affected countries such as commerce, industry and tourism (food and products contamination — issues of import/export, contamination of vehicles, ships — border crossings issues, foreign nationals).

The ConvEx-3 provided an excellent opportunity for FAO to test its response to a nuclear emergency through the involvement of the FAO Nuclear Emergency Crisis Network of Technical Experts (ECN) in Rome and the Joint FAO/IAEA Division in Vienna in continuous 12 hour shifts over a two-day period. The exercise tested the communication system and working instructions developed to support the Cooperative Arrangements between FAO and IAEA and was successful in identifying both strengths and weakness of the Arrangements, including in identifying specific areas where action was required. The exercise also revealed some significant issues such as the number of national competent authorities that would have to apply food restrictions, as this could have significant impact on commodity trade and food security in some adjoining Member States.

Interagency Collaboration in the Elaboration and Revision of Standards Related to Radiation Protection of the Public

Radiation Safety Standards Committee (RASSC)

FAO activities related to emergency preparedness and response also include their participation in the Radiation Safety Standards Committee (RASSC), which is a standing body of senior experts in radiation safety established by the Deputy Director General in the IAEA Department of Nuclear Safety and Security. RASSC advises the Deputy Director General on the overall programme for the development, review and revision of international standards relating to radiation safety.

These RASSC functions include the provision of advice on the approach and prioritization of the development of the radiation safety standards issued in the IAEA Safety Standards Series, covering Safety Fundamentals, Safety Requirements and Safety Guides, both thematic and practice specific. In this regard, the FAO plays a critical role in the development of emergency preparedness and response procedures related to food and agriculture as a cosponsor of the IAEA Safety Standards, including through its participation in the international organization secretariat established for the review and revision of the International Basic Safety Standards.

In view of ongoing collaborative work between the FAO and the Radiation Safety Standards Committee, it is anticipated that the FAO will be represented at the next 28th (June 2010) and 29th (December 2010) Meetings of the RASSC.

Interagency Committee on Radiation Safety (IACRS)

The Interagency Committee on Radiation Safety (IACRS) was formed in 1990 to foster the international harmonisation of radiation protection and safety as a forum for consultation and collaboration in radiation safety matters between international organisations. The objective of the IACRS is to promote consistency and coordination of policies with respect to the application of principles, criteria and standards of radiation protection and safety and translating them into regulatory terms; coordinating research and development; advancing education and training; promoting widespread information exchange; facilitating the transfer of technology and know-how, and; providing services in radiation protection and safety.

In this regard, the FAO was represented at the most recent 14th Meeting of the IACRS held jointly with the Basic Safety Standards Secretariat in Paris, France, from 12–13 January 2010. The Meeting discussed radon exposure management, international activities related to non-medical imaging, justification of medical exposure and revisions to the international BSS, including harmonization with the ICRP. A separate BSS Secretariat meeting was also convened to agree on the text of draft 3.0 of the revised BSS prior to its submission to Member States of the cosponsoring Organizations in late January 2010 for a 120 day comment period.

In view of ongoing collaborative work between the FAO and the Interagency Committee on Radiation Safety and the BSS Secretariat in the continuing revision of the Basic Safety Standards, it is envisioned that the FAO will be represented at the next 15th meeting of the IACRS which is tentatively scheduled to be held at the headquarters of the International Labour Organization in Geneva, Switzerland in June/July 2011.

International Basic Safety Standards (BSS) for Protection Against Ionizing Radiation and for the Safety of Radiation Sources

The International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS) is endorsed and published jointly by six cosponsoring organizations[1], including the FAO. As directed by the IAEA General Conference resolution GC(49)/RES/9A of September 2005, the 49th IAEA General Conference requested the IAEA Secretariat to undertake a review of the BSS and following this resolution, the IAEA invited representatives of UN and other intergovernmental organizations that were current sponsors of the BSS to coordinate the review of the BSS. Furthermore, as noted by the IAEA General Conference resolution [GC(50)/RES(10)] in September 2006, the 50th IAEA General Conference stated that "… the revision of the BSS is to be co-ordinated by a secretariat established by the Agency with the participation of the co-sponsors, and urges that secretariat to carefully consider and justify potential changes, taking into account their implications for national regulations." In response to these resolutions, the IACRS established a Joint Secretariat (BSS Secretariat) to undertake this task.

The BSS Secretariat, which is coordinated by the IAEA, is overseeing the review and revision of the BSS. The revised BSS will supersede the current BSS and reflect

1 The BSS was issued by the IAEA in 1996 in its Safety Series No. 115. It is jointly sponsored by FAO, IAEA, ILO, OECD/NEA, PAHO and WHO.

the knowledge gained and subsequent developments in radiation protection and safety and related fields.

The BSS Secretariat is tasked to:

- Support and facilitate the revision of the BSS, by ensuring that the interests, views and responsibilities of each cosponsoring organization are fully taken into account.
- Provide a forum for cosponsor organisations to inform each other of developments that may need to be taken into account.
- Coordinate the approval process of the co-sponsoring organisations for the revised BSS.

The FAO has been intimately involved with the review and revision of the BSS since the inception of the BSS Secretariat in 2006. It is anticipated that further discussions and revisions to the BSS will result in the final approval of the Standard at the 29th Meeting of RASSC in December 2010. The revised BSS will then follow the approval process of each of the cosponsoring and potential cosponsoring organizations before it is published.

In closing, the Joint FAO/IAEA Division looks forward to its continued collaboration with FAO headquarters and other international agencies in assisting Member States to effectively respond to nuclear emergencies through the provision of training and support and the development, coordination and implementation of standards, management procedures and emergency preparedness and response mechanisms.

Past Events

Working Group Meetings on Irradiation (chemical safety) of the European Food Safety Authority (EFSA) Scientific Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF); Parma, Italy; 25-26 January and 8-9 March 2010; Valencia, Spain; 4-6 May 2010

Technical Officer: Carl Blackburn

The technical officer served as an expert at the second (Parma, Italy; 25–26 January 2010), third (Parma, Italy; 8–9 March 2010) and fourth (Valencia, Spain; 4–6 May 2010) Working Group Meetings on Irradiation (chemical safety) of the European Food Safety Authority (EFSA) Scientific Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF).

In 1986, 1992 and 1998, the European Commission Scientific Committee for Food (EC/SCF) had expressed scientific opinions on the safety of the irradiation of a series of foods and food ingredients, which was intended to lead to the establishment of a list of specific classes of foods authorized for treatment with ionizing radiation, and the EC/SCF recommended maximum overall average doses that could be applied at the European Union (EU) level.

These opinions preceded EU food irradiation legislation (Directives 1999/2/EC and 1992/3/EC). Directive 1999/2/EC harmonizes the general and technical aspects for irradiating food across the all EU countries. This includes the labelling of irradiated foods and conditions for authorising food irradiation. Directive 1999/3/EC established a Community list of food and food ingredients authorized for treatment with ionising radiation. To date, Directive 1999/3/EC gives an initial list and it only contains a single food category: dried aromatic herbs, spices and vegetable seasonings. Until a finalized list enters into force, EU countries may irradiate other foods provided that the foodstuffs concerned were subject to a favourable opinion by the EC/SCF and the overall average absorbed doses do not exceed the EC/SCF recommended limits. At present several countries in the EU have authorized a wide range of irradiated foods in line with EC/SCF opinions, but not limited to the list in Directive 1999/3/EC. Other EU countries only allow the irradiation of one food category, dried aromatic herbs, spices and vegetable seasonings as per Directive 1999/3/EC.

The EFSA and its Panels have replaced the EC/SCF and the European Commission recently asked EFSA to issue an opinion on the safety of certain irradiated food products in order to establish whether the food classes and doses specified in the previous SCF opinions are still up-to-date to ensure consumer safety. This is part of the European Community process of considering different options and proposals for completing the EU list of food and food ingredients legally authorized for treatment, and therefore harmonizing the list of irradiated foods allowed for sale within all twenty-seven EU member countries.

The CEF Panel of EFSA is to provide a scientific opinion on the chemical safety of irradiated foods, and in parallel the EFSA Panel on Biological Hazards (BIOHAZ) is to address the efficacy and the microbiological safety of irradiation treatments (see January 2010 Newsletter). The CEF Working Group on Food Irradiation has met four times whilst drafting a scientific opinion on the chemical safety of irradiated foods. In order to have both scientific opinions (i.e. from the EFSA BIOHAZ and CEF Panels) distributed at the same time, the European Commission had extended the deadline for the publication of both BIOHAZ and CEF opinions until December 2010. A coordinated approach is being followed by the CEF and the BIOHAZ Panels and their respective working groups in developing their scientific opinions.

Joint FAO/IAEA Meeting on the Review and Revision of the Cooperative Arrangements Between FAO and IAEA for Information Exchange and Technical Support in Relation to Food and Agriculture in the Case of a Nuclear or Radiological Emergency; FAO Headquarters; Rome, Italy; 15-16 April 2010

Technical Officer: David H. Byron

In view of FAO responsibilities under the *Joint Radiation Emergency Management Plan of the International Organizations* (EPR JPLAN 2010) which stipulate that detailed inter-agency procedures should be maintained by the participating organizations, including FAO and the IAEA, the subprogramme successfully arranged a meeting at FAO Headquarters in Rome to revise the *Cooperative Arrangements between FAO and IAEA for Information Exchange and Technical Support in Relation to Food and Agriculture in the Case of a Nuclear or Radiological Emergency* (Cooperative Arrangements).

The Meeting was conducted in collaboration with the IAEA Department of Nuclear Safety, Incident and Emergency Centre, with the participation of FAO representatives from the Departments of Agriculture and Consumer Protection (AG), Technical Cooperation (TC), Fisheries and Aquaculture (FI) and Forestry (FO).

Recalling the requirements of sections 4.3 and 4.7 of the JPLAN, it was indicated that the purpose of the meeting was to revise the Cooperative Arrangements, which was last updated and signed in July 2007. An agreed revision of the main text, together with the annexes and the check lists, were expected outputs of the meeting. It was agreed that the revised Cooperative Arrangements should be signed by the respective representatives of both FAO and IAEA by 1 July 2010 (see Feature Article for details).

The Meeting reached the following conclusions and recommendations:

- A first draft of the revised and newly named Cooperative Arrangements between FAO and IAEA in Response to Nuclear or Radiological Emergencies will be shared with the ECN group for comments and input. Subsequently, it will be submitted to both the FAO and IAEA legal offices for final revisions. The importance to have the arrangements signed by 1 July 2010 was highly recommended.
- It was agreed that the annexes and check lists will not be part of the signed arrangements. However, it was recommended that a hard copy of both sets of documents should be published after their revision.
- An ECN meeting will be convened in the first week of June in order to proceed with revisions to the annexes and check lists.
- It was acknowledged that the terms of reference of the ECN group should be revised and updated.
- It was clarified that NAFA/AGE should be included in the Food Chain Crisis Management Framework (FCC) as part of the Agriculture and Consumer Protection Department (AGD) where the framework is based. The need to advocate for AGE to be an official member of the Oversight Committee of the FCC intelligence and coordination unit was recommended.

Fifth Meeting of the Commission on Phytosanitary Measures (CPM) of the International Plant Protection Convention (IPPC); Rome, Italy; 22-26 March 2010

Technical Officer: Carl Blackburn

Over the past three years, the Food and Environment Protection and Insect Pest Control subprogrammes have supported the technical development of irradiation as phytosanitary treatment and in this regard, a representative of the Joint Division attended the Fifth Meeting of the Commission on Phytosanitary Measures (CPM) of the International Plant Protection Convention (IPPC) at FAO Headquarters in Rome, Italy 22–26 March 2010.

Of the fourteen draft standards put forward for adoption to date, the fourth meeting of the CPM in 2009 adopted eight irradiation treatments for inclusion in the International Standard for Phytosanitary Measures (ISPM) No.28 (*Phytosanitary Treatments for Regulated Pests*). At their most recent 2010 meeting, the CPM adopted additional irradiation treatments for *Conotrachelus nenuphar*, *Grapholita molesta*, and *Grapholita molesta* under hypoxia. This makes a total of eleven internationally accepted post-harvest irradiation treatments to date.

Two additional remaining draft standards for the treatment of weevils have been forwarded to the IPPC Standards Committee for further review (irradiation treatments for *Cylas formicarius elegantulus*, and *Euscepes postfasciatus*), and a draft standard for irradiation treatment of the moth *Omphisa anastomosalis* was removed from the list of proposed treatments. It was indicated that further research should be done on this treatment to produce the necessary data for international acceptance.

14th Meeting of the Interagency Committee on Radiation Safety (IACRS); OECD/NEA Headquarters; Paris, France; 12–13 January 2010

Technical Officer: David H. Byron

The 14th Meeting of the Interagency Committee for Radiation Safety (IACRS) was held at the Headquarters of the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development (OECD) in Paris, France, 12–13 January 2010. The meeting was attended by IACRS Member organizations from the EC, FAO, IAEA, ILO, NEA, UNSCEAR and WHO and IACRS Observer organizations from the ICRP, IEC, IRPA and ISO.

The 14th Meeting of the IACRS discussed radon exposure management, international activities related to non-medical imaging, justification of medical exposure and revisions to the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS), including harmonization with the ICRP. A separate BSS Secretariat meeting was also convened to discuss the latest changes to draft 3.0 of the revised BSS.

The reporting officer presented a statement on FAO matters of interest to the 14th IACRS related to radiation protection and safety, including the:

- Newly created 2010–2011 Project (2.1.3.3) on Preparedness and Response to Nuclear Emergencies and Radiological Events Affecting Food and Agriculture within the IAEA Subprogramme on Improving Food Safety and Consumer Protection (2.1.3).
- FAO contributions to the revision of the 2010 Edition of the Joint Radiation Emergency Management Plan (JPlan) of the International Organizations.
- IAEA request for FAO co-sponsorship of the IAEA Safety Guide on Criteria for Use in Planning Response to Nuclear and Radiological Emergencies (DS-44).
- International Radiation Protection Association (IRPA) request for FAO co-sponsorship of the 13th International Congress of IRPA in Glasgow, Scotland, 13–18 May 2012.

In view of ongoing collaborative work between the FAO, the Interagency Committee on Radiation Safety and the BSS Secretariat in the continuing revision of the Basic Safety Standards, it is anticipated that a subprogramme representative will attend the next 15th meeting of the IACRS that will be held at ILO Headquarters in Geneva, Switzerland in June/July 2011.

4th Annual Meeting of the EU 6th Framework Integrated Project "BioCop"; Marloie, Belgium; 26–27 November 2009

Technical Officer: Andrew Cannavan

The 4th annual meeting of the EU 6th Framework Integrated Project “BioCop’ was hosted by the Laboratoire d’Hormonologie, Centre d’Economie Rurale (CER) Groupe, Marloie, Belgium, 26–27 November 2009. The Head of the Food & Environmental Protection Laboratory participated in the meeting as acting Chair of the Project Advisory Board and gave a presentation on Friday 27 November summarising the observations of the Advisory Board as the project enters its final phase.

The project focuses on the development and implementation of new methods to monitor and control the occurrence of multiple chemical contaminants in foods through the use of advanced sample preparation techniques and emerging biotechnological screening approaches. The main project objectives include the development of novel screening methods to detect multiple chemical contaminants in foods, training of scientists in the developed technologies, and widespread dissemination of project results and information.

A wide range of techniques have been developed for application to the detection of food contaminants, utilizing technologies such as transcriptomics, proteomics, molecular immunology, microarrays, biosensor technology, bioinformatics and mass spectrometry, and resulting in a number of rapid tests that can detect and identify many types of toxins in foods. The results include techniques suitable for routine regulatory monitoring and also those that are more suited to research applications to underpin food safety policy development.

A significant development in the final phase of the project is the dissemination of methods and techniques to developing countries through the inclusion of a new project partner for training and technology transfer in Thailand. This was in response to recommendations from the Advisory Board at an early stage of the project that the technologies developed should be made available to countries outside Europe, and especially to developing countries, to enhance their food safety and help to establish equivalence of food safety standards with those of the EU and other major trading blocks, thereby enhancing international trade in food commodities. The first training activity for countries in the East Asia/Pacific region will take place in June 2010.

The project partner in Thailand, Dr. Sasitorn Kanarat, has also interacted in IAEA projects in the past and is currently a Research Contract Holder under the CRP “Development of radiometric and allied analytical methods to strengthen national residue control programs for antibiotic and anthelmintic veterinary drug residues” (D5.20.36). Preliminary discussions were held with Dr. Kanarat with a view to establishing a partnership with the

Laboratory Centre for Food and Agricultural Products in Bangkok for the technology transfer of pesticide residue methodology to IAEA and FAO member states in East Asia. The institute has a sound infrastructure, is well equipped, has well qualified staff and is keen to establish such a relationship with the Agency.

Participation of an Agency representative in an advisory capacity in this type of project helps to facilitate the effective transfer of the technologies developed to a wider customer base, including IAEA and FAO developing country member states that have no chance to undertake the primary development themselves. This adds value to the project outcomes through the enhancement of food safety standards both within and outside the EU, and through increased trade between developing countries and the major trading blocks of the developed world.

Further information on the BioCop project is available at http://www.biocop.org/.

Forthcoming Events

International Symposium on Management and Strategy for Sustainable Environment Leading to Food Safety; Busan, Korea; 8–9 July 2010

The Korean Society of Environmental Agriculture (KSEA), has organized a 30th Anniversary International Symposium on Management and Strategy for Sustainable Environment Leading to Food Safety, which is being held in July 8 to 9, 2010, at the Busan Exhibition & Convention Center(BEXCO) in Busan city, Korea.

The objectives of the symposium are to identify scientific and practicable approaches to ensure that agricultural practices are compatible with sustainability of the environment and food safety for human health, and to strengthen the international network among scientists concerned with these and related issues.

The official E-mail address of the society is **ksea01@paran.com** (Society Office). Further information can be obtained from the chief of organizing committee, Dr. Jin Wook Kwon at **jinwook@nvrqs.go.kr.**

Food Integrity and Traceability Conference; Queen's University Belfast; 21–24 March 2011

The ability to protect the integrity of the food supply chain is a massive challenge but one which is of the utmost importance to protect the consumer. This encompasses the threats posed by microbiological and chemical contamination of the supply chain, along with guaranteeing the authenticity of food products to combat fraudulent practices and control adulteration for economic, food safety and cultural reasons.

Significant efforts worldwide have been devoted to tackling the multiple threats to the integrity of the food supply chain. These range from the introduction of control measures based on HACCP principles by agri-food industries to the introduction of national and international legislation. The drive to introduce improved traceability systems for agri-food products has been another important step in delivering a higher degree of integrity to the supply chain. All these measures have been supported by substantial research efforts.

Major gaps still exist in ensuring that the food we consume is safe and authentic. The ever growing list of food product recalls due to contamination with, for example, Salmonella, E.coli and Listeria, and scandals such as melamine and dioxin contamination of many food products has highlighted the need for improved measures to verify the integrity of the food supply chain. Continued research and improved techniques will facilitate targeted and efficient recall of contaminated products and allow trace-back to contamination sources for mitigation and ongoing improvement of farm-to-fork food safety systems.

Call for Papers

Background to the conference: The number of 'food scares' has grown enormously over the past decade; imported foods found to contain dangerous contaminants such as drugs, dyes and bacterial toxins are now reported frequently. As demands from consumers and regulators grow regarding food safety, the need to develop technologies to detect contaminants within food has increased.

Key Conference Themes

Contributing papers, as 10 and 20 minute oral presentations or posters, are particularly welcome across the main broad themes of the conference. In addition contributors across a number of specific topics are encouraged.

Theme 1: Reviewing recent progress in delivering safe, authentic and traceable food to the consumer.

Theme 2: Identifying the greatest current and emerging threats to the integrity of the agri-food supply.

Theme 3: Delivering new analytical means of verifying the integrity of the agri-food supply chain.

Examples of Topics for Special Focus Contributors

1. Advances in monitoring schemes for feed and food contamination identification.

2. Advances in methods/processes for improving feed and food traceability.

3. Emerging biotoxins: environmental contaminants, processing contaminants, microbiological threats which may pose new issues with supply chain integrity.

4. Fingerprinting-based approaches to early risk identification.

5. On-site analysis e.g. on farms, slaughterhouses, feedmills, processing plants.

6. The issues that current regulations, or lack of regulations, pose in delivering total food integrity.

7. Laboratory accreditation and method validation.

8. Key findings from National, EU and International food safety research projects.

9. The potential roles of nanomaterials (positive and negative) in food safety.

10. Innovations in combating food fraud.

Audience

All stakeholders in food integrity; scientists, regulators and industry representatives should attend.

For further information please visit www.qub.ac.uk/asset2011 or www.safefood.eu. For registration please visit **www.qub.ac.uk/asset2011**

The Saskatoon International Workshop on Validation and Reglatory Analysis; Saskatoon, Saskatchewan; 19–22 June 2011

The 2nd SASKVAL International Workshop on Validation and Regulatory Analysis of Residues in Foods is scheduled for Saskatoon, Saskatchewan, 19–22 June 2011.

The Workshop, the only one of its kind held in North and South America, will provide a forum for laboratory analysts and regulators to discuss the validation of analytical methods used in residue control programmes and the subsequent use/acceptance of the results if challenged by producers or courts of law.

The primary focus of the Workshop is residues (veterinary drugs, pesticides) and contaminants in foods, however, other major related topics including:

- programme design and quality management of residue control programmes,
- the development and validation of multi-residue analytical methods,
- current international initiatives,
- novel applications, new emerging technologies and methods of analysis,
- risk assessment and risk management procedures for residue control programmes.

For further information please contact:

SASKVAL Workshop
116 Veterinary Road
Saskatoon, SK
S7N 2R3
CANADA
saskval@inspection.gc.ca

Or visit www.saskval.ca

Coordinated Research Projects

Consultants Meeting to Develop a Coordinated Research Project on the Implementation of Nuclear Techniques to Improve Food Traceability; Vienna, Austria; 15–19 March 2010

Technical Officers: Josef Brodesser and Andrew Cannavan

A consultants meeting (CM) was held in Vienna, Austria 15–19 March 2010 to develop a Coordinated Research Project on the Implementation of Nuclear Techniques to Improve Food Traceability. In addition to IAEA Staff, the participants were:

- Mr. Simon Kelly, School of Environmental Sciences, University of East Anglia, Norwich, UK
- Mr. Luc Rock, Queens University Belfast, Belfast, UK
- Ms. Marion Brunner, VIRIS Laboratory, University of Natural Resources and Applied Life Sciences, Vienna, Austria
- Mr. Thomas Prohaska, VIRIS Laboratory, University of Natural Resources and Applied Life Sciences, Vienna, Austria
- Ms. Elena Maestri, Department of Environmental Sciences, Division of Genetics, University of Parma, Parma, Italy
- Mr. Franz Ulberth, EC-DG Joint Research Centre, Institute of Reference Materials and Measurement, Geel, Belgium
- Mr. Zhihua Ye, Institute of Quality Standards and Testing Technology for Agroproducts, Chinese Academy of Agricultural Sciences, Beijing, China
- Mr. Dzulkifly Mat Hashim, Products and Process Innovation, Halal Produts Research Institute, Universiti Putra Malaysia, Serdang Selangor, Malaysia
- Mr. Yusuf Zafar, National Institute for Genomics and Advanced Biotechnology, Pakistan Atomic Energy Commission, Islamabad, Pakistan

The objectives of the Meeting were to:

- Critically review the draft Coordinated Research Project proposal.
- Address and elaborate the requirements for traceability systems on a global basis, with emphasis on its implementation in developing countries.
- Report on available methods for isotopic and related analysis in foodstuffs with regard to regional provenance and trace-back.
- Discuss and make recommendations on the most effective techniques and directions where further research should be focused.
- Address the systems needed to assure the quality of research processes used in this CRP and provide guidelines to implement them.
- Assist in the preparation and finalization of a proposal for approval by the IAEA Committee for Coordinated Research Activities (CCRA).
- Identify potential agreement and contract holders with suitable laboratories and resources.
- Identify possible sources of extra-budgetary funding.
- Produce a meeting report on the above.

The Meeting discussed the current situation in different regions on the basis of consultant presentations, including the:

- Status of SPS and analytical facilities in Pakistan.
- General Situation of Research on Application of Isotope Ratio Techniques in Food Analysis in China.
- Halal Food Traceability.

Further presentations were made on the technologies available for traceability detection and verification, including:

- Food authenticity research at the European Commission JRC-IRMM.
- Food safety and security - experiences at the University of Parma.
- Food traceability studies via multi-element and isotopic fingerprints.
- Stable Isotope Facility & Centre for Assured, Safe and Traceable Food at Queens University Belfast.

The Meeting noted that:

- For the benefit of countries with limited resources, the CRP should include the development of methods that do not require the purchase of costly equipment. Transfer of these methods to these countries would empower them in the preliminary establishment of national monitoring programs for food traceability.
- Taking into account new developments in the field of ‘omics’ (genomics, metabolomics, proteomics) and of established techniques such as FTIR, GC and HPLC, the use of these techniques for traceability applications should be investigated as part of the CRP.

- A protected website for interaction between IAEA, contract and agreement holders should be established.
- Appropriate experts should be invited to the RCMs to present up to date developments in the residues field to all participants. A component of training was felt to be important to the success of the project and this could best be achieved in tandem with RCMs. The University of Natural Resources and Applied Life Sciences, Vienna, offered to host a preparatory course in conjunction with the first RCM on the application of state of the art analytical methods for verifying the traceability of food commodities.
- Up to 12 research contracts should be awarded to Member States submitting appropriate research proposals. Each prospective Principal Scientific Investigator will have to submit a research proposal highlighting current equipment and experience levels in their laboratory together with an indication of the availability of adequate funds for relevant research activities.
- Research Agreement holders (3–5) should be invited to support the CRP with their expertise.
- Technical contacts should be awarded to selected institutions to undertake multivariate statistical and spatial modelling of large datasets for the CRP.
- The Food and Environmental Protection Laboratory in Seibersdorf will provide scientific and technical support to the CRP for method development, optimisation and validation, including quality control and method performance criteria.

The CM further agreed that the CRP will have a significant impact on the improvement of food traceability systems used in member states. This will enhance food safety and consumer protection and help to ensure successful domestic and international trade in developing countries. The CRP is within the FAO/IAEA mandate to ensure the safety and quality of food commodities. The CM recognises that IAEA is in the unique position of coordinating research efforts in developing countries and, consequently, strongly recommends that this CRP is funded by IAEA.

Based on the CRP proposal and the activities needed to meet the objectives of the project, the CM agreed on the following recommendations:

- The CRP should be multi-disciplinary, involving institutes with an appropriate range of nuclear and complementary analytical capabilities and expertise with adequate quality assurance and quality control systems.
- Two technical contracts should be awarded to undertake multivariate statistical and spatial modelling of large datasets.
- Contract holders need to ensure the collection of authentic samples and this may include the involvement of competent authorities.
- The possibility should be explored of using the GNIP/GNIR framework to host an equivalent database for quality assured isotopic and elemental data on food commodities to ensure sustainability.
- The possibility of involving instrument manufacturers to encourage participation in the CRP should be explored.
- A scientific steering committee should be established, with members drawn from participants and external experts.
- Possible synergies and affiliations with food safety/provenance projects (e.g. SELAMAT, MONIQA, TRACE, TRACEBACK, BIOCOP, CONffIDENCE) and other institutes/organizations working in the fields of bio-terrorism and other forensic areas should be explored.
- The possibility of using lower cost instrumentation for isotopic and elemental analysis (e.g. CRDS) should be investigated to facilitate the implementation of nuclear techniques in developing countries.
- The possibility of a special edition for this CRP with editors of peer reviewed journals should be discussed.

Participants of the Consultants Meeting

We are pleased to report that the new Coordinated Research Project on the Implementation of Nuclear Techniques to Improve Food Traceability was approved on the basis of the project proposal that was developed by the Consultants Meeting. In this regard, qualified candidates are encouraged to apply to participate in the new CRP by the application deadline of **30 September 2010**. The CRP will commence in early 2011. Please see http://www-crp.iaea.org/html/rifa-show-approvedcrp.asp for details.

Third Research Coordination Meeting of the Coordinated Research Project on Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Analysis (K4.10.10); IAEA; Vienna, Austria, 1–5 February 2010

Technical Officers: Ross Jeffree and David H. Byron

The 3rd Research Coordination Meeting (RCM) of the IAEA Coordinated Research Project (CRP) on Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Analysis met at IAEA, Vienna, Austria 1–5 February 2010.

The RCM recalled that the broad objective of the CRP was to generate data on priority contaminants in seafood organisms with regard to human consumption, sale and export, and to assess the application and relevance of these experimentally-derived and field-based data to the management of these contaminants in seafood. The specific CRP objectives included the:

- Integration of current studies on the applications of nuclear techniques to the study of the bioaccumulation and food-chain transfer of contaminants in seafood, with risk management decisions in relation to the assessment of their suitability for human consumption and trade
- The clear identification of the needs for scientific data on the bioaccumulation of priority contaminants in seafood through linkages with international standardisation bodies
- The generation of data that are relevant to the management of contaminants in seafood through the application of radiotracer, radioassay and related nuclear technologies.

The RCM noted that the general objectives of the meeting were to:

- Discuss and review the project reports presented by the individual participants, including in the context of the overall CRP objectives and the conclusions and recommendations of the 2nd RCM
- Examine additional means of strengthening interaction between the participants
- Prepare revised conclusions and recommendations to facilitate the project tasks

In reviewing the objectives of the CRP and discussions at the 2nd RCM, the participants confirmed that the CRP would optimally generate scientifically sound outputs and outcomes related to international standardization activities, including the:

- generation of quality-assured field data on contaminant levels in target biota, using reference material
- interpretation of data underpinned by mechanistic understandings, based on radio-assay/tracer experimental studies
- potential consideration of data by JECFA to facilitate decision making on acceptable background levels in seafood and/or advice from JECFA on what additional data would be needed
- JECFA and/or related expert committee assessments of seafood contaminants based on the CRP data provided, leading to the potential establishment of Codex maximum levels in seafood

Among the topics of discussion, the following presentations were made to provide information on the further consideration of the CRP results within the international community. These presentations included:

- Recent Standardization Activities of the Joint FAO/WHO Codex Alimentarius Commission Related to Seafood and Seafood Safety
- Proposal Concerning the Establishment of the Marine Radioecology International Network (MARLIN)
- Status of Ongoing and Future IAEA Technical Cooperation Projects on the Use of Receptor Binding Assay for the Quantification of PSP and CFP Biotoxins in Seafood
- RCM Country Presentations, Conclusions and Recommendations (Brazil, Canada, Chile, China, France, French Polynesia, Ghana, Japan, Pakistan, Philippines, Thailand and Vietnam)

The RCM noted that the Joint FAO/WHO Expert Committee on Food Additives is scheduled to evaluate cadmium and lead at its 73rd Meeting (Geneva, 8–17 June 2010). It was further noted that in response to a JECFA call for data circulated on 14 September 2009, CRP participants from Canada, China, Japan, Thailand and Vietnam submitted data prior to the JECFA deadline of 1 December 2009.

Review of the Coordinated Research Project D5.20.35 on Integrated Analytical Approaches to Assess Indicators of the Effectiveness of Pesticide Management Practices at a Catchment Scale; Vienna, Austria; 28 January 2010

Technical Officer: B. Maestroni

A review of the first three years of work under Coordinated Research Project D5.20.35 Integrated Analytical Approaches to Assess Indicators of the Effectiveness of Pesticide Management Practices at a Catchment Scale took place on 28 January 2010.

Despite the challenging issues in implementing this CRP, all contract holders have participated enthusiastically in the project and have applied the information acquired in the coordination meetings, improving their laboratory's capabilities. All research institutions have embraced multidisciplinary and multistakeholder approaches. This has facilitated collection of the input parameters to the Pesticide Impact Rating Index (PIRI), the first tier risk as-

sessment tool used under the CRP, as well as the introduction of the bioassays and the bioindicators to complement chemical analyses, thus delivering the integration strategy described in the project objectives. A technical contract on the planning, organization and conduct of an interlaboratory trial was awarded to a laboratory in Germany, and this was highly appreciated by all contract holders. The laboratories implemented corrective actions under ISO 17025.

An exchange of information between the CRP and regional technical cooperation projects (TCPs) was initiated under TCP RLA5/0/50 and continues with TCP RLA5/0/53. While the CRP has prepared the protocols and the basic research, the technical cooperation project has ensured the active transfer of knowledge and information generated under the CRP and the capacity building activities. These included the Regional Training Course on Pesticide Risk Assessment, Sampling and Analytical Methodology for Pesticides in Water held in December 2007; the Regional Training Course on Refinement of Analytical Methodology, LIMS, Bioassays and QA/QC Measures held in June 2008; the GC-MS training course held in November 2008; and, the First Level Regional Training Course on the Estimation of Pesticide Loads in a Microcatchment, Revision of Sampling Plans, Use of PIRI, GIS, and LIMS Bioindicator/Bioassay and Analytical techniques held in November 2009.

Quick communication has been an issue from the onset of the project. The establishment of the CRP web site (http://elearning.iaea.org/ATutor/bounce.php?course=82) has enabled effective information exchange and recently added a set of networking tools.

The CRP web page can be accessed through the FAO/IAEA eLearning web site after registration. Since it is not open to the public at large, access to the CRP pages requires enrolment approval. Figure 1 shows a table of contents for all information generated under the CRP. This has provided transparency, a tight focus, and traceability of information.

Time and efforts were spent in harmonizing protocols and providing a minimum level of equipment to sample, analyze and evaluate residue data in surface waters. Valuable data is now being generated by research contract holders at the sub-catchment scale. The utilization of the flow-meters and the training on geographical information system (GIS) modelling will eventually lead to scaling up the microcatchment data to a catchment scale.

In summary, the CRP encompasses:

- A preventative approach
- A risk based approach, through use of the pesticide impact rating index (PIRI)
- Integrated monitoring, chemical and biological tools (bioindicators and bioassays, in situ and laboratory)
- A holistic stakeholders approach (farmers, associations, producers, consumers)
- Sustainable monitoring through recognition of value added of produce
- Value added to the food produced under environmental sustainability, this has economic and trade impact
- A 'black box' strategy used to monitor indicators of good agricultural practice
- Strong links with TCPs RLA/5/050 and RLA/5/053

We are pleased to announce that the third research coordination meeting is scheduled to take place in Vienna, Austria, 6–10 December 2010.

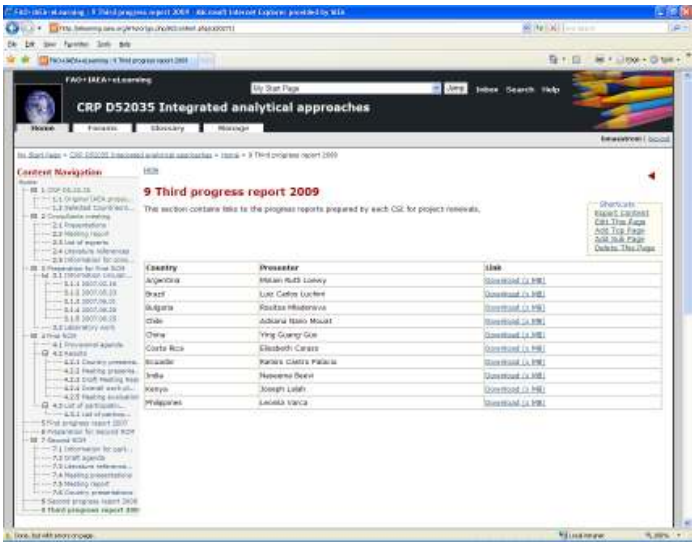

Figure 1. A screenshot from the CRP web page.

Consultants Meeting to Develop a Coordinated Research Project (CRP) on Irradiated Foods for Immuno-Compromised Patients and Other Potential Target Groups; Vienna, Austria; 24-27 November 2009

Technical Officer: Carl Blackburn

A consultants meeting was held to advise the Food and Environmental Protection (FEP) Subprogramme of the Joint FAO / IAEA Programme for Nuclear Techniques in Food and Agriculture (NAFA) on a proposed new CRP on Irradiated Foods for Immuno-Compromised Patients and Other Potential Target Groups in Vienna, Austria, 24–27 November 2009. The meeting produced a CRP proposal that was subsequently considered and approved by the IAEA's Committee on Coordinated Research Activities February 2010.[2]

In addition to IAEA staff, the meeting participants were:

2 http://www-naweb.iaea.org/nafa/fep/crp/fep-irradiated-foods-for-ICP.html

- Dr Susy Frey Sabato, Instituto de Pesquisas Energéticas e Nucleares (Brazil)
- Dr Csilla Mohácsi-Farkas, Corvinus University of Budapest (Hungary)
- Ms Jesusa Salvador, National Kidney and Transplant Institute (Philippines)
- Dr Ju-Woon Lee, Korea Atomic Energy Research Institute (Republic of Korea)
- Dr Suresh Pillai, Texas A&M University (USA).
- Dr Yohan Yoon, Korea Atomic Energy Research Institute.

The objectives of the meeting were to:

(1) Critically review the draft Proposal for the Coordinated Research Project.
(2) Identify and highlight issues, including
    - Important foods or food types to include
    - Degree of sterilization (completely sterile or 'clean')
    - Nutrient quality
    - Microbiological criteria
    - Organoleptic (sensory) criteria
    - Technical / irradiation considerations
(3) Make recommendations and provide conclusions based on the above analysis.
(4) Help identify suitable potential agreement and contract holders.

Review of the CRP Proposal

The consultants agreed that a CRP on irradiated foods for immuno-compromised patients would produce very valuable research and the proposal should be developed further.

The proposed CRP title of Use of Irradiation for Shelf-Stable Sterile Foods for Immuno-compromised Patients and other Specific Target Groups was altered as it the meeting thought it did not fully capture the scope of the necessary research. Namely, prolonged shelf-stability was not seen as critical to ensuring that food was safe for patients. Also, an appropriate level of food safety would not necessarily require complete sterilization. The Consultants Meeting therefore agreed that the CRP title should be revised to the Development of Irradiated Foods for Immuno-compromised Patients and Other Potential Target Groups.

Collaboration with the healthcare and medical community was thought to be essential to the success of the proposed CRP. It was felt that their involvement is critical for the development, adoption and acceptance of irradiated foods for patients. A survey of hospitals would be useful to gather data from Member States (for example dietary requirements, microbiological criteria and legal requirements). A survey would also bring the CRP to the attention of the medical community at large.

The meeting also noted that the CRP should recognize and take account of local food preferences when extending the variety of foods available for patients. The types of food considered most important for patients and amenable to irradiation were fresh produce (fruits, vegetables, and salads), ready-to-eat meals and functional foods.

The positive psychological effect of eating food either as a 'treat' (e.g. ice cream) or reflecting a more normal diet was discussed. It was thought that a maximum 'feel-good' benefit would be achieved if the CRP reflected the ethnic, local and regional food preferences of patients.

The consultants noted that microbiological criteria are available for many foods, either in legislation or international standards, but these criteria are normally applicable to healthy consumers. There do not appear to be defined sets of microbiological criteria for low microbial diets/sterile foods intended for hospital patients and food preparation practices in hospitals seem to vary from country to country. It was also noted that the requirements of each specific target group of patients would need to be addressed by the CRP as well as any related factors such as age (infant, child, adult or elderly) and specific feeding requirements (orally or nasogastric).

There was also some discussion on other potential target groups in terms of non-medical applications. It was felt that the CRP should primarily address the needs of patients and the medical community (for example, irradiated ready-to-eat meals could be used in hospitals that lack specialist catering facilities for the immuno-compromised). However, it was noted that irradiated foods developed for patients could also be marketed or developed for other purposes (e.g. space foods, civil defense, out-door activities) and that irradiated foods could fulfill or be readily adapted to meet the needs of people other than hospital patients.

The consultants made the following conclusions and recommendations based on the proposed scope of the CRP and the activities needed to attain the CRP objectives.

Conclusions

1. The sensory and related psychological effects of a diet should not be under-estimated. Access to a varied diet that includes fresh and local produce and which meets ethnic preferences can promote a beneficial feeling of familiarity and well-being. Irradiation, by extending the variety of foods while maintaining organoleptic and nutritional quality, would be of psychological value to patients while at the same time helping them maintain a nutritionally beneficial diet.

2. Food irradiation has the potential to provide nutritious, easily digestible, wholesome, and palatable hospital diets. The variety of foods available for hospital patients would be increased and enhanced by including irradiated fresh and ready-to-eat meals. The risk of cross contamination associated with conventional handling, processing and preparation technologies is also minimised as irradiation can be applied as a final treatment step in order to prevent such contamination.

3. The CRP must focus on foods of national or regional relevance and should reflect the requirements of their medical communities. However, these needs may also be aligned with irradiated foods marketed or developed for other purposes (e.g. space foods, civil defence, outdoor activities), where the degree of processing and the qualities of the irradiated product fulfils or could be readily adapted to meet the needs of specific target groups of patients.

4. Microbiological limits in food standards and legislation are normally applicable to healthy populations i.e. not the immuno-compromised. Defined sets of microbiological criteria for therapeutic diets are not commonly available and food practices in hospitals vary from country to country. A common set of microbiological criteria would facilitate the development of special foods for these target groups.

5. Fresh produce treatments might require the combination of irradiation with other food technologies, such as modified atmosphere packaging (MAP), to maintain optimal organoleptic and nutritional qualities. The point at which ionizing radiation (gamma rays, electron beam or X rays) is applied in the production chain and the manner of its application may also be critical and should be taken into account.

6. Involving the healthcare and medical community (as well as other relevant international organizations) and communicating the benefits of irradiated food is critical to the successful adoption, development, marketing and commercialization of irradiated foods for hospitals. Irradiated foods developed under this CRP could have a place in therapeutic as well as regular hospital diets.

Recommendations

1. The CRP should primarily concentrate on foods for immuno-compromised patients as well as other potential target groups.

2. CRP participants should investigate and develop irradiated foods for immuno-compromised patients and other target groups in collaboration with other relevant partners, including medical (nutritionists, doctors), other healthcare food industry specialists and relevant international organizations. The title of the CRP should be revised to the Development of Irradiated Foods for Immuno-compromised Patients and Other Potential Target Groups.

3. CRP participants must have access to, or be able to undertake:

- Radiation processing (gamma, X ray or electron beam)
- Quantitative microbiological, nutritional and sensory testing
- Qualitative psychological assessments

4. The CRP should mainly investigate irradiated foods such as fresh produce (fruits, vegetables, and salads), ready-to-eat meals (chilled packed meals) and functional foods. Studies should take into consideration ethnic, local and regional foods.

5. The first RCM should:

- Establish a range of diverse foods for study
- Agree which organisms are of importance, including viruses, bacteria and parasites
- Determine appropriate microbial criteria for the foods under development

6. Studies should take account of the specific target group of patients and any related factors such as age, additional special dietary requirements (low salt, low protein, low fat), and specific feeding requirements (e.g. orally or nasogastric).

7. The CRP should include an educational element on irradiated therapeutic food, which should be targeted at medical specialists. The collation and dissemination of appropriate information and data should form part of this activity, as should patient surveys regarding the acceptability of irradiated foods in hospital diets.

Coordinated Research Project (CRP) on the Development of Radiometric and Allied Analytical Methods to Strengthen National Residue Control Programmes for Antibiotic and Anthelmintic Veterinary Drug Residues

Technical Officer: Rajendra Patel

Following the Research Contract meeting (RCM) held in October 2009 at the IAEA in Vienna, this CRP has made an excellent start. At the RCM work plans were agreed with the Contract Holders from Brazil (2), China (2), Kenya, Republic of Korea, Mongolia, Peru, Sri Lanka,

Thailand and Tunisia. Agreement Holders and Consultants from Austria, Belgium, Germany, Netherlands, UK and USA also played an active role in advising the participants with their project plans.

The main purpose of this CRP is to assist National Reference Laboratories of FAO and IAEA member states to implement effective and appropriate monitoring methods for residues of selected antibiotic and anthelmintic veterinary medicines. With this in mind, a number of research projects have focused on developing screening and confirmatory methods suitable for use in surveillance programmes. For example, in Brazil, immunoassays are being developed for ciprofloxacin, enrofloxacin and florfenicol. A high-pressure liquid chromatography-UV detector (HPLC-UV) method for the monitoring of florfenicol residues in fish samples has also been developed and validated. In China a multi-analyte high performance thin layer chromatography (HPTLC) method is being set up together with a liquid chromatography electrospray ionization tandem mass spectrometry (LC-ESI-MS/MS) method for 13 aminoglycosides. Both these methods are currently undergoing optimisation for routine use. In Sri Lanka a HPTLC method for detection of sulfonamides in shrimps has been set up and is undergoing validation prior to application in routine surveillance. In Thailand, work has been initiated to identify unique bacterial strains susceptible to specific antimicrobials. These will be used to develop a simple microbiological assay utilising specific indicators changing color as the pH of the growth media changes as a result of microbial metabolism during growth. In the Republic of Korea methods are being investigated for detection of veterinary drugs in complex environmental samples such as soil and manure. Negative control material for these matrices has been prepared. In Tunisia a pharmacokinetic study in Sea Bass (Dicentrarchus labrax) using 14C-Flumequine will be conducted. We are grateful to colleagues at the US FDA Centre for Veterinary Medicine for making the 14C-Flumequine available to the Contract Holder. In Mongolia, the Contract Holder is investigating sources of natural antimicrobial compounds likely to impact the regulatory framework for veterinary drug residues and in this respect, the natural occurrence of the prohibited antibiotic chloramphenicol in plant material has already been demonstrated (B. Berendsen et al. , Anal Bioanal Chem 2010, http://dx.doi.org/10.1007/s00216-010-3724-6).

This CRP forms a unique and global network of scientific expertise addressing complex and important food safety challenges and its successful implementation will result in improved food and feed quality and safety in FAO/IAEA Member States and further help developing countries to access major global food markets. Research results from the participants will assist regulators in the development of new guidelines and regulations pertaining to food safety and the environmental impact of veterinary drugs. All the methods developed and validated by the CRP will be made available through publications and on the Food and Environmental Protection Subprogramme web pages.

Technical Cooperation Projects

Project Number	Title and Project Objectives	Technical Officer
ALG5025	**Strengthening Capabilities to Control Veterinary Drug Residues in Foodstuffs** To improve consumer protection and facilitate trade through increased capacity in the determination of veterinary drug residues in foods.	**Patel, Rajendra Kumar P. (NAFA)** **Cannavan, Andrew (NAFA)**
ARG5011	**The Use of Ionizing Radiation for the Phytosanitary Treatment of Fresh Fruit** To strengthen the national technological capacity for the establishment of irradiation services for phytosanitary treatment.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
BEN5004	**Regulatory Control and Monitoring of Mycotoxins to Facilitate Trade** To establish laboratory capacities and analytical procedures for mycotoxin control.	**Brodesser, Peter Josef (NAFA)** **Byron, David Henry (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
BGD5024 (completed)	**Phytosanitary Treatment for Insect Pests Infesting Fresh Fruits and Vegetables** To strengthen the national capacity in applying irradiation as a quarantine treatment for insect pest infestations in fresh fruits and vegetables.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
BGD5027	**Establishing a Veterinary Drug Residue Laboratory** To establish a laboratory complying with international standards for surveillance of veterinary drug residues and prohibited substances in food of animal origin.	**Cannavan, Andrew (NAFA)** **Patel, Rajendra Kumar P. (NAFA)**
BOL5017	**Capacity for Monitoring Pesticide Residues for Compliance with Minimum Risk Levels and Good Agricultural Practice According to ISO 17025** To improve food safety and environmental quality in Bolivia and the competitiveness of Bolivian farmers.	**Ferris, Ian Glen (NAFA)** **Maestroni, Britt Marianna (NAFA)**
BRA5058	**Applying Ionizing Radiation for Food Security and Healthcare** To train specialized personnel capable of processing food and blood with radiation, taking into consideration the variety of foodstuffs, storage facilities and climatic conditions in the country.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
BZE5003	**Providing Technical Assistance and Training for the Control of Chemical Residues in Food.** To help ensure that the food placed on the market for consumers from national or imported sources is free from harmful chemical contaminants by supporting and strengthening the development of a national chemical contaminant residue monitoring programme, and to further increase the technical capacity (in the area of residue testing) of the competent authority in Belize responsible for agricultural health and food safety.	**Maestroni, Britt Marianna (NAFA)** **Ferris, Ian Glen (NAFA)**
CHI5046	**Certification of Exported Animal Products Using Nuclear and Other Analytical Techniques** To strengthen the analytical capabilities of laboratories authorized to certify exported animal products to support the national programme on control of chemical residues, in order to comply with international standards, harmonize measurement results and promote mutual recognition agreements on product certification.	**Cannavan, Andrew (NAFA)** **Patel, Rajendra Kumar P. (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
CHI5048	**Integrated Watershed Management for the Sustainability of Agricultural Lands** To develop a management model for sustainable agricultural systems through nuclear and chemical diagnosis of the impacts of anthropogenic practices.	**Ferris, Ian Glen (NAFA)** **Mabit, Lionel (NAFA)**
COL5021	**Cost Benefit Assessment for the Modernization of an Irradiator in Colombia** To develop a proposal for the sustainable operation of a pilot irradiator (100 000 Ci, cobalt-60), through the realization of a cost benefit analysis with account taken of the situation in Colombia.	**Blackburn, Carl Michael (NAFA)** **Sampa, Maria Helena de O. (NAPC)** **Pacheco Jimenez, Ronald Enrique (NSRW)**
COL5022	**Assessment of the Impact of Pesticide Use in Lake Tota, Boyacá,Colombia** To identify sources of agrochemical pollution; to determine the pesticide transport mechanism, the risk of pollution from agrochemicals applied to the area of the project and the environmental impact and risk to human health; to upgrade the pesticide residue analysis laboratory for monitoring and analysis of pollution in water resources.	**Ferris, Ian Glen (NAFA)** **Maestroni, Britt Marianna (NAFA)**
COS5026	**Management and Appropriate Use of Insecticide-nematicides** To reduce the adverse impact of insecticide-nematicides through the application of water management and nuclear techniques.	**Ferris, Ian Glen (NAFA)**
CPR5018	**Building Technological Capacity for Food Traceability and Testing of Pesticide Residues in Food** To provide the technical and regulatory basis for food origin traceability and for monitoring residues of pesticides, in order to ensure food safety and consumer confidence.	**Brodesser, Peter Josef (NAFA)**
ERI5005 (completed)	**Zoonotic (diseases that can be transmitted from animals to humans) Disease Control and Analysis of Veterinary Residues in Foods** The objective of the project is to determine the epidemiological prevalence of brucellosis and tuberculosis in the major dairy producing areas and to develop baseline data on veterinary drug residues in milk and meat products.	**Cannavan, Andrew (NAFA)** **Unger, Hermann (NAFA)** **Patel, Rajendra Kumar P. (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
GUA5015 (completed)	**Establishing a Food Irradiation Plant** To establish the technical conditions for setting up a food irradiation plant in Guatemala in order to support agriculture exports.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
HAI5003	**Enhancing Crop Productivity through the Application of Isotope Nuclear Techniques** To enhance national capabilities to apply suitable agricultural practices and nuclear techniques to increase crop productivity to meet the national requirements for food security.	**Sakadevan, Karuppan (NAFA)** **Ferris, Ian Glen (NAFA)**
INS5033	**Enhancement of Quality Assurance for the Analysis of Veterinary Drug Residues** To enhance the national capacity to ensure the safety of food products of animal origin.	**Patel, Rajendra Kumar P. (NAFA)** **Cannavan, Andrew (NAFA)**
ISR5016	**Supporting a Feasibility Study for Using Irradiation as a Quarantine Treatment** To investigate the technical feasibility of using irradiation as a quarantine treatment on key export commodities.	**Byron, David Henry (NAFA)** **Blackburn, Carl Michael (NAFA)**
IVC5027	**Monitoring of Pesticide Residues in Food Products** To enhance the national capacity to ensure the safety of food products of animal origin.	**Brodesser, Peter Josef (NAFA)** **Maestroni, Britt Marianna (NAFA)**
JAM5011	**Supporting Food Irradiation of Selected Economically Important Crops** To increase the efficiency and productivity of farmers and/or agro-processors in Jamaica in the marketability of selected highly perishable and economically important foods/food products.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
LEB5014	**Upgrading the Environmental and Food Analysis Laboratory at the National Council for Scientific Research** To upgrade the laboratory of environment and food analysis in order to extend analytical capabilities for the analysis of thermo fragile organic compounds.	**Brodesser, Peter Josef (NAFA)**
MAK5005 (completed)	**Upgrading of Food Safety System** To improve the food safety system in the country.	**Brodesser, Peter Josef (NAFA)** **Maestroni, Britt Marianna (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
MNE5002	**Upgrading Capabilities to Establish Effective Monitoring Systems for Residues in Food and Air Quality** To establish an effective monitoring system for residues in food and air quality in Montenegro by enhancing analytical capabilities and establishing a network of air quality monitoring stations.	**Brodesser, Peter Josef (NAFA)** **Wegrzynek, Dariusz (NAFA)**
MNE8002 (completed)	**Upgrading a Persistent Organic Pollutant Laboratory towards Accreditation for Environmental Monitoring** To upgrade capacities in Montenegro and renovate the existing laboratory equipment at CETI through the provision of a new GCMS system required for POP control, especially for the presence of polychlorinated dibenzo-dioxins (PCDD) and polychlorinated dibenzo-furans (PCDF) and other POPs in the air, water and human food so as to protect the health of Montenegrin population.	**Safrany, Agnes (NAPC)** **Brodesser, Peter Josef (NAFA)**
MOR5024 (completed)	**Industrial Application of Irradiation** To reduce staple food losses, increase the microbiological safety of foods, and facilitate food trade through the use of irradiation technology.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
MOR5029	**Conserving and Improving the Quality of Aromatic and Medicinal Plants through Irradiation, and Transfer of this Procedure on an Industrial Scale** To help promote aromatic and medicinal plants in Morocco and to improve the income of those who grow, produce and sell them by valorizing them.	**Blackburn, Carl Michael (NAFA)** **Sampa, Maria Helena de O. (NAPC)**
NIC5007	**Determining Drug Residues in Bovine Meat Exports** To determine veterinary medicine residues and growth promoters through nuclear and complementary techniques to improve production, product quality and diagnostic techniques.	**Cannavan, Andrew (NAFA)** **Brodesser, Peter Josef (NAFA)** **Patel, Rajendra Kumar P. (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
NIR5033	**Improvement of Quality Management and Food Safety Monitoring Using Isotope Techniques** To improve the safety and quality of food, and to provide up-to-date information on methods of regulatory control in order to strengthen the technical capability to perform pesticide residue analysis in foodstuffs. To improve capacities and procedures for mycotoxin control for compliance with international standards. To serve as a reference center in the region.	**Brodesser, Peter Josef (NAFA)** **Byron, David Henry (NAFA)**
NIR5034	**Feasibility Study on the Optimal Use of an Industrial Gamma Irradiation Facility** To conduct a feasibility study on the optimal use of the new gamma irradiation facility for industrial application in Nigeria.	**Sampa, Maria Helena de O. (NAPC)** **Blackburn, Carl Michael (NAFA)**
PAN5017	**Monitoring Pesticide Residues in the Production of Tropical Fruit (Pineapples and Melons) and Controlling Analytical Quality with the Aid of Nuclear Techniques** To improve food safety in the production of tropical fruits in Panama.	**Ferris, Ian Glen (NAFA)** **Maestroni, Britt Marianna (NAFA)**
PAN5019	**Supporting the Accreditation of a Pesticides Residue Laboratory** To establish an accredited laboratory according to ISO 17025.	**Maestroni, Britt Marianna (NAFA)** **Ferris, Ian Glen (NAFA)**
PHI5030	**Upgrading the Gamma Irradiation Facility** To upgrade and increase the throughput of the pilot-scale gamma irradiation facility at the Philippine Nuclear Research Institute (PNRI) to a semi-commercial one.	**Sampa, Maria Helena de O. (NAPC)** **Haji-Saeid, Seyed Mohammad (NAPC)** **Blackburn, Carl Michael (NAFA)**
RAS5046	**Novel Applications of Food Irradiation Technology for Improving Socioeconomic Development (RCA)** To focus on the application of technologies related to new uses of irradiation for sanitary and phytosanitary purposes, including technology transfer to participating RCA Member States.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
RAS5050	**Enhancing Sanitary and Phytosanitary Treatment of Regional Products for Export by Irradiation (RCA)** To enhance treatment of and trade in irradiated products of economic importance in the Asia Pacific region.	**Blackburn, Carl Michael (NAFA)** **Byron, David Henry (NAFA)**
RLA5050	**Strengthening Laboratory Capacity to Assess the Implementation of Good Agricultural Practices in the Production of Fruit and Vegetables in Latin America** To improve the assessment of good agricultural practices, with the support of analytical laboratories.	**Ferris, Ian Glen (NAFA)** **Dercon, Gerd (NAFA)** **Maestroni, Britt Marianna (NAFA)**
RLA5053	**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 (ARCAL CII)** To apply a diagnosis and assesment system for evaluating the impact of pesticide contamination in food and environmental compartments.	**Ferris, Ian Glen (NAFA)** **Dercon, Gerd (NAFA)** **Maestroni, Britt Marianna (NAFA)**
RLA5055	**Establishing a South American Regional Network of National and Reference Laboratories for Pharmacologically Active Substances and Contaminants in Food of Animal Origin Through Implementation of Approved Nuclear & Conventional Analytical Techniques (ARCAL CIV)** To establish a network of Latin American National Laboratories and Centres of Excellence by introducing harmonized procedures for the analysis of pharmacologically active substances and contaminants in food of animal origin.	**Patel, Rajendra Kumar P. (NAFA)** **Cannavan, Andrew (NAFA)**
SLO5002 (completed)	**Protecting Groundwater and Soil against Pollutants Using Nuclear Techniques** To improve the capability of counterpart institutes in addressing nitrate and pesticide in drinking water by calibrating and applying relevant risk management approaches at benchmark sites in Slovenian catchments.	**Adu-Gyamfi, Joseph Jackson (NAAL)** **Ferris, Ian Glen (NAFA)**

Project Number	Title and Project Objectives	Technical Officer
SRL8019	**Technical Support for the Establishment and Operation of a Multi-Purpose Gamma Irradiation Facility** To provide technical assistance for the establishment of a multi-purpose gamma irradiation facility (MGIF) in Sri Lanka to sterilize medical products, to develop health care products, and to improve the quality and safety of food and other agricultural products.	**Sampa, Maria Helena de O. (NAPC)** **Blackburn, Carl Michael (NAFA)**
SYR5020	**Implementation of Quality Assurance and Quality Control Procedures in Pesticide Residue Analysis Laboratories** To improve the national pesticide residue monitoring programme and introduce analytical quality assurance and validated risk management technologies, which will lead to more sustainable cropping systems.	**Brodesser, Peter Josef (NAFA)** **Byron, David Henry (NAFA)**
TAD5004	**Improving Laboratory Capacity for Food Safety** To provide assistance in the establishment of a central laboratory for the analysis of contaminants and residues in food and agricultural products and satellite laboratories at the border with neighbouring countries.	**Fesenko, Sergey (NAFA)** **Ferris, Ian Glen (NAFA)** **Maestroni, Britt Marianna (NAFA)**
URT5024	**Nuclear Techniques for the Monitoring of the Food Quality in the United Republic Of Tanzania** To improve consumer protection and facilitate trade.	**Brodesser, Peter Josef (NAFA)** **Byron, David Henry (NAFA)**
URU5025	**Determining Pesticide and Antibiotic Residues in Food for Local and Export Consumption** To improve the capability to determine pesticide residues in fresh fruit and vegetables, to introduce the Quecher procedure to analyse pesticide residues and to introduce the use of 14C-labelled pesticides.	**Maestroni, Britt Marianna (NAFA)** **Ferris, Ian Glen (NAFA)**
URU5027	**Preparing for the Introduction of Irradiation Techniques** To introduce irradiation technology in Uruguay as a health and plant protection measure that will contribute to stimulating production and improving its quality for both local and external markets.	**Blackburn, Carl Michael (NAFA)**

Assistance in the field of food traceability

The Food and Environmental Protection Subprogramme (FEP) of the Joint FAO/IAEA Division on Food and Agriculture is pleased to announce that food traceability has been introduced as a new activity of the Subprogramme. The FEP objectives remain unchanged, namely, to enhance Member State capacities to improve food safety and facilitate international trade through the application of nuclear and related technologies. Food traceability is an additional tool to help reach this objective.

Safe and high quality food is a prerequisite to ensure consumer health and successful domestic and international trade. In addition, production must ensure the sustainable development of human and agricultural resources. Traceability systems play a key role in assuring food safety and in providing objective indicators of the effectiveness of food control systems. An independent means of verifying such systems is the use of analytical techniques to identify the origin of food. Such techniques also help guarantee food authenticity, combat fraudulent practices, and control food adulteration for reasons of economic, religious or cultural importance.

Objectives

For the IAEA technical cooperation project cycle 2012–2013, the FEP can provide assistance to Member State laboratories in the planning and technical backup of technical cooperation projects submitted through the IAEA, including in the area of food traceability.

Food traceability offers a means to address some of the barriers that developing countries are facing in international trade as well as helping to assure local consumers of the safety of their food. In particular, it will help Member State laboratories in the establishment of robust analytical techniques to support food traceability systems, which facilitates the determination of the origin and provenance of food through the assessment of the isotopic and elemental composition of foodstuffs using an integrated and multidisciplinary approach. The immediate benefit to laboratories will be the implementation and application of state-of-the-art nuclear measurement techniques to determine where foodstuffs are grown. These techniques will complement traditional screening methods to detect residues and contaminants in food and to provide holistic food safety systems that add value for the primary producer.

In addition to its application to food safety issues, traceability can also address religious or cultural concerns. For example, whilst safe for human consumption, the animal or botanical source of a food may nevertheless be unfit for some consumers due to dietary or religious reasons. For instance, gelatine derived from porcine sources and ethanol derived from wines or spirits are not compliant with Halal guidelines.

The capability to certify food origin or authenticity is also of significant economic importance to many stakeholders in developing countries. For example, some food products can be marketed using labels indicating geographic origin that are based on standards of identity or composition related to a very specific production area. This adds value to such products in terms of marketability and increased export value. Basmati rice from India and Pakistan, for example, is defined by its cultivar and also by its area of production. Genomic techniques can easily confirm the cultivar of Basmati rice, while isotopic and elemental fingerprinting is essential to determine the geographical origin.

Nuclear component

Nuclear techniques can be used to measure the isotopic (e.g. 3H/2H/1H, 13C/12C, 15N/14N, 18O/16O, 34S/32S, 87Sr/86Sr, 208Pb/207Pb/206Pb) and elemental (e.g. macro, micro, and trace) composition of food and to determine the origin of contamination present in food. Examples of the techniques are presented in Appendix 1.

Contact Information

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Method	Abbreviation	Fingerprint
Neutron activitation analysis	NAA	Isotopic and elemental
(Multicollector)-Inductively coupled plasma-mass sepectrometry	(MC)-ICP-MS	Isotopic and elemental
Nuclear magnetic resonance	NMR	Isotopic
Thermal ionization- mass spectrometry	TIMS	Isotopic
Isotope ratio mass spectrometry	IRMS	Isotopic
Cavity- ring-down spectroscopy	CRDS	Isotopic
Atomic absorption spectrometry	AAS	Elemental
Atomic emission spectrometry	AES	Elemental

Appendix 1: Nuclear techniques that can be possibly applied in food traceability studies. Where appropriate, these techniques can be complemented by conventational, non nuclear approaches.

Developing Guidelines for the Audit and Accreditation of Food Irradiation Facilities; Vienna, Austria; 1-5 March 2010; Jakrta, Indonesia; 10-14 May 2010

Technical Officer: Carl Blackburn

Two meetings have been held under the Asia and Pacific Regional Technical Cooperation Project RAS/5/050 on Enhancing Sanitary and Phytosanitary Treatment of Regional Products for Export by Irradiation to develop and produce guidelines for the audit and accreditation of food irradiation facilities.

The RAS/5/050 project addresses regional bio-security concerns by setting up agreed regional training programmes to provide adequate levels of competencies to quarantine regulators and operators of irradiation facilities (gamma, X ray or electron beam) to enhance the phytosanitary treatment of exported agricultural produce. Part of the project involves producing guidelines and procedures.

The lack of regionally agreed and harmonized protocols and procedures is a major obstacle to trade in irradiated products of economic importance. Irradiation can provide phytosanitary security and ensure produce meets necessary quarantine requirements for trade. Chemical treatments have been employed to treat agricultural products, but these chemicals are being phased out and irradiation is one of the few economically viable phytosanitary treatments which can replace them.

This regional technical cooperation project aims to enhance sanitary and phytosanitary irradiation treatments of produce (e.g. fruits) destined for export. It involves the training of quarantine inspectors responsible for accreditation of offshore facilities and a key element of this project is the development of guidelines for the accreditation procedures and audit of food irradiation facilities. Draft guidelines on audit and accreditation procedures should be based on existing international standards, i.e. food safety standards under the Codex Alimentarius Commission (Codex) and phytosanitary standards under the International Plant Protection Convention (IPPC).

The Codex General Standard for Irradiated Foods was adopted by the Codex Alimentarius Commission in 1979 and subsequently revised in 1983 and 2003. This standard applies to foods processed by ionizing radiation. There is also a Codex International Code of Practice for the operation of food irradiation facilities. This code of practice has been revised alongside the General Standard and it identifies the essential practices to be implemented at a facility to achieve effective radiation processing of food products in a manner that maintains quality and yields food products that are safe and suitable for consumption.

In 2003, the International Plant Protection Convention approved the International Standard for Phytosanitary Measures “Guidelines for the Use of Irradiation as a Phytosanitary Measure” (ISPM 18), which provides technical guidance on the specific procedures for the application of ionizing radiation as a phytosanitary treatment and has facilitated international trade in irradiated fresh fruits (e.g. between countries such as Australia and New Zealand in 2005 and between India and the United States in 2006). Research has continued to develop such treatments and in 2009/2010 eleven irradiation treatments were adopted by the IPPC for inclusion in the international IPPC standard on phytosanitary treatments for regulated pests.

The Consultants Meeting to produce the guidelines was held at IAEA, Vienna, Austria 1–5 March 2010. The meeting was opened by Mr Prinath Dias, of the Asia and Pacific Section, Department of Technical Cooperation (TC), IAEA. Mr David Byron, Food and Environment Protection Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, provided further information on recent IAEA food irradiation activities and provided a list of Codex documents that would help inform the development of the guidelines.

IAEA/RCA Consultants Meeting Participants

Peter Leach (Australia), Larry Zettler (USA), John Woolston (UK) and the technical officer were given the task of producing written guidelines for accrediting irradiation facilities that process food commodities to ensure phytosanitary security. With Peter Leach as chairperson, the meeting discussed development of guidelines within existing national and international standards on food irradiation in a way that would harmonize existing practices and procedures. Updates and decisions from meetings of other international and regional bodies relevant to the draft guidelines were discussed, as were developments in the trade of irradiated commodities.

There was some discussion whether the sanitary and phytosanitary considerations should be brought together in one guidance document or separated into sections or different documents. It was decided that the draft guidelines would produce one set of integrated guidelines aimed specifically at facilities that strive to meet both sanitary and phytosanitary requirements.

In general, the adopted regulatory approach for phytosanitary treatments is different to that for sanitary applications, the former is subject to a greater degree of direct

oversight and supervision by regulatory authorities (e.g. on-site monitoring of phytosanitary irradiation treatments is performed continuously by the food importer, even though the staff and facility of the provider have been audited, certified and accredited). In contrast, accreditation of irradiation facilities undertaking sanitary applications of irradiation relies on audits of both procedures and records (an official control body does not need to be present when items of food are irradiated). However international standards for phytosanitary irradiation treatment do not specify direct oversight and the meeting noted that one set of guidelines should include matters related to both sanitary and phytosanitary applications. The specific particulars of oversight and regulatory control of the irradiation activities is a matter for the entities involved and is generally covered by bilateral agreements between the authorities of the producer country and the importer country.

A second meeting was organized by the IAEA in cooperation with the Government of Indonesia through the National Nuclear Energy Agency of Indonesia (BATAN). This IAEA/RCA meeting was held 10–14 May 2010 in Jakarta, Indonesia. Dr. Taswanda Taryo, Deputy Head of BATAN, presided over the opening ceremony and the meeting was chaired by the local organizer Prof. Achmad Nasroh Kuswadi. Representatives from 13 participating countries attended and delegates had a broad range of technical expertise, including specialists in plant health sciences, quarantine security and radiation processing. Yves Henon (IAEA Consultant) gave a presentation on regulatory and quality assurance audits from the perspective of an operator of an irradiation facility and each participant gave a presentation on their countries approach to authorization and regulation of food irradiation facilities and a brief status report on food irradiation in their country. The guidelines produced at the March meeting were discussed in great detail and developed further. A finalized version of the guidelines is being prepared for consideration at the IAEA/RCA Executive Management Meeting for Quarantine Authorities and Nuclear Institutes, being organized in cooperation with the Government of the Republic of Korea through the Korea Atomic Energy Research Institute (KAERI) 13–16 July 2010.

Supporting the Accreditation of a Pesticides Residue Laboratory

Technical Officer: B. Maestroni

Ms. Maestroni travelled to Panama City, Panama, from 1-5 March, 2010 to evaluate progress under PAN/5/019 Supporting the Accreditation of a Pesticides Residue Laboratory, to revise the project work plan and to initiate discussions with the National Accreditation Body in Panama.

The Directorate of Sanidad Vegetal (DNSV), a service under the Ministry of Agricultural Development (MIDA), inaugurated a laboratory for the control of pesticide residues in fresh fruits and vegetables in May 2006. The laboratory has offered services for the analysis of organophosphorus, organochlorine and carbamate pesticides since April 2007 and is a recipient of technical assistance from IAEA under TCP PAN/5/017 and PAN/5/019. Achievements have been highlighted in a letter to the IAEA, in which it is stated that through capacity building provided by IAEA and an additional bilateral project from Taiwan, MIDA was able to establish a national pesticide monitoring programme for fresh fruits and vegetables, and therefore address food safety in terms of compliance to maximum residue limits (MRLs) to ensure domestic and international trade and to protect consumer health.

MIDA management affirmed that a national workshop held in December 2008 under project PAN/5/017 succeeded in raising awareness among producers about the importance of monitoring good agricultural practices (GAP) through analytical services. One of Panama's major supermarket chains, Grupo Rey, subsequently requested that MIDA provide certification services for GAP compliance. A working group was set up by MIDA, which is currently in the process of preparing a generic guideline for the preparation of GAP manuals. The working group will also look into the legislative/legal framework for concepts such as traceability, food safety and GAP. MIDA acted quickly to implement end product testing and set up a national initiative to ensure GAP and extension services to the farmers. By the end of 2011 eleven GAP manuals should be available on the web for different fruit and vegetable commodities. This is an outstanding outcome from the IAEA projects.

Project sustainability was questioned in discussions with local FAO officials, Mr. Roca and Mr. Hruska. The main concern is the lack of regular funding for the laboratory, which is currently not included in the legislation. Sustainability of the laboratory activities depends on government contributions for the medium term, especially for consumables. In the long-term, income generated from services to external clients should be available to improve laboratory infrastructure, enable continuous training and provide sufficient monetary rewards to retain the best analysts. The FAO representative offered to include this issue as an agenda item for a meeting between the Director General of FAO and the Minister of Agriculture for Panama, which will take place later in 2010.

Ms Maestroni suggested that IAEA, together with FAO and MIDA, should organize a decision-makers' forum on the 9th of August, 2010, to raise awareness amongst Panama's high-level government officials on "the importance and the role of the MIDA analytical laboratory in the assessment of good agricultural practices, the insurance of food safety, and the compliance of food produce to domestic and international trade requirements". The FAO representatives in Panama have tentatively accepted the invitation and will contribute to the agenda.

Ms Maestroni also paid a visit to the offices of the Inter-American Institute for Cooperation on Agriculture (IICA)

in Panama and discussed with Mr. Marte, the IICA representative, a possible future collaboration on pesticide management practices and environmental sustainability in the Central American region. Mr. Marte suggested sending project ideas to the head of the IICA office in Costa Rica, who is also the executive secretary of the Consejo Agropecuario Centroamericano (CAC), a committee composed of agricultural ministers from Central America that helps integrate agriculture with other regional initiatives. IICA is a technical cooperation organization that is very active locally and as such would make an excellent partner for IAEA in building local capacity. It is hoped that IICA will participate in the planned decision-makers forum and contribute with practical project proposals for Panama and also in the region.

As part of the requirements for reaching accreditation under a quality system in MIDA, issues regarding staffing and personnel conditions were discussed in detail with MIDA managers, the IAEA National Liaison Officer (NLO) in Panama and the section in MIDA responsible for international cooperation. At the moment the laboratory staff comprises young analysts, and the danger is that once they are extensively trained they will become targets for private enterprise, which can offer substantially higher salaries. It was generally agreed that staff should be motivated to stay in their jobs; however no feasible solution was suggested. The IAEA NLO indicated that he would raise the issue with the Minister of Agriculture in Panama.

A formal meeting with the National Accreditation Body in Panama (CNA) was held on the last day of the mission. The CNA representative explained that the accreditation process would take a minimum of 6–8 months from the day of application. To date Panama's accreditation body has not entered into mutual recognition agreements with other bodies as this was not contemplated in the initial national legislation in 1997. CNA is attempting to persuade the relevant ministry to modify the law and to reach agreements with bodies such as the International Laboratory Accreditation Cooperation (ILAC) and the International Accreditation Council (IAC). The CNA has no expertise in the field of analytical chemistry, and relies on auditors from Costa Rica and Argentina. I advised the project counterpart to contact the Costa Rican accreditation body, and to set up an informal meeting to gather information about their experience in the accreditation of pesticide residue analytical laboratories.

In conclusion Ms Maestroni's mission to Panama enabled a review of the current PAN/5/019 status and needs for the Central American region. Integrated approaches to target food safety, domestic and international trade, and environmental sustainability are required. All involved donor organizations, including financial institutions, should work together to ensure that technical cooperation projects achieve optimal impact at the national and regional level.

RLA/5/053 ARCAL First Level Regional Training Course on the Estimation of Pesticide Loads in a Microcatchment, Revision of Sampling Plans, Use of PIRI, GIS, LIMS, Bioindicator/Bioassay and Analytical Methods; Costa Rica, 23 November–4 December 2009

Technical Officers: I. Ferris and B. Maestroni

Under the technical cooperation project TCP RLA/5/050[3] a 'black box' monitoring strategy 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. The ARCAL technical cooperation project RLA/5/053 takes the approach a step further by obtaining information about relevant pesticide processes in the subcatchment and pesticide load to the environment, and an additional nine countries to the original RLA/5/050 are participating including the Dominican Republic, El Salvador, Haiti, Jamaica, Nicaragua, Paraguay, Peru, Spain (net contributor) and Venezuela. However, at the first level training course no laboratories were represented from Haiti, Nicaragua and Paraguay either because the course pre-requisites could not be fulfilled or for logistical reasons.

The aim of the course was to train technical staff involved in the implementation of RLA/5/053 or related national projects. Topics included: integrated analytical approaches to monitor good agricultural practice (GAP) at a landscape scale including PIRI, LIMS and GIS; field sampling, assessment of bioindicators and path tracking; and analytical methodologies for pesticide residues in water and sediments.

The course was hosted by the Universidad de Costa Rica, Centro de Investigación en Contaminación Ambiental. The event provided an opportunity to assess progress made during 2009 and develop a website for participants to learn and interact with one another[4]. Laboratories in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, and Uruguay have identified microcatchments and commenced monitoring. They have the necessary human resources to implement the RLA/5/053 workplan. Participants from Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, and Uruguay provided the training for the course, except for the components covered in separate reports by Ms. Tanya Cáceres (pesticide sorption/degradation), Messrs Andras Jozsef Nemeth (GIS) and José Luis Tadeo Lluch (analytical methodology).

3 http://elearning.iaea.org/ATutor/go.php/69/index.php

4 http://elearning.iaea.org/ATutor/go.php/106/index.php

This is compelling evidence that these countries have not only applied the harmonized approaches developed under the coordinated research project (CRP D5.20.35) on Integrated Analytical Approaches to Assess Indicators of the Effectiveness of Pesticide Management Practices at the Catchment Scale[5] but are able to train others in their use. In the case of the demonstration of the use of the Doppler flow meter, Argentina and Colombia shared videos and provided instructions and tips for other laboratories who where having difficulties in using their Doppler flow meters.

Technical Cooperation Project Success Stories — The Provision of Scientific Expertise and Technical Support through the Technical Cooperation Programme

Technical Officer: Josef Brodesser

A great part of the activities of the Food and Environmental Protection (FEP) Section lies in its contribution to the planning, design and execution of Technical Cooperation Projects, which are conducted under the auspices of the IAEA Technical Cooperation (TC) Department. TC has the overall responsibility for the projects with technical management provided by the Technical Officers within the respective technical departments. The specific advantage of this approach is the combination of administrative management by TC and technical/scientific expertise from the technical divisions.

Funds are made available through TC for the procurement of equipment and fellowship training. Specific solutions can be elaborated through the technical departments to ensure that analytical equipment is actually used following delivery and installation. Together with the training of fellows, which is designed to be held abroad as well as in the country, this considerably strengthens the sustainability of the projects.

The following two examples illustrate the implementation of successful TC projects through collaboration with the Food and Enviromental Protection subprogramme:

Example 1: Montenegro – Project *Upgrading a Persistent Organic Pollutant Laboratory towards Accreditation for Environmental Monitoring*

Montenegro signed the Stockholm Convention on Persistent Organic Pollutants (POPs), which is presently under ratification procedure. By ratifying the Stockholm Convention, Montenegro commits to manage POPs in accordance with best international practices. A prerequisite for this is to have available a well equipped *national reference centre* to carry out the analysis necessary to identify POPs, assess their impact on human health and the environment and give recommendations to the Government on compliance with the agreements and obligations of the Convention.

The project has been instrumental in providing the Centre for Eco-toxicological Researches (CETI) of Montenegro with the means and expert advice required to set up and validate reliable methods to identify and quantitatively determine POPs. Staff have been trained in relevant establishments on, among other topics, analytical approaches for the determination of POPs in environmental matrices, adequate sampling techniques, sample preparation and extraction, clean-up and GC/MS detection of target compounds. The laboratory Quality Management system was also assessed to identify gaps and to provide advice on its optimization and progress towards accreditation to international standards.

The laboratory is fully functional and subsequent to the finalization of the project in 2009 a number of activities have been undertaken by the laboratory, including:

- A full scope environmental monitoring program in the area of polychlorinated dibenzo-dioxins (PCDD), polychlorinated dibenzo-furans (PCDF) and dioxin-like polychlorinated biphenyls (PCB) analysis.
- A monitoring program of PCDD, PCDF, PCB and organochlorine pesticides including some metabolites: (α-BHC; β-BHC; γ-BHC; 4,4'-DDT; 2,4'-DDT; 4,4'-DDD; 4,4'-DDE; 2,4'-DDD) in animals, foodstuff of animal origin and animal feed.
- A monitoring program is being implemented for the determination of pesticides (insecticides, fungicides, herbicides and growth regulators, approximately 300 active ingredients marketed for agricultural use) in foods of plant origin.
- Completion of a POPs' inventory in the country.

Example 2: Lebanon – Project *Upgrading the Environmental and Food Analysis Laboratory at the National Council for Scientific Research*

Two fellows from the Lebanese project counterpart took part in long term training at the Agency's Food and Environmental Protection Laboratory. Fellows also participated in a QA/QC workshop held at Seibersdorf, including training on the use of gas chromatography-mass spectrometry (GC-MS) for residues analysis and gaining additional knowledge on various aspects of GC-MS theory and troubleshooting techniques. They also worked with laboratory staff on the adaptation and validation of a multi-residue isotope-dilution method for the determination of agrochemicals in water and performing GC-MS analysis of mosquito net samples for pesticides.

Further fellowship training was organized for other staff of the counterpart institute in other European institutes covering respective analytical topics of interest.

5 http://elearning.iaea.org/ATutor/go.php/82/index.php

Having returned to their home institute, the trained staff seamlessly applied their knowledge gained. The on site-laboratory is functional, with fully operational equipment which was put into use after installation without delay. Analytical techniques are being introduced, methods validated and the preparation for laboratory accreditation is being driven forward towards auditing by an internationally recognized accreditation body in the near future. Tangible laboratory results and the QM documentation developed so far demonstrate the progress made at the institute following fellowship training.

Both examples given above demonstrate that the combined inputs of the respective TC and Food and Envriomrntal Protection subprogramme can provide great support towards achieving the intended project goals. Together with the strong dedication of project counterparts in implementing planned activities, the work done on site can result in encouraging success stories.

Food and Environmental Protection Laboratory, Seibersdorf

Measuring the soil sorption coefficient using ^{14}C -Carbofuran

Technical Officer: Britt Maestroni

A regional network of laboratories was created under the TC project RLA/5/050 on Strengthening Laboratory Capacity to Assess the Implementation of Good Agricultural Practices in the Production of Fruit and Vegetables in Latin America to monitor residues of agrochemicals in water, soil and air as indicators of good agriculture practice (GAP) and thus prevent contamination at the source. A 'black box' monitoring strategy was developed under the coordinated research project D5.20.35, Integrated Analytical Approaches to Assess Indicators of the Effectiveness of Pesticide Management Practices at a Catchment Scale that involved integrated biological and chemical monitoring of water quality at a landscape scale using harmonized protocols and georeferenced sampling. The follow up TC project, RLA/5/053, takes the strategy a step further and obtains information about relevant processes affecting pesticide within the catchment site thus 'opening the black box'.

An example of this approach is to measure the sorption and accelerated degradation of agrochemicals in soils using ^{14}C-labelled pesticides. The first regional training course held in Costa Rica from 23 November - 4 December 2009 gave participants hands-on training with the RLA/5/053 network coordinator, Dr. Tanya Cáceres, and provided a means to calibrate the Pesticide Impact Rating Index Program (PIRI) for their local subcatchment. The course also provided training on LIMS and GIS software, practice in field sampling, assessment of bioindicators and path tracking. Laboratory sessions focused on methodologies, including bioassay, analysis of pesticide residues in water and sediments, and measuring and calculating the pesticide sorption in soil using ^{14}C-carbofuran.

The soil sorption coefficient, K_d, and the soil organic carbon sorption coefficient, K_{oc}, of pesticides are basic parameters used by environmental scientists and regulatory agencies worldwide in describing the environmental fate and behaviour of pesticides. They measure the strength of sorption of pesticides to soils at the water/solid interface, and thus influence environmental mobility and persistence. K_{oc} is regarded as a more universal parameter related to the hydrophobicity of the pesticide molecule, which applies to a given pesticide in all soils. This value is used in first-tier risk assessment programs such as PIRI and simulation models to estimate pesticide leaching and runoff. Factors that influence the sorption of pesticides in soil are shown in Table 1.

The plot of the pesticide concentration in soil versus the pesticide concentration in the aqueous solution is called a soil sorption isotherm, see Figure 1.

The experimental procedure for determining the soil sorption paramters Kd and Koc involve mixing portions of homogenized soil, with calcium chloride solution containing different activities of 14C-carbofuran for 1 hour and 24 hours, until the distribution of the pesticide between soil and water has reached a steady state. The mixture is then centrifuged and a portion of the supernatant taken for liquid scintillation counting.

The soil sorption paramters K_d and K_{oc} can be calculated from the amount of labelled carbofuran in the liquid portion, and knowledge of the concentrations and activities used and the fraction of organic content in the soil. The procedure was applied to soil samples taken in Costa Rica. The results of the laboratory study are shown below

	K_d replicate1	K_d replicate2	K_{oc} replicate 1	K_{oc} replicate 2
^{14}C Dilution 1	0.62	0.46	19	14
^{14}C Dilution 2		0.73		22
^{14}C Dilution 3	2.02	0.81	61.	25
^{14}C Dilution 4		0.51	10.	15
^{14}C Dilution 5	0.25	0.50	8	15
^{14}C Dilution 3 (24 h)	1.23		37.	

The measured Koc for this Costa Rican soil is close to the reported value of 23.3 l/kg and within the EU range 9.7-

35.8 l/kg[6] , with the exception of the 24 h measurement where some degradation may have occurred.

	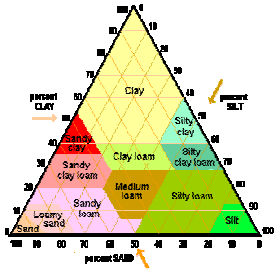
Pesticide MP	Soil composition
Electronic structure (charge)	Clay
Adsorption by ion exchange	Silt
Water solubility	Sand
Nature of the formulation	Organic matter
	pH

Table 1: Factors that influence sorption of pesticides to soil

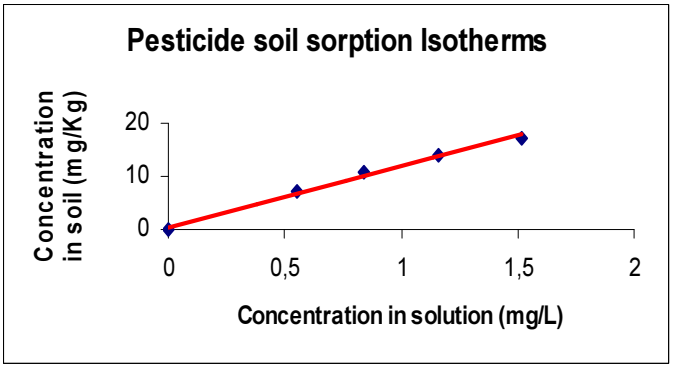

Figure 1. Pesticide soil sorption isotherm.

Using cavity-ring-down spectroscopy for measuring $^{18}O/^{16}O$ and $^{2}D/1H$ isotopes in food commodities

Technical Officer: Britt Maestroni

Initial work on food traceability using cavity-ring-down spectroscopy (CRDS) recently started at the Food and Environmental Protection Laboratory (FEPL). The CRDS instrument installed in the FEPL is a stable isotope analyzer based on laser absorption. It analyses $^{18}O/^{16}O$ and $^{2}H/^{1}H$ isotopes from liquid water. The principle underlying the measurements is as follows: a few microliters of water are injected into the system (see Figure 1) and evaporated. A laser light at a specific wavelength passes through the water vapour and some of the light is absorbed. The amount of absorption is directly related to the quantity of $H_2{}^{18}O$. The wavelength is then shifted to measure absorption related to the quantities of H_2O and $^{1}H^{2}H$ O (see Figure2). Using the absolute abundances of the three water molecules and the measurements of calibrated in-house standards, the results can be converted to delta values for comparison with data from authentic products of known origin, either by direct comparative measurements or through databases. The CRDS specifically measures the decay of the light absorption during time, so if water vapor is present the decay will be faster compared to the situation in which no water is present. The configuration of the instrument and the presence of reflecting mirrors ensure a path length of up to 20 kilometers, which in turns provides good precision and sensitivity. This type of instrument represents a revolution in terms of stable isotope analysis because of its lower cost, ease of use and robustness compared to traditional isotope ratio mass spectrometers (IRMS).

Figure 1. The cavity-ring-down spectroscopy isotopic analyser installed in the FEPL.

The work carried out at the FEPL is currently focusing on the optimization of the sample preparation methodology to obtain “pure water”, that is free from interfering substances, from fresh fruits and vegetables. Two main approaches are applied: cryodistillation and centrifugation of extracts of fruits and vegetables. Preliminary investigations are being carried out for the isotopic characterization of tomato, orange, lemons, mandarins, bananas, strawberries and apples. The objective of the work is to develop methodologies for traceability and authentication of food that can be transferred and applied in many developing countries.

6 http://sitem.herts.ac.uk/aeru/iupac/118.htm

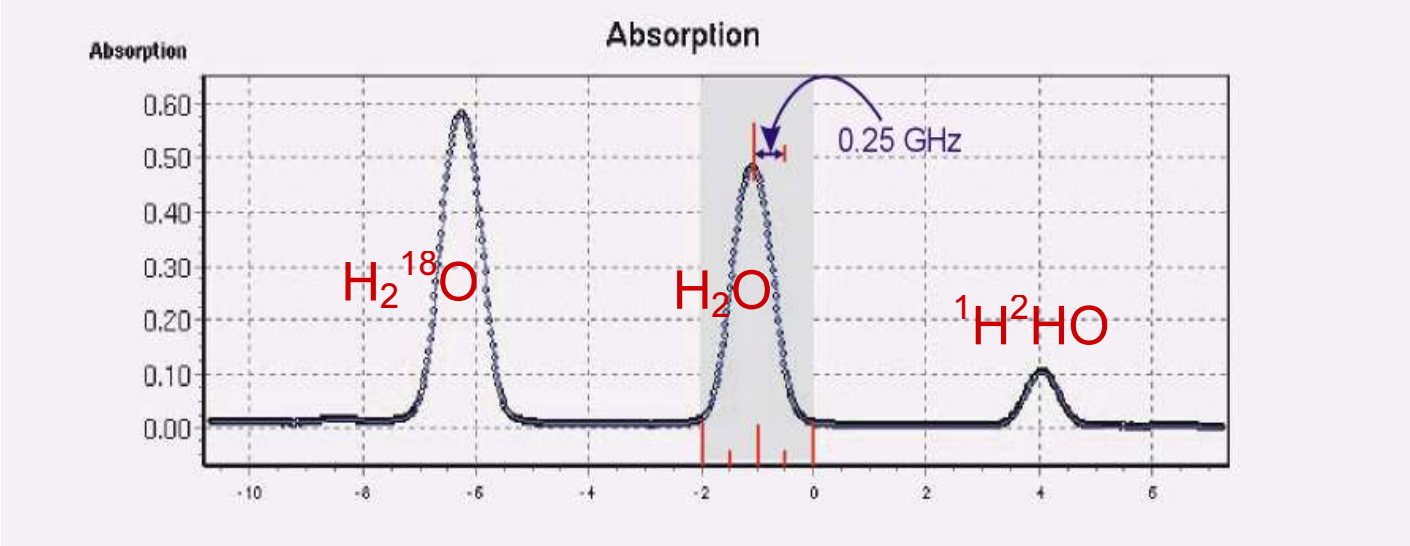

Figure 2: Each type of water molecule ($H_2{}^{18}O$, H_2O and $^1H\,^2H\,O$) has a unique optical absorption

Fellows

Ms. Van Nguyen Thi Thuy from the Centre for Nuclear Techniques, Ho Chi Minh, Vietnam, completed a 3-month fellowship in the Food and Environmental Protection Laboratory on 31 January 2010. Ms. Nguyen Thi Thuy was trained in the operation, maintenance and troubleshooting of chromatographic instrumentation, including basic training on hyphenated mass spectrometric techniques such as gas chromatography-mass spectrometry (GC-MS) for pesticide residue analysis, and participated in analytical method development with laboratory staff.

Ms. Van Nguyen Thi Thuy (left) being trained in GC-MS by Ms. Zora Jandric

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Sasanya, J.J, Abd-Alla, A.M.M, Parker, A.G and Cannavan, A. (2010). Analysis of the antiviral drugs acyclovir and valacyclovir-hydrochloride in tsetse flies (*Glossina pallidipes*) using LC-MSMS. Journal of Chromatography B, Analytical Technologies in the Biomedical and Life Sciences, *in press*.

Cannavan, A. and Maestroni, B.M. (2010). Analytical methodology for food safety and traceability in developing countries. Agro Food Industry Hi-Tech, *in press*.

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Byron, D.H., Cannavan, A., and Patel, R.K.P (2010), Matters of Interest arising from other International Organisations (CX/CF 10/4/3-Add.1). Fourth Session of the Codex Committee on Contaminanats in Food, Izmir, Turkey, 26-30 April 2010.

Byron, D.H. (2010), Report on Activities of the International Atomic Energy Agency (IAEA) Relevant to Codex Work (CAC/33 INF/7). Thirty-third Session of the Joint FAO/WHO Codex Alimentarius Commision, Geneva, Switzerland, 5-9 July 2010.

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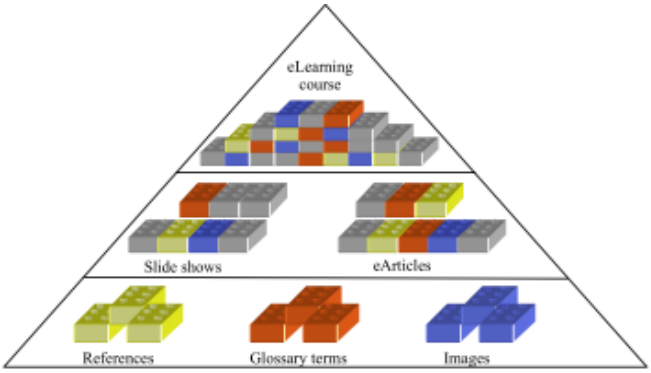
FAO/IAEA eLearning (http://eLearning.iaea.org)

Technical Officers: Brian Bales (MTIT) Ian G. Ferris (FEP) and Britt M. Maestroni (FEPL)

The second article about FAO/IAEA eLearning focuses on eArticles and converging technologies.

Each FAO/IAEA eLearning course caps the knowledge management pyramid by aggregating knowledge objects from lower levels as illustrated here.



The knowledge management pyramid depicting the 'Lego' like engineering and underlying standards that permit the assembly and reuse of knowledge objects

Editors and institutions typically volunteer to share their expertise and provide information in the form of glossaries, references, multimedia and other common database resources under their name or banner. These knowledge objects are then incorporated by course developers into slide shows and eArticles, which in turn form the basis of eLearning courses.

The advantage of this approach is that discrete knowledge objects may be reused, added or updated if critical gaps exist, thus avoiding unnecessary duplication of effort. For example, eArticles guidelines on pesticide sorption and degradation are intended to foster harmonization and comparisons of measurements amongst laboratories. The same eArticles may be linked from the pesticide risk assessment and management courses. In the case of eArticles about nuclear and associated techniques, they may be linked from most courses. Authors of eArticles should aim for this multiplier effect as it can improve knowledge acquisition and transfer.

Most course developers have preferred to use slide shows to achieve more visual impact. Recently, text-based eArticles have emerged as an alternative to slide shows with advantages in some areas: technical guidelines are easier to develop as eArticles; display and editing of formula are far superior; eArticles scale without loss of resolution (i.e., easier viewing on small and large screens) and eArticles offer better support for assistive technologies and universal accessibility.

One long-standing problem with eArticles concerned text and entity encoding for special characters such as "∑" or "∑". Content developers typically used the latter symbol in Word documents then would cut and paste selected content into an eArticle "textarea". This workflow enabled experts to quickly fill out an eArticle table of contents without any knowledge of HTML. Unfortunately this approach brought along invisible metadata fragments leading to invalid markup tags. In addition, regions that didn't support the Latin 1 character set (ISO 8859-1) would often see special characters replaced with "□", "?" or "¿". The missing characters reduced the

quality of the text and prevented effective use of assistive technologies, such as text-to-speech. One solution is to remove ghost metadata fragments and encode HTML entities. UTF-8 entity encoding offers advantages over the previous Latin 1 encoding: UTF-8 can represent any character in the Unicode standard; UTF-8 is supported currently by all Internet protocols; UTF-8 is backwardly compatible with earlier ASCII-based standard character encodings; and UTF-8 is generally compatible with existing IAEA application programming interfaces.

The implementation of UTF-8 for eArticles began in March 2010 with an evaluation of open-source editors. The TinyMCE WYSIWYG editor (Version 3.3.6) fulfilled all the technical requirements. For content developers, TinyMCE displays edited text similar to the appearance of the rendered webpage. In addition, TinyMCE is used by ATutor, thus preserving a similar user interface for FAO/IAEA eLearning content developers.

To access the TinyMCE editor, editors open their eArticle for editing as usual. However, now the markup tags are displayed by default to assist those without broadband connection. Editors may open TinyMCE with one click of the "Toggle WYSIWYG" button and use the visual toolkit for adding or marking up text correctly. Another click of the "Toggle WYSIWYG" button exits the WYSIWYG editor, eliminates invalidate markup tags, and displays the entity code. For example, the symbol “á” is converted to “&aacute that is interpreted correctly across all regions as “á”.

Since XHTML is stricter than HTML, editors are advised to use the "Test markup" feature as a final check to ensure valid markup tags. Editors can click the "Test markup" button to open an XHTML validator in a separate window. The test shows either the rendered text or an error message. The following shortcut keyboard sequences simplifies the task of selecting, copying and pasting--“Ctrl A” “Ctrl C”, “Ctrl V” (Linux/Window) and Cmd A” “Cmd C”, “Cmd V” (Mac).

Personal digital assistants (PDAs) like iPad are exciting developments that offer a new delivery channel to capacitate laboratories. The open standard for sharing eBooks is ePub and is produced readily from eArticles. Direct ePub downloads from the FEP website will allow laboratories to access content rapidly, at any time. To support ongoing coordinated research projects and technical cooperation projects, five ePubs are planned for release by early 2011: bioindicators, GIS and modeling, laboratory protocols for measurement of pesticide sorption & degradation, mass spectrometry, and statistics. Downloads will be available for free.

Other work scheduled for FAO/IAEA eLearning includes translation of the ATutor and eLearning interfaces. The Division of Human Health, Nutritional and Health-Related Environmental Studies plan to translate ATutor into French while the translation of the eArticle interface into Spanish will be carried out by the Joint FAO/IAEA Programme Nuclear Techniques in Food and Agriculture.

The authors would like to thank the TinyMCE team and Josh Lockhart for the TinyMCE javascript that produces compliant XHTML 1.0.

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