codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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Agenda Item 15 (b)

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON FOOD ADDITIVES AND CONTAMINANTS

Thirty-seventh Session
The Hague, the Netherlands, 25 -29 April 2005

SCHEDULE I OF THE GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOODS

(Prepared by the Netherlands and Japan)

1. The 36th Session of the CCFAC considered CX/FAC 04/36/16 which contains the revised Schedule I of the General Standard for Contaminants and Toxins in Foods and Annex IV mentioned in the General Standard.

2. The Committee based its discussion on the questions raised in paragraphs 1 to 5 of the working paper as follows:

Inclusion of Schedule I in the GSCTF: The Committee agreed to include Schedule I in the format presented in the working paper. It was noted that some editorial amendments needed to be made before its inclusion in the GSCTF and the Committee agreed to entrust this work to the Codex and JECFA Secretariats, the latter to correct the references to toxicological intake (ALINORM 04/27/12, para. 117).

Removal of Annex IV (Annotated List of Contaminants and Toxins) of the GSCTF: The Committee noted that Annex IV was an informative document encompassing contaminants and toxins for which maximum levels had been developed or were being developed in Codex. The document was considered useful in providing an overview of the situation regarding Codex decisions about contaminants and toxins, and to give guidance about further actions required by CCFAC.

The Committee agreed that such information should be part of a working document to be updated yearly and presented at each session of the Committee for information and support for the discussion on the GSCTF. The Committee also agreed that the working document should not contain any references to revoked maximum levels. The Committee requested the Delegations of the Netherlands and Japan to revise the working document, using a suitable database, for presentation at the 37th Session (ALINORM 04/27/12, paras 118-119).

Exclusion of quality-related parameters from the GSCTF: The Committee noted that the Preamble of the GSCTF clearly stated that the Standard did not apply to contaminants having food quality significance but not public health significance in foods. It therefore agreed not to include maximum levels for quality-related parameters such as copper, zinc, iron, etc. in the General Standard but to keep this information in the above-mentioned working document as a record of the complete range of contaminants in the Codex system (ALINORM 04/27/12, para 120).

Inclusion of Schedule II in the GSCTF: The Committee noted that Schedule II presented a list of maximum levels for contaminants and toxins arranged by food category. In this regard, the Committee noted that the current food categorization system used in the GSCTF was based on a system developed by the Codex Committee on Pesticide Residues (CCPR). The Committee further noted that CCPR developed this list mainly for primary food commodities although some processed foods such as fruit juices were already included. However, further work was required for processed, derived and multi-ingredient foods.

The Committee agreed that, in view of the lack of commodity codes for some existing commodities with contaminants maximum levels, it would not be advisable at this stage to include Schedule II in the GSCTF. Meanwhile, it was agreed that the committee should enter into consultations with CCPR to determine the best approach to be followed for further development of the food categorization system, in order to allow inclusion of Schedule II in the GSCTF at sometime in the future (ALINORM 04/27/12, paras 122-123).

3. These decisions have been incorporated in the attached Annotated List of Contaminants and Toxins in Foods (Part 1 and 2) and Schedule I as much as possible. The list of inconsistent MLs were prepared and submitted to the Codex Secretariat for inclusion in CX/FAC 05/37/2.

An Annotated List presents contaminants and toxins that are or have been dealt with in the CCFAC. It does not only encompass the contaminants and toxins for which Codex standards exist or are being developed, but also those for which further information is sought or about which a Codex decision has been taken.

The Annotated List has the purpose of providing an overview of the situation regarding Codex decisions about this subject and to give guidance about further actions required. Therefore also relevant information and references are added to the List. The information shall comprise at least the current situation regarding the criteria that are important for the decision procedure of the CCFAC.

It is thus an active list, which needs to be regularly updated. In order to provide a structure for it and to facilitate the filing and retrieval of data, a number is assigned to contaminants and toxins in the list.

The situation regarding contaminants and toxins is very complex and many substances are or have been the subject of scientific research and discussion regarding their occurrence in foods and their significance for human and animal health. On a national level, there are many activities, sometimes implying legal measures which may affect international trade in foods and feeds. It is obviously important for the CCFAC to take note of the developments in this field and to consider the necessity of actions. In order to obtain an overview of the situation, the CCFAC shall develop and maintain a working document in which more comprehensive information regarding contaminants and toxins in foods is presented in a summary form[1].

Annex IV has two parts: *Part 1* containing maximum and guideline levels developed by CCFAC and contaminant provisions included in commodity standards; and *Part 2* containing maximum levels developed for copper, iron and zinc which are regarded as quality factors as opposed to safety factors. Although Schedule 1 shall contain only those levels adopted by the Commission and currently valid, Part 1 contains also those levels still at various steps of the Codex elaboration procedure for the facilitation of consideration of proposed maximum levels by the CCFAC.

INDEX OF CONTAMINANTS IN ALPHABETIC ORDER

[1] Taken from the text in Annex IV which was deleted from the GSCTF by the 27th CAC.

T-2 toxin	5.03.1	1	32
Tin	1.16	1	16
Vinylchloride monomer	3.01.5	1	19
Zearalenone	5.04.3	1	35
Zinc	1.18	2	42

EXPLANATORY NOTES

Reference to JECFA:	References to JECFA meeting in which the contaminant was evaluated and the year of that meeting
Toxicological guidance value:	Toxicological advice about the tolerable intake level of the contaminant for humans, expressed in milligrammes (mg) per kg body weight (bw). The year of recommendations and additional explanation are included.
Residue definition:	Definition of the contaminant in the form of which the ML applies or which may or should be analyzed in commodities.
Synonyms:	Symbols, synonyms abbreviations, scientific descriptions and identification codes used to define the contaminant.
Commodity code:	The code for food commodities are according to the food and feed categorization system as contained in Annex V of the GSCTF. The food/feed categorization. The food/feed categorization system also specifies the part of Commodity which should be analysed and to which the ML applies, unless a specific commodity definition is provided as an annex to the ML. For those maximum levels contained in Codex commodity standards, the relevant standard numbers are referred, if the code numbers are not readily available for these commodities.
Suffix:	A note accompanying an ML or GL, used to specify the application or the future revision of the ML, e.g., specific residue definitions can be mentioned by abbreviations here. See also “Qualification of MLs” below.
Type:	Indicates whether the value is Codex maximum level (ML) or Codex guideline level (GL). See also the definitions of these terms in the preamble of the GSCTF.
Step:	Step of the Codex Elaboration Procedure at which each maximum level is (at the time of the publication of this paper). See the Codex Procedural Manual. The term “Adopted” is used for an adopted MLs and Codex Standards.

Qualification of MLs

(*):	At or about the limit of determination
C:	In canned products only
R:	Under review

Definitions of some toxicological terms

PMTDI:	*(Provisional Maximum Tolerable Daily Intake)* The endpoint used for contaminants with no cumulative properties. Its value represents permissible human exposure as a result of the natural occurrence of the substance in food and in drinking-water. In the case of trace elements that are both essential nutrients and unavoidable constituents of food, a range is expressed, the lower value representing the level of essentiality and the upper value the PMTDI.
PTWI:	*(Provisional Tolerable Weekly Intake)* An endpoint used for food contaminants such as heavy metals with cumulative properties. Its value represents permissible human weekly exposure to those contaminants unavoidably associated with the consumption of otherwise wholesome and nutritious foods.
PTMI:	*(Provisional Tolerable Monthly Intake)* An endpoint used for a food contaminant with cumulative properties that has a very long half-life in the human body. Its value represents permissible human monthly exposure to a contaminant unavoidably associated with otherwise wholesome and nutritious foods

Ref: http://jecfa.ilsi.org/section1.htm#52

1.03 Arsenic

Reference to JECFA: 5 (1960), 10 (1967), 27 (1983), 33 (1988)
Toxicological guidance PTWI 0.015 mg/kg bw (1988, For inorganic arsenic)
Residue definition: Arsenic: total (As-tot) when not otherwise mentioned; inorganic arsenic (As-in); or other specification
Synonyms: As

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
JF 0175	Fruit juices	0.2		ML	Adopted	Various CS	FJ	Orange juice; Grapefruit juice; Apple juice; Grape juice; Pineapple juice; Blackcurrant juice; Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice	3)
NF 0175	Fruit nectars	0.2		ML	Adopted	Various CS	FJ	Apricot, peach and pear nectars; Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards	3)
CS 49-1981	Tomato juice	0.2		ML	Adopted	CS 49-1981	FJ		
CS 19-1981	Edible fats and oils (not covered by other standards)	0.1	R	ML	Adopted	CS 19-1981, Rev.2-1999	FO		1)
	Fat spread and blended spreads	0.1		ML	6		FO 03		
CS 32-1981	Margarine	0.1		ML	Adopted	CS 32-1981, Rev.1-1989	FO		2)
CS 135-1981	Minarine	0.1		ML	Adopted	CS 135-1981, Rev.1-1989	FO		2)
CS 211-1999	Named animal fats	0.1		ML	Adopted	CS 211-1999	FO	Lard, rendered pork fat, premier jus and edible tallow.	1)
CS 210-1999	Named vegetable oils	0.1		ML	Adopted	CS 210-1999	FO 03	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, safflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein.	1)
CS 33-1981	Olive oils and olive-pomace oils	0.1		ML	Adopted	CS 33-1981, Rev.2-2003	FO	OC 305, OR 305 and OR 5330	
CS 108-1981	Natural mineral water	0.01	mg/l	ML	Adopted	CS 108-1981, Rev.1-1997	NMW		Changed from 0.05 mg/l in 2001.
CS 150-1985	Salt, food grade	0.5		ML	Adopted	CS 150-1985, Rev.1-1997	FAC		

1) The revised Standards for oils and fats contain the following wording for the mentioned contaminant MLs: "The products covered by the provisions of this Standard shall comply with MLs being established by the CAC but in the meantime the following limits will apply." CS for Edible Fats and Oils Not Covered by Individual Standards contains the same contaminant provisions as the other recent Standards for oils and fats (only applying to Pb and As).
2) The Standards for margarine and minarine (CS 32-1981 and CS 135-1981) contain MLs for Fe, Cu, Pb and As, but the CCFO is working on a draft Standard for fat spreads and blended spreads, which will contain the same text as in the more recently revised Standards for oils and fats and which will only apply to Pb and As.
3) The 3rd session of the ad hoc Intergovernmental task force on fruit and vegetable juices is developing a proposed draft Codex General Standard for fruit juices and nectars (see ALINORM 03/39A, Appendix II).

The 2003 CAC adopted this text and advanced it to step 7, noting that some details needed to be further discussed, but with the expectation that at the next session of the Task Force a single standard could be presented for final adoption by the CAC. This new General Standard does not contain contaminant MLs. See the list of relevant Standards for fruit juices and nectars for 1.16, tin.

Arsenic is a metalloid element which is normally occurring in mineral bound form in the earth's crust and which can become more easily available by natural sources such as volcanic activity and weathering of minerals, and by anthropogenic activity causing emissions in the environment, such as ore smelting, burning of coal and specific uses, such as arsenic-based wood preservatives, pesticides or veterinary or human medicinal drugs. As a result of naturally occurring metabolic processes in the biosphere arsenic occurs as a large number of organic or inorganic chemical forms in food (species). Especially in the marine environment arsenic is often found in high concentrations of organic forms of arsenic, until 50 mg/kg of arsenic (wet weight basis) in some seafoods, including seaweed, fish, shellfish and crustaceans. In fresh water and in the terrestrial environments arsenic is normally found in much lower levels (typically 0-20 ug/kg) in crop plants and in livestock. Higher levels may be found in rice, mushrooms, and sometimes in e.g. poultry which is fed with arsenic containing fish meal. Levels of arsenic in drinking water are of concern in many countries; levels exceeding 200 mg/l have been reported, which can adversely affect the health of consumers. The most toxic forms of arsenic are the inorganic arsenic (III) and (V) compounds; the inorganic arsenic trioxide is well known as a rat poison, which was also sometimes used for homicide. Methylated forms of arsenic have a low acute toxicity; arsenobetaine which is the principal arsenic form in fish and crustaceans is considered non-toxic. In shellfish, molluscs and seaweed dimethylarsinylriboside derivatives occur ("arsenosugars"), the possible toxicity of which is not known in detail. Only a few percent of the total arsenic in fish is present in inorganic form, which is the only form about which a PTWI has been developed by JECFA. The human epidemiological data used for this risk assessment is based on exposure to inorganic arsenic in drinking water. IARC has classified inorganic arsenic as a human carcinogen, and the estimated lifetime risk for arsenic-induced skin cancer which may be caused by drinking water at or in excess of the WHO-GL for arsenic in drinking water is estimated at 6x 10-4.

The analysis of total arsenic in food has up to date suffered from difficulties with respect to accuracy and precision. Furthermore, speciated data for arsenic are strongly needed because of the large differences in toxicity to humans of the various forms of arsenic.

The intake of total arsenic in the human diet is usually dominated by organic arsenic derived from seafood. The available data about the possible human exposure to inorganic arsenic (often using the assumption that non-seafood commodities contain only inorganic arsenic) suggest that the PTWI will normally not be exceeded, unless there is a large contribution from drinking water. Further research is needed about the fate of organic arsenicals and the possibility that they might be converted to more toxic inorganic forms of arsenic, whether by processing or by metabolism in animals or humans.

A position document CX/FAC 99/22 on arsenic was last discussed in the 31st CCFAC (1999) (see ALINORM 99/12A, para. 137). The document noted that several countries have established MLs for arsenic in food commodities and some of these were stringent regarding sea foods, so trade problems might occur. The present range of Codex MLs for arsenic in some commodities do not cover all national MLs. The document concluded however that in general there are no indications that specific Codex MLs for arsenic in food commodities would be necessary. Also, at present there is no sufficient basis to decide about the establishment of Codex MLs for arsenic, due to the uncertainties mentioned about the levels of naturally occurring arsenic species in foods, about their toxicity and about the availability of suitable analytical methods. It was acknowledged that at present especially the ML for arsenic in drinking water and in mineral water is relevant. The CCFAC asked Denmark to finalize the position paper and agreed that the finalized position paper would form the basis for future work until such time as routine methodology became available to determine toxic arsenic compounds in food.

1.06 Cadmium

Reference to JECFA: 16 (1972), 33 (1988), 41 (1993), 55 (2000), 61 (2003), 64 (2005)

Toxicological guidance: PTWI 0.007 mg/kg bw (1988, maintained in 2000 & 2003
The 64th JECFA concluded that the effect of different MLs on overall intake of cadmium would be very small. At the proposed Codex MLs, mean intake of cadmium would be reduced by approximately 1% of the PTWI. The imposition of MLs one level lower would result in potential reductions in intake of cadmium of no more than 6% (wheat grain, potatoes) of the PTWI. At the proposed Codex MLs, so more than 9% of a commodity would be violative (oysters). MLs one level below those proposed would result in approximately 25% of molluscs, potatoes, and other vegetables being violative.)

Residue definition: Cadmium, total

Synonyms: Cd

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
VB 0040	Brassica vegetables	0.05		ML	6		FAC 02, 03, 04		1)
VA 0035	Bulb vegetables	0.05		ML	6		FAC 02, 03, 04		1)
VC 0045	Fruiting vegetables, cucurbits	0.05		ML	6		FAC 02, 03		1)
VO 0050	Fruiting vegetables, other than cucurbits	0.05		ML	6		FAC 02, 03, 04	Excluding tomatoes and edible fungi.	1)
VL 0053	Leafy vegetables	0.2		ML	6		FAC 02, 03, 04		1)
VP 0060	Legume vegetables	0.1		ML	Adopted	CAC/GL 39-2001			
VR 0589	Potato	0.1		ML	6		FAC 02, 03, 04	Peeled	1)
VD 0070	Pulses	0.1		ML	Adopted	CAC/GL 39-2001		Excluding soya bean (dry)	
VR 0075	Root and tuber vegetables	0.1		ML	6		FAC 02, 03 , 04	Excluding potato and celeriac	1)
VS 0078	Stalk and stem vegetables	0.1		ML	6		FAC 02, 03, 04		1)
GC 0081	Cereal grains, except buckwheat, cañihua and quinoa	0.1		ML	Adopted	CAC/GL 39-2001		Excluding wheat and rice; and bran and germ	
CM 0649	Rice, polished	0.4		ML	3		FAC 02, 03, 04		Changed from 0.2 mg/kg and advanced to Step 5 by the CCFAC-36. Returned to Step 3 by CAC-27.
GC 0654	Wheat grain	0.2		ML	6		FAC 02, 03, 04	Excluding bran and germ	
IM 0150	Molluscs, incl. cephalopods	1		ML	3		FAC 02, 03, 04		1)

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Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 108-1981	Natural mineral water	0.003	mg/l	ML	Adopted	CS 108-1981, Rev.1-1997	NMW		
CS 150-1985	Salt, food grade	0.5		ML	Adopted	CS 150-1985, Rev.1-1997	FAC		

1) The 35th CCFAC forwarded these proposed MLs at Step 5 to the CAC, and kept the draft MLs for rice (polished, soy bean (dry), molluscs and peanuts at step 3 for a further round of comments (ALINORM 03/12A, para. 165). The 2003 CAC returned the proposals from Step 5 to Step 3, taking into consideration that the 2003 JECFA would evaluate the risks from exposure to cadmium; the CCFAC was asked to accelerate its work to move revised draft MLs to Step 8 as soon as practicable (ALINORM 03/41, paras 125-126).

A position document (CX/FAC 95/19) on cadmium was followed by a discussion document (last version CX/FAC 99/21) in which MLs for cadmium were proposed. Since then the proposed MLs have been discussed in the CCFAC and progress is mentioned in the CCFAC Reports.

The 36th CCFAC decided to discontinue the work on developing MLs for cadmium in fruits, meat of cattle, pigs, sheep and poultry; hourse meat; herbs, fresh; fungi (edible); celeriac; soya beans (dry); and peanuts as no levels were necessary because these foods were no major contributors to cadmium intake, and forwarded the other proposed draft MLs, except the one for mollusks (including cephalopods), to the CAC for preliinary adoption at Sstep 5 (ALINORM 04/27/12, paras 175-182). The 27th CAC adopted the proposed draft MLs for cadmium at Step 5 and advanced them to Step 6 as proposed with the exception of polished rice, which was returned to Step 3 (ALINORM 04/27/41, para. 68).

1.11 Lead

Reference to JECFA: 10 (1966), 16 (1972), 22 (1978), 30 (1986), 41 (1993), 53 (1999)
Toxicological guidance PTWI 0.025 mg/kg bw (1986, maintained in 1993 & 1999)
Residue definition: Lead, total
Synonyms: Pb

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
FT 0026	Assorted (sub)tropical fruits, edible peel	0.1		ML	Adopted	CS 230-2001	FAC		
FI 0030	Assorted (sub)tropical fruits, inedible peel	0.1		ML	Adopted	CS 230-2001	FAC		
FB 0018	Berries and other small fruits	0.2		ML	Adopted	CS 230-2001	FAC		
FC 0001	Citrus fruits	0.1		ML	Adopted	CS 230-2001	FAC		
FP 0009	Pome fruits	0.1		ML	Adopted	CS 230-2001	FAC		
FS 0012	Stone fruits	0.1		ML	Adopted	CS 230-2001	FAC		
VB 0040	Brassica vegetables	0.3		ML	Adopted	CS 230-2001	FAC	Excluding kale	
VA 0035	Bulb vegetables	0.1		ML	Adopted	CS 230-2001	FAC		
VC 0045	Fruiting vegetables, cucurbits	0.1		ML	Adopted	CS 230-2001	FAC		
VO 0050	Fruiting vegetables, other than cucurbits	0.1		ML	Adopted	CS 230-2001	FAC	Excluding mushrooms.	
VL 0053	Leafy vegetables	0.3		ML	Adopted	CS 230-2001	FAC	Including Brassica leafy vegetables but excluding spinach.	
VP 0060	Legume vegetables	0.2		ML	Adopted	CS 230-2001	FAC		
VD 0070	Pulses	0.2		ML	Adopted	CS 230-2001	FAC		
VR 0075	Root and tuber vegetables	0.1		ML	Adopted	CS 230-2001	FAC	Including peeled potatoes	
CS 79-1981	Jams and jellies	1		ML	Adopted	CS 79-1981	PFV		
CS 160-1987	Mango chutney	1		ML	Adopted	CS 160-1987	PFV		
CS 66-1981	Table olives	1		ML	Adopted	CS 66-1981	PFV		
CS 57-1981	Processed tomato concentrates	1.5		ML	Adopted	CS 57-1981	PFV		
JF 0175	Fruit juices	0.3	R	ML	Adopted	CS various	FJ	Orange juice; Grapefruit juice; Apple juice; Grape juice; Pineapple juice; Blackcurrant juice; Fruit juices not covered by other standards; and Concentrated pineapple juice	2)
JF 0175	Fruit juices	0.05		ML	Adopted		FAC	Including nectars; Ready to drink	Although this ML was adopted by the 2001 CAC (ALINORM 01/41, para. 132), it is not mentioned in CS 230-2001.

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Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
NF 0175	Fruit nectars	0.3	R	ML	Adopted	CS various	FJ	Apricot, peach and pear nectars Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards	2)
CS 47-1981	Lemon juice	1	R	ML	Adopted	CS 47-1981	FJ		2)
CS 49-1981	Tomato juice	0.3		ML	Adopted	CS 49-1981	FJ		
GC 0081	Cereal grains, except buckwheat, cañihua and quinoa	0.2		ML	Adopted	CS 230-2001	FAC		
CS 98-1981	Cooked cured chopped meat	0.5		ML	Adopted	CS 98-1981	PMPP		
CS 96-1981	Cooked cured ham	0.5		ML	Adopted	CS 96-1981	PMPP		
CS 97-1981	Cooked cured pork shoulder	0.5		ML	Adopted	CS 97-1981	PMPP		
CS 89-1981	Luncheon meat	0.5		ML	Adopted	CS 89-1981	PMPP		
MM 0097	Meat of cattle, pigs and sheep	0.1		ML	Adopted	CS 230-2001	FAC		
PM 0110	Poultry meat	0.1		ML	Adopted	CS 230-2001	FAC		
MO 0097	Edible offal of cattle, pigs and sheep	0.5		ML	Adopted	CS 230-2001	FAC		Appendix XI of ALINORM 01/12 includes "Edible offal of cattle, pig and poultry" and MO 0097 which is the code for Edible offal of cattle, pig and sheep.
PO 0111	Edible offal of poultry	0.5		ML	Adopted	CS 230-2001	FAC		Appendix XI of ALINORM 01/12 includes "Edible offal of cattle, pig and poultry" but it does not mention "PO 0111" in the table.
WD 0120	Diadromous fish	0.2		ML	7		FAC 02, 03, 04	Fish muscle	4)
WF 0115	Freshwater fish	0.2		ML	7		FAC 02, 03, 04	Fish muscle	4)
WS 0125	Marine fish	0.2		ML	7		FAC 02, 03, 04	Fish muscle	4)
CS 19-1981	Edible fats and oils (not covered by other standards)	0.1	R	ML	Adopted	CS 19-1981, Rev.2-1999	FO		5)

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Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
MF 0097	Fat of cattle, pigs and sheep	0.1		ML	Adopted	CS 230-2001	FAC		Appendix XI of ALINORM 01/12 includes "Fat from meat" and the code MF 0097 which does not exist in the Codex Classification of Foods and Animal Feeds. Cattle fat, MF 0812; pig fat, MF 0818; and sheep fat, MF 0822.
	Fat spreads and blended spreads	0.1		ML	6		FO		
CS 32-1981	Margarine	0.1	R	ML	Adopted	CS 32-1981, Rev.1-1989	FO-03		The Standards for margarine and minarine (CS 32-1981 and CS 135-1981) contain MLs for Fe, Cu, Pb and As, but the CCFO is working on a draft Standard for fat spreads and blended spreads, which will contain the same text as in the more recently revised Standards for oils and fats and which will only apply to Pb and As.
CS 135-1981	Minarine	0.1	R	ML	Adopted	CS 135-1981, Rev.1-1989	FO 03		The Standards for margarine and minarine (CS 32-1981 and CS 135-1981) contain MLs for Fe, Cu, Pb and As, but the CCFO is working on a draft Standard for fat spreads and blended spreads, which will contain the same text as in the more recently revised Standards for oils and fats and which will only apply to Pb and As.
CS 211-1999	Named animal fats	0.1		ML	Adopted	CS 211-1999	FO	Lard, rendered pork fat, premier jus and edible tallow.	1)
CS 210-1999	Named vegetable oils	0.1		ML	Adopted	CS 210-1999	FO	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, safflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein.	4)
CS 33-1981	Olive oils and olive pomace oils	0.1		ML	Adopted	CS 33-1981, Rev.2-2003	FO	OC 305, OR 305 and OR 5330	
PF 0111	Poultry fats	0.1		ML	Adopted	CS 230-2001	FAC		
OC 0172	Vegetable oils	0.1		ML	Adopted	CS 230-2001	FAC	Excluding cocoa butter.	
OR 0172	Vegetable oils	0.1		ML	Adopted	CS 230-2001	FAC	Excluding cocoa butter.	

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Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
ML 0107	Milk of cattle, goats and sheep	0.02		ML	Adopted	CS 230-2001	FAC	A concentration factor applies to partially or wholly dehydrated milks.	The previous footnote “For dairy products, an appropriate concentration factor should apply”, was changed to “a concentration factor applies to partially or wholly dehydrated milk” by the 35th CCFAC. 6)
LS 0107	Secondary milk products	0.02		ML	Adopted	CS 230-2001	FAC 00-03	As consumed	
CS 108-1981	Natural mineral water	0.01	mg/l	ML	Adopted	CS 108-1981, Rev.1-1997	NMW		
	Infant formulae	0.02		ML	Adopted	CS 230-2001	FAC	Ready to use	
CS 150-1985	Salt, food grade	2		ML	Adopted	CS 150-1985, Rev.1-1997	NFSDU		
FF 0269	Wine	0.2		ML	Adopted	CS 230-2001	FAC		The OIV requested special consideration to be given to levels of lead in wines that had been stored for long periods of time (ALINORM 01/41, para. 123).

1) The 21st session of the Codex Committee on Processed Fruits and Vegetables retained the draft CS for Pickled Products at step 6 for redrafting etc., and returned the proposed draft CSs for canned citrus fruits; jams, jellies and marmalades; soy sauce; canned tomatoes; processed tomato concentrates; canned vegetables, to Step 2 for redrafting etc. (ALINORM 03/27, paras 95-96). The CS for Canned Stone Fruits was adopted by the 26th CAC, and therefore the existing Standards for peaches, plums and apricots were revoked. The new CS does not contain specific MLs for contaminants; this means that the previously existing Codex MLs of 1 mg/kg for lead in these commodities are no longer valid. See the list of standards for processed fruit and vegetable products in 1.16, tin.

2) Section 6.2 on other contaminant in the Draft General Standard for Fruit Juices and Nectars (advanced to Step 8 for adoption by the 28th Session of the Codex Alimentarius Commission; ALINORM 05/28/39, Appendix II) does not contain numerical maximum limits but contains the following statement: The products covered by the provisions of this Standard should comply with those maximum levels for contaminants established by the Codex Alimentarius Commission for these products.

3) The 2001 CAC requested reevaluation of the lead MLs in milk and milk fat (ALINORM 01/41, para. 121); see also ALINORM 03/12 para. 135-137. The 35th CCFAC discussed the issue of the necessity of a ML for milk, as milk was not a major contributor to the intake of lead. However, in view of opinions that milk is a major contributor to the exposure of infants and young children, the ML for milk was maintained. The Committee decided to inform the CAC that the current level for lead in milk fat (0.1 mg/kg) should be revoked (no documentation of such a decision is found in the CAC 2003 report however).

4) The 34th and the 35th CCFAC discussed various options for establishing ML(s) for lead in fish. Also analytical problems and economic aspects were highlighted. The 35th CCFAC decided to maintain the proposed ML in step 6 and to request a statistical analysis of the data available and of the comments submitted, using different levels of concern (e.g. 0.2, 0.4 and 0.5 mg/kg) in order to have a basis for decisions on whether or not to adopt a tiered approach. The need for more data (in GEMS Food format) and relevant information was stressed. See ALINORM 03/12A, paras 137-142.

5) The revised Standards for oils and fats contain the following wording for the mentioned contaminant MLs: "The products covered by the provisions of this Standard shall comply with MLs being established by the CAC but in the meantime the following limits will apply." CS for Edible Fats and Oils Not Covered by Individual Standards contains the same contaminant provisions as the other recent Standards for oils and fats (only applying to Pb and As).

The CAC agreed (ALINORM 01/41, para. 124) that the CCFAC should develop a Code of Practice on the prevention and reduction of lead contamination in food and recommended that the FAO Guidelines on lead-soldered cans could be useful in this regard. A first draft of this Code of Practice (CX/FAC 03/28) was discussed by the 2003 CCFAC (ALINORM 03/12A, paras 150-152) and was forwarded to the CAC. The CAC adopted this Code of Practice at step 5; the CCFAC will discuss a revised version in its 2004 session.

1.13.1 Mercury

Reference to JECFA: 10 (1966), 14 (1970), 16 (1972), 22 (1978)
Toxicological guidance PTWI 0.005 mg/kg bw (1978)
Residue definition: Mercury, Total
Synonyms: Hg

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 108-1981	Natural mineral water	0.001	mg/l	ML	Adopted	CS 108-1981, Rev.1-1997	NMW		
CS 150-1985	Salt, food grade	0.1		ML	Adopted	CS 150-1985, Rev.1-1997	FAC		

Mercury is a naturally occurring metallic element which can be present in foodstuffs by natural causes; elevated levels can also occur due to e.g. environmental contamination by industrial or other uses of mercury. Methylmercury and also total mercury levels in terrestrial animals and plants are usually very low; the use of fish meal as animal feed can however also lead to higher methyl mercury levels in other animal products. No CCFAC position document is available about mercury.

The draft Code of Practice for Source Directed Measures to Reduce Contamination of Food with Chemicals (ALINORM 01/12A, Appendix XIII) was adopted by the 24th CAC (2001), with an amendment to paragraph 3 of the introduction (ALINORM 01/41, paras 130-131).

1.13.2 Methylmercury

Reference to JECFA: 22 (1978), 33 (1988), 53 (1999), 61 (2003)
Toxicological guidance PTWI 0.0016 mg/kg bw (2003)
Residue definition: Methylmercury

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
WS 0125	Fish	0.5		GL	Adopted	CAC/GL 7-1991	CCFAC	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	
WD 0120	Fish	0.5	R	GL	Adopted	CAC/GL 7-1991	CCFAC	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	1)
WF 0115	Fish	0.5	R	GL	Adopted	CAC/GL 7-1991	CCFAC	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	
	Other predatory fish	1	R	GL	Adopted	CAC/GL 7-1991	CCFAC	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	The GLs for methylmercury in fish were adopted by the CAC-19 in 1991 (ALINORM 91/40, para. 202), on the understanding that the levels would be kept under review by the CCFAC as well as the CCFFP, especially as to the identification of predatory species of fish to which the higher GL applies. 1)
WF 0865	Pike	1		GL	Adopted	CAC/GL 7-1991	CCFAC	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	The GLs for methylmercury in fish were adopted by the CAC-19 in 1991 (ALINORM 91/40, para. 202), on the understanding that the levels would be kept under review by the CCFAC as well as the CCFFP, especially as to the identification of predatory species of fish to which the higher GL applies. 1)

WS 0131	Shark	1		GL	Adopted	CAC/GL 7-1991	CCFAC	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade	The GLs for methylmercury in fish were adopted by the CAC-19 in 1991 (ALINORM 91/40, para. 202), on the understanding that the levels would be kept under review by the CCFAC as well as the CCFFP, especially as to the identification of predatory species of fish to which the higher GL applies. 1)
	Swordfish	1	R	GL	Adopted	CAC/GL 7-1991	CCFAC	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	The GLs for methylmercury in fish were adopted by the CAC-19 in 1991 (ALINORM 91/40, para. 202), on the understanding that the levels would be kept under review by the CCFAC as well as the CCFFP, especially as to the identification of predatory species of fish to which the higher GL applies. 1)
WS 0132	Tuna	1	R	GL	Adopted	CAC/GL 7-1991	CCFAC	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.	The GLs for methylmercury in fish were adopted by the CAC-19 in 1991 (ALINORM 91/40, para. 202), on the understanding that the levels would be kept under review by the CCFAC as well as the CCFFP, especially as to the identification of predatory species of fish to which the higher GL applies. 1)

1) The 1992 CCFAC informed the CAC and the CCFFP that the recommended GLs for mercury in fish referred to total mercury rather than methylmercury. The 20th CAC (1993) decided to maintain the GLs for methylmercury in fish as previously adopted, while recommending that the establishment of corresponding GLs for total mercury in fish be considered by the CCFAC at its next meeting. The 26th CCFAC (1994) noted that analysis of total mercury was generally adequate to ensure that GLs for methylmercury were not exceeded and decided that the establishment of GLs for total mercury in fish was not necessary. The 29th CCFAC noted that the 43rd CXEXEC had recommended that the CCFAC initiate a new risk analysis on mm. It was decided to defer any decision on the question of GLs based on mm or tm until JECFA had performed the risk assessment. The 53rd JECFA (1999) maintained the existing PTWI for mm and recommended that mm be re-evaluated in 2002 when a new information on the cohort in one of the studies could be assessed and possibly other new relevant data could be available. The 53rd JECFA also recommended that the nutritional benefits of fish consumption are weighed against the possibility of harm when limits on mm concentrations in fish or on fish consumption are being considered. The 32nd CCFAC (2000) took note of these recommendations.

Methylmercury is the most toxic form of mercury and is formed in aquatic environments. Methylmercury therefore is found mainly in aquatic organisms. It can accumulate in the food chain; the levels in large predatory fish species are therefore higher than in other species and fish is the predominant source of human exposure to methylmercury. Methylmercury and also total mercury levels in terrestrial animals and plants are usually very low; the use of fish meal as animal feed can however also lead to higher methyl mercury levels in other animal products. The 53rd JECFA calculated the human exposure to methylmercury in regional diets to range from 0.3-1.5 ug/kg bw/week. Nationally reported dietary exposures are in the range 0.1 –2.0 ug/kg bw/week.

The draft Code of Practice for Source Directed Measures to Reduce Contamination of Food with Chemicals (ALINORM 01/12A, Appendix XIII) was adopted by the 24th CAC (2001), with an amendment to paragraph 3 of the introduction.

1.16 Tin

Reference to JECFA: 10 (1966), 14 (1970), 15 (1971), 19 (1975), 22 (1978), 26(1982), 33(1988), 55 (2000), 64 (2005)
Toxicological guidance PTWI 14 mg/kg bw (1988, Expressed as Sn; includes tin from food additive uses; maintained in 2000.)
Residue definition: Tin, total (Sn-tot) when not otherwise mentioned; inorganic tin (Sn-in); or other specification
Synonyms: Sn

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 78-1981	Canned fruit cocktail	250	C R	ML	Adopted	CS 78-1981	PFV		
CS 15-1981	Canned grapefruit	250	C R	ML	Adopted	CS 15-1981	PFV		
CS 68-1981	Canned mandarin oranges	250	C R	ML	Adopted	CS 68-1981	PFV		
CS 159-1987	Canned mangoes	250	C R	ML	Adopted	CS 159-1987	PFV		
CS 42-1981	Canned pineapple	250	C R	ML	Adopted	CS 42-1981	PFV		
CS 60-1981	Canned raspberries	250	C R	ML	Adopted	CS 60-1981	PFV		
CS 62-1981	Canned strawberries	200	C R	ML	Adopted	CS 62-1981	PFV		
CS 99-1981	Canned tropical fruit salad	250	C R	ML	Adopted	CS 99-1981	PFV		
CS 79-1981	Jams (fruit preserves) and jellies	250	C R	ML	Adopted	CS 79-1981	PFV		
CS 160-1987	Mango chutney	250	C R	ML	Adopted	CS 160-1987	PFV		
CS 56-1981	Canned asparagus	250	C R	ML	Adopted	CS 56-1981	PFV		
CS 116-1981	Canned carrots	250	C R	ML	Adopted	CS 116-1981	PFV		
CS 16-1981	Canned green and wax beans	250	C R	ML	Adopted	CS 16-1981	PFV		
CS 58-1981	Canned green peas	250	C R	ML	Adopted	CS 58-1981	PFV		
CS 81-1981	Canned mature processed peas	250	C R	ML	Adopted	CS 81-1981	PFV		
CS 55-1981	Canned mushrooms	250	C R	ML	Adopted	CS 55-1981	PFV		
CS 144-1985	Canned palmito	250	C	ML	Adopted	CS 144-1985	PFV		
CS 18-1981	Canned sweet corn	250	C R	ML	Adopted	CS 18-1981	PFV		
CS 13-1981	Canned tomatoes	250	C R	ML	Adopted	CS 13-1981	PFV		
CS 115-1981	Pickled cucumber	250	C R	ML	Adopted	CS 115-1981	PFV		
CS 57-1981	Processed tomato concentrates	250	C R	ML	Adopted	CS 57-1981	PFV		
JF 0175	Apple, grape, blackcurrant, small fruit juices	150	C R	ML	Adopted	CS various	FJ		1)
CS 44-1981	Apricot, peach and pear nectars	250	C R	ML	Adopted	CS 44-1981	FJ		1)
BE	Canned beverages	200	C	ML	4		FAC 99-04		2)

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Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 139-1983	Concentrated pineapple juice	250	C	ML	Adopted	CS 139-1983	FJ	With preservatives for manufacturing	
JF 0175	Fruit juices	200	C R	ML	Adopted	CS 164-1989	FJ	Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice.	1)
NF 0175	Fruit nectars	200	C R	ML	Adopted	various	FJ	Pulpy nectars of certain small fruits; and Nectars not covered by other standards.	1)
JF 0203	Grapefruit juice	250	C R	ML	Adopted	CS 46-1981	FJ		1)
CS 148-1981	Guava nectar	250	C R	ML	Adopted	CS 148-1981	FJ		1)
CS 47-1981	Lemon juice	250	C R	ML	Adopted	CS 47-1981	FJ		1)
CS 149-1981	Liquid pulpy mango products	250	C R	ML	Adopted	CS 149-1981	FJ		1)
GL 11-1991	Mixed fruit juices	200	C R	ML	Adopted	GL 11-1991	FJ		1)
GL 12-1991	Mixed fruit nectars	200	C R	ML	Adopted	GL 12-1991	FJ		1)
CS 134-1981	Nectars of certain citrus fruits	250	C R	ML	Adopted	CS 134-1981	FJ		1)
CS 101-1981	Non-pulpy blackcurrant nectar	150	C R	ML	Adopted	CS 101-1981	FJ		1)
JF 0004	Orange juice	250	C R	ML	Adopted	CS 45-1981	FJ		1)
JF 0341	Pineapple juice	250	C R	ML	Adopted	CS 85-1981	FJ		1)
CS 122-1981	Pulpy nectars of certain small fruits	150	C R	ML	Adopted	CS 122-1981	FJ		1)
CS 49-1981	Tomato juice	250	C R	ML	Adopted	CS 49-1981	FJ		1)
CS 145-1985	Canned chestnuts and chestnut puree	250	C R	ML	Adopted	CS 145-1985	PFV		
CS 98-1981	Cooked cured chopped meat	200	C	ML	Adopted	CS 98-1981, Rev.1-1991	PMPP	For products in tinplate containers	
CS 98-1981	Cooked cured chopped meat	50		ML	Adopted	CS 98-1981, Rev.1-1991	PMPP	For products in other containers	
CS 96-1981	Cooked cured ham	50		ML	Adopted	CS 96-1981, Rev.1-1991	PMPP	For products in other containers	
CS 96-1981	Cooked cured ham	200	C	ML	Adopted	CS 96-1981, Rev.1-1991	PMPP	For products in tinplate containers	
CS 97-1981	Cooked cured pork shoulder	200	C	ML	Adopted	CS 97-1981, Rev.1-1991	PMPP	For products in tinplate containers	
CS 97-1981	Cooked cured pork shoulder	50		ML	Adopted	CS 97-1981, Rev.1-1991	PMPP	For products in other containers	
CS 88-1981	Corned beef	50		ML	Adopted	CS 88-1981, Rev.1-1991	PMPP	For products in other containers	

ANNOTATED LIST OF CONTAMINANTS AND TOXINS IN FOODS: Part 1

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 88-1981	Corned beef	200	C	ML	Adopted	CS 88-1981, Rev.1-1991	PMPP	For products in tinplate containers	
CS 89-1981	Luncheon meat	50		ML	Adopted	CS 89-1981	PMPP	For products in other containers	
CS 89-1981	Luncheon meat	200	C	ML	Adopted	CS 89-1981	PMPP	For products in tinplate containers	
NE	Canned foods other than beverages	250	C	ML	4		FAC 99-04		2)

Concentrations as low as 150 mg/kg in canned beverages and 250 mg/kg in other canned foods may produce acute manifestations of gastric irritation in certain individuals.

1) The 3rd session of the ad hoc Intergovernmental task force on fruit and vegetable juices is developing a proposed draft Codex General Standard for fruit juices and nectars (see ALINORM 03/39A, Appendix II). The 2003 CAC adopted this text and advanced it to step 7, noting that some details needed to be further discussed, but with the expectation that at the next session of the Task Force a single standard could be presented for final adoption by the CAC. This new General Standard does not contain contaminant MLs.

2) The 55th JECFA (2000) maintained the existing PTWI and reiterated that limited human data available indicate that concentrations of 150 mg/kg tin in canned beverages and 250 mg/kg in other canned foods may produce acute manifestations of gastric irritation in certain individuals. This is considered to be a reversible effect however, which may occur in a limited number of sensitive subject only. Following the discussions in the 34th CCFAC (2002) and in the 35th CCFAC (2003)(ALINORM 03/12, para. 146 and ALINORM 03/12A, para. 160), the proposed MLs were repeatedly returned to step 3. The 35th CCFAC changed the terminology of the commodities to which the proposed draft MLs apply, which previously was liquid canned foods resp. solid foods, to canned beverages and canned foods other than beverages. The Committee decided to ask JECFA to evaluate current tin levels in canned foods and to determine an acute reference dose; it was noted that new data would become available

The acute toxicity was assessed at the 55th JECFA but data were insufficient for establishing an acute reference dose. The 55th JECFA reiterated that tin concentrations as low as 150 mg/kg in canned beverages and 250 mg/kg in other canned foods may produce acute manifestations of gastric irritation in certain individuals. The 64th JECFA concluded that the data available indicated that it is inappropriate to establish and ARfD for inorganic tin, since whether or not irritation of the gastrointestinal tract occurs after ingestion of a food containing tin depends on the concentration and nature of tin in the product, rather than on the dose ingested on a body-weight basis.

A discussion paper on tin (last version CX/FAC 03/29) is a revision of the position paper first discussed in CCFAC 1997 and contains all relevant information and references. The 35th CCFAC decide to discontinue its future consideration. The 35th CCFAC agreed that a Code of Practice for the Prevention and Reduction of Tin should be elaborated, for consideration at its next session.

The 26th CAC approved the elaboration of a proposed draft Code of Practice for the Prevention and Reduction of Tin Contamination in Foods as new work for the Committee (ALINROM 03/41, para. 138 and Appendix VIII). The 36th CCFAC forwarded the renamed proposed draft Code of Practice for the Prevention and Reduction of Inorganic Tin Contamination in Canned Foods to the CAC for preliminary adoption at Step 5 (ALINORM 04/27/12, para. 174). The 27th CAC adopted the Proposed Draft Code at Step 5 and advanced it to Step 6 as proposed (ALINORM 04/27/41, para. 70).

3.01.5 Vinyl chloride monomer

Reference to JECFA: 28 (1984)
Toxicological guidance: Provisional Acceptance (1984, the use of food-contact materials from which vinyl chloride may migrate is provisionally accepted, on condition that the amount of the substance migrating into food is reduced to the lowest level technologically attainable)
Residue definition: Vinylchloride monomer
Synonyms: Monochloroethene, chloroethylene; abbreviation VC or VCM

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
	Food	0.01		GL	Adopted	CAC/GL 6-1991	FAC	The GL in food packaging material is 1.0 mg/kg.	

Vinylchloride monomer is the main starting substance for the manufacture of polymers which are used as resins, o.a. as packaging material for o.a. foods. Vinyl chloride is not known to occur as a natural product.

Residues of VCM may be still present in the polymer. Vinyl chloride is considered by IARC to be a human carcinogen (as has been shown in occupational exposure situations). Migration of possibly harmful substances from food contact materials has been discussed in the CCFA/CCFAC in the period 1986-1991.

Guideline levels for vinyl chloride monomer and acrylonitrile in food and packaging material were adopted by the CAC at its 19th session (1991) on the understanding that the AOAC and the ISO would develop appropriate sampling plans and methods of analysis.

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3.04 Polychlorinated biphenyls

Reference to JECFA: 35 (1989)
Toxicological guidance: Not established (For coplanar PCBs (dioxin-like PCBs), see the toxicological guidance value of 3.08 Dioxins)
Residue definition:
Synonyms: Abbreviations, PCBs

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC

No ML

PCBs are a class of stable chlorinated aromatic hydrocarbons which (mostly prior to the 1970s) have been produced since 1930 and used extensively in a wide range of industrial applications. One of the main uses which still persists is as dielectric and heat exchange fluids. Despite increasing withdrawal of the use and restrictions on the production, large amounts of PCBs continue to be present in the environment, either in use in existing industrial systems, or in waste materials, or dispersed as persistent pollutants. PCBs are mixtures of related chemicals which are formed by the chlorination of biphenyl. Theoretically, 209 congeners are possible; in practice about 130 are likely to occur in commercial products. Also related by-products are formed, such as polychlorinated dibenzofurans (PCDFs), and may be found in technical PCB-mixtures. Some of the trade names for technical PCB-mixtures as they were produced are Aroclor, Clophen, Kanechlor. The different congeners in PCB-mixtures can be designated by their IUPAC number, and different industrial PCB-mixtures can be characterized by their composition in terms of the relative percentages of the congeners.

Degradation of PCBs in the environment depends on the degree of chlorination (higher chlorinated compounds are generally more persistent against photolytic, microbial and animal metabolic degradation) and on the position of the chlorine atoms in the molecule. All congeners are lipophilic and accumulate in the food chain.

PCBs were discussed by the 35th JECFA (1989); it was difficult to come to clear conclusions about the toxicity of PCBs as such because impurities such as dioxins and related compounds (e.g., PCDFs) probably were present in the PCB-mixtures used for the animal studies. The Committee concluded that 0.04 mg/kg bw was the NOEL in monkey studies. However, because of the limitations of the data and the ill-defined nature of the materials used in the study, no tolerable intake for humans could be established. One of the complications is that humans are exposed to biologically filtered mixtures of congeners, which are rather different from the industrial PCB-mixtures that were used for the studies. No toxicological monograph was prepared (see however EHC 140).

PCBs were evaluated by IARC in 1978 and 1987. The conclusion was that PCBs are carcinogenic for laboratory animals and are probably carcinogenic for humans (IARC, 1987). Extensive documentation about PCBs is gathered in EHC 140 (WHO, 1993)

The major foods in which contamination with PCBs can be significant are fish, milk and dairy products, meat and eggs. Because PCBs bioaccumulate, the levels will usually be higher in animals which are higher in the food chain, but local pollution and feed composition may have major influence on the levels in animal products. Humans with a considerable intake of animal fats also may accumulate high levels of PCBs and as a consequence also PCB-levels in breast milk and in human adipose fat may be high. The JECFA, however, considered that the advantages to the infant of breast-feeding outweigh any potential hazards due to the PCB-content of breast milk. The JECFA recommended that PCB-levels in foods are monitored , preferably by quantifying the most important individual congeners. Safety studies should be carried out on the toxicological potential of the PCB-congeners which are predominantly present in foods. It is evident that in relation to the persistent nature of PCBs and ongoing environmental contamination, it is still valid to pay due attention to PCBs. JECFA pointed out that a long-term goal should be the reduction of PCBs in the diet to a minimum.

PCBs are related to other chlorinated hydrocarbons, such as polybrominated biphenyls (PBBs), polychlorinated terphenyls (PCTs), tetrachlorobenzyltoluenes, and polychlorinated dibenzodioxins and dibenzofurans. Coplanar PCBs were integrated included in the toxicological evaluation of dioxins (see the PTMI of 3.08 Dioxins), but it has to be borne in mind that the toxicological effects of PCBs are broader than the dioxin-related effects. The CCFAC discussed PCBs from 1990 to 1994 on the basis of CX/FAC 90/20-Add.1 and further related documents. It was noted that several countries have established MLs for PCBs in food, so that trade issues might arise. Some of these countries have introduced MLs for the sum of some specific PCB-congeners, which is probably the best defined way of analysing and reporting PCBs. The most important congeners for analysis of the general content of PCBs in foods are usually considered to be IUPAC numbers 28, 52, 101, 118, 138, 153 and 180.

The CCFAC also acknowledged that source-directed measures were most important to reduce contamination with PCBs. The Committee agreed in 1992 that it was premature to set (maximum) levels for these contaminants at this stage. The discussions later were focused on dioxins and the dioxin-related PCBs.

The PCB-congeners that most easily adopt a co-planar configuration (the non-ortho substituted PCBs, numbers 77, 126 and 169) are potent Ah receptor agonists. Mono-ortho substituted PCBs are less potent but are included with a TEQ-factor for dioxin-like activity (nos 105, 114, 118, 123, 156, 157, 167, 189). Sometimes also PCB 81 and two di-ortho substituted PCBs (170 and 180) were included in the discussion about the TEF-approach for dioxins because of their ability to induce P4501A1 enzymes and their occurrence and persistence in the environment; they however were not incorporated in the WHO-recommendation about the TEF-approach for dioxin-related compounds (1998). The PCBs with a TEF form usually only a few percent of the total PCBs, but are relevant because of this specific toxicity, which can form an important contribution to the total TEQ for dioxins in a sample of food and in the human diet.

3.08 Dioxins

Reference to JECFA: 57 (2001)
Toxicological guidance PTMI 70 pg TEQ/kg bw (2001, Including coplanar PCBs)
Residue definition:
Synonyms: Polychlorinated dibenzo-dioxins and –furans

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

The term dioxins refers to a group of polychlorinated planar aromatic compounds. The group consists of 75 dibenzo-p-dioxins (PCDD) and 135 dibenzofurans (PCDF). The most studied and toxic dioxins are 17 congeners with a 2,3,7,8-chlorosubstitution pattern, of which 2,3,7,8-tetra-CDD (TCDD) is the most toxic and most studied congener. Dioxins are ubiquitously present as contaminants in the environment and in food, be it in minute amounts. Dioxins are lipophilic compounds which bind to sediment and organic matter in the environment and tend to be absorbed in animal and human fatty tissue. They are extremely resistant towards chemical and biological transformation processes and are consequently persistent in the environment and accumulate in the food chain. Dioxins are formed as unwanted by-products in combustion processes or industrial processes. Most of the dioxins enter the environment by emission to air. The Ah receptor is an important factor in the toxicological effects of dioxins. Activation of this receptor can result in endocrine and paracrine disturbances and alterations in cell functions including growth and differentiation.

Developmental neurobehavioral (cognitive) and reproductive effects and immunotoxic effects belong to the most sensitive endpoints of dioxin toxicology. TCDD is classified by IARC as Group 1 human carcinogen. It has been shown to be carcinogenic in several animal species at multiple sites, but TCDD is not an initiator of carcinogenesis and the tumour promotion in animal studies indicated a non-genotoxic mechanism.

The toxic equivalency concept has been developed for application to dioxins in order to assess the toxicity of a mixture of congeners as it exists in practice. Toxic Equivalency Factors (TEFs) have been established in relation to TCDD and the total toxicity of a mixture can thus be calculated as total toxic equivalents (TEQs). It has been shown that also some PCB-congeners (those with a planar dioxin-like structure) have effects on the Ah receptor and thus they are given TEFs and can be combined with the dioxins for the calculation of total TEQ of a sample.

The situation regarding dioxins has been reviewed in a discussion paper (last version CX/FAC 00/26). The 32nd CCFAC requested an additional position paper in which recent intake assessments and national regulations regarding dioxins are assembled. This was presented to the 33rd CCFAC. A revision of this document was requested, with also data on dioxin levels in food and feedingstuffs and breast-milk; the latest version is CX/FAC 03/32. The 34th CCFAC agreed that it should not draft MLs for dioxins at the time. The 35th CCFAC requested a revision of the position paper, including the insertion of a new section to cover ranges of data on background levels of dioxins and dioxin-like PCBs in food and feed. The 36th CCFAC encouraged Codex members to submit data on dioxins and dioxin-like PCBs in foods, and it agreed to request WHO to report in a detailed way to the Committee on the data submitted withing three years time. In view of this, the CCFAC agreed to discontinue the consideration of the position paper (ALINORM 04/27/12, paras 188-189).

A proposed draft Code of Practice for source directed measures to reduce dioxin and dioxin like PCB contamination of foods has been prepared to be discussed by the 35th CCFAC. The 35th CCFAC agreed that a revised draft should be elaborated, taking into account the comments submitted and, in particular, Annex C of the Stockholm Convention on Persistent Organic Pollutants.

The 36th CCFAC returned the proposed draft Code of Practice to Step 2 for revision, circulation and comments at Step 3, and further consideration at the next session of the Committee (ALINORM 04/27/12, para. 185).

3.10 Chloropropanols

Reference to JECFA: 41 (1993; for 1,3-dichloro-2-propanol only) 57 (2001)

Toxicological guidance: PMTDI 0.002 mg/kg bw (2001, For 3-chloro-1,2-propanediol. Establishment of tolerable intake was considered to be inappropriate for 1,3-dichloro-2-propanol because of the nature of the toxicity (tumorogenic in various organs in rats and the contaminant can interact with chromosomes and/or DNA. However, JECFA noted that 1,3-dichloro-2-propanol is associated with high levels of 3-chloro-1,2-propanediol, and regulatory control for the latter would oviate the need for specific controls for 1,3-dichloro-2-propanol)

Residue definition:

Synonyms: Two substances are the most important members of this group: 3-monochloropropane-1,2-diol (3-MCPD) and 1,3-dichloro-2-propanol (1,3-DCP)

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC

No ML

Chloropropanols can be formed in foods as a result of specific processing and storage conditions. The main source is acid hydrolysation of vegetable proteins for the production of savoury food ingredients. In this process the use of hydrochloric acid can result in high temperature chlorination of lipids present in the protein starting materials. 3-MCPD has been shown to be a precursor for 1,3-DCP-formation and control of the levels of 3-MCPD is expected to obviate the need for specific control on 1,3-DCP. High levels of chloropropanols (up to 100 mg/kg and more) have especially been found in products like non-traditionally fermented soy sauces and hydrolysed vegetable proteins (HVP).

There is an obvious connection with the conditions of the production method and the levels of chloropropanols in these products are shown to be declining in the last decade since the problem was noticed and measures have been taken to reduce the formation of chloropropanols. These compounds have also been found however in many other foods, including baked goods, bread, cooked/cured meat/fish and malt ingredients. There are (inconclusive) indications that cooking (grilling) could result in some formation of 3-MCPD. Also packaging materials and paper used for processing of food may contain 3-MCPD and could contribute to exposure via food, but this has led to the development of resins with significantly lower levels of 3-MCPD. Further information is required on the levels of chloropropanols in foods and food ingredients, on the dietary exposure to these compounds, on the origin and formation and on production methods which can be utilised to avoid chloropropanol contamination of foodstuffs.

Position papers have been written; the 35th CCFAC agreed that the paper should be revised on the basis of the discussions and of submitted comments and data (ALINORM 03/12A, para. 179).

The setting of MLs for chloropropanols in foodstuffs was asked to be considered at the 35th session of the CCFAC. The CCFAC could not reach a consensus on a ML of 1 mg/kg for acid-HVP soy sauce as proposed, and deferred the elaboration of MLs in different foodstuffs until its next session; the revised position paper should include proposals for the elaboration of MLs for chloropropanols in relevant foods (ALINORM 03/12A, paras 173-179).

The 36th CCFAC agreed to commence work on the establishment of a maximum level for 3-MCPD in acid-HVPs and acid-HVP containing products subject to approval as new work, in addition, the CCFAC agreed that a working group would prepare an updated discussion paper (ALINORM 04/27/12, paras 193-194).

3.xx Polybrominated diphenyl ethers

Reference to JECFA: 64 (2005)

Toxicological guidance (Intake estimates: mean approximately 4 ng/kg bw/day; Based on limited toxicity data, The 64th JECFA concluded that there appeared to be a large MOE for a non-genotoxic compound which, despite the inadequacy of the data on toxicity and intake, gave reassurance that intakes of PBDEs are not likely to be a significant health concern.)

Residue definition:

Synonyms: PBDEs

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

3.xx Polycyclic aromatic hydrocarbons

Reference to JECFA: 64 (2005)
Toxicological guidance (Intake estimates for benzo[a]pyrene as marker for PAHs: mean 4 ng/kg bw/day; high 10 ng/kg b/day;
Margin of exposure (MOE): Cancer (BMDL for benzo[a]pyrene as markere for mixures of PAHs 100 000 ng/kg bw/day), mean intake 25 000; high intake 10 000)
Residue definition:
Synonyms: PAHs

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

The 64th JECFA applied a surrogate approach to the evaluation, in which benzo[a]pyrene was used as a marker of exposure to, and effect of, the 13 genotoxic and carcinogenic PAHs. Based on the derived MOEs, the JECFA concluded that the estimated intakes of PAHs were of low concern for human health. Measures to reduce intake of PAHs could include avoiding contact of foods with flames, and cooking with the heat source above rather below the food. Efforts should be made to reduce contamination with PAHs during drying and smoking processes.

4.09.1 Acrylonitrile

Reference to JECFA: 28 (1984)

Toxicological guidance: Provisional Acceptance (1984, the use of food-contact materials from which acrylonitrile may migrate is provisionally accepted on condition that the amount of the substance migrating into food is reduced to the lowest level technologically attainable.)

Residue definition: Acrylonitrile (monomer)

Synonyms: 2-Propenenitrile; vinyl cyanide (VCN); cyanoethylene; abbreviations, AN, CAN.

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
	Food	0.02		GL	Adopted	CAC/GL 6-1991	FAC		

Acrylonitrile monomer is the starting substance for the manufacture of polymers which are used as fibres, resins, rubber and also as packaging material for foods. Acrylonitrile is not known to occur as a natural product. Acrylonitrile is classified by IARC as possibly carcinogenic to humans (Group 2B). Polymers derived from acrylonitrile may still contain small amounts of free monomer. Migration of possibly harmful substances from food contact materials has been discussed in the CCFA/CCFAC in the period 1986-1991.

Guideline Levels for Acrylonitrile in Food and Vinyl Chloride Monomer in Food and Food Packaging Materials were adopted by the CAC at its 19th session (1991) with the understanding that the AOAC and the ISO would be requested to elaborate appropriate sampling plans and methods of analysis (ALINORM 91/40, paras 203-204).

IARC Vol. 71, 43-108.

4.11.1 Ethyl carbamate

Reference to JECFA: 64 (2005)
Toxicological guidance (Intake estimates: from food (=mean) 15 ng/kg bw/day; from food and alcoholic beverages (=high) 80 ng/kg bw/day
Margin of Exposure (MOE): cancer (BMDL 0.3 mg/kg bw/day), mean intake 20 000, high intake 3 800.)
Residue definition:
Synonyms: Urethane; abbreviation, EC

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

Ethyl carbamate (also called urethane) is used in the chemical industry as an intermediate in the synthesis of some other chemicals. It is also a contaminant in food which may be produced during fermentation and other processing of food. High levels (up to several thousand ug/l) may be found in some spirits such as stone fruit brandies, cognac and whiskies, while lower levels (in the order of a few ug/kg) are found in fermented drinks like wine and beer, and to some extent also in fermented foods like bread, soy sauce, yogurt and olives. Levels may vary considerably from batch to batch. Following discovery of the problem in the 1980's efforts were taken by public health officials and the industry to reduce or eliminate the formation of this compound during the relevant food production processes. The major formation pathway is that arginine, an amino acid which occurs naturally e.g. in grape juice, is metabolized by yeast yielding urea. When this occurs in excess amounts, urea may be released from the yeast cells during and at the end of the fermentation. Urea can react spontaneously with ethanol (the main fermentation product) to form ethyl carbamate (EC). Citrulline, another amino acid and a precursor of arginine, can serve as an EC precursor.

Acute exposure to high levels of EC may induce vomiting, coma or hemorrhages and result in injury to the kidneys and liver. No information is available on the chronic, reproductive or developmental effects of EC in humans. An increased incidence of lung tumors was observed in rodents exposed by oral or inhalation route; IARC classified EC in Group 2B, possibly carcinogenic to humans.

When EC was discussed in the CCFAC in 1991, a Danish national TDI of 0.2 ug/kg bw was reported. The intake of a person consuming some of the higher contaminated food products was estimated to be more than 50% of this TDI. Therefore measures aimed at reducing the EC formation were seen as necessary. No specific health effects by EC in humans related to dietary exposure are reported however.

Some countries mentioned national GLs for EC. No trade problems are reported however. The 27th CCFAC (1995) decided that no further action was needed at present.

The 64th JECFA concluded that intake of ethyl carbamate from foods excluding alcoholic beverages would be of low concern. The MOE from all intakes, food and alcoholic beverages combined, is of concern and therefore mitigation measures to reduce concentrations of ethyl carbamate in some alcoholic beverages should be continued.

4.xx Acrylamide

Reference to JECFA: 64 (2005)

Toxicological guidance (Intake estimates: mean 0.001 mg/kg bw/day; high 0.004 mg/kg bw/day;
Margin of exposure (MOE): morphological changes in nerves (MOEL 0.2 mg/kg bw/day), mean intake 200, high intake 50; reproductive, developmental and other non-neoplastic effects (NOEL 2 mg/kg bw/day), mean intake 2000, high intake 500; cancer (BMDL 0.3 mg/kg bw/day), mean intake 300, high intake 75.)

Residue definition:

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

The 64th JECFA concluded that adverse effects based on morphological changes in nerves and on reproductive, developmental and othernon-neoplastic effects are unlikely at the estimateed average intakes, but that morphological changes in verves cannot be excluded for some individuals with very high intakes. It considered the MOEs (Cancer effects - mean and high intakes) to be low for a compound that is genotoxic and cancinogenic and that they may indicate a human health concern. Therefore, appropriate efforts to reduce acrylamide concentrations in food stuffs should continue.

5.01.1 Aflatoxins, Total

Reference to JECFA: 31 (1987), 46 (1996), 49 (1997)
Toxicological guidance Carcinogenic potency estimates for aflatoxins B, G, M (1997, Intake should be reduced to levels as low as reasonably possible.)
Residue definition: Aflatoxins total (B1 +B2 + G1 + G2)
Synonyms: Abbreviations, AFB, AFG, with numbers, to designate specific compounds

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
TN 0660	Almonds	15		ML	3		FAC 04	Unprocessed and processed	
TN 0666	Hazelnuts	15		ML	3		FAC 04		
TN 0675	Pistachio nut	15		ML	3		FAC 04		
SO 0703	Peanuts, raw	15		ML	Adopted	CS 209-1999, Rev.1-2001	FAC		1)

1) The 1994 CCCPL decided not to proceed with the proposed GL for processed peanuts and to advance the proposed GL for raw peanuts (intended for further processing), associated with a specific sampling plan because the contamination is usually very inhomogeneous in a lot. It is assumed that raw peanuts are the major commodity in international trade. The 49th JECFA (1997) evaluated hypothetical standards of 10 and 20 ug/kg AFB in peanuts and concluded that the higher standard would not result in any observable difference in rates of liver cancer. As a result of this evaluation, the 1998 CCFAC (discussing options of 10 and 15 ug/kg as a ML for AF-total in peanuts), decided to propose 15 ug/kg as ML. The resulting CS 209-1999 contains a sampling plan. A discussion paper on the development of a Code of Practice for the reduction of aflatoxin contamination in peanuts (CX/FAC 03/25) was considered by the 2003 CCFAC. The CCFAC forwarded the proposed draft Code of Practice to the 26th CAC for adoption at Step 5. The 2003 CAC adopted this proposal. The 36th CCFAC forwarded the Code to the 27th CAC for final adoption at Step 8 (ALINORM 04/27/12, para. 140). The 27th CAC adopted the Code at Step 8 as porposed (ALINORM 04/27/41, para. 30)

Aflatoxins are a group of highly toxic mycotoxins produced by fungi of the genus Aspergillus. The four main aflatoxins found in contaminated plant products are B1, B2, G1 and G2 and are a group of structurally related difuranocoumarin derivatives that usually occur together in varying ratios, AFB1 usually being the most important one. These compounds pose a substantial hazard to human and animal health. IARC (1992) classified aflatoxin B1 in Group 1 (human carcinogen) and AFM in Group 2B (probable human carcinogen). The liver is the primary target organ. A wide range of foods may be contaminated with aflatoxins; they are most commonly found in groundnuts (peanuts), dried fruit, tree nuts (such as almonds, pecans, walnuts, pistachio and brazil nuts), spices, figs, crude vegetable oils, cocoa beans, maize, rice, cottonseed and copra. AFB1 present in animal feed can partly be transferred to milk in the form of the metabolite AFM1 (mostly 1-2%, but higher percentages are found at low contamination levels in high producing animals.)
Aflatoxin contamination is responsible for considerable economic losses and efforts are being made to reduce contamination of food and feedingstuffs.
The 23rd CCFAC (1991) decided to discontinue the development of a ML for aflatoxins in foods in general, and to discuss the problems on a commodity basis.
It is acknowledged that for primary plant products the aflatoxin contamination is often not homogeneous and a sampling plan is necessary to assure reasonable application of MLs. A general position paper on aflatoxins in food and feeds (CX/FAC 97/16) was presented to the 1997 CCFAC.

- A discussion Paper on aflatoxins in tree nuts (last published version CX/FAC 04/36/22) was discussed by the 2003 CCFAC; the CCFAC agreed that it would be revised for consideration at its next meeting. Additional information is requested on aflatoxin contamination in tree nuts other than almonds, hazelnuts and pistachios. The Committee agreed to the elaboration of MLs for aflatoxins in almonds, hazelnuts and pistachios, based on the ALARA principle and with the understanding that related sampling plans needed to be established. This activity was approved by the 2003 CAC as new work. A Code of Practice for the prevention and reduction of aflatoxin contamination in tree nuts is being developed (last published version CX/FAC 04/27/21). This activity was approved by the 2002 CCEXEC as new work. The 36th CCFAC forwarded the proposed draft Code of Practice to the CAC for adoption at Step 5 (ALINORM 04/27/12, para. 143). The 27th CAC adopted the proposed draft Code at Step 5 as proposed (ALINORM 04/27/47, para. 69).

- Corn was included in a Technical Consultation on sampling plans for aflatoxins in commodities. See FAO Food and nutrition Paper 55 (Rome, 1993).

- The 1994 CCFAC decided to discontinue the establishment of GLs for AFB1 in supplementary feedingstuffs for milk-producing animals (previously proposed at the level of 5 ug/kg), based on the assumption that the relationship between aflatoxins in milk and feeds is not (completely) clear and that there is not much international trade in (composite) supplementary feedingstuffs. International trade mostly is in the form of individual commodities which can be used as feed components in various quantities, directed to other feed uses than milk producing animals, or to other uses in general, or be decontaminated etc. Therefore, a Code of Practice for the reduction of aflatoxin B1 in raw materials and supplemental feedingstuffs for milk-producing animals was developed and adopted as RCP 045-1997.

5.01.2 Aflatoxin M1

Reference to JECFA: 56 (2001)

Toxicological guidance: Cancer potency estimates at specified residue levels (2001, Using worst-case assumptions, the additional risks for liver cancer predicted with use of proposed maximum levels of aflatoxin M1 of 0.05 and 0.5 µg/kg are very small. The potency of aflatoxin M1 appears to be so low in HBsAg- individuals that a carcinogenic effect of M1 intake in those who consume large quantities of milk and milk products in comparison with non-consumers of these products would be impossible to demonstrate. Hepatitis B virus carriers might benefit from a reduction in the aflatoxin concentration in their diet, and the reduction might also offer some protection in hepatitis C virus carriers.)

Residue definition: Aflatoxin M1

Synonyms: AFM1

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
ML 0106	Milk	0.5		ML	Adopted	CS 232-2001	FAC		

The 24th CCFAC (1993) decided to stop the development of a specific standard for AFM1 in milk destined for use in baby foods.

The CCFAC has discussed 2 options for a standard for AFM1 in milk: 0.05 ug/kg and 0.5 ug/kg. At the request of the 32nd CCFAC (2000), the 56th JECFA (2001) examined exposure to AFM1 and conducted a quantitative risk assessment to compare the consequences of setting the maximum level in milk at 0.05 ug/kg and 0.5 ug/kg. The estimates of the potency of aflatoxin M1 were combined with estimates of intake from the GEMS/Food European regional diet. JECFA noted that the calculation showed that, with worst case assumptions, the projected risks for liver cancer at the proposed maximum levels of aflatoxin M1 of 0.05 and 0.5 ug/kg are very small. As a result, 0.5 ug/kg was forwarded to the 24th CAC in 2001which adopted this draft ML, noting that data supporting the lower level, if and when available, could be examined by the CCFAC at a future meeting when necessary.

It is acknowledged that the AFM1 level in milk is related to the AFB1 level in the animal feed. See note under Aflatoxins, total.

5.02.1 Ochratoxin A

Reference to JECFA: 37 (1990), 44 (1995), 56 (2001)
Toxicological guidance PTWI 0.0001mg/kg bw (2001,)
Residue definition: Ochratoxin A
Synonyms: (The term ochratoxins include a number of related mycotoxins (A, B, C and their esters and metabolites), the most important one being ochratoxin A)

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
GC 0650	Barley	5		ML	6		FAC 91-04		1)
GC 0654	Rye	5		ML	6		FAC 91-04		1)
GC 0640	Wheat	5		ML	6		FAC 91-04		1)

1) The draft ML of 5 ug/kg for OTA was forwarded for adoption at Step 8 by the 2002 CCFAC (ALINORM 03/12, para 111-114), on the basis of the assumption that this level was ALARA. The 26th CAC (2003) discussed this proposal (ALINORM 03/41, PARAS 45-47). Many delegations were of the opinion that this proposed ML was too low and, taking account of the evaluation of the 56th JECFA, noted that a ML of 20 ug/kg could be adequate in terms of public health and safety. The CAC concluded that there was a lack of consensus both regarding the appropriate ML and regarding the reference to derived products and returned the standard to Step 6 for further work by the CCFAC.

Ochratoxin A (OTA) is the major compound of a group of chemically related mycotoxins produced by species of the genera Aspergillus and Penicillium. OTA contamination is commonly found in various cereals, some pulses, coffee, cocoa, figs, grapes, wine, nuts and coconut products. It can also be transferred through the feed to animal products and concentrates especially in the kidney, but may also be found in meat and milk. Most OTA is however converted to the less harmful ochratoxin-? in the rumen of ruminants.

OTA is a nephrotoxic mycotoxin, which is carcinogenic to rodents and has also teratogenic, immunotoxic and possibly neurotoxic properties. It has been associated with Balkan Endemic Nephropathy. The situation regarding ochratoxins has been reviewed in a position paper (last version CX/FAC 99/14).

OTA is incorporated with a specific Annex in the Code of Practice for the prevention and reduction of mycotoxin contamination in cereals, which was adopted by the 2003 CAC (last published version in Appendix X of ALINORM 03/12A).

5.03.1 T-2 and HT-2 toxin

Reference to JECFA: 56 (2001)
Toxicological guidance PMTDI 0.00006 mg/kg bw (, Group PMTDI for T-2 and HT-2 toxins, alone or in combination)
Residue definition:
Synonyms:

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC

No ML

T-2 and HT-2 toxin are closely related compounds belonging to a group of chemically related mycotoxins called type A trichothecenes (which are epoxy-sesquiterpenoid compounds) and are produced by certain Fusarium species, which are pathogens of several cereal grains. The most important producer is F. sporotrichioides, a saprophyte which only will grow at high water activities. As a consequence, T-2 and HT-2 toxins are not normally found in grain at harvest, but result from water damage when it remains wet for longer periods in the field or after harvest. T-2 and HT-2 toxin undergo rapid metabolism and elimination in livestock species and the transfer from feed to animal products is probably negligible. Maximum levels in feed are not needed to product public health, but are useful for the protection of animal health and productivity. Especially pigs are vulnerable. In animals, decreased feed consumption, diarrhoea and vomiting have been observed as acute effects.

T-2 toxin is a potent inhibitor of protein synthesis, both in vivo and in vitro. T-2 toxin is linked to outbreaks of acute poisoning of humans, in which the adverse effects reported include nausea, vomiting, pharyngeal irritation, abdominal pain, diarrhoea, bloody stool, dizziness and chills. Co-occurrence of T-2 toxin with other trichothecenes in these cases is likely. T-2 toxin is also associated with food-related poisoning incidents in 1931- 1947 referred to as alimentary toxic aleukia, in the former Soviet Union. The PMTDI is based on a 3-week dietary study with pigs, applying a safety factor of 500 to a LOEL for changes in white and red cell counts. The average intake of T-2 and HT-2 toxin via the human diet was estimated by JECFA as 8 resp. 9 ng/kg bw, which is lower than the group PMTDI. An intake at the level of the PMTDI is not expected to result in effects of T-2 and HT-2 toxin on the immune system and to haematotoxicity, which are considered critical effects after short-term intake. JECFA recommended that toxic equivalency factors relative to DON be developed for the other trichothecenes commonly occurring in cereal grains, if sufficient data become available.

T-2 and HT-2-toxin are incorporated with a specific Annex for trichothecenes in the Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals, which was adopted by the 2003 CAC (last published version in Appendix X of ALINORM 03/12A).

No further action on T-2 and HT-2 toxin has been recommended by the 2001 CCFAC, probably based on the understanding that the (limited) information available suggested that intakes would not exceed the PMTDI (ALINORM 01/12A, para. 16).

5.03.8 Deoxynivalenol

Reference to JECFA: 56 (2001)
Toxicological guidance PMTDI 0.001 mg/kg bw (2001)
Residue definition:
Synonyms: Vomitoxin; Abbreviation, DON

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

Deoxynivalenol (DON) is the major compound of a group of chemically related mycotoxins called type B trichothecenes (which are epoxy-sesquiterpenoid compounds) and is produced by certain Fusarium species, which are pathogens of several cereal grains. Closely related compounds are e.g. nivalenol and several acetyl-DON derivatives. DON is water-soluble and chemically very stable under most normal food processing conditions. DON contamination is commonly found in various cereals and cereal products. It undergoes rapid metabolism and elimination in livestock species and the transfer from feed to animal products is probably negligible. Maximum levels in feed are not needed to product public health, but are useful for the protection of animal health and productivity. Especially pigs are vulnerable.

In animals, decreased feed consumption, diarrhoea and vomiting have been observed as acute effects. JECFA recognized that DON can lead to outbreaks of acute illness in humans. The available data did not permit to set an acute reference dose however. The PMTDI is based on a chronic dietary study with mice, applying a safety factor of 100. An intake at the level of the PMTDI is not expected to result in effects of DON on the immune system, growth or reproduction, which are the most critical effects. JECFA recommended that toxic equivalency factors relative to DON be developed for the other trichothecenes commonly occurring in cereal grains, if sufficient data become available.

The JECFA estimated that the PMTDI for DON could be exceeded in 4 out of 5 GEMS/Food regional diets.

The situation regarding deoxynivalenol has been reviewed in a discussion paper (last version CX/FAC 03/35); the 35th CCFAC discontinued the consideration of this discussion paper and agreed to commence work on the elaboration of MLs for DON (ALINORM 03/12A, paras 180-182). The CAC in 2003 approved the development of maximum levels for DON as new work.

DON is incorporated with a specific Annex for trichothecenes in the Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals, which was adopted by the 2003 CAC (last published version in Appendix X of ALINORM 03/12A).

5.04.1 Fumonisins

Reference to JECFA: 56 (2001)
Toxicological guidance PMTDI 0.002 mg/kg bw (2001,)
Residue definition:
Synonyms: (Several related compounds have been described, notably fumonisin B1, B2 and B3 (abbreviation: FB1 etc.))

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC

No ML

Fumonisins are a class of recently identified mycotoxins that are produced mainly by certain Fusarium species, especially F. moniliforme which is a pathogen of corn (Zea mays). Fumonisins are a structurally related group of diesters of propane-1, 2, 3-tricarboxylic acid and various 2-amino-12, 16-dimethylpolyhydroxyeicosanes. There are at least 12 fumonisin analogues identified, classified into series A, B, F and P. The B-series, consisting mainly of FB1 and FB2, are believed to be the most abundant and most toxic compounds. A typical ratio between these analogues is B1:B2:B3 as 10:3:1. The worldwide occurrence of fumonisins in corn and corn-based products is well documented; sporadic natural occurrence in sorghum, rice and navy beans has been reported. Fumonisins are heat-stable, so cooking and other heat processes do not substantially reduce their levels in foods. Processing involving treatment of wet milling fractions may however lead to elimination of most fumonisin. The human exposure via food can vary to a large extent, because of the large range of fumonisin contents which have been found in practice. Fumonisins undergo rapid metabolism and elimination in livestock species and the transfer from feed to animal products is probably negligible. Maximum levels in feed are not needed to product public health, but are useful for the protection of animal health and productivity.

In animals, various adverse effects have been observed. The horse appears to be the most sensitive species, and equine leukoencephalomalacia (ELEM) is the most frequently encountered disease. Fumonisins are also associated with liver damage, often also kidney lesions and changes in certain lipid classes, especially sphingolipids, in all animals studied. Carcinogenic effects have been observed in animals exposed to high dietary levels.

Nephrotoxicity, observed in several strains of rat, was considered by JECFA to be the most sensitive toxic effect. On the basis of the NOEL for renal toxicity and a safety factor of 100, the PMTDI was established.

National estimates for the mean or median intake were generally much lower than the PMTDI (the highest being 0.2 ug/kg bw).

A position paper has been prepared for fumonisins (last version CX/FAC 00/22). The 32nd CCFAC in 2000 asked the US to finalize the position paper as a potential basis for future work and also requested the US to develop an Annex for the general Code of Practice for the Prevention of Mycotoxin Contamination in Cereals to provide specific information and recommendations on the prevention of fumonisin contamination in cereals (ALINORM 01/12 para. 106-109).

Fumonisins are incorporated with a specific Annex in the Code of Practice for the prevention of mycotoxin contamination in cereals, which was adopted by the 2003 CAC (last published version in Appendix X of ALINORM 03/12A).

5.04.3 Zearalenone

Reference to JECFA: 53 (1999)
Toxicological guidance: PMTDI 0.0005 mg/kg bw (1999, The total intake of zearalenone and its metabolites (including alpha-zearalanol (zeranol)) should not exceed the PMTDI.)
Residue definition:
Synonyms: (Zearalenone is the most important of a group of related mycotoxins and relevant metabolites. Abbreviation, ZEN. Its metabolite, alpha-zearalanol (zeranol) is used as vererinary drug.)

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
No ML									

Zearalenone (ZEN) is the most important of a group of resorcyclic acid lactone mycotoxins, produced by several species of Fusarium moulds.

It is found worldwide in a number of cereal crops and also in derived products like beer. It has been implicated in numerous incidents of mycotoxicosis in farm animals, especially pigs. ZEN is rapidly metabolized and excreted in animals; residues of this mycotoxin in animal products are probably not significant from a health point of view. A metabolite of ZEN, alpha-zearalanol (zeranol, abbreviated here as ZAL) is, however, relevant relating to its potential use as a veterinary drug. Also beta-zearalanol (taleranol) has hormonal activity. Besides these substances which can be used as anabolic growth promotors, also alpha- and beta-zearalenol (ZEL) and zearalanone (ZAN) are mentioned as possibly occurring metabolites of or co-occurring substances with ZEN.

The PMTDI for ZEN was set by applying a safety factor of 100 from the lowest NOAEL, related to the estrogenic effect in pigs.

ZAL has an ADI of 0,5 ug/kg bw (ref. JECFA 26, 27 and 32)

The situation regarding ZEN has been reviewed in a position paper (last version CX/FAC 00/19). Preliminary intake calculations indicate values well below the PMTDI. It is mentioned however that further action seems required to reduce the levels of ZEN in risk products (especially maize containing products) for especially children with a high intake of these products. The 31st CCFAC (1999) agreed that, recognizing that there were no identified trade problems with ZEN, Codex ML was not necessary for the time being (ALINORM 99/12A, paras 110-112). The standards mentioned here for ZAL in cattle liver and cattle muscle have been established by the CCRVDF because of recognized use of zeranol in cattle; they are relevant for the CCFAC in so far that feed contamination with ZEN can lead to residues of both ZEN and ZAL (and other metabolites) in cattle liver and muscle.
ZEN is incorporated in a specific Annex in the Code of Practice for the prevention of mycotoxin contamination in cereals, which was adopted by the 2003 CAC (last published version in Appendix X of ALINORM 03/12A).

Residues of ZEN and ZAL together in an animal product may be regarded as evidence that the animal feed was contaminated with ZEN. In order to distinguish between contamination of the feed with mycotoxins of the ZEN group or use of ZAL as veterinary drug, it may be necessary to determine the relative proportions of the different residues, e.g. as ZEN + ?- and ?-ZEL against ZAL. A ratio of 5 or more probably indicates only contamination by mycotoxins.

Maximum residue limits have been recommended by Codex for zeranol in cattle muscle and liver.

5.06.1 Patulin

Reference to JECFA: 35 (1989), 44 (1995)
Toxicological guidance PMTDI 0.0004 mg/kg bw (1995,)
Residue definition: patulin

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
JF 0226	Apple juice	50		ML	Adopted		FAC 97-02	The ML also covers apple juice as ingredient in other beverages.	A Code of Practice on the Prevention and Reduction of Patulin Contamination in Apple Juice and Apple Juice Ingredients in Other

Patulin is a low molecular weight hemiacetal lactone mycotoxin produced by species of the genera Aspergillus, Penicillium and Byssochlamys. The major sources of patulin contamination are apples with brown rot and blue mould. Because patulin does not spread much from spoilt tissue, the main human exposure can be expected from processed products, like apple juice and apple sauce, in which the contamination is not visible. Because fermentation destroys patulin, it is not normally present in cider and perry, unless unfermented apple juice has been added after fermentation. Patulin may also be a contaminant of soft fruits, some vegetables, barley, wheat and corn.

The PMTDI was set by applying a safety factor of 100 from the lowest NOAEL of 43 ug/kg bw/day in rats. Potential health problems related to patulin are connected to cytotoxic, immunotoxic, neurotoxic, gastrointestinal and other effects observed in animals. Patulin is mostly eliminated within a few days after ingestion.

The situation regarding patulin was reviewed in a position paper (last version CX/FAC 99/16).

The 36th CCFAC agreed that patulin was removed from the agenda of the CCFAC and to include it on Priority List of Evaluation by JECFA in 4-year time (I.e., 2007). The CCFAC further agreed that, based on the available data, it would make specific request to JECFA as to the type of risk assessment that should be performed (ALINORM 04/27/12, para. 131).

8 Radionuclides

Dose per unit intake factor in Sv/Bq	Representative radionuclides	Level in Bq/kg	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius
10^{-6}	^{241}Am, ^{239}Pu	10	GL	Adopted	CAC/GL 5-1989	FAC	Foods destined for general consumption
10^{-7}	^{90}Sr	100	GL	Adopted	CAC/GL 5-1989	FAC	Foods destined for general consumption
10^{-8}	^{131}I, ^{134}Cs, ^{137}Cs	1000	GL	Adopted	CAC/GL 5-1989	FAC	Foods destined for general consumption
10^{-6}	^{241}Am, ^{239}Pu	1	GL	Adopted	CAC/GL 5-1989	FAC	Milk and infant foods
10^{-7}	^{131}I, ^{90}Sr	100	GL	Adopted	CAC/GL 5-1989	FAC	Milk and infant foods
10^{-8}	^{134}Cs, ^{137}Cs	1000	GL	Adopted	CAC/GL 5-1989	FAC	Milk and infant foods
Radionuclides in foods							
	^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am	1	GL	6		FAC 04	
	^{90}SR, ^{106} Ru, ^{129}I, ^{131}I, ^{235}U	10	GL	6		FAC 04	
	^{35}S, ^{60}Co, ^{89}Sr, ^{103}Ru, ^{134}Cs, ^{137}Cs, ^{144}Ce, ^{192}Ir	100	GL	6		FAC 04	
	^{3}H*, ^{14}C, ^{99}Tc	1000	GL	6		FAC 04	* This represents the most conservative value for tritium

The 35th CCFAC agreed to request the IAEA to prepare a revised version of the Codex Guideline Levels for Radionuclides in Foods for Use in International Trade for consideration at its next session, on the basis of document CX/FAC 03/13 and its discussion (see ALINORM 03/12A, paras 79-84). The 26th CAC approved this proposal as new work.

The 36th CCFAC forwarded the proposed draft revised guideline levels to the CAC for preliminary adoption at Step 5 (ALINORM 04/27/12, paras 199-204). The 27th CAC adopted the proposed draft guideline levels at Step 5 and advanced them to Step 6 as proposed (ALINORM 04/27/41, para. 71).

1.09 Copper

Reference to JECFA: 10 (1966), 14 (1970), 26 (1982)
Toxicological guidance PMTDI 0.05-0.5 mg/kg bw (1982)
Residue definition: Copper, total
Synonyms: Cu

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 150-1985	Salt, food grade	2		ML	Adopted	CS 150-1985, Rev.1-1997	FAC		
JF 0175	Fruit juices	5		ML	Adopted	various CS	FJ	Orange juice; Grapefruit juice; Apple juice; Grape juice; Pineapple juice; Blackcurrant juice; Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice. ML for sum of copper, zinc and iron: 20 mg/kg.	2)
NF 0175	Fruit nectars	5		ML	Adopted	Various CS	FJ	Apricot, peach and pear nectars; Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards. ML for sum of copper, zinc and iron: 20 mg/kg	2)
CS 49-1981	Tomato juice	5		ML	Adopted	CS 49-1981	FJ	ML for sum of copper, zinc and iron: 20 mg/kg	
OR 0172	Edible fats and oils, refined (not covered by other standards)	0.1		ML	Adopted	CS 19-1981, Rev.2-1999	FO	This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	
OC 0172	Edible fats and oils, virgin and cold pressed (not covered by other standards)	0.4		ML	Adopted	CS 19-1981, Rev.2-1999	FO	This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	
CS 32-1981	Margarine	0.1		ML	Adopted	CS 32-1981, Rev.1-1989	FO		
CS 135-1981	Minarine	0.1		ML	Adopted	CS 135-1981, Rev.1-1989	FO		
CS 211-1999	Named animal fats	0.4		ML	Adopted	CS 211-1999	FO	Lard, rendered pork fat, premier jus and edible tallow. This ML is mentioned to be a quality characteristic, for voluntary application	1)

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
								by commercial partners and not for application by governments.	
OR 0172	Named vegetable oils, refined	0.1		ML	Adopted	CS 210-1999	FO-03	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, saflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein. This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	1)
OC 0172	Named vegetable oils, virgin	0.4		ML	Adopted	CS 210-1999	FO-03	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, saflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein. This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	
CS 108-1981	Natural mineral water	1	mg/l	ML	Adopted	CS 108-1981, Rev.1-1997	NMW		

1) The revised Standards for oils and fats contain the following wording for the mentioned contaminant MLs: "The products covered by the provisions of this Standard shall comply with MLs being established by the CAC but in the meantime the following limits will apply."

2) The 3rd session of the ad hoc Intergovernmental task force on fruit and vegetable juices is developing a proposed draft Codex General Standard for fruit juices and nectars (see ALINORM 03/39A, Appendix II). The 2003 CAC adopted this text and advanced it to step 7, noting that some details needed to be further discussed, but with the expectation that at the next session of the Task Force a single standard could be presented for final adoption by the CAC. This new General Standard does not contain contaminant MLs. See the list of relevant Standards for fruit juices and nectars in 1.16, tin.

Copper is a naturally occurring element, which sometimes is naturally found in its metallic form, but usually in the form of insoluble or soluble salts. In the soil and in plants and animal tissues it is normally always present in small quantities. Copper is an essential element, but toxic concentrations could be reached by environmental contamination or by specific conditions in connection with uses of copper compounds.

The 26th CCFAC (1994) expressed the view that the MLs for copper in fats and oils, as contained in document CX/FAC 94/11, were not related to safety, but were proposed as quality characteristics to prevent lipid oxidation. These MLs should therefore not be considered as contaminant MLs in the context of the activities of the CCFAC. The CCFAC decided to leave the establishment of such levels to the CCFO (ALINORM 95/12, para. 86-91) . The MLs have accordingly been characterised as quality characteristics in CS 19-1981. This notion however has not yet been expressed in all relevant commodity standards in which MLs for copper are established.

1.10 Iron

Reference to JECFA: 27 (1983)
Toxicological guidance: PMTDI 0.8 mg/kg bw (1983, Group PMTDI, applies to iron from all sources except for iron oxides used as colouring agent, supplemental iron taken during pregnancy and lactation, and supplemental iron for specific clinical requirements)
Residue definition: Iron, total
Synonyms: Fe

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
CS 48-1981	Apple juice	10		ML	Adopted	CS 48-1981	FJ	ML for sum of copper, zinc and iron: 20 mg/kg.	
JF 0175	Fruit juices	15		ML	Adopted	Various CS	FJ	Orange juice; Grapefruit juice; Pineapple juice; Blackcurrant juice; Fruit juices not covered by other standards; and Concentrated pineapple juice. ML for sum of copper, zinc and iron: 20 mg/kg.	
NF 0175	Fruit nectars	15		ML	Adopted	Various CS	FJ	Apricot, peach and pear nectars Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards. ML for sum of copper, zinc and iron: 20 mg/kg.	
CS 82-1981	Grape juice	15		ML	Adopted	CS 82-1981	FJ	ML for sum of copper, zinc and iron: 17 mg/kg.	
CS 49-1981	Tomato juice	15		ML	Adopted	CS 49-1981	FJ	ML for sum of copper, zinc and iron: 20 mg/kg.	
CS 19-1981	Edible fats and oils, refined (not covered by other standards)	2.5		ML	Adopted	CS 19-1981, Rev.2-1999	FO	This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	
CS 19-1981	Edible fats and oils, virgin and cold pressed	5		ML	Adopted	CS 19-1981, Rev.2-1999	FO	This ML is mentioned to be a quality characteristic, for voluntary application by commercial partners and not for application by governments.	
CS 32-1981	Margarine	1.5		ML	Adopted	CS 32-1981, Rev.1-1989	FO		
CS 135-1981	Minarine	1.5		ML	Adopted	CS 135-1981, Rev.1-1989	FO		
CS 211-1999	Named animal fats	1.5		ML	Adopted	CS 211-1999	FO		

Iron is a naturally occurring element, which is not naturally found in its metallic form, but usually in the form of insoluble or soluble salts. In the soil and in plants and animal tissues it is normally always present in small quantities. Iron is an essential element, but toxic concentrations could be reached by environmental contamination or by specific conditions in connection with uses of iron compounds.

The 26th CCFAC (1994) expressed the view that the MLs for iron in fats and oils, as contained in document CX/FAC 94/11, were not related to safety, but were proposed as quality characteristics to prevent lipid oxidation. These MLs should therefore not be considered as contaminant MLs in the context of the activities of the CCFAC. The CCFAC decided to leave the establishment of such levels to the CCFO (ALINORM 95/12, para. 86-91) . The MLs have accordingly been characterised as quality characteristics in CS 19-1981. This notion however has not yet been expressed in all relevant commodity standards in which MLs for iron are established.

1.18 Zinc

Reference to JECFA: 10 (1966), 26 (1982)
Toxicological guidance PMTDI 0.3-1 mg/kg bw (1982)
Residue definition: Zinc, total
Synonyms: Zn

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Step	Reference	Ref to CC	Notes/Remarks for Codex Alimentarius	Notes for CCFAC
JF 0175	Fruit juices	5		ML	Adopted	Various CS	FJ	Orange juice; Grapefruit juice; Apple juice; Pineapple juice; Blackcurrant juice; Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice. ML for the sum of copper, zinc and iron: 20 mg/kg	
NF 0175	Fruit nectars	5		ML	Adopted	Various CS	FJ	Apricot, peach and pear nectars Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards. ML for the sum of copper, zinc and iron: 20 mg/kg	
CS 82-1981	Grape juice	5		ML	Adopted	CS 82-1981	FJ	ML for the sum of copper, zinc and iron: 17 mg/kg	
CS 49-1981	Tomato juice	5		ML	Adopted	CS 49-1981	FJ	ML for the sum of copper, zinc and iron: 20 mg/kg	

Zinc is a naturally occurring element, which naturally is never found in its metallic form, but which occurs usually in the form of insoluble or soluble salts. In the soil and in plants and animal tissues it is normally always present in small quantities. Zinc is an essential element, but toxic concentrations could be reached by environmental contamination or by specific conditions in connection with uses of zinc compounds.

The MLs for zinc should probably not be considered as contaminant MLs in the context of the activities of the CCFAC. The MLs should accordingly be characterised as quality characteristics. This notion however has not yet been expressed in the commodity standards in which MLs for zinc are established.

INDEX OF CONTAMINANTS IN ALPHABETIC ORDER

EXPLANATORY NOTES

Reference to JECFA:	References to JECFA meeting in which the contaminant was evaluated and the year of that meeting
Toxicological guidance value:	Toxicological advice about the tolerable intake level of the contaminant for humans, expressed in milligrammes (mg) per kg body weight (bw). The year of recommendations and additional explanation are included.
Residue definition:	Definition of the contaminant in the form of which the ML applies or which may or should be analyzed in commodities.
Synonyms:	Symbols, synonyms abbreviations, scientific descriptions and identification codes used to define the contaminant.
Commodity code:	The code for food commodities are according to the food and feed categorization system as contained in Annex V of the GSCTF. The food/feed categorization. The food/feed categorization system also specifies the part of Commodity which should be analysed and to which the ML applies, unless a specific commodity definition is provided as an annex to the ML. For those maximum levels contained in Codex commodity standards, the relevant standard numbers are referred, if the code numbers are not readily available for these commodities.
Suffix:	A note accompanying an ML or GL, used to specify the application or the future revision of the ML, e.g., specific residue definitions can be mentioned by abbreviations here. See also “Qualification of MLs” below.
Type:	Indicates whether the value is Codex maximum level (ML) or Codex guideline level (GL). See also the definitions of these terms in the preamble of the GSCTF.

Qualification of MLs

(*):	At or about the limit of determination
C:	In canned products only

Definitions of some toxicological terms

PMTDI:	*(Provisional Maximum Tolerable Daily Intake)* The endpoint used for contaminants with no cumulative properties. Its value represents permissible human exposure as a result of the natural occurrence of the substance in food and in drinking-water. In the case of trace elements that are both essential nutrients and unavoidable constituents of food, a range is expressed, the lower value representing the level of essentiality and the upper value the PMTDI.
PTWI:	*(Provisional Tolerable Weekly Intake)* An endpoint used for food contaminants such as heavy metals with cumulative properties. Its value represents permissible human weekly exposure to those contaminants unavoidably associated with the consumption of otherwise wholesome and nutritious foods.
PTMI:	*(Provisional Tolerable Monthly Intake)* An endpoint used for a food contaminant with cumulative properties that has a very long half-life in the human body. Its value represents permissible human monthly exposure to a contaminant unavoidably associated with otherwise wholesome and nutritious foods

Ref: http://jecfa.ilsi.org/section1.htm#52

1.03 Arsenic

Reference to JECFA: 5 (1960), 10 (1967), 27 (1983), 33 (1988)
Toxicological guidance PTWI 0.015 mg/kg bw (1988, For inorganic arsenic)
Residue definition: Arsenic: total (As-tot) when not otherwise mentioned; inorganic arsenic (As-in); or other specification
Synonyms: As

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
JF 0175	Fruit juices	0.2		ML	Various CS	Orange juice; Grapefruit juice; Apple juice; Grape juice; Pineapple juice; Blackcurrant juice; Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice
NF 0175	Fruit nectars	0.2		ML	Various CS	Apricot, peach and pear nectars; Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards
CS 49-1981	Tomato juice	0.2		ML	CS 49-1981	
CS 19-1981	Edible fats and oils (not covered by other standards)	0.1		ML	CS 19-1981, Rev.2-1999	
	Fat spread and blended spreads	0.1		ML		
CS 32-1981	Margarine	0.1		ML	CS 32-1981, Rev.1-1989	
CS 135-1981	Minarine	0.1		ML	CS 135-1981, Rev.1-1989	
CS 211-1999	Named animal fats	0.1		ML	CS 211-1999	Lard, rendered pork fat, premier jus and edible tallow.
CS 210-1999	Named vegetable oils	0.1		ML	CS 210-1999	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, safflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein.
CS 33-1981	Olive oils and olive-pomace oils	0.1		ML	CS 33-1981, Rev.2-2003	OC 305, OR 305 and OR 5330
CS 108-1981	Natural mineral water	0.01	mg/l	ML	CS 108-1981, Rev.1-1997	
CS 150-1985	Salt, food grade	0.5		ML	CS 150-1985, Rev.1-1997	

1.06 Cadmium

Reference to JECFA: 16 (1972), 33 (1988), 41 (1993), 55 (2000), 61 (2003), 64 (2005)

Toxicological guidance: PTWI 0.007 mg/kg bw (1988, maintained in 2000 & 2003
The 64th JECFA concluded that the effect of different MLs on overall intake of cadmium would be very small. At the proposed Codex MLs, mean intake of cadmium would be reduced by approximately 1% of the PTWI. The imposition of MLs one level lower would result in potential reductions in intake of cadmium of no more than 6% (wheat grain, potatoes) of the PTWI. At the proposed Codex MLs, so more than 9% of a commodity would be violative (oysters). MLs one level below those proposed would result in approximately 25% of molluscs, potatoes, and other vegetables being violative.)

Residue definition: Cadmium, total

Synonyms: Cd

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
VP 0060	Legume vegetables	0.1		ML	CAC/GL 39-2001	
VD 0070	Pulses	0.1		ML	CAC/GL 39-2001	Excluding soya bean (dry)
GC 0081	Cereal grains, except buckwheat, cañihua and quinoa	0.1		ML	CAC/GL 39-2001	Excluding wheat and rice; and bran and germ
CS 108-1981	Natural mineral water	0.003	mg/l	ML	CS 108-1981, Rev.1-1997	
CS 150-1985	Salt, food grade	0.5		ML	CS 150-1985, Rev.1-1997	

1.11 Lead

Reference to JECFA: 10 (1966), 16 (1972), 22 (1978), 30 (1986), 41 (1993), 53 (1999)
Toxicological guidance PTWI 0.025 mg/kg bw (1986, maintained in 1993 & 1999)
Residue definition: Lead, total
Synonyms: Pb

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
FT 0026	Assorted (sub)tropical fruits, edible peel	0.1		ML	CS 230-2001	
FI 0030	Assorted (sub)tropical fruits, inedible peel	0.1		ML	CS 230-2001	
FB 0018	Berries and other small fruits	0.2		ML	CS 230-2001	
FC 0001	Citrus fruits	0.1		ML	CS 230-2001	
FP 0009	Pome fruits	0.1		ML	CS 230-2001	
FS 0012	Stone fruits	0.1		ML	CS 230-2001	
VB 0040	Brassica vegetables	0.3		ML	CS 230-2001	Excluding kale
VA 0035	Bulb vegetables	0.1		ML	CS 230-2001	
VC 0045	Fruiting vegetables, cucurbits	0.1		ML	CS 230-2001	
VO 0050	Fruiting vegetables, other than cucurbits	0.1		ML	CS 230-2001	Excluding mushrooms.
VL 0053	Leafy vegetables	0.3		ML	CS 230-2001	Including Brassica leafy vegetables but excluding spinach.
VP 0060	Legume vegetables	0.2		ML	CS 230-2001	
VD 0070	Pulses	0.2		ML	CS 230-2001	
VR 0075	Root and tuber vegetables	0.1		ML	CS 230-2001	Including peeled potatoes
CS 79-1981	Jams and jellies	1		ML	CS 79-1981	
CS 160-1987	Mango chutney	1		ML	CS 160-1987	
CS 66-1981	Table olives	1		ML	CS 66-1981	
CS 57-1981	Processed tomato concentrates	1.5		ML	CS 57-1981	
JF 0175	Fruit juices	0.3		ML	CS various	Orange juice; Grapefruit juice; Apple juice; Grape juice; Pineapple juice; Blackcurrant juice; Fruit juices not covered by other standards; and Concentrated pineapple juice
JF 0175	Fruit juices	0.05		ML		Including nectars; Ready to drink
NF 0175	Fruit nectars	0.3		ML	CS various	Apricot, peach and pear nectars Guava nectar; Non-pulpy blackcurrant nectar; Pulpy nectars of certain small fruits; Nectars of certain citrus fruits; and Nectars not covered by other standards
CS 47-1981	Lemon juice	1		ML	CS 47-1981	

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
CS 49-1981	Tomato juice	0.3		ML	CS 49-1981	
GC 0081	Cereal grains, except buckwheat, cañihua and quinoa	0.2		ML	CS 230-2001	
CS 98-1981	Cooked cured chopped meat	0.5		ML	CS 98-1981	
CS 96-1981	Cooked cured ham	0.5		ML	CS 96-1981	
CS 97-1981	Cooked cured pork shoulder	0.5		ML	CS 97-1981	
CS 89-1981	Luncheon meat	0.5		ML	CS 89-1981	
MM 0097	Meat of cattle, pigs and sheep	0.1		ML	CS 230-2001	
PM 0110	Poultry meat	0.1		ML	CS 230-2001	
MO 0097	Edible offal of cattle, pigs and sheep	0.5		ML	CS 230-2001	
PO 0111	Edible offal of poultry	0.5		ML	CS 230-2001	
CS 19-1981	Edible fats and oils (not covered by other standards)	0.1		ML	CS 19-1981, Rev.2-1999	
MF 0097	Fat of cattle, pigs and sheep	0.1		ML	CS 230-2001	
CS 32-1981	Margarine	0.1		ML	CS 32-1981, Rev.1-1989	
CS 135-1981	Minarine	0.1		ML	CS 135-1981, Rev.1-1989	
CS 211-1999	Named animal fats	0.1		ML	CS 211-1999	Lard, rendered pork fat, premier jus and edible tallow.
CS 210-1999	Named vegetable oils	0.1		ML	CS 210-1999	Oils of arachis, babasu, coconut, cottonseed, grapeseed, maize, mustardseed, palm kernel, palm, rapeseed, safflowerseed, sesameseed, soya bean, and sunflowerseed, and palm olein, stearin and superolein.
CS 33-1981	Olive oils and olive pomace oils	0.1		ML	CS 33-1981, Rev.2-2003	OC 305, OR 305 and OR 5330
PF 0111	Poultry fats	0.1		ML	CS 230-2001	
OC 0172	Vegetable oils	0.1		ML	CS 230-2001	Excluding cocoa butter.
OR 0172	Vegetable oils	0.1		ML	CS 230-2001	Excluding cocoa butter.
ML 0107	Milk of cattle, goats and sheep	0.02		ML	CS 230-2001	A concentration factor applies to partially or wholly dehydrated milks.
LS 0107	Secondary milk products	0.02		ML	CS 230-2001	As consumed
CS 108-1981	Natural mineral water	0.01	mg/l	ML	CS 108-1981, Rev.1-1997	

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
	Infant formulae	0.02		ML	CS 230-2001	Ready to use
CS 150-1985	Salt, food grade	2		ML	CS 150-1985, Rev.1-1997	
FF 0269	Wine	0.2		ML	CS 230-2001	

1.13.1 Mercury

Reference to JECFA: 10 (1966), 14 (1970), 16 (1972), 22 (1978)
Toxicological guidance PTWI 0.005 mg/kg bw (1978)
Residue definition: Mercury, Total
Synonyms: Hg

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
CS 108-1981	Natural mineral water	0.001	mg/l	ML	CS 108-1981, Rev.1-1997	
CS 150-1985	Salt, food grade	0.1		ML	CS 150-1985, Rev.1-1997	

1.13.2 Methylmercury

Reference to JECFA: 22 (1978), 33 (1988), 53 (1999), 61 (2003)
Toxicological guidance PTWI 0.0016 mg/kg bw (2003)
Residue definition: Methylmercury

Commodity/Product		Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
Code	**Name**					
WS 0125	Fish	0.5			CAC/GL 7-1991	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
WD 0120	Fish	0.5			CAC/GL 7-1991	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
WF 0115	Fish	0.5			CAC/GL 7-1991	Except predatory fish The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
	Other predatory fish	1			CAC/GL 7-1991	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
WF 0865	Pike	1			CAC/GL 7-1991	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
WS 0131	Shark	1			CAC/GL 7-1991	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade
	Swordfish	1			CAC/GL 7-1991	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.
WS 0132	Tuna	1			CAC/GL 7-1991	The Guideline levels are intended for methylmercury in fresh or processed fish and fish products moving in international trade.

1.16 Tin

Reference to JECFA: 10 (1966), 14 (1970), 15 (1971), 19 (1975), 22 (1978), 26(1982), 33(1988), 55 (2000), 64 (2005)
Toxicological guidance PTWI 14 mg/kg bw (1988, Expressed as Sn; includes tin from food additive uses; maintained in 2000.)
Residue definition: Tin, total (Sn-tot) when not otherwise mentioned; inorganic tin (Sn-in); or other specification
Synonyms: Sn

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
CS 78-1981	Canned fruit cocktail	250	C	ML	CS 78-1981	
CS 15-1981	Canned grapefruit	250	C	ML	CS 15-1981	
CS 68-1981	Canned mandarin oranges	250	C	ML	CS 68-1981	
CS 159-1987	Canned mangoes	250	C	ML	CS 159-1987	
CS 42-1981	Canned pineapple	250	C	ML	CS 42-1981	
CS 60-1981	Canned raspberries	250	C	ML	CS 60-1981	
CS 62-1981	Canned strawberries	200	C	ML	CS 62-1981	
CS 99-1981	Canned tropical fruit salad	250	C	ML	CS 99-1981	
CS 79-1981	Jams (fruit preserves) and jellies	250	C	ML	CS 79-1981	
CS 160-1987	Mango chutney	250	C	ML	CS 160-1987	
CS 56-1981	Canned asparagus	250	C	ML	CS 56-1981	
CS 116-1981	Canned carrots	250	C	ML	CS 116-1981	
CS 16-1981	Canned green and wax beans	250	C	ML	CS 16-1981	
CS 58-1981	Canned green peas	250	C	ML	CS 58-1981	
CS 81-1981	Canned mature processed peas	250	C	ML	CS 81-1981	
CS 55-1981	Canned mushrooms	250	C	ML	CS 55-1981	
CS 144-1985	Canned palmito	250	C	ML	CS 144-1985	
CS 18-1981	Canned sweet corn	250	C	ML	CS 18-1981	
CS 13-1981	Canned tomatoes	250	C	ML	CS 13-1981	
CS 115-1981	Pickled cucumber	250	C	ML	CS 115-1981	
CS 57-1981	Processed tomato concentrates	250	C	ML	CS 57-1981	
JF 0175	Apple, grape, blackcurrant, small fruit juices	150	C	ML	CS various	
CS 44-1981	Apricot, peach and pear nectars	250	C	ML	CS 44-1981	

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
CS 139-1983	Concentrated pineapple juice	250	C	ML	CS 139-1983	With preservatives for manufacturing
JF 0175	Fruit juices	200	C	ML	CS 164-1989	Lemon juice; Fruit juices not covered by other standards; and Concentrated pineapple juice.
NF 0175	Fruit nectars	200	C	ML	various	Pulpy nectars of certain small fruits; and Nectars not covered by other standards.
JF 0203	Grapefruit juice	250	C	ML	CS 46-1981	
CS 148-1981	Guava nectar	250	C	ML	CS 148-1981	
CS 47-1981	Lemon juice	250	C	ML	CS 47-1981	
CS 149-1981	Liquid pulpy mango products	250	C	ML	CS 149-1981	
GL 11-1991	Mixed fruit juices	200	C	ML	GL 11-1991	
GL 12-1991	Mixed fruit nectars	200	C	ML	GL 12-1991	
CS 134-1981	Nectars of certain citrus fruits	250	C	ML	CS 134-1981	
CS 101-1981	Non-pulpy blackcurrant nectar	150	C	ML	CS 101-1981	
JF 0004	Orange juice	250	C	ML	CS 45-1981	
JF 0341	Pineapple juice	250	C	ML	CS 85-1981	
CS 122-1981	Pulpy nectars of certain small fruits	150	C	ML	CS 122-1981	
CS 49-1981	Tomato juice	250	C	ML	CS 49-1981	
CS 145-1985	Canned chestnuts and chestnut puree	250	C	ML	CS 145-1985	
CS 98-1981	Cooked cured chopped meat	200	C	ML	CS 98-1981, Rev.1-1991	For products in tinplate containers
CS 98-1981	Cooked cured chopped meat	50		ML	CS 98-1981, Rev.1-1991	For products in other containers
CS 96-1981	Cooked cured ham	50		ML	CS 96-1981, Rev.1-1991	For products in other containers
CS 96-1981	Cooked cured ham	200	C	ML	CS 96-1981, Rev.1-1991	For products in tinplate containers
CS 97-1981	Cooked cured pork shoulder	200	C	ML	CS 97-1981, Rev.1-1991	For products in tinplate containers
CS 97-1981	Cooked cured pork shoulder	50		ML	CS 97-1981, Rev.1-1991	For products in other containers
CS 88-1981	Corned beef	50		ML	CS 88-1981, Rev.1-1991	For products in other containers
CS 88-1981	Corned beef	200	C	ML	CS 88-1981, Rev.1-1991	For products in tinplate containers
CS 89-1981	Luncheon meat	50		ML	CS 89-1981	For products in other containers
CS 89-1981	Luncheon meat	200	C	ML	CS 89-1981	For products in tinplate containers

3.01.5 Vinyl chloride monomer

Reference to JECFA: 28 (1984)
Toxicological guidance: Provisional Acceptance (1984, the use of food-contact materials from which vinyl chloride may migrate is provisionally accepted, on condition that the amount of the substance migrating into food is reduced to the lowest level technologically attainable)
Residue definition: Vinylchloride monomer
Synonyms: Monochloroethene, chloroethylene; abbreviation VC or VCM

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
	Food	0.01		GL	CAC/GL 6-1991	The GL in food packaging material is 1.0 mg/kg.

4.09.1 Acrylonitrile

Reference to JECFA: 28 (1984)

Toxicological guidance: Provisional Acceptance (1984, the use of food-contact materials from which acrylonitrile may migrate is provisionally accepted on condition that the amount of the substance migrating into food is reduced to the lowest level technologically attainable.)

Residue definition: Acrylonitrile (monomer)

Synonyms: 2-Propenenitrile; vinyl cyanide (VCN); cyanoethylene; abbreviations, AN, CAN.

Commodity/Product Code	Name	Level mg/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
	Food	0.02		GL	CAC/GL 6-1991	

5.01.1 Aflatoxins, Total

Reference to JECFA: 31 (1987), 46 (1996), 49 (1997)
Toxicological guidance Carcinogenic potency estimates for aflatoxins B, G, M (1997, Intake should be reduced to levels as low as reasonably possible.)
Residue definition: Aflatoxins total (B1 +B2 + G1 + G2)
Synonyms: Abbreviations, AFB, AFG, with numbers, to designate specific compounds

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
SO 0703	Peanuts, raw	15		ML	CS 209-1999, Rev.1-2001	

5.01.2 Aflatoxin M1

Reference to JECFA: 56 (2001)

Toxicological guidance: Cancer potency estimates at specified residue levels (2001, Using worst-case assumptions, the additional risks for liver cancer predicted with use of proposed maximum levels of aflatoxin M1 of 0.05 and 0.5 µg/kg are very small. The potency of aflatoxin M1 appears to be so low in HBsAg- individuals that a carcinogenic effect of M1 intake in those who consume large quantities of milk and milk products in comparison with non-consumers of these products would be impossible to demonstrate. Hepatitis B virus carriers might benefit from a reduction in the aflatoxin concentration in their diet, and the reduction might also offer some protection in hepatitis C virus carriers.)

Residue definition: Aflatoxin M1

Synonyms: AFM1

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
ML 0106	Milk	0.5		ML	CS 232-2001	

5.06.1 Patulin

Reference to JECFA: 35 (1989), 44 (1995)
Toxicological guidance PMTDI 0.0004 mg/kg bw (1995)
Residue definition: patulin

Commodity/Product Code	Name	Level ug/kg	Suffix	Type	Reference	Notes/Remarks for Codex Alimentarius
JF 0226	Apple juice	50		ML		The ML also covers apple juice as ingredient in other beverages.

8 Radionuclides

Dose per unit intake factor in Sv/Bq	Representative radionuclides	Level in Bq/kg	Type	Step	Reference	Notes/Remarks for Codex Alimentarius
10^{-6}	241-Am, 239-Pu	10	GL	Adopted	CAC/GL 5-1989	Foods destined for general consumption
10^{-7}	90-Sr	100	GL	Adopted	CAC/GL 5-1989	Foods destined for general consumption
10^{-8}	131-I, 134-Cs, 137-Cs	1000	GL	Adopted	CAC/GL 5-1989	Foods destined for general consumption
10^{-6}	241-Am, 239-Pu	1	GL	Adopted	CAC/GL 5-1989	Milk and infant foods
10^{-7}	131-I, 90-Sr	100	GL	Adopted	CAC/GL 5-1989	Milk and infant foods
10^{-8}	134-Cs, 137-Cs	1000	GL	Adopted	CAC/GL 5-1989	Milk and infant foods