CODEX ALIMENTARIUS COMMISSION

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Food and Agriculture Organization of the United Nations

World Health Organization

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX ALIMENTARIUS COMMISSION

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ACTIVITIES OF THE JOINT FAO/IAEA DIVISION OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE RELEVANT TO CODEX WORK[1]

1. For more than fifty years, the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture (the Joint Division) has promoted the mandates of both the International Atomic Energy Agency (IAEA), through peaceful uses of atomic energy to accelerate and expand the contributions of nuclear technologies to promote global health and prosperity, and the Food and Agriculture Organization of the United Nations (FAO) in its efforts to eliminate world hunger and reduce poverty through sustainable agricultural and rural development, improved nutrition and food security.

2. The Joint Division strives to strengthen and enhance capacities for the use of nuclear related techniques for sustainable food security and to disseminate these techniques through international activities, including research, technical assistance, training and outreach in its Member States. The Joint Division is based in Vienna, Austria and comprises five sections covering the areas of food and environmental protection, soil and water management and crop nutrition, plant breeding and genetics, animal production and health, and insect pest control. Each section has a laboratory in the FAO/IAEA Agriculture & Biotechnology Laboratories complex at Seibersdorf.

3. The Joint Division will continue to strengthen its joint efforts with sister divisions in FAO Headquarters to improve food safety, protect consumer health, and facilitate international agricultural trade by providing assistance in four main areas, namely, coordinating and supporting research, providing technical and advisory services, providing laboratory support and training, and collecting, analysing and disseminating information. The activities most closely related to the work of Codex are the use of ionizing radiation, food authenticity, the control of food contaminants, and nuclear or radiological emergency preparedness for events that could affect food and agriculture.

4. In these areas, the Food and Environmental Protection subprogramme coordinates six international research projects and, since the Joint Division's previous report to the CAC, has provided scientific and technical support to over 40 IAEA Technical Cooperation Projects at national, regional and interregional levels. These have included food safety initiatives such as monitoring for pesticide, veterinary drug, mycotoxin and heavy metal residues in food and feed commodities and the environment. Technology transfer and capacity building activities have included in-house training via expert missions, scientific visits and fellowships to train laboratory specialists and build human resource capacities in developing countries. Through the IAEA Technical Cooperation fund, member countries have also received assistance with the procurement of gamma irradiation units, analytical instruments, supplies and consumables, including stable isotope internal standards and radio-labelled standards.

5. A major output of the Joint Division in 2014 was the International Symposium on Food Safety and Quality: Applications of Nuclear and Related Techniques. This event was hosted at the IAEA's Headquarters in Vienna, Austria, from 10 to 13 November 2014. It brought together more than 300 participants from over 85 countries and six international organizations. Some 63 speakers presented on issues related to nuclear techniques in food traceability, contaminant control and quality, and food irradiation. Associated satellite events included a Workshop on Food Control Systems and the Role of the Different Stakeholders in the Food Supply Chain, and a practical laboratory based FAO/IAEA training workshop on the application of laboratory quality assurance and control to address food safety and quality.

[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).

6. The Joint Division is continuing to work with various member countries at national, regional and interregional levels to promote the establishment and functioning of laboratory networks for the sharing of technical expertise, supply-chain intelligence, experience and resources (including veterinary residue and food contaminant data). The initial focus was in Latin America and the Caribbean region and the successful initiative is now being extended to Africa and Asia. There is growing interest world-wide and the Joint Division is working with member countries to develop an interregional project to enhance capacity building and improve food safety by creating an interregional network. It is envisaged that participating laboratories will generate and contribute data relevant to Codex.

7. The Joint Division actively participates in the Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF), the Codex Committee on Contaminants in Foods (CCCF), and the Codex Committee on Pesticide Residues (CCPR). It also hosts and maintains international resources such as the Food Contaminant and Residue Information System (FCRIS)[2], which is a free-to-access online information system that provides analytical methods and associated information. This database supports the application of Guidelines for the Design and Implementation of National Regulatory Food Safety Assurance Programme Associated with the use of Veterinary Drugs in Food Producing Animals (CAC/GL 71-2009) and also extends this support in the interests of the Codex Committee on Pesticide Residues. For example, the FCRIS currently has 91 methods of analysis in the method databases for veterinary drug or pesticide residue analysis.

RESIDUES OF VETERINARY DRUGS IN FOODS

8. At the 22nd session of the CCRVDF, the Joint Division report included information on a new five-year coordinated research project on the "Development and Strengthening of Radio-Analytical and Complementary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products (CRP D52039)"[3]. Representatives from participating food safety and research institutions in Belgium, Brazil, Cameroon, Canada, Chile, China, Ecuador, India, Singapore, South Africa, Turkey and Uganda held their first research coordination meeting in June 2015. This strategic research initiative has the overall objective to enhance national control programmes for residues of veterinary pharmaceuticals and related chemicals in aquaculture products and feeds. It follows on from a successfully completed coordinated research project to develop radiometric and allied analytical methods to strengthen national residue control programmes for antibiotic and veterinary anthelmintic drug residues (CRP D52036). Analytical methods were developed collaboratively in this project by institutions in Austria, Belgium, Brazil, China, Germany, Kenya, Mongolia, the Netherlands, Peru, Republic of Korea, Sri Lanka, Thailand, Tunisia, UK and USA. Several of these methods are already being used in member countries.

PESTICIDE RESIDUES IN FOOD AND FEED COMMODITIES AND THE ENVIRONMENT

9. As regards the 47th Session of the CCPR, the Joint Division provided technical support and assisted in drafting a document on Performance Criteria Specific for Methods of Analysis for Pesticide Residues as a member of a CCPR electronic working group. The Joint Division agreed to assist in finalizing a draft for the consideration of the 48th CCPR in 2016. In addition, participants were interested in the Red Analitica de Latino America y el Caribe (RALACA) network that was initially established in conjunction with the Joint FAO/IAEA Division. Now comprising over 50 laboratories in 19 Latin America and Caribbean countries, this network has developed at least 12 national chemical residue monitoring programmes and, in addition, 15 laboratories have worked together to monitor veterinary residues in foods and feeds. More than 125 analytical methods were developed and validated or re-validated and over 206 laboratory staff trained over a two-year period.

CONTAMINANTS IN FOODS

10. The Joint Division participated at the 9th CCCF and also in working groups developing standards and guidelines, for example on maximum levels for cadmium in chocolate and cocoa-derived products and also on Guideline Levels (GLs) for radionuclides in foods following a nuclear or radiological emergency.

11. The CCCF was up-dated on the work of the IAEA Radiation Safety Standards Committee (RASSC)[4] involving international standards relating to radionuclides in food and water. An Inter-Agency Working Group had reviewed standards related to food and drinking water containing radionuclides and reported their findings to the CCCF and RASSC. A CCCF electronic working group, assisted by the Joint Division, produced a paper on the interpretation and implementation of the Guideline Levels for radionuclides in food traded internationally and contained in the Codex General Standard for Contaminants and Toxins in Food

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2 The Food Contaminant and Residue Information System (FCRIS) is available at: http://nucleus.iaea.org/fcris/Default.aspx/ or indirectly via: http://nucleus.iaea.org/Home/index.html.

3 http://cra.iaea.org/cra/stories/2014-12-10-D52039-VetDrugs-Aquaculture.html

4 A standing body of senior experts in radiation safety, it advises the IAEA on the radiation safety programme for the development, review and revision of standards relating to radiation safety and the programme for their application.

and Feed (GSCTFF) [CODEX STAN 193-1995], as was requested by the CCCF in consideration of four questions raised by the Inter-Agency Working Group.

12. As regards the four questions raised by the Inter-Agency Working Group, (i) the Joint Division considers that Codex GLs relate to food in international trade and that when comparing the GLs to radionuclide concentrations in food it is necessary to take into account any change in radionuclide concentrations when the food is ready to eat (e.g. what the radionuclide concentrations would be in food after reconstitution or as otherwise prepared for consumption); (ii) the Joint Division considers that it is not possible to define a fixed time frame for the application of the GLs, and a practical approach is needed, for example, until the underlying assumptions contained in the GSCTFF (e.g. fraction of contaminated food, and minor crops) are no longer valid; (iii) it is also considered that the identification of internationally validated methods of analysis for radionuclides in foods would be useful to include in Codex Standards, especially as different analytical methodologies are necessary for different types of radionuclide (i.e. alpha-, beta- and gamma-emitters); and (iv) it is agreed that the General Guidelines on Sampling (CAC/GL 50-2004) are sufficient for radionuclide testing and allow users enough flexibility.

13. The CCCF was also informed about efforts to produce an IAEA technical document (TECDOC) entitled "*Guidance on Radionuclide Activity Concentrations for Food and Drinking Water*" intended for existing exposure situations. A Technical Meeting, attended by 45 experts from 37 Member States plus representatives from the FAO and WHO, was held at the IAEA's Headquarters in Vienna, Austria, from 8 to 12 September 2014. The meeting's purpose was to provide guidance and input on the development of the TECDOC and to discuss radiological criteria, including radionuclide activity concentrations, used as the basis for the control of foodstuffs and drinking water in existing exposure situations (i.e. not in radiological or nuclear emergency situations). The radionuclide Guideline Levels in CODEX STAN 193-1995 were included in these discussions. An equivalent approach to that used to calculate the Codex Guideline Levels was agreed as an appropriate framework for calculating radionuclide reference levels (Bq/kg) for radioactivity in food in "normal" circumstances or well after an emergency has been declared ended should residual quantities of radionuclides be present in food and the environment. The TECDOC will therefore encourage countries to develop national radionuclide reference levels for existing exposure situations that, where appropriate, are consistent with the Codex Guideline Levels for radionuclides in food traded internationally.

14. The TECDOC will provide an explanation of the different international standards relating to radionuclides in food and drinking water and the circumstances in which they are intended to be used, with particular focus on an existing exposure situation. It will emphasise that 1 mSv/year is the appropriate dose criterion for food and also for drinking water because this is specified in the IAEA Basic Safety Standards in relation to existing exposure situations. The document will include a framework to help countries develop activity concentration levels for use as radionuclide reference levels at the national level, which are consistent with 1 mSv/year dose criteria for an existing exposure situation. The draft document, developed by IAEA, FAO and WHO following the September 2014 Technical Meeting, will be considered by RASSC at its next meeting. The aim is to finalize the IAEA publication by the end of 2015. The IAEA and Joint Division will continue to report developments to the CCCF and will share the TECDOC with interested parties as soon as it is available.

FOOD IRRADIATION

15. As was reported at the 37th session of the Joint FAO/WHO Codex Alimentarius Commission (CAC), the Joint Division has worked with member countries in the Asia and the Pacific region to produce a new Regional Standard for Phytosanitary Measures (RSPM), *Approval of Irradiation Facilities* (APPPC RSPM No. 9). This RSPM has since been published and is available online[5]. The RSPM addresses phytosanitary treatment of both non-food and food commodities and in terms of irradiated food commodities it highlights the need to recognise Codex Alimentarius standards and codes of practice for irradiated food and food irradiation facilities. A harmonized approach to the acceptance of irradiation facilities has become important as the commercial uptake of irradiation as a phytosanitary treatment is increasing and this RSPM is being put forward for consideration as an International Standard Phytosanitary Measure of the International Plant Protection Convention.

16. A Manual of Good Food Irradiation Practice has been developed and is soon to be published by the IAEA in its Technical Series of reports. An electronic learning course on food irradiation was recently published online[6] and is free of charge. It is intended for self-study by those interested in the use of ionizing radiation for food applications and/or phytosanitary uses, with modules developed specially for regulators, industry and members of the general public.

[5] http://www.fao.org/3/a-i3707e.pdf
[6] http:/bit.do/iaeafoodirradiation

FOOD TRACEABILITY AND AUTHENTICITY

17. The Joint Division provides support to FAO and IAEA member countries for the implementation of holistic food safety and control systems. This includes the development or application of isotopic, metabolomic and related analytical techniques to verify or provide information on the origin of food and hence enable the audit of information-based traceability systems. These analytical techniques can also be applied to verify the authenticity of foodstuffs or to detect adulteration. This area of work is necessary to combat fraud, enhance food safety and enable international trade in food commodities. For example, activities under the Joint Division will potentially contribute to future revision of the Codex Standard for Honey (CODEX STAN 12-1981)[7] as well as assisting in the general development of methods and procedures to establish the authenticity of products or identify adulteration.

18. Capacity building activities in this field include a regional project for food traceability and food safety control systems in South-East Asia, and several national projects requested by member countries, currently in the planning phase. Research activities include international research projects on the implementation of nuclear techniques to improve food traceability and on the application of accessible technologies for the verification of origin of dairy products as an example control system to enhance global trade and food safety.

19. The Joint FAO/IAEA Division is making an important contribution to the development of this area by working in collaboration with other IAEA specialist laboratories and national and international institutes to develop quality control materials that will eventually be approved as certified reference materials (CRMs) for the assessment of trace elements and contaminants in food matrices. Such materials are essential in food traceability and authenticity work, since isotopic techniques fundamentally rely on the availability of suitable CRMs, and there are very few such materials currently available. Research at the Joint Division's laboratories has identified several candidate materials and work is continuing to verify that they meet the necessary stringent criteria.

NUCLEAR AND RADIOLOGICAL EMERGENCY PREPAREDNESS

20. The FAO, through the Joint FAO/IAEA Division, works in partnership with the IAEA, WHO and other relevant international organizations in preparing for and responding to nuclear or radiological emergencies within the framework of the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) and in accordance with the Joint Radiation Emergency Management Plan of the International Organizations (EPR-JPLAN 2013)[8]. These practical arrangements are also reflected in the cooperative arrangements between the FAO and the IAEA for the provision of support in response to nuclear or radiological emergencies.

21. The Joint Division's Coordinated Research Project entitled "Response to Nuclear Emergencies Affecting Food and Agriculture"[9] involves institutions in Belgium, China, France, India, Japan, the Former Yugoslav Republic of Macedonia, Morocco, Russian Federation and Ukraine. This collaborative research effort has developed innovative systems for data collection and management as well as geovisualization. The systems together provide an electronic platform as a complete technology package. It is currently being tested and can be used as an app on smart-phones, thereby providing a portable means to aid sample collection and mapping.

22. New safety requirements in nuclear and radiological emergency preparedness and response have been approved and will be published in the IAEA Safety Standards Series of publications as '*Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Requirements No. GSR Part 7*' this year. The new Safety Requirements are a revision of a previous standard No. GS-R-2 issued in 2002 that takes into account: (i) experience gained from studying the responses to emergencies since 2002, including, but not limited to, the Fukushima Daiichi nuclear power plant accident in Japan in 2011, as well as findings from exercises conducted since 2002; (ii) feedback obtained from Member States since 2002; (iii) relevant developments in this field as well as recommendations of the International Commission on Radiological Protection; and (iv) the experience of relevant international intergovernmental organizations, including the FAO (through the Joint Division).

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7 See http://www.codexalimentarius.org/input/download/standards/310/cxs_012e.pdf.
8 Available online at: http://www-pub.iaea.org/MTCD/publications/PDF/EPRJplan2013_web.pdf.
9 http://www-naweb.iaea.org/nafa/swmn/crp/swmcn-nuclear-emergency-food.html

23. The new safety requirements are sponsored by 13 international organizations[10]. This safety requirements publication includes generic criteria for use in a nuclear or radiological emergency in relation to radionuclides in food, milk and drinking water that are intended for use within affected areas and are consistent with IAEA Safety Standards Series No.GSG-2 issued in 2011 (co-sponsored by FAO) and also consistent with Codex Guideline Levels for radionuclides in foods intended for international trade.

24. Subsequent to our report to the 37th CAC, activities of the Joint FAO/IAEA Division related to the accident at the Fukushima Daiichi nuclear power plant (NPP) in Japan have included:

- Continued cooperation with other IAEA Departments, the World Health Organization (WHO) and other international organizations in the dissemination and interpretation of international standards;
- Collection and analysis of monitoring data (FAO/IAEA database);
- Contributing to the IAEA Report on the Fukushima Accident, which is scheduled for publication in September 2015 together with five detailed technical volumes; and
- Implementation of activities related to the IAEA Action Plan on Nuclear Safety, including technical meetings of international experts.

25. The authorities in Japan have been reporting caesium radionuclide levels in foods since March 2011. For example, an average of over 20,000 samples per month have been published online this year. These monitoring data have included foods both on sale and from production areas in Japan. Few samples (averaging less than 0.2 percent per month in 2015) are exceeding the Japanese standard limits for caesium radionuclides in foods. The authorities are maintaining comprehensive monitoring programmes to ensure the integrity of the food supply chain.

[10] The 13 organizations are: Comprehensive Nuclear-Test-Ban Treaty Organization, Food and Agriculture Organization of the United Nations, International Atomic Energy Agency, International Civil Aviation Organization, International Labour Organization, International Maritime Organization, Interpol, Nuclear Energy Agency of the Organisation for Economic Cooperation and Development, Pan American Health Organization, United Nations Environment Programme, United Nations Office for the Co-Ordination of Humanitarian Affairs, World Health Organization, and the World Meteorological Organization.