CODEX ALIMENTARIUS COMMISSION E

Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

**Agenda Item 13** **CX/CF 19/13/11**
**February 2019**

**JOINT FAO/WHO FOOD STANDARDS PROGRAMME**

**CODEX COMMITTEE ON CONTAMINANTS IN FOODS**

**13th Session**
**Yogyakarta, Indonesia, 29 April – 3 May 2019**

# DISCUSSION PAPER ON THE REVISION OF THE CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF LEAD CONTAMINATION IN FOODS (CXC 56-2004)

*(Prepared by the Electronic Working Group led by the United States of America and the United Kingdom)*

## Background

1. Lead is a toxic heavy metal that occurs in the environment both naturally and, to a greater extent from anthropogenic sources because of its widespread industrial uses. Exposure to lead can occur through ingestion, inhalation, and dermal contact. Lead exposure is associated with neurodevelopmental effects, mortality (mainly due to cardiovascular diseases), impaired renal function, hypertension, impaired fertility, and adverse pregnancy outcomes. Because of neurodevelopmental effects, fetuses, infants, and children are the most sensitive to lead exposures.[1]

2. Efforts to remove lead from gasoline have had a significant impact on reducing lead exposures worldwide. With regards to reducing lead exposure from food, measures have focused on implementing standards for allowable lead levels in food, food additives, and food contact substances; ending the use of lead-soldered cans; controlling lead levels in water; reducing leaching from lead-containing vessels or restricting its use for decorative purposes; and preventing contamination during food handling and processing.

3. Given the importance of reducing dietary lead exposure, in 2004 the Codex Alimentarius Commission (CAC) adopted a *Code of practice (COP) for the prevention and reduction of lead contamination in foods* (CXC 56-2004). The COP includes recommended practices for lead reduction in the areas of agriculture, drinking water, food ingredients and processing, production and use of packaging and storage products, consumer practices and consideration for certain foods.

4. At its 73rd session (June 2010), the Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluated new information on the toxicology, epidemiology, exposure assessment, and analytical methodology of lead at the request of the Committee on Contaminants in Food (CCCF). JECFA withdrew the previously established provisional tolerable weekly intake (PTWI) of 25 µg/kg bw and concluded that it was not possible to establish a new PTWI that would be considered health protective. JECFA concluded that in populations with prolonged dietary exposures to higher levels of lead, measures should be taken to identify major contributing sources, and if appropriate, to identify methods for reducing dietary exposure that are commensurate with the level of risk reduction.

5. Since the JECFA assessment, CCCF has initiated new work on lead, including work led by the United States of America on revision of maximum levels (MLs) for lead in selected commodities in the General Standard for Contaminants and Toxins in Food and Feed (GSCTFF) (see Agenda Item 5) and work chaired by Brazil on future work on MLs for lead for inclusion in the GSCTFF (see Agenda Item 11).

6. Given that lead exposure from food continues to be a public health concern and given that new information may be available on reducing lead in foods, CCCF12 (March 2018) agreed to establish an electronic working group (EWG) chaired by the United States of America, and co-chaired by the United Kingdom, to prepare a discussion paper, including a project document, for a proposal for new work on revision of the existing COP (CXC 56-2004).[2]

---

[1] JECFA (Joint FAO/WHO Expert Committee on Food Additives). 2011. Safety evaluation certain food additives and contaminants. WHO Food Additive Series: 64. Prepared by the 73rd meeting of JECFA. Available: http://apps.who.int/food-additives-contaminants-jecfa-database/chemical.aspx?chemID=3511.

[2] REP 18/CF, para. 160.

7. The aim of this discussion paper is to provide additional information on sources of lead in food and updated practices for reducing lead in food that have become available since publication of CXC 56-2004. The paper reviews new material for consideration in the revised COP, organized according to the section headings in CXC 56-2004. References are included in some sections as needed, although they will not be included in the final COP.

8. Appendix I of this paper contains a draft project document for the proposal for new work for review by CAC. Appendix II contains a draft revised COP with tracked changes. Appendix III contains a list of participants in this EWG.

9. Each section below reviews the materials contained in CXC 56-2004 and provides recommendations for revisions.

**COP Introduction**

10. The COP introduction (specifically paragraph 1) contains background on the occurrence and toxic effects of lead. Paragraph 1 needs to be updated, including mention of the JECFA73 assessment.

11. Paragraph 2 identifies general sources of lead exposure in addition to food and water, such as the workplace, hobbies, and through exposure to contaminated soil and air. The EWG recommends that the list of general sources of lead exposure in the introduction (paragraph 2) which reads, "Lead exposure can occur through food and water, as well as in the workplace, through hobbies, and through exposure to lead-contaminated soil and air" be expanded to include cosmetics, some traditional medicines, and materials used in religious or traditional practices.

12. Paragraph 6 describes worldwide effects to reduce lead exposure from food. The EWG recommends including food contact substances as one of the areas where standards have been implemented for allowable lead levels.

**Recommended practices based on Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP)**

***Source Directed Measures***

13. There is currently no paragraph referring readers to the *Code of Practice for Source Directed Measures to Reduce Contamination in Foods with Chemicals* (CXC 49-2001). The EWG suggests addition of a paragraph such as the following:

    - National or relevant food control authorities should consider implementation of source directed measures in the *Code of Practice for Source Directed Measures to Reduce Contamination in Foods with Chemicals* (CXC 49-2001).

***Agricultural***

14. Paragraphs 8-18 of the CXC 56-2004 review the following recommended practices:

    - Reducing or eliminating use of leaded gasoline in agricultural areas (paragraph 8).
    - Awareness and possible testing of soil near lead sources, such as industrial facilities, roadways, ordnance depots, rifle ranges, military firing ranges, as well as on farms or near gardens, with buildings having weathered exterior paint (paragraph 9).
    - Avoidance of land treated with lead arsenate pesticides or sewage sludge that does not adhere to maximum allowable lead levels set by national authorities (paragraphs 10-11).
    - Choosing crops that are less vulnerable to airborne deposition of lead in areas where lead atmospheric levels are higher (paragraph 12).
    - Avoiding use of compounds that contain or are contaminated with lead in agricultural areas (paragraph 13).
    - Avoiding use of dryers or other equipment powered by leaded gasoline on harvested crops (paragraph 14).
    - Protection of crops from lead contamination (e.g., exposure to atmospheric lead, soil, dust) during transport to processing facilities (paragraph 15).
    - Taking steps by home or small-scale commercial gardeners to reduce lead contamination (paragraph 16).
    - Protecting agricultural water for irrigation from sources of lead contamination and monitoring lead levels (paragraph 17).
    - Local and national authorities should make farmers aware of appropriate practices for preventing lead contamination of farmlands (paragraph 18).

15. Additional information on agricultural measures can be included in the revised COP. The EWG has identified the following possible additions:

- Other sources of lead on agricultural lands should be removed where possible, including discarded vehicle batteries, electric fencing batteries, and old vehicles and machinery. Lead solder or other lead materials used for repairing farming equipment should be avoided.
- Livestock should be protected from lead sources, including peeling paint on buildings, bonfire ash, metal roofing material, and contaminated water sources.
- Livestock soil consumption should be minimized, through provision of a balanced diet (including minerals).
- Feed and feed additives (including mineral mixes and feed binders) should meet standards established by national authorities.
- Cows that produce milk found to have elevated lead levels, should not be used as a source of milk until lead decreases to levels deemed appropriate by national authorities.
- In areas known to have higher lead levels in soil, consider planting certain types of garden plants and trees that may be less susceptible to lead contamination including fruiting vegetables, vegetables that grow on vines, and fruit trees. Decrease planting of root vegetables or relocate root crops to planting locations with lower lead levels.

16. In addition, one revision to existing bullets (pars. 8-18) in CXC 56-2004 was suggested by the EWG.

- One comment suggested adding text to the bullet in paragraph 11 to ensure fertilizers (including sewage sludge) adhere to standards set by local or national authorities.

17. The EWG has identified additional recommendations for land remediation and for home and small-scale commercial gardeners.

- For soil with mildly elevated lead levels, mulch can be applied to reduce dust and soil splashing on plants to reduce lead contamination.
- In addition, for soil with slightly elevated lead levels, phosphate amendments can be applied to reduce the bioavailability of lead. However, an assessment of the efficacy of phosphate amendments may be needed, given the influence of other soil factors (e.g., acidity, levels of other metals). Use of phosphate amendments should be used in combination with other soil mitigation measures (e.g., building up gardening beds with clean soil as described in CXC 56-2004) (Paltseva et al. 2018).
- For gardeners, contaminated soil can be physically removed and replaced with clean soil. Gardeners should consult local authorities regarding proper disposal of removed soil.

***Drinking water***

18. Paragraphs 19-21 of CXC 56-2004 review the following recommended practices:

- Establishing allowable lead levels or appropriate treatment techniques for controlling lead levels in drinking water (paragraph 19).
- Considering treatment techniques for water systems with high lead levels, to minimize corrosion and reduce leaching of lead in the distribution system (paragraph 20).
- Considering replacing problematic lead piping and other lead-containing fixtures (paragraph 21).

19. In addition to the material covered above, the EWG has identified additional mitigation measures related to drinking water.

- Changes in municipal water treatment regimens (e.g., addition of chloramines, change in water source) have been found to influence the levels of lead in drinking water (Edwards and Dudi 2004; Switzer et al. 2006). For example, addition of chloramines to water systems that contain lead piping, fixtures, or solder has increased lead levels in drinking water (Miranda et al. 2007), while failure to use corrosion control treatment with a new water source also resulted in elevated lead levels in the drinking water (Pieper et al. 2017). This suggests it may be appropriate to add information on the effects of changes in municipal water treatment regimens on lead levels in drinking water.

- Information can be included on specific lead-containing fixtures that are the primary sources of contamination for drinking water and water for food preparation. Specific lead sources include brass faucets, lead solder on copper pipes, lead pipes, or lead service lines connecting the water main to inside plumbing (Maas et al. 2005).

20. The EWG is also considering including information on the importance of monitoring lead levels in drinking water in schools and childcare centers, and applying mitigation measures to reduce elevated lead levels, given the concern regarding the effects of lead on young children.

***Food Ingredients and Processing***

21. Paragraphs 22-30 of CXC 56-2004 review the following recommended practices:

- Establishing standards limiting lead in foods and food ingredients and monitoring selected foods and dietary supplements (paragraph 22).
- Choosing food and food ingredients with the lowest lead levels possible (paragraph 23).
- Processing and washing vegetables for maximal removal of surface lead (paragraph 24).
- Ensuring that the water supply for food processing complies with national or local maximum limits for lead (paragraph 25).
- Examining piping and fixtures within facilities for likely lead sources (paragraph 26).
- Using food-grade metals for all surfaces that come into contact with food and beverages (paragraph 27).
- Not using lead solder to repair broken equipment and not using non-food-grade equipment (paragraph 28).
- Ensuring that lead paint peelings and lead paint and dust from abatement do not contaminate facilities (par 29).
- Occasional testing of raw materials and finished products for lead as a means of verifying control measures (par 30).

22. The EWG has identified additional information for inclusion in the COP related to testing certain foods for lead, adhering to recommended lead levels, using quality assurance programs, selection and treatment of processing aids for beverages, and sourcing of ingredients for baby foods.

- Food producers should adhere to recommended MLs in the Codex General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995) or recommended levels in national or regional standards for foods and food additives; this is particularly important for infant foods.
- More focused testing should be considered for ingredients or products known to contain high lead levels; this could include products identified in the GSCTFF (CX/CF 18/12/5) or through the discussion paper on future work on MLs for lead for inclusion in the GSCTFF (CX/CF 18/12/1). This is particularly important for ingredients or products that may have a history of economic adulteration (for example, certain spices).
- Consider participating in quality assurance programs that include written documentation for how potential lead sources are to be controlled, monitoring of these controls for their effectiveness, and testing finished products for lead.
- Filtration aids (specifically diatomaceous earth, bentonite, and charcoal filtration) used in the processing of fruit juice, wines, and beer can contain lead that may leach into these beverages. Selection of filter aids with lower concentrations of lead or pre-washing of filter aids can help reduce lead levels (Stockley et al. 2003; Wang et al. 2017; Redan et al. submitted). Research suggests that washing diatomaceous earth filter aids with an ethylenediamine tetraacetic aid [EDTA] solution can significantly reduce lead levels in the filter aids (Redan et al. submitted). Washing filtration aids (activated carbon and diatomaceous earth) with hydrochloric acid solution also can reduce lead levels in beverages. Alternative filtration aids that reduce or avoid lead leaching include ceramic filter membranes, ultrafiltration polymer membranes, and resin filtration.
- For infant foods, consideration should be given to sourcing of raw materials and ingredients used in the manufacture of finished products for infants to ensure levels of lead are as low as reasonably achievable.
- Metal detectors can be used in slaughterhouses and fish processing facilities for detecting lead shot or fishing sinkers in wild meat and fish.

23. In addition, revision to an existing bullet in CXC 56-2004 was suggested by the EWG.

- Some foods can be contaminated with lead during the production process. The advice for food processors to examine old piping within facilities (paragraph 26) should also include considering replacement of outdated piping and fixtures, and old containers, particularly those containing brass alloys and lead soldering. However, changes in piping and fixtures should be made in a way that does not trigger unintentional release of lead.

***Production and use of packaging and storage products***

24. Paragraphs 31-40 of CXC 56-2004 review the following recommended practices:

- Avoid use of lead-soldered cans or if lead-soldered cans are used, apply methods to reduce lead exposure during manufacture of lead-soldered cans (paragraphs 31-32).
- Use tinplate for food cans that meets international standards for maximum allowable lead concentration (paragraph 33).
- Avoid use of lead dyes or lead-based printing inks for packaging (paragraph 34).
- Avoid use of plastic bags or boxes for food packing, whose exteriors are treated with lead-based dyes or lead-based printing inks (paragraph 35).
- Avoid packing foods in traditional lead-glazed ceramics (paragraph 36).
- Avoid use of lead foil capsules on wine bottles (paragraph 37).
- Consider setting standards for lead migration from lead-glazed ceramic ware, lead crystal, and other lead-containing items that might potentially be used for food storage or preparation by consumers (paragraph 38).
- Label any decorative ceramic ware as not for food use, that has the potential to leach unacceptable quantities of lead (paragraph 39).
- Use manufacturing procedures and quality control mechanisms that minimize lead leaching by ceramic ware producers (paragraph 40).

25. The EWG has identified additional information on production and use of packaging and storage products.

- As one regulatory option, consider setting standards for lead migration and lead composition in food contact materials used in food processing or manufacturing.

***Consumer practices and consideration of certain foods***

26. Paragraphs 41-45 of CXC 56-2004 review the following recommended practices:

- Educating consumers, by local and national authorities, about appropriate practices to reduce lead contamination in the garden and the home (paragraph 41).
- For consumers, avoiding storage or frequent use of cooking or serving vessels that can transfer lead (paragraph 42).
- For consumers, washing fruits and vegetables thoroughly, and washing hands before food preparation (paragraph 43).
- For consumers, where lead in water distribution systems is a problem, letting water run from faucets before use and avoiding use of hot water from the faucet for food preparation (paragraph 44).
- Avoiding consumption of traditional foods such as calabash chalk if the product cannot be produced without high levels of lead (paragraph 45).

27. The EWG has identified additional information for inclusion in the COP related to consumer practices and certain foods.

- The recommendation on consumer education to local and national authorities could be expanded to address education about the hazards of lead, particularly to children; sources of lead; and appropriate practices to reduce lead contamination from food prepared in the home or grown in the garden.

- Consumers should be educated about the concerns surrounding geophagia (the practice of consuming soil) that is mainly practiced by children and pregnant and lactating women. In addition to calabash chalk as discussed in CXC 56-2004, there are a number of clay products that have been found to contain high lead levels and are known by a variety of names including mabele, sikor, and pimba (Reeuwijk et al. 2013). Pregnant and lactating women, and children who frequently engage in geophagia, should be discouraged from this practice. Given that geophagia is practiced widely in some cultures, incorporating consumption of calabash chalk and other clays within the heading “consumer practices” is appropriate.

- Foods, herbs, and spices that, are used as traditional medicines, can also be a source of lead exposure. Ingestion of these medicines, in particular by young children, has been associated with health effects. In an evaluation of case reports by Karri et al. (2008) from 1966 to 2007, of the 76 cases of lead encephalopathy identified from use of traditional medicines, 5% were in adults and 95% were in children. Public health organizations and community organizations should consider issuing advisories to users of traditional medicines, encouraging consumers to consult their physicians about lead screening (Karri et al. 2008; Mathee et al. 2015).

- In addition to washing vegetables and fruits to remove dust and soil that may contain lead, consumers should remove outer leaves from leafy greens and peel root crops to reduce lead levels. Storing food and eating/cooking utensils in sealed containers or closed cabinets can protect them from dust deposition.

- Consuming game meat containing lead shot (pellets) can contribute to lead exposure. Studies have shown that blood lead levels are higher in people who consume game meat versus those who do not (Iqbal et al. 2009; Bjermo et al. 2013). This is particularly a problem when consuming meat from smaller animals killed by lead shot, as higher levels of lead are found in the tissue. Children and women of childbearing age should reduce or avoid consumption of game killed with lead shot. When hunting for game that is intended as food, use of a rifle or slug shot rather than a shotgun may reduce lead contamination of meat.
- National authorities should educate people about the potential risks of consuming local specialty foods or wild, collected foods (e.g., mushrooms) that could contain elevated lead levels.

**Recommendations**

28. The EWG makes the following recommendations to CCCF:

- There is sufficient additional information available on lead sources and mitigation measures to justify revisions to the *Code of Practice for the Prevention and Reduction of Lead Contamination* (CXC 56-2004).
- CCCF agrees to forward the project document for revisions to CXC 62-2006 (Appendix I) to CCEXEC/CAC for approval as new work.
- CCCF establishes an EWG to prepare a proposed revised COP for comment by CCCF14 and provides general comments on the proposed revisions as outlined in Appendix II to give guidance to the EWG in the revision of the COP.

## References

Adamse, P., H.J. Van der Fels-Klerx, J. de Jong. 2017. Cadmium, lead, mercury and arsenic in animal feed and feed materials – trend analysis of monitoring results. Food Additives Contaminants: Part A. 34(8): 1298-1311.

Bjermo H., S. Salomon, C. Nälsen, T. Lundh, H. Enghardt, B. M. Pearson, A.K. Lindroos, B. A.G. Jönsson, L. Barregård, P.O. Barnerud. 2013. Lead, mercury, and cadmium in blood and their relation to diet among Swedish adults. Food and Chemical Toxicology. 57:161-169.

Edwards, M. and A. Dudi. 2004. Role of chlorine and chloramine in corrosion of lead-bearing plumbing materials. Journal – American Water Works Association. 96(10): 69-81.

Iqbal S., W. Blumenthal, C. Kennedy, F.Y. Yip, S. Pickard, W.D. Flanders, K. Loringer, K. Kruger, K.L. Caldwell, M.J. Brown. 2009. Hunting with lead: association between blood lead levels and wild game consumption. Environmental Research. 109: 952-959.

Karri S.K., R.B. Saper, S.N. Kales. 2008. Lead encephalopathy due to traditional medicines. Curr. Drug Saf. 3(1):54-59.

Maas, R.P., S.C. Patch, D.M. Morgan. 2005. Reducing lead exposure from drinking water: recent history and current status. Public Health Reports. May-June 2005.

Mathee A., N. Naicker, J. Teare. 2015. Retrospective investigation of a lead poisoning outbreak from the consumption of an Ayurvedic medicine: Durban, South Africa. International Journal of Environmental Research and Public Health. 12:7804-7813.

Miranda, M.K., D. Kim, A.P. Hull, C.J. Paul, and M.A. Overstreet Galeano. 2007. Changes in blood lead levels associated with use of chloramines in water treatment systems. Environmental Health Perspectives. 115(2):221-225.

Paltseva, A., Z. Cheng, M. Deeb, P.M. Groffman, R.K. Shaw, M. Maddaloni. 2018. Accumulation of arsenic and lead in garden-grown vegetables: Factors and mitigation strategies. Science of the Total Environment. 640-641: 273-283.

Pieper, K.J., M. Tnag, M.A. Edwards. 2017. Flint water crisis caused by interrupted corrosion control: investigating “ground zero” home. Environmental Science & Technology. 51:2007-2014.

Redan B., J.E. Jablonski, C. Halverson, J. Jaganathan, Md. A. Mabud, L.S. Jackson. Factors affecting transfer of heavy metals arsenic, lead, and cadmium from diatomaceous earth filter aids to alcoholic beverages during laboratory-scale filtration. Submitted for publication to Journal of Agricultural and Food Chemistry.

Reeuwijk, N.M., W.N.M. Klerx, M. Kooijman, L.A.P. Hoogenboom, I.M.C.M. Rietjens, and M.J. Martena. 2013. Levels of lead, arsenic, mercury and cadmium in clays for oral use on the Dutch market and estimation of associated risks. Food Additives & Contaminants: Part A. 30(9): 1535-1545.

Stockley C.S., L.H. Smith, K.G. Tiller, B.L. Gulson, C. D’A. Osborn, T.H. Lee. 2003. Lead in wine: a case study on two varieties at two wineries in South Australia. Australia Journal of Grape and Wine Research. 9(1):47-55.

Switzer J.A., V.V. Rajasekharan, S. Boonsalee, E.A. Kulp, E.W. Bohannan. 2006. Evidence that monochloramine disinfectant could lead to elevated Pb levels in drinking water. Environmental Science and Technology. 40:3384-3387.

Wang Z., L.S. Jackson, J.E. Jablonski. 2017. Factors affecting the levels of heavy metals in juices processed with filter aids. Journal of Food Protection. 80(6):892-902.

**APPENDIX I**

**PROJECT DOCUMENT**

**Proposal for new work to revise the Code of Practice for the Prevention and Reduction of Lead Contamination in Foods (CXC 56-2004) (For Consideration by CCCF)**

**1. The purpose and scope of the project**

The purpose of the proposed new work is to revise the Code of Practice (COP) for the Prevention and Reduction of Lead Contamination in Foods (CXC 56-2004) adopted in 2004 to reflect new information available on measures to reduce lead during agricultural production and food processing. A revised COP would complement ongoing work by CCCF on lead, including revision of maximum levels (MLs) for lead in selected commodities in the General Standard for Contaminants and Toxins in Food and Feed (GSCTFF) and a discussion paper on future work on MLs for lead for inclusion in the GSCTFF.

The scope of the work encompasses updating the existing lead COP to add new information on lead reduction in the areas of agricultural production (e.g., techniques to address lead contamination in soil and water) and food processing (e.g., filtration aids for juice manufacture, measures to reduce lead in foods during cooking, and minimizing introduction of lead from food processing equipment).

**2. Relevance and timeliness**

At its 73rd session (2010), JECFA conducted a new evaluation of lead. JECFA stated that exposure to lead is associated with a wide range of effects, including various neurodevelopmental effects, mortality (mainly due to cardiovascular diseases), impaired renal function, hypertension, impaired fertility, and adverse pregnancy outcomes. Fetuses, infants, and children are the most sensitive to lead exposures due to neurodevelopmental effects. JECFA withdrew the provisional tolerable weekly intake (PTWI) for lead and concluded that it was not possible to establish a new PTWI that would be health protective. JECFA concluded that in populations with prolonged dietary exposures to higher levels of lead, measures should be taken to identify major contributing sources, and if appropriate, to identify methods of reducing dietary exposure that are commensurate with the level of risk reduction.

Given the health concerns associated with lead exposures, the new work aims to continue to reduce exposures by updating the existing COP.

**3. Main aspects to be covered**

The work will address measures, supported by scientific data that have become available since adoption of the COP in 2004. Measures to be addressed may include remediation of agricultural soil contaminated with lead (e.g., soil amendments), removal of lead from water used for irrigation and washing, and food processing modifications (e.g. evaluation of filtration aids).

**4. Assessment against the criteria for the establishment of work priorities**

**General criterion**

To protect consumers' health (particularly infants and young children), exposures to lead should be reduced through best practices. A revised COP compiling agricultural and food processing and preparation measures to reduce lead will identify additional measures that can be taken to reduce exposures. A revised COP will facilitate fair trade by making this updated information on recommended practices available to all member countries.

**a. Diversification of national legislations and apparent resultant or potential impediments to international trade**

Development of a revised COP is needed to ensure that information on recommended practices for preventing and reducing lead exposures is available to all member countries. It also will provide the means to enable exporters to ensure reduced lead levels and to assist in compliance with any current MLs and those that may be established in the future.

**b. Scope of work and establishment of priorities between the various sections of the work**

The revised COP will provide measures to reduce lead in food, as it will address all aspects of food production from agricultural production to processing to packaging and distribution.

**c. Work already undertaken by other international organizations in this field and/or suggested by the relevant international intergovernmental body(ies)**

Codes of practice or toolboxes that address lead exposures have been developed for workplaces, for water sanitation (e.g., WHO) and for agriculture, and can be used in the revision of the COP.

**5. Relevance to Codex Strategic Goals**

**Goal 1: Establish international food standards that address current and emerging food issues**

Updating the COP for the prevention and reduction of lead contamination in foods will address a current need to continue to reduce lead exposures, using updated measures.

**Goal 2: Ensure the application of risk analysis principles in the development of Codex standards**

This work will assist in applying risk analysis principles in the development of Codex standards by using scientific data and results from the JECFA assessment to support the continued reduction of lead in foods.

**Goal 3: Facilitate the effective participation of all Codex members**

The proposed draft revision to the COP will make additional information on recommended practices to prevent and reduce lead available to all member countries.

**Goal 4: Implement effective and efficient work management systems and practices**

A revised COP will help ensure development and implementation of effective and efficient work management systems and practices by agricultural producers, food processors, and consumers to produce foods with lower levels of lead.

**6. Information on the relationship between the proposal and other existing Codex documents**

In 2004, the Codex Alimentarius Commission adopted the Code of Practice for the Prevention and Reduction of Lead Contamination in Foods (CXC 56-2004). In addition, MLs for a variety of foods (e.g., fruit juices, canned fruits, canned vegetables, infant formula) have been updated over the past several years in the GSCTFF (CXS 193-1995) and completion of this work is anticipated in 2019. There is also a proposal for new work on the development of MLs for lead for additional foods for inclusion in the GSCTFF. This revised COP supports the ongoing ML work.

**7. Identification of any requirement for any availability of expert scientific advice**

The JECFA Secretariat has already provided needed expert scientific advice (JECFA, 73rd report).

**8. Identification of any need for technical input to the standard from external bodies**

Currently, there is no identified need for additional technical input from external bodies.

**9. The proposed timeline for completion of the new work, including the starting date, proposed date for adoption at Step 5 and the proposed data for adoption by the Commission**

Work will commence following approval by CAC in 2019. Completion of work is expected by 2021 or earlier.

**APPENDIX II**

**PROPOSED REVISION OF THE CODE OF PRACTICE FOR THE PREVENTION AND REDUCTION OF LEAD CONTAMINATION IN FOODS**
**(For information to CCCF)**

**INTRODUCTION**

1. Lead is a toxic heavy metal that occurs in the environment both naturally, and to a greater extent from anthropogenic sources, because of its ~~with~~ widespread industrial uses ~~but not known nutritional benefits~~. The toxic effects of lead in food have been reviewed several times by the FAO/WHO Joint Expert Committee on Food Additives (JECFA). Lead exposure is associated with neurodevelopmental effects, mortality (mainly due to cardiovascular diseases), impaired renal function, hypertension, impaired fertility, and adverse pregnancy outcomes. Because of neurodevelopmental effects, fetuses, infants, and children are the most sensitive to lead exposures. ~~Chronic exposure to lead at relatively low levels can result in damage to the kidneys and liver, and to the reproductive, cardiovascular, immune, hematopoietic, nervous, and gastrointestinal systems. Short-term exposure to high amounts of lead can cause gastrointestinal distress, anemia, encephalopathy, and death. The most critical effect of low-level lead exposure is reduced cognitive and intellectual development in children.~~

2. At its 73rd session (June 2010), JECFA evaluated new information on the toxicology, epidemiology, exposure assessment, and analytical methodology of lead. JECFA withdrew the previously established provisional tolerable weekly intake (PTWI) of 25 µg/kg bw and concluded that it was not possible to establish a new PTWI that would be considered health protective. JECFA concluded that in populations with prolonged dietary exposures to higher levels of lead, measures should be taken to identify major contributing sources, and if appropriate, to identify methods for reducing dietary exposure that are commensurate with the level of risk reduction.

3. Lead exposure can occur through food and water, as well as in the workplace, through hobbies, through exposure to lead-contaminated soil and air, and through use of cosmetics, traditional medicines, and materials used in religious practices.

4. Lead contamination of food arises from numerous sources, including air and soil. Atmospheric lead from industrial pollution or leaded gasoline can contaminate food through deposition on agricultural crop plants. Soil lead arising from lead-containing ordnance stored on former munitions sites and from ammunition used in rifle or military firing, atmospheric deposition, or inappropriate application of pesticides, fertilizers, or sewage sludge can contaminate agricultural crop plants through uptake or through deposition of the soil on plant surfaces. Contaminated plants and soil are, in turn, a source of contamination of livestock.

5. Water is also a source of lead contamination of food. Surface water sources can be contaminated through runoff (drainage), atmospheric deposition, and, on a local level, by leaching of lead from game shot or fishing sinkers. Contaminated surface waters are a potential source of contamination of aquatic food animals. For drinking water and water for food preparation, the use of lead pipes or lead-containing fixtures in water distribution systems is a primary source of contamination.

6. Lead contamination of food can also arise from food processing, food handling, and food packaging. Sources of lead in food processing areas include lead paint and lead-containing equipment, such as piping and lead-soldered machinery. In the packaging area, lead-soldered cans have been identified as a very important source of lead contamination of food. Other packaging items that are potential sources of lead contamination include colored plastic bags and wrapping papers, cardboard containers that contain lead or are colored with lead-containing dyes, lead foil capsules on wine bottles, and lead-glazed ceramic, lead crystal, or lead-containing metal vessels used for packaging or storing foods.

7. There have been worldwide efforts to reduce lead exposure from food. Such efforts have focused on implementing standards for allowable lead levels in food~~, and~~ food additives, and food contact substances; ending the use of lead-soldered cans, particularly for infant foods; controlling lead levels in water; reducing leaching from lead-containing vessels or restricting their use for decorative purposes; and identifying and reacting to additional sources of lead contamination in foods or dietary supplements. Although not targeted specifically at food, efforts to reduce environmental sources of lead, including restrictions on industrial emissions and restricted use of leaded gasoline, have also contributed to declining lead levels in food.

**8.** Codex, intergovernmental organizations, and many countries have set standards for allowable levels of lead in various foods. Low levels of lead in foods may be unavoidable, because of the ubiquitous nature of lead in the modern industrial world. However, following good agricultural and manufacturing practices can minimize lead contamination of foods. Because many useful interventions for reducing lead rely on actions by consumers, a section with suggestions for modifying consumer practices has also been included in this Code.

## I. RECOMMENDED PRACTICES BASED ON GOOD AGRICULTURAL PRACTICES (GAP) AND GOOD MANUFACTURING PRACTICES (GMP)

### 1.1 Source directed measures

9. National or relevant food control authorities should consider implementation of source directed measures in the *Code of Practice for Source Directed Measures to Reduce Contamination in Foods with Chemicals* (CXC 49-2011).

### 1.2 Agricultural

10. Leaded gasoline is a major contributor to atmospheric lead. National authorities should consider reducing or eliminating the use of leaded gasoline in agricultural areas.

11. Agricultural lands near industrial facilities, roadways, and ordnance depots, rifle ranges and military firing ranges may have higher lead levels than more isolated lands. Sources of lead on agricultural lands should be removed, including vehicle batteries; electric fencing batteries; and old, discarded vehicles and machinery. Use of lead solder and other lead materials for repairing farming equipment should be avoided. Land near buildings with weathered exterior paint also may have high lead levels, a particular concern when such buildings are situated near livestock or small gardens. Where possible, farmers should test lead levels in soils that are near lead sources or that are suspected of having elevated lead levels to determine if lead levels exceed recommendations for planting by local authorities. Livestock should be prevented from grazing in areas with lead sources, including peeling paint, bonfire ash, metal roofing material, and contaminated surface waters. In addition, livestock soil consumption should be minimized, through a balanced diet (including minerals).

12. Feed and feed additives (including mineral mixes and feed binders) should meet lead standards established by national authorities.

13. Cows that produce milk found to have elevated lead levels should not be used as a source of milk until lead decreases to levels deemed appropriate by national authorities.

14. Farmers should avoid using lands that have been treated with lead arsenate pesticide, such as former orchards, to grow crops that may accumulate lead internally (such as carrots and other root crops) or on their surface (such as leafy vegetables).

15. Ensure fertilizers (including sewage sludge) adhere to standards set by local or national authorities, and farmers should avoid growing crops on lands that have been treated with fertilizers ~~sewage sludge~~ that do~~es~~ not adhere to maximum allowable lead levels set by national or local authorities.

16. Leafy vegetables are more vulnerable than non-leafy vegetables or root vegetables to deposition from airborne lead. Cereal grains also have been reported to absorb lead from the air at a significant rate. In areas where atmospheric lead levels are higher, farmers should consider choosing crops that are less vulnerable to airborne deposition.

17. Farmers should avoid using compounds that contain lead (such as lead arsenate pesticide) or may be contaminated with lead (e.g., improperly prepared copper fungicide or phosphate fertilizer) in agricultural areas.

18. Dryers powered with leaded gasoline have been found to contaminate drying crops with lead. Farmers and processors should avoid using dryers or other equipment powered by leaded gasoline on harvested crops.

19. Crops should be protected from lead contamination (e.g., exposure to atmospheric lead, soil, dust) during transport to processing facilities.

20. In areas known to have higher lead levels in soil, consider planting certain types of garden plants and trees that may be less susceptible to lead contamination including fruiting vegetables, vegetables that grow on vines, and fruit trees. Decrease planting of root vegetables or relocate root crops to planting localities with lower lead levels.

21. Home or small-scale commercial gardeners should also take steps to reduce lead contamination. Avoid planting near roadways and buildings painted with lead-based paint. If gardens are located in an area with potentially high lead levels, test soil before planting. Good gardening practices for soils with mildly elevated lead levels include mixing organic matter into the soil, adjusting soil pH to reduce availability of lead to plants, choosing plants that are less vulnerable to lead contamination, using liners to reduce contact deposition of soil on plants, and applying mulch to reduce dust and soil splashing on plants. Some lead levels are considered too high for gardening. It may be possible to build up gardening beds with lead-free soil in such areas and add phosphate amendments to reduce bioavailability of lead. Contaminated soil can be physically removed and replaced with clean soil. Gardeners should consult with local agricultural services, where available, for advice on what lead levels are too high for gardening and advice on how to garden safely in lead-contaminated soils, and recommended practices for disposal of removed soil.

22. Agricultural water for irrigation should be protected from sources of lead contamination and monitored for lead levels to prevent or reduce lead contamination of crops. For example, well water used for irrigation should be properly protected to prevent contamination and routinely monitored.

23. Local and national authorities should make farmers aware of appropriate practices for preventing lead contamination of farmlands.

### 1.1 Drinking water

24. National authorities should consider establishing allowable lead levels or appropriate treatment techniques for controlling lead levels in drinking water. The WHO has established a guideline value for maximal lead levels in drinking water of 0.010 mg/L.

25. Administrators of water systems with high lead levels should consider treatment techniques, such as increasing the pH of acidic waters, to minimize corrosion and reduce leaching of lead in the distribution system. Because changes in water treatment practices (for example, addition of chloramines or use of corrosion control treatment) can influence the levels of lead in drinking water, lead levels should be monitored during any system changes.

26. Given the number of potential lead sources in drinking water systems, including brass faucets, lead solder on copper pipes, lead pipes, and ~~or~~ lead service lines, ~~where appropriate,~~ administrators of water systems should consider, where appropriate, replacing problematic lead piping and other lead-containing fixtures.

27. Monitor lead levels in drinking water in schools and childcare centers and apply mitigation measures to reduce elevated lead levels.

### 1.2 Food ingredients and processing

28. Food producers should adhere to recommended MLs in the General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995) or recommended levels in national or regional standards for foods and food additives; this is particularly important for infant foods.

29. Where needed, national authorities should consider establishing standards limiting the amount of lead allowed in foods and food ingredients, including the traditional foods of their countries. Selected foods and dietary supplements should be monitored to ensure that lead levels do not rise above normal background levels.

30. Food processors should choose food and food ingredients, including ingredients used for dietary supplements that have the lowest lead levels possible. They should also consider whether the land used to produce crops has been treated with lead- containing pesticides or sewage sludge.

31. During processing, maximum removal of surface lead from plants should be practiced, e.g., by thoroughly washing vegetables, particularly leafy vegetables; removing the outer leaves of leafy vegetables; and peeling root vegetables, where appropriate. (Home gardeners should also follow such steps if their soil has elevated lead levels.)

32. Food processors should ensure that the water supply for food processing complies with maximum limits for lead established by the national or local authorities.

33. Food processors should examine piping within facilities to ensure that older piping is not adding lead to water supplies inside the facility, and should consider, where appropriate, replacing outdated piping, fixtures, and old containers as they may contain ~~such piping may include~~ brass alloys ~~fixtures, in addition to~~ and lead solderinged ~~pipes~~.

34. Food processors should use food-grade metals for all metal surfaces that come into contact with food and beverages.

35. Food processors should not use lead solder to repair broken equipment in food processing facilities. They should also not substitute non-food-grade equipment that may be present in a food processing facility for broken food-grade equipment.

36. Food processors should ensure that lead paint peelings do not become a source of lead contamination in processing facilities. If food processors carry out lead paint abatement, they should also ensure that appropriate cleanup procedures are followed to prevent further dispersion of lead paint and dust, which could create a greater hazard.

37. Food processors should occasionally test incoming raw materials and finished products for lead to verify that their control measures are functioning effectively.

38. Consider participating in quality assurance programs that include written documentation for how potential lead sources are to be controlled, monitoring of these controls for their effectiveness, and testing of raw materials and finished products for lead.

39. More focused testing should be considered for ingredients or products known to contain high lead levels. This is particularly important for ingredients or products that may have a history of economic adulteration (for example, spices).

40. For infant foods, consideration should be given to sourcing of raw materials and ingredients used in the manufacture of finished products for infants to ensure levels of lead are as low as reasonably achievable.

41. Because filtration aids (specifically diatomaceous earth, bentonite, and charcoal filtration) used in processing fruit juices, wines, and beer can contain lead, selecting filtration aids with lower lead levels and washing filtration aids with acidic solutions (such as ethylenediamine tetra acetic acid [EDTA] or hydrochloric acid solution) can reduce lead levels in the beverages.

42. Metal detectors can be used in slaughterhouses and fish processing facilities to detect lead shot or fishing sinkers in wild meat and fish.

### 1.3 Production and use of packaging and storage products

43. To provide maximum protection against lead contamination, food processors should not use lead-soldered cans. Alternatives to lead-soldered cans are discussed in Food and Nutrition Paper 36 from the FAO, “Guidelines for can manufacturers and food canners. Prevention of metal contamination of canned foods,” as well as JECFA Monograph 622. These alternatives include using two-piece cans (which lack side seams) rather than three-piece cans, using cementing and welding to bond seams instead of soldering, using lead-free (tin) solders, and using alternative containers, such as glass.

44. Where it is not feasible to avoid the use of lead-soldered cans, methods for reducing lead exposure from lead-soldered cans are discussed in depth in FAO Food and Nutrition Paper 36. Lead can be released from the solder surface itself, or from solder dust or solder splashes deposited inside the can during the can-making process. Methods for reducing splashing and dust formation include avoiding the use of excess flux, controlling exhaust over the work area to minimize dust deposition, controlling the temperature of the fluxed can body and solder, post- solder lacquering of the interior surface or interior side seams of cans, careful wiping of excess solder from finished cans, and washing soldered cans before use. For a detailed description of proper manufacturing practices with lead-soldered cans, the FAO paper should be consulted.

45. Tinplate used for food cans should meet international standards for maximum allowable lead concentration. ASTM International has set a maximum concentration of 0.010 percent lead for “Grade A” tinplate.

46. Lead dyes or lead-based printing inks should not be used for packaging, such as for brightly colored candy wrappers. Even if such wrapping does not come in direct contact with foods, children may be tempted to put the brightly colored wrappers in their mouths.

47. Plastic bags or boxes with exteriors treated with lead-based dyes or lead-based printing inks should not be used for packing food. Handling of these items during cooking or reuse by consumers for storing other food items can cause lead contamination.

48. Packing foods for sale in traditional lead-glazed ceramics should be avoided because these ceramics may leach significant quantities of lead into the foods.

49. Lead foil capsules should not be used on wine bottles because this practice may leave lead residues around the mouth of the bottle that can contaminate wine upon pouring.

50. National authorities should consider setting standards for lead migration from lead-glazed ceramic ware, lead crystal, and other lead-containing items that might potentially be used for food storage or preparation by consumers.

51. As one regulatory option, consider setting standards for lead migration and lead composition in food contact materials used in food processing or manufacturing.

52. Decorative ceramic ware that has the potential to leach unacceptable quantities of lead should be clearly labeled as not for food use.

53. Ceramic ware producers should use manufacturing procedures and quality control mechanisms that minimize lead leaching.

### 1.4 Consumer practices and consideration of certain foods

54. Local and national authorities should consider educating consumers about the hazards of lead, particularly to children; sources of lead; and appropriate practices to reduce lead contamination from food prepared in the home or grown in the garden ~~and the home~~.

55. Consumers should avoid storing foods, particularly acidic foods or foods for infants and children, in decorative ceramic ware, lead crystal, or other containers that can leach lead. Foods should not be stored in opened lead-soldered cans or stored in reused lead-dyed bags and containers. Consumers should avoid frequent use of ceramic mugs when drinking hot beverages such as coffee or tea, unless the mugs are known to have been made with a lead glaze that is properly fired or with a non- lead glaze.

56. Consumers should wash vegetables and fruit thoroughly to remove dust and soil that may contain lead. Removing outer leaves from leafy greens and peeling root crops can reduce lead levels. Store food and eating/cooking utensils in sealed containers or closed cabinets that protect them from falling ~~fall~~ dust. Washing hands before preparing food will also help remove any lead-contaminated dust or soil from hands.

57. Where lead in water distribution systems is a problem, consumers should let water run from faucets before use to allow corroded lead from piping to be flushed out of the system, particularly if they are preparing foods for infants or children. Hot water from the faucet should not be used for drinking, cooking or food preparation.

58. Consumers should be educated about the concerns surrounding geophagia (the practice of consuming soil) that is practiced mainly by children and pregnant and lactating women. Various clay products, known by names such as calabash chalk, mabele, sikor, and pimbpa, have been found to contain elevated lead levels. Pregnant and lactating women, and children who frequently engage in geophagia, should be discouraged from this practice.

59. Foods, herbs, and spices that are ~~which may be~~ used as traditional medicines can also be ~~are~~ sources of lead exposure. Public health organizations and community organizations should consider issuing advisories to users of traditional medicines, encouraging consumers to consult their physicians about lead screening.

60. Because consuming game meat containing lead shot (pellets) can contribute to lead exposure, children and women of childbearing age should reduce or avoid consumption of game killed with lead shot. When hunting game intended for consumption, consider using a rifle or slug shot rather than a shotgun, as this may reduce lead contamination of the meat.

61. National authorities should educate people about the potential risks of consuming local specialty foods or wild, collected foods (for example, mushrooms) that could contain elevated lead levels.

~~**1.5 Consideration for certain foods**~~

~~10. Calabash chalk, also known by other names such as Argila, La Croia, Calabarstone, Ebumba, Mabele, Nzu, and Ulo, is eaten by some women as a traditional food to help alleviate morning sickness during pregnancy. Levels of lead in this product are often high (greater than 10 mg/kg) and may have consequences for the health of the developing fetus. If the product cannot be produced without high levels of lead, the product should no longer be consumed.~~

**APPENDIX III**

## LIST OF PARTICIPANTS

**CHAIR United States**
Eileen Abt
Chemist, Plant Products Branch
Office of Food Safety
U.S. Food and Drug Administration
eileen.abt@fda.hhs.gov

**Lauren Posnick Robin**
Chief, Plant Products Branch
Office of Food Safety
U.S. Food and Drug Administration
lauren.robin@fda.hhs.gov

**CO-CHAIR United Kingdom**
Christina Baskaran
Contaminants Policy Advisor
Food Standards Agency
christina.baskaran@food.gov.uk

**Argentina**
Silvana Ruarte
Jefe de Servicio Analítica de Alimentos
Departamento Control y Desarrollo
Dirección de Fiscalización, Vigilancia y Gestión de Riesgo
Instituto Nacional de Alimentos
sruarte@anmat.gov.ar; codex@magyp.gob.ar

Codex Contact Point
codex@magyp.gov.ar

**Australia**
Matthew O'Mullane
Risk assessment manager
Food Standards Australia New Zealand
Matthew.O'Mullane@foodstandards.gov.au

Codex Contact Point
Codex.contact@agriculture.gov.au

**Brazil**
Lígia Lindner Schreiner
Risk Assessment Manager
Brazilian Health Regulatory Agency - ANVISA
ligia.schreiner@anvisa.gov.br

Larissa Bertollo Gomes Porto
Health Regulation Specialist
Brazilian Health Regulatory Agency - ANVISA
larissa.porto@anvisa.gov.br

Codex contact point
codexbrasil@inmetro.gov.br

**Canada**
Elizabeth Elliott
Head, Food Contaminants Section
Bureau of Chemical Safety
Health Canada
Elizabeth.Elliott@hc-sc.gc.ca

Stephanie Glanville
Scientific Evaluator, Food Contaminants Section
Bureau of Chemical Safety
Health Canada
Stephanie.glanville@canada.ca

**China**
Yongning Wu
Professor, Chief Scientist
China National Center of Food Safety Risk Assessment (CFSA)
wuyongning@cfsa.net.cn

Yi Shao
Associate Professor
Division II of Food Safety Standards
China National Center of Food Safety Risk Assessment (CFSA)
shaoyi@cfsa.net.cn

Codex contact point
codexchinamoa@126.com

**Egypt**
Noha Mohamed Atia
Food Standards Specialist
Egyptian Organization for Standardization and Quality
Ministry of Trade and Industry
nonaaatia@yahoo.com

Codex contact point
Egy.codexpoint@gmail.com

**European Union**
Vereele Vanheusden
European Commission
Health and Food Safety Directorate-General
veerle.vanheusden@ec.europa.eu

**India**
K.K. Sharma
Network Coordinator All India Network Project on Pesticide Residues
Indian Agricultural Research Institute
kksaicrp@yahoo.co.in

Rajesh R
Assistant Director (Tech)
Export Inspection Agency-Kolkata
eia-kolkata4@eicindia.gov.in
govtrajesh@gmail.com

Ms. Pooja
Jr. Chemist
Codex Cell, Spices Board
**Pooja.sb@nic.in**

Codex Contact Point
codex-india@nic.in

**Indonesia**
Dyah Setyowati
Head of Section of Food Standard
Harmonization Directorate of Processed Food Standardization
National Agency of Drug and Food Control
codexbpom@yahoo.com

Purba Mauizzati
Director of Processed Food Standardization
National Agency of Drug and Food Control
codexbpom@yahoo.com

**Iran**
Mansooreh Mazaheri
Head of Biology Research Department
Faculty of Food & Agriculture
Standard Research Institute

**Iraq**
Ahmed Salah Sajet
Head of Biological Technique Department
Central Organization for Standardization and Quality Control (COSQC)
Ahmedsalehsajet@yahoo.com

**Japan**
Tetsuo Urushiyama
Associate Director
Plant Products Safety Division
Ministry of Agriculture, Forestry and Fisheries
Testuo_urushiyama530@maff.go.jp

Yoshiyuki Takagishi
Associate Director
Food Safety Policy Division, Food Safety and Consumer Affairs Bureau, Ministry of Agriculture, Forestry and Fisheries
yoshiyuki_takagis500@maff.go.jp

Chiho Goto
Section Chief, Analysis and brewing technology
National Tax Agency of Japan

Codex contact point
codex@mext.go.jp

**Kazakhstan**
Zhanar Tolysbayeva
Technical Expert
Ministry of Healthcare
tolyzhan@gmail.com

**Korea**
Miok Eom
Senior Scientific Officer,
Residues and Contaminants Standard Division
Ministry of Food and Drug Safety (MFDS)
miokeom@korea.kr

Hyunjung Kim
SPS researcher, Quarantine Policy Division
Ministry of Agriculture Food and Rural Affiars (MAFRA)
acceptable@korea.kr

Yeonkyu Lee
Codex Researcher, Food Standard Division
Ministry of Food and Drug Safety (MFDS)
codexkorea@korea.kr

Min Yoo
Researcher
Ministry of Food and Drug Safety (MFDS)
minyoo83@korea.kr
Codexkorea@korea.kr

Codex contact point
codexkorea@korea.kr

**Malaysia**
Raizawanis Abdul Rahman
Principal Assistant Director
Food Safety and Quality Division
Ministry of Health
raizawanis@moh.gov.my

Codex contact point
Ccp-malaysia@moh.gov.my

**Mexico**
Tania Daniela Fosado Soriano
Secretaria de Economia
tania.fosado@economia.gob.mx

Alfredo Alvarado Garcia
Gerencia de Asuntos Internacionales en Inocuidad Alimentaria
COFEPRIS
aalvaradog@cofepris.gob.mx;
codex@cofepris.gov.mx

**New Zealand**
Andrew Pearson
Manager, Food Risk Assessment (Acting)
Ministry for Primary Industries
andrew.pearson@mpi.govt.nz

**Paraguay**
Mirtha Carrillo de Vera
Coordinadora de Subcomité de Contaminante de los Alimentos
Comité Nacional Codex Alimentarius Captulo Paraguay (CONACAP)
mirthacarrillo1966@gmail.com;
mcarrillo@senacsa.gov.py

Codex contact point
codexparaguay@gmail.com

**Peru**
Javier Aguilar Zapata
Servicio Nacional de Sanidad Agraria
Ministry of Agriculture

Jorge Pastor Miranda
Servicio Nacional de Sanidad Agraria
Ministry of Agriculture

**Spain**
Manuela Mirat Temes
Jefe de Servicio del departamento de técnicas espectroscopicas y fertilizantes
Laboratorio Arbitral Agroalimentario
S. Gral de Control yde Laboratorios Alimentarios
mmiratte@mapama.es

**Thailand**
Korwadee Phonkliang
Standards Officer, Officer of Standard Development
National Bureau of Agricultural Commodity and Food Standards
codex@acfs.go.th; korwadeep@hotmail.com

**United Kingdom**
Christina Baskaran
Contaminants Policy Advisor
Food Standards Agency
Christina.Baskaran@food.gov.uk

Izaak Fryer-Kanssen
Chemical Contaminants and Residues Office
Food Standards Agency
Izaak.fryerkanssen@food.gov.uk

**United States of America**
Eileen Abt
Chemist
Office of Food Safety
U.S. Food and Drug Administration
eileen.abt@fda.hhs.gov

Lauren Posnick Robin
U.S. Delegate
Office of Food Safety
U.S. Food and Drug Administration
lauren.robin@fda.hhs.gov

Vera Bzhilyanskaya
Joint Institute for Safety & Applied Nutrition intern
Office of Food Safety
U.S. Food and Drug Administration
Vera.bzhilyanskaya@fda.hhs.gov

Henry Kim
Senior Policy Analyst
Office of Food Safety
U.S. Food and Drug Administration
henry.kim@fda.hhs.gov

Sara McGrath
Chemist
Office of Food Safety
U.S. Food and Drug Administration
sara.mcgrath@fda.hhs.gov

**Slovenia**
Tina Zavasnik Bergant
Senior Advisor
Ministry of Agriculture, Forestry and Food

**FAO (JECFA)**
Markus Lipp
Senior Officer
Agriculture and Consumer Protection Department
Food and Agriculture Organization of the UN
Viale delle Terme di Caracalla
markus.lipp@fao.org

Vittorio Fattori
Food Safety Officer
Agriculture and Consumer Protection Department
Food and Agriculture Organization of the UN
Viale delle Terme di Caracalla
vittorio.fattori@fao.org

**FIVS**
Laura Gelezuinas
Manager
lgelezuinas@fivs.org

Timothy Ryan
Scientific and Technical Committee & Economic Sustainability Expert
tim.ryan@ejgall.com

Paul Huckaba
Scientific and Technical Committee Expert & Co-Chair
Paul.huchaba@broncowine.com

**FoodDrinkEurope**
Eoin Keane
Manager Food Policy, Science and R&D
**e.keane@fooddrinkeurope.eu**

**ICBA (International Council of Beverages Associations)**
Simone SooHoo
Director of Global Affairs
simone@icba-net.org

**ICGMA (International Council of Grocery Manufacturers Associations/)**
Nichole Mitchell
International Council of Grocery Manufacturers Associations (ICGMA)
nmitchell@gmaonline.org

**IFT (Institute of Food Technology)**
James R. Coughlin
Coughlin & Associates
jrcoughlin@cox.net

**ISDI (International Special Dietary Foods Industries)**
Jean Christophe Kremer
Secretary General
secretariat@isdi.org

**OIV (International Organisation of Vine and Wine)**
Jean-Claude Ruf
Scientific Coordinator
jrug@oiv.int

**WHO (JECFA)**
Angelika Tritscher
Coordinator, Risk Assessment and Management
tritschera@who.int

**WPTC (World Processing Tomato Council)**
Sophie Colvine
General Secretary
colvine@tomate.org