



JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION

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INFORMATION ON ACTIVITIES OF THE JOINT FAO/IAEA DIVISION OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE¹

1. The Joint Food and Agriculture Organization of the United Nations (FAO) and International Atomic Energy Agency (IAEA) Division of Nuclear Techniques in Food and Agriculture (the "Joint FAO/IAEA Division") supports and implements activities related to the improvement of food safety and control systems. Its activities are therefore closely related to Codex Alimentarius Commission (CAC) and several of its committees.
2. Through its Food and Environmental Protection Section and Laboratory, the Joint FAO/IAEA Division assists member countries of both FAO and IAEA in the peaceful application of nuclear techniques and related technologies for food quality, safety and control. Activities of interest to the CAC include the detection and control of various chemical residues and food contaminants; food traceability and authenticity; food related radiation safety standards; preparedness and response to nuclear and radiological emergencies affecting food and agriculture; and food irradiation. These activities are provided within the broad context of coordinating and supporting research worldwide; providing technical and advisory services for projects and training activities; providing applied research, laboratory support and training through the FAO/IAEA Agriculture and Biotechnology Laboratories situated at Seibersdorf, Austria; and collecting, analysing and disseminating information for the effective transfer of skills and technology. The Joint FAO/IAEA Division also provides technical support for national, regional and inter-regional development work through IAEA Technical Cooperation projects.

Codex Related Activities and Training

3. The Joint FAO/IAEA Division has provided inputs to the Codex and received feedback from Codex member countries for future research and development work. Representatives of the Joint FAO/IAEA Division have actively participated at Codex events over the past year, including meetings of the Codex Alimentarius Commission and the Codex Committee on Contaminants in Foods (CCCF), the Codex Committee on Pesticide Residues (CCPR), the Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF) and a meeting of the Coordinating Committee for Asia (CCASIA). The Joint FAO/IAEA Division has also been involved in helping Codex develop standards and guidelines, recent examples being participation in the electronic working groups on maximum levels for cadmium in chocolate and cocoa products and the unintended presence of residues of veterinary drugs in food commodities resulting from carryover of veterinary drugs into feed, as well as provision of comments on *Guidelines on Performance Criteria Specific for Methods of Analysis for the Determination of Pesticide Residues*.
4. In 2016, many technical meetings and workshops were requested by our member countries and in addition, the Joint FAO/IAEA Division was also invited to participate at a full range of technical conferences and meetings. These included meetings and events to mark 30 years after Chernobyl (April, Belarus), the Third Food Integrity Conference (April, Czech Republic), EuroResidue VIII (May, the Netherlands), the Asian Development Bank Food Security Forum (June, Philippines), the Korean Society for Environmental Agriculture 'Integrated Management of Agricultural Environment for Food' (July, Republic of Korea) and the INFOSAN (International Food Safety Authority Network) conference on 'New Science for Food Safety: Supporting Food Chain Transparency for Improved Health' (November, Singapore).

¹ Document prepared by and under responsibility of the Joint FAO/IAEA Division (please see <http://www.naweb.iaea.org/nafa/index.html> for additional details).

5. Over 780 food specialists, from all regions of the world, have been trained through our activities in 2016. Highlights include the following bespoke regional courses and workshops: Awareness on analytical methods and challenges in food authenticity, safety and traceability (hosted in Austria with the participation of specialists from Iraq, Kuwait, Libya, the Marshall Islands and Syria); Nuclear / Isotopic and Complementary Techniques in Food Safety (several countries of Africa and hosted in Malawi); Training on Sampling and Data Processing for Food Safety Laboratories (hosted in Botswana); Analytical Method Development and Validation (hosted in Benin); Food Microbiology Training (Namibia); Quality Management for Food Safety Laboratories (international participation and hosted in Indonesia); Food Sampling Training (hosted in Colombia); and Training on Sampling for Pesticide and Mycotoxin Analysis (hosted in Bahrain). Others include: (a) training courses on: pesticides, minor use/species and related plant products of public health and trade importance (Singapore – Interregional); Pesticide residues in Animal Products, (Benin); Optimization and harmonization of radio receptor assay technique for analysis of veterinary drug residues and related contaminants in foods and feeds (Uganda – Interregional); Basic maintenance and troubleshooting of analytical instruments for food and environmental safety monitoring and control programmes (Singapore – regional Asia Pacific and South Africa – Interregional); and Radio receptor assays, related screening and confirmatory methods for veterinary drug residues and associated chemical and natural food contaminants (Thailand – regional Asia Pacific).

6. Recent publications include a special issue of the journal *Food Control* reporting the proceedings of the FAO/IAEA Symposium on Food Safety and Quality². The Food and Environmental Protection Section's Newsletter³ provides a full list of our technical and scientific publications, which include 15 articles in peer reviewed journals, 14 conference papers, two special editions of scientific journals, two IAEA-TECDOCs, five manuals and one chapter in a specialist book series.

Technical Guidance on Radionuclides in Food and Drinking Water

7. In its report to this Committee and the CCCF in 2016, the Joint FAO/IAEA Division mentioned the importance of a new technical document (IAEA-TECDOC-1788) on *Criteria for Radionuclide Activity Concentrations for Food and Drinking Water*. In light of the considerable interests expressed by the CCCF, a side event was held at CCCF11. The subject was *Radionuclides in Food: Standards, New National Guidance and Recent Developments*. It was arranged by the Joint FAO/IAEA Division and the presenters were experts from international organizations; the IAEA; the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD); and the Joint FAO/IAEA Division. This was a very well received event and should the CAC be interested the Joint FAO/IAEA Division would be willing to arrange a similar side event at a future CAC.

8. TECDOC-1788 is freely available online⁴. Prepared by the IAEA, FAO and the World Health Organization (WHO), TECDOC-1788 is important as a reference source and as technical guidance. It is an authoritative reference to the different international standards that relate to radionuclides in food and drinking water, and this includes the guideline levels in the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995). For completeness, the TECDOC also summarizes current international standards for radionuclides in food, milk and drinking water in "emergency exposure situations" issued by the IAEA in joint sponsorship with international organizations including FAO and WHO⁵.

9. This TECDOC highlights and discusses the circumstances in which such standards are intended to be used. However, its main focus is "existing exposure situations" and in this regard the TECDOC provides technical guidance to help authorities develop activity concentration levels (becquerel per kilogram) for use as practical reference levels. It advocates the same approach as CODEX STAN 193-1995 and relates to International Basic Safety Standards (IBSS)⁶ that require regulatory bodies or other relevant authorities to establish specific reference levels for exposure due to radionuclides in food. Such reference levels should be based on an annual effective dose to the representative person that generally does not exceed a value of about 1 mSv. The TECDOC will therefore help countries develop national radionuclide reference levels that are required by the IBSS and are consistent with the Codex guideline levels for radionuclides in food.

² <http://www.sciencedirect.com/science/journal/09567135/72/part/PB>

³ <http://www-pub.iaea.org/MTCD/Publications/PDF/Newsletters/FEP-20-1.pdf>

⁴ http://www-pub.iaea.org/MTCD/publications/PDF/TE-1788_web.pdf

⁵ IAEA Safety Standards Series No. GSR Part 7 (2015) and No. GSG-2 (2011).

⁶ IAEA Safety Standards Series No. GSR Part 3

Technical Workshop on the Remediation of Radioactive Contamination in Agriculture

10. The National Agriculture and Food Research Organization of Japan and the Joint FAO/IAEA Division hosted this international technical workshop on Remediation of Radioactive Contamination in Agriculture. The presentations are available online⁷. It was held at the IAEA Headquarters, Vienna, Austria in October 2016 and was attended by over 100 participants. The technical workshop served to improve understanding of radioactive contamination in agriculture. Authorities and organizations with responsibilities for food and agriculture were targeted, as were nuclear safety institutions and organizations. It provided an opportunity to forge collaborative working to facilitate future policy development and research planning. There have been few major nuclear accidents that have affected agricultural production in the long term. However, the year 2016 marked the fifth anniversary of the accident at the Fukushima Daiichi nuclear power plant (NPP) and the 30th anniversary of the accident at the Chernobyl NPP, both classified as major accidents at Level 7, the highest on the IAEA's International Nuclear and Radiological Event Scale. The major focus of the workshop was therefore on residual levels of caesium radionuclides in countries affected by these accidents. Emergency preparedness related to food and agricultural production in all countries will be greatly improved by a broad understanding in this area. The workshop also helped to inform technical specialists and support collaborations and efforts to re-establish agricultural trade in food products from areas currently affected by residual levels of caesium radionuclides.

Coordinated Research Initiatives

11. In the period covered by this report the Joint FAO/IAEA Division has been implementing seven Coordinated Research Projects (CRPs). Of particular interest to the CAC are two newly initiated CRPs, one on *Integrated Radiometric and Complementary Techniques for Mixed Contaminants and Residues in Foods* (Reference D52041) and another on *Field-Deployable Analytical Methods to Assess the Authenticity, Safety and Quality of Food* (Reference D52040 and G42007).

12. The CRP D52041 had its first research coordination meeting in June at the IAEA Headquarters in Vienna, Austria. An international network of 17 laboratories and institutions from 17 different countries (Benin, Botswana, Chile, China, Colombia, Ecuador, Former Yugoslavia Republic of Macedonia, Italy, Netherlands, Nicaragua, Pakistan, Papua New Guinea, Peru, South Africa, Spain, Uganda, USA). The objective is to research and develop systematic programmes for measuring mixtures of contaminants and residues in foods, and appropriate multi-class analytical methods of analysis, leveraging the advantages of nuclear, isotopic and complementary techniques to strengthen the capacity of Member State analytical laboratories and national contaminant and residue monitoring programs, thus contributing to food safety and supporting international trade. New multi-class analytical methods will be developed, validated and transferred to control laboratories. It is envisaged that the research could also yield data on contaminants that would be of interest to CCCF, CCPR and CCRVDF.

13. As regards the new food authenticity and traceability CRP (Reference D52040 and G42007), this is a joint initiative being taken forward by both the Joint FAO/IAEA Division and the IAEA Division of Physical and Chemical Sciences. The objective is to research and develop measurement methods and applications for bench-top, portable and hand-held instrumentation using nuclear and related technology to screen for adulteration and contamination in foods. The first research coordination meeting was held in May at the IAEA Headquarters and attended by representatives of the 14 participating institutions from 13 countries (Austria, Belgium, China, India, Malaysia, Morocco, Russian Federation, Singapore, Sri Lanka, Sweden, Uganda, UK, USA).

14. A CRP on the *Development and Strengthening of Radio-analytical and Complimentary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products* (reference D52039) is ongoing and the second research coordination meeting for this project was held in Rancagua, Chile in October 2016. Its predecessor, a CRP on *Developing Radiometric and Allied Analytical Methods to Strengthen National Residue Control Programmes for Antibiotic and Veterinary Anthelmintic Drug Residues* has been completed. Analytical methods that were developed have been compiled into a manual and published⁸; the research work has also been published⁹ as an IAEA TECDOC and in a number of peer-reviewed articles. Researchers from Austria, Belgium, Brazil, China, Germany, Kenya, Mongolia, the Netherlands, Peru, Republic of Korea, Sri Lanka, Thailand, Tunisia, UK and USA contributed to this work. The methods are also available via the online a web platform¹⁰ hosted by the Joint FAO/IAEA Division.

⁷ <http://www-naweb.iaea.org/nafa/news/2016-FAO-IAEA-NARO.html>

⁸ <http://www-pub.iaea.org/MTCD/Publications/PDF/TCS63web.pdf>

⁹ <http://www-pub.iaea.org/MTCD/Publications/PDF/TE1800web.pdf>

¹⁰ See <http://nucleus.iaea.org/fcris/>

15. The CRP on *Implementation of Nuclear Techniques to Improve Food Traceability* (D52037), which commenced in 2011, was completed with the final research coordination meeting in November 2016. The project had 16 participating laboratories in 15 countries. The aim of this CRP was to develop nuclear and related technology systems that contribute to food safety and traceability by verifying the origin and authenticity of foods and natural commodities. The CRP achieved the first stage of this by demonstrating the applicability of the techniques to a wide range of foodstuffs. The protocols and databases developed are foundational to the future development of food control systems and reducing barriers to international trade. Furthermore, the project has facilitated investment by several of the member countries in these capabilities, and helped secure new funding for projects and equipment and facilitate new scientific collaborations and involvement in national and international food authenticity projects and networks. All of these achievements have raised awareness and allowed project members to interact with food industry stakeholders and regulators within their respective countries, helping to improve food traceability and safety systems.

16. A second CRP in this field of work, *Accessible Technologies for the Verification of Origin of Dairy Products as an Example Control System to Enhance Global Trade and Food Safety* (D52038) has 15 participating laboratories in 15 countries. The 2nd research coordination meeting was held in Rabat, Morocco, in October 2016. The CRP has initiated useful collaborations between laboratories in different member countries and it provides information with potential regulatory impact, e.g. the detection of milk whose chemical parameters do not comply with that from the claimed origin may be an indication of fraud.

17. As regards food irradiation, the second research coordination meeting of a food irradiation CRP was held in Strasbourg, France in March this year. The CRP D61024 is researching *The Application of Electron Beam and X-ray Applications for Food Irradiation*. This seeks to increase and enhance the capacity to irradiate food by using electrically generated (“machine source”) ionizing radiation.

Technical Cooperation

18. The Joint FAO/IAEA Division is providing technical support to 59 IAEA Technical Cooperation Projects in the area of food safety and control¹¹: 47 are national projects, 11 are regional and one is an inter-regional project to establish a world-wide network of analytical and control laboratories. Looking forward to the 2018-19 biennium, there are some 30 new project designs that are being reviewed and developed. We hope to provide more information on these at the next CAC in 2018.

19. Forging networks is closely related to the delivery of our research and technical cooperation activities. The Joint FAO/IAEA Division is working with various Member States at national, regional and interregional levels to promote laboratory networks for the sharing of technical expertise, experiences and resources, including laboratory methods and protocols for collecting residue or contaminant data. Initial networking focussed on Latin America and Africa, and this is now being extended to Asia. In addition, a new interregional technical cooperation project is promoting partnerships with laboratories and control authorities involved with food safety, veterinary drug residue and contaminant monitoring. This provides the opportunity to further develop and inter-link regional networks, including the opportunity to collect occurrence data on residues and contaminants to support standards setting. Through the interregional project, complementary to the Codex Trust Fund, a number of participants have been supported to attend the CCRVDF, CCCF, CCPR and Codex Committee on Methods of Analysis. This is expected to continue.

20. The Joint FAO/IAEA Division is pleased to continue to support, develop and promulgate the standards of the CAC and will continue in its efforts to work with member countries and Codex Committees to enhance food safety, quality and control and in doing so help facilitate international food trade.

For further information please contact: Zhihua Ye

Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

Food and Environmental Protection Section

E-mail: Official.Mail@iaea.org

Internet: <http://www-naweb.iaea.org/nafa/fep/index.html>

¹¹ A full list is available in our latest Newsletter, pages 18-23: <http://www-pub.iaea.org/MTCD/Publications/PDF/Newsletters/FEP-20-1.pdf>