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Agenda Item 10 **CX/CF 11/5/15**

February 2011

JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON CONTAMINANTS IN FOODS
5th Session
The Hague, The Netherlands, 21 – 25 March 2011

Prepared by the electronic Working Group led by the United States of America and the Netherlands

ENDORSEMENT OF PROVISIONS FOR HEALTH-RELATED LIMITS FOR CERTAIN SUBSTANCES IN THE STANDARD FOR NATURAL MINERAL WATERS

BACKGROUND

1. The 4th Session of the Codex Committee on Contaminants in Food (CCCF) agreed to establish an Electronic Working Group, led by the United States of America with the assistance of The Netherlands, with the following terms of reference:

i. Develop criteria to differentiate between safety and quality parameters;

ii. Based on these criteria, determine which of the compounds in section 3.2 of the Codex Standard for Natural Mineral Waters[1] (CSNMW) are also safety parameters;

iii. For compounds listed in sections 3.2.17 to 3.2.20 determine more appropriate Maximum Levels (MLs) for these substances or specific identified substances within these groups; and

iv. Consider whether all safety parameters identified in section 3.2 should be integrated into the General Standard for Contaminants and Toxins in Food and Feed[2] (GSCTFF) or retained in the Standard for Natural Mineral Waters.

2. The United States prepared a draft with the assistance of the Netherlands. Comments on the draft were received from Argentina, Australia, the European Union (EU), France, the International Council of Beverages Associations (ICBA), the International Council of Bottled Water Associations (ICBWA), Lebanon, and Spain.

CRITERIA TO DIFFERENTIATE BETWEEN SAFETY AND QUALITY PARAMETERS

Safety Parameters

3. The first step in developing criteria to differentiate between safety and quality parameters for natural mineral waters is to develop definitions of these terms. The *Recommended International Code of Practice – General Principles of Food Hygiene Codex* defines food safety as: "Assurance that the food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use." Based on this definition, the working group recommends defining "safety parameter" as follows:

> ***Safety parameter***: A parameter that is set, along with a parametric value such as a maximum level, to regulate contaminants to assure that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

[1] CODEX STAN 108-1981
[2] CODEX STAN 193-1995

Quality Parameters

4. Food quality has a more elusive meaning (*1*). It has been variously defined as "the quality characteristics of food that is acceptable to consumers [including external factors such as appearance, texture, and flavours, and internal standards such as chemical, physical, and microbial attributes]" (*2*); the requirements necessary to satisfy the needs and expectations of the consumer, including food safety (*3*); and "the totality of characteristics of an entity that bears on its ability to satisfy stated and implied needs" (*4*). The GSCTFF does not define quality, but contains the concept that a contaminant can have food and feed quality significance, but no public health significance.

5. The Codex Procedural Manual (19th Edition) states that "quality factors . . . are essential for the designation, definition or composition of the product concerned [and] could include the quality of the raw material, with the object of protecting the health of the consumer, provisions on taste, odour, colour and texture which may be apprehended by the senses, and basic quality criteria for the finished products, with the object of preventing fraud."

6. One useful model for defining "quality parameter" in relation to natural mineral waters can be found in drinking water (tap water) standards. The following bullets provide examples of four approaches taken by standard-setting organizations to quality-related parameters for drinking water:

i. The World Health Organization (WHO) has established health-based guideline values for chemical contaminants that normally represent the concentration of a chemical constituent that does not result in any significant risk to health over a lifetime of consumption (*5*). WHO also identifies chemicals that have effects on acceptability, i.e., substances of health concern that have effects on the acceptability of drinking water (e.g., taste, odor) at concentrations significantly lower than those of health concern.

ii. The United States Environmental Protection Agency (U.S. EPA) differentiates between National Primary Drinking Water Regulations, which set "maximum contaminant levels" for drinking water contaminants that present a risk to human health, and National Secondary Drinking Water Regulations, which set non-enforceable "secondary maximum contaminant levels" for contaminants that may cause cosmetic effects (such as skin or tooth discoloration), aesthetic effects (such as taste, odor, or color), or technical effects (such as staining) in drinking water (*6,7*).

iii. The European Union (EU) differentiates between "parameters" and "indicator parameters" in Directive 98/83/EC on the quality of water intended for human consumption. The parameters category includes chemicals such as arsenic and antimony. The indicator parameters category includes chemicals such as iron and manganese, as well as color and odor (*8*).

iv. The Australian Government National Health and Medical Research Council (NHMRC) differentiates between health-related guideline values, which are based on risk to the health of consumers, and aesthetic guideline values, which are associated with the acceptability of water to the consumer, e.g., taste and odour (*9*).

7. These examples show that drinking water standards differentiate between parameters that affect health and parameters that affect water acceptability to consumers, while also potentially affecting health. Based on these examples and the discussion of quality in paras. 4 and 5, part of the working group recommended defining "quality parameter" as follows:

> ***Quality parameter*:** A parameter that is established to regulate contaminants (1) that cause adverse cosmetic effects or aesthetic effects, but not adverse public health effects, at concentrations found in water, or (2) that can potentially cause adverse public health effects, but have effects on acceptability of water by consumers at concentrations significantly lower than those that cause adverse health effects. A quality parameter may include a parametric value, such as an ML or other guideline value.

8. Another part of the working group felt that it was not appropriate to use drinking water standards as a model for defining quality parameters. According to this view, the definition of quality parameter should take into account the requirement in the CSNMW that natural mineral water has to be "free from contamination at the source."[3] An alternate definition recommended by one member of the working group is as follows:

> ***Quality parameter*:** A parameter that is established to regulate contaminants (1) that cause adverse cosmetic effects or aesthetic effects, but not adverse public health effects, at concentrations found in water, or (2) that can potentially cause adverse public health effects, but have effects on acceptability of water by consumers or can compromise the specific characteristics of natural mineral water concerning the purity at source at concentrations significantly lower than those that cause adverse health effects. A quality parameter may include a parametric value, such as an ML or other guideline value.

DETERMINE WHICH COMPOUNDS IN SECTION 3.2 OF THE CODEX STANDARD FOR NATURAL MINERAL WATERS ARE ALSO SAFETY PARAMETERS

9. Table 1 in Annex 1 lists substances found in Section 3.2.1 to Section 3.2.16 of the CSNMW. The table also lists comparable standards adopted by the EU, the WHO, the Australian NHMRC, and the U.S. EPA for drinking water, and indicates standards designated as provisional, secondary, or related to consumer acceptability by the respective standard-setting organizations.

10. Based on the parametric values listed in the CSNMW (see Table 1 in Annex 1 of this document) and the criteria for safety and quality parameters in paras. 3 and 7, respectively, the following parameters were identified as safety parameters: antimony, arsenic, barium, borate (boron), cadmium, chromium, cyanide, fluoride, lead, manganese, mercury, nickel, nitrate, nitrite, and selenium.

11. Copper. The CSNMW includes a parametric value for copper of 1.0 mg/l under health-related limits for certain substances (see Table 1 in Annex 1 of this document). However, copper is listed in the GSCTFF as a contaminant that has only food and feed quality significance, but no public health significance. Both the EU and WHO have a health-based guideline value of 2.0 mg/l for copper in drinking water. The Australian NHMRC has a health-based guideline of 2.0 mg/l and an aesthetic guideline of 1.0 mg/l. The U.S. EPA has an action level of 1.3 mg/l based on health effects, and a secondary maximum contaminant level of 1.0 mg/l for quality effects (metallic taste and staining). Based on the criteria established in para. 7 for a quality parameter, specifically recognizing that a quality parameter may have health effects above a certain level, the working group recommends that copper, as listed in the CSNMW with a parametric value of 1.0 mg/l, be identified as a quality parameter.

DETERMINE APPROPRIATE MAXIMUM LEVELS (MLs) FOR SUBSTANCES OR SPECIFIC IDENTIFIED SUBSTANCES IN SECTIONS 3.2.17 TO 3.2.20 OF THE CSNMW

12. As a reminder, at the 4th Session of the CCCF in April 2010, the Committee considered whether it was appropriate to fully endorse sections 3.2.17 (surface active agents), 3.2.18 (pesticides and PCBs), 3.2.19 (mineral oil) and 3.2.20 (polynuclear aromatic hydrocarbons, PAH) in the CSNMW, given that the Codex Committee on Methods of Analysis and Sampling (CCMAS) had identified methods of analysis for these compounds. The CSNMW states that each of these substances shall be below the limit of quantification (LOQ) when tested, in accordance with the methods prescribed in relevant Codex texts on methods of analysis and sampling.

[3] The relevant text from the definition of natural mineral water in Section 2.1 of the CSNMW (CODEX STAN 108) is as follows:
Natural mineral water is clearly distinguishable from ordinary drinking water because:
(b) it is obtained directly from natural or drilled sources from underground water bearing strata for which all possible precautions should be taken within the protected parameters to avoid any pollution of, or external influence on, the chemical and physical qualities of natural mineral water; [and]
(d) it is collected under conditions which guarantee the original microbiological purity and chemical composition of essential components.

13. Some delegations at the 4th Session did not support the endorsement of sections 3.2.17 to 3.2.20, noting that section 3.2 states that substances in 3.2.17 to 3.2.20 shall be below the LOQ when tested with relevant ISO methods; that the methods identified by CCMAS did not provide the LOQ, but cited minimum applicable ranges which were very low levels; and that this had the unintended effect of setting de facto MLs which were not consistent with much higher guideline values established by WHO for these chemicals in drinking water; and therefore questioned the appropriateness of meeting these levels in natural mineral waters.

14. It was clarified that the Codex Committee on Natural Mineral Waters had been adjourned *sine die* and that it was within the remit of CCCF to consider the proposed MLs in the CSNMW, to determine whether they were safety parameters, and, if so, to make proposals on more appropriate MLs.

15. As noted in para. 6, drinking water (tap water) standards can serve as a useful model for natural mineral waters, particularly for establishing safety parameters. Therefore, this section provides examples of drinking water standards for the specified substances from the WHO, the U.S. EPA, the EU, and the Australian NHMRC as a basis for identifying more appropriate MLs. Also, where WHO has established guideline values in drinking water, the general approach taken in this section was to recommend adoption of WHO values, because WHO values are international recommendations. For balance, this section also presents a different approach consistent with the alternate definition of quality parameters in para. 8.

Surface-active agents

16. Surface-active agents, also called surfactants, are a group of substances that include soaps, detergents, foaming agents, and other substances (*10*). The WHO Guidelines for Drinking-Water Quality, 3rd Ed., does not have a guideline value for surface-active agents in drinking water, but notes that the concentration of detergents in drinking-water should not be allowed to reach levels giving rise to either foaming or taste problems. The U.S. EPA established a non-enforceable secondary maximum contaminant level for "foaming agents" of 0.5 mg/l, and notes that foaming is usually caused by detergents and similar substances and is commonly associated with an off-taste described as oily, fishy, or perfume-like. The EU and the Australian NHMRC have not established parametric values for surfactants.

17. Based on the information in para. 16, the working group recommends that surface-active agents be considered a quality parameter.

18. The method endorsed by CCMAS[4] for surface-active agents is ISO Method 16265:2009, which measures anionic surfactants and other methylene-blue active substances. CCMAS did not report an LOQ for this method, but the limit of detection (LOD) is 0.05 mg/l. The LOD is tenfold lower than the EPA secondary maximum contaminant level of 0.5 mg/l. Furthermore, the WHO, the U.S. EPA, the EU, and the Australian NHMRC have not established health-related standards for surface-active agents in drinking water. Part of the working group therefore recommends the following options for surface-active agents:

i. Establish a new section in the CSNMW on quality parameters and move the parameter for surface-active agents to the new section. Do not establish a parametric value, but recognize that no odor, taste, or foaming associated with surface-active agents should be present in NMWs, which is consistent with the WHO recommendation for detergents in drinking water.

ii. Establish a new section on quality parameters in the CSNMW and move the parameter for surface-active agents to the new section. Establish a parametric value of 0.5 mg/l (based on the U.S. EPA secondary value), while also recognizing that no odor, taste, or foaming associated with surface-active agents should be present in NMWs.

iii. Remove this parameter from the CSNMW, given that WHO, the EU, US EPA, and Australian NHMRC have not established health-related standards for surface-active agents.

19. Another part of the working group felt an ML should be set for surface-active agents that should be stricter than for drinking water or as low as practically feasible. They suggested an ML equivalent to the limit of detection of 0.05 mg/l in ISO Method 16265:2009.

[4] ALINORM 10/33/23. This reference applies to all the CCMAS methods.

Pesticides and PCBs

Pesticides

20. The terms of reference in the Codex Procedural Manual (19th Edition) specify that the Codex Committee on Pesticide Residues (CCPR) establish MLs for pesticide residues in specific food items or in groups of food. Therefore, the working group recommends that CCCF recommendations on pesticides be referred to CCPR for consideration.

21. The WHO, the U.S. EPA, and the Australian NHMRC have established guideline values or maximum contaminant levels for pesticides in drinking water as shown in Table 2 in Annex 1. The EU drinking water standards do not specify pesticides generally, but require monitoring of pesticides likely to be present in a given water supply. The EU has a parametric value of 0.00010 mg/l for each pesticide, with the exception of aldrin, dieldrin, heptachlor, and heptachlor epoxide, for which the parametric values are 0.000030 mg/l, and the summed concentrations of all pesticides may not exceed 0.0005 mg/L.

22. Based on the information in para. 21, part of the working group recommends that pesticides be considered a safety parameter.

23. CCMAS endorsed the following methods and applicable ranges for pesticides: AOAC Official Method 990.06 [5] (15 ng/l) and ISO 6468 (10 ng/1). The pesticides detected by these methods are shown in Table 3 in Annex 1. Table 2 in Annex 1 also shows how the pesticides detected by AOAC 990.06 and ISO 6468 correspond to pesticides for which WHO and the U.S. EPA have established guideline values and maximum contaminant levels, respectively. The CCMAS-endorsed methods detect less than half of the pesticides for which guideline values have been established by WHO.

24. Based on the information in paras. 20-23, part of the working group therefore recommends that CCCF recommend to CCPR that WHO pesticide parameters and guideline values be adopted as parameters and parametric values in the CSNMW.

25. Another part of the working group felt that pesticides were a quality parameter in natural mineral waters, and that CCCF recommendations therefore should not be referred to CCPR. This part of the working group recommended the following options:

i. Set any ML at the lowest level practically feasible.

ii. Set a maximum value for total pesticides at 0.00025 mg/l, representing 50% of the ML for total pesticides applicable to drinking water under EU regulations.

PCBs

26. Polychlorinated biphenyls (PCBs) are an odorless family of stable organic chemicals that were previously widely used as flame retardants, dielectric fluids, and hydraulic fluids. The WHO and the EU have not established parameters for PCBs in drinking water. The U.S. EPA has established a maximum contaminant level of 0.0005 mg/l for PCBs (as decachlorobiphenyl).

27. CCMAS endorsed methods AOAC 990.06 [6] and ISO 6468 for PCBs, and identified applicable ranges of >10 ng/l (0.00001 mg/l) and > 15 ng/l (0.000015 mg/l). The ISO 6468 method detects PCBs 28, 52, 101, 138, 153, 180, and 194. (No PCBs are listed in AOAC 990.06).

28. Based on the information in para. 26, i.e., that the U.S. EPA has established a maximum contaminant level for PCBs, the working group recommends that PCBs be considered a safety parameter.

29. The working group therefore recommends the following options for PCBs:

i. Remove the currently specified parameter for PCBs from the CSNMW because WHO has not established any guideline values for PCBs in drinking water, and because WHO guideline values are international recommendations.

ii. Establish a parametric value based on the safety-based U.S. EPA value of 0.0005 mg/l for PCBs (as decachlorobiphenyl).

[5] ALINORM 10/33/23 states method 990.16, but the intended method is 990.06.
[6] ALINORM 10/33/23 states method 990.16, but the intended method is 990.06.

30. Another part of the working group felt that PCBs were a quality parameter in natural mineral waters. This part of the working group recommended the following options:

i. Set any ML at the lowest level practically feasible.

ii. Select a limited number of PCBs, following the approach of EC Regulation 1881/2006, "Setting maximum levels for certain contaminants in foodstuffs," and set a total limit of 0.0001 mg/l for the selected PCBs.

Mineral oil

31. Mineral oil is a mixture of liquid hydrocarbons obtained from petroleum. Mineral oil may be present as a contaminant in foods, but it also has uses as a food additive, laxative, lubricant, ointment base, and emollient (*11*). Mineral oils are of variable composition depending on the boiling point of the hydrocarbon fractions. For food purposes, mineral oils usually consist of liquid petrolatum or liquid paraffin, consisting essentially of n-alkanes and some cyclic paraffins (*12*).

32. For use of mineral oil as a food additive, the Codex General Standard for Food Additives[7] (GSFA) includes MLs for high-viscosity and medium- to low-viscosity (Class I) mineral oil in 12 food categories, ranging from 800 mg/kg to 20,000 mg/kg.

33. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) has established the following acceptable daily intakes (ADIs) for mineral oil: high viscosity, 0-20 mg/kg bw, and medium- to low-viscosity (Class I), 0-10 mg/kg bw. JECFA has also established a temporary ADI of 0-0.01 mg/kg bw for Class II and Class III medium- to low-viscosity mineral oils, which is scheduled for reevaluation pending completion of new research studies (*13*).

34. The WHO has not established a health-based guideline value for mineral oil in drinking water. However, WHO's Guidelines for Drinking Water Quality, 3rd Ed., lists petroleum oils (described as low molecular weight hydrocarbons including alkylbenzenes such as trimethylbenzene) as a contaminant that can affect acceptability (i.e., a quality factor) because of low odour thresholds. The U.S. EPA, the EU, and the Australian NHMRC have not established parametric values for mineral oils.

35. Based on the information in paras. 31-34, the working group recommends that mineral oil be considered as a quality parameter in natural mineral water.

36. CCMAS endorsed method ISO 9377-2:2000 for measurement of mineral oils in natural mineral water. This method detects long-chain or branched aliphatic, alicyclic, aromatic or alkyl-substituted aromatic hydrocarbons that are extractable with a hydrocarbon solvent (with a boiling point between 36 °C and 69 °C), not adsorbed on Florisil, and that may be chromatographed with retention times between those of *n*-decane (C10H22) and *n*-tetracontane (C40H82). The applicable range reported by CCMAS was > 0.1 mg/l. There are no comparable parametric values from the WHO, the U.S. EPA, or the EU to compare with this range.

37. Based on the information in paras. 31-36, part of the working group recommended the following options for mineral oils:

i. Remove the parameter from the NMW standard, given that the WHO, the U.S. EPA, and the EU have not established parameters for mineral oil.

ii. Establish a new section in the CSNMW on quality parameters and move the parameter for mineral oils to the new section. Do not establish a parametric value, but recognize that no odor or taste associated with mineral oil should be present in NMWs.

38. Another part of the working group recommended setting an ML for mineral oils equivalent to the minimum range reported in ISO 9377-2:2000, i.e., 0.1 mg/l.

[7] CODEX STAN 192-1995

Polynuclear aromatic hydrocarbons

39. Polynuclear aromatic hydrocarbons (or polycyclic aromatic hydrocarbons) (PAHs) constitute a family of organic compounds containing two or more fused aromatic rings, which result primarily from incomplete combustion processes (5). The WHO has established a guideline value of 0.7 µg/l for the PAH benzo(a)pyrene in drinking water. The U.S. EPA has established a maximum contaminant level for benzo(a)pyrene in drinking water of 0.2 µg/l. The Australian NHMRC has established a guideline value for benzo(a)pyrene in drinking water of 0.01 µg/l. The EU has established parametric values of 0.010 µg/L for benzo(a)pyrene and 0.10 µg/l for the sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, and indeno(1,2,3-cd)pyrene in drinking water. Based on this information, the working group recommends that PAHs be considered a safety parameter.

40. The methods endorsed by CCMAS for PAHs are ISO Methods 17993:2004, 7981-1:2005, and 7981-2:2005. CCMAS did not identify LOQs for these methods, but reported applicable ranges of 0.005 µg/l (17993:2004), 0.04 µg/l (7981-1:2005), and 0.005 µg/l (7981-2:2005).[8]

41. Based on the information in paras. 39-40, part of the working group recommends that CCCF adopt the WHO guideline value, 0.7 µg/l benzo(a)pyrene, in place of the currently specified parametric value in the CSNMW, i.e., "below the limit of quantification," or below 0.005 µg/l in accordance with the methods endorsed by CCMAS, because WHO has established a guideline value for PAHs as benzo(a)pyrene at 0.7 µg/l in drinking water, and because the WHO guideline value is an international recommendation.

42. Another part of the working group felt that PAHs were a quality parameter in natural mineral waters. This part of the working group recommended the following options:

i. Set any ML at the lowest level practically feasible.

ii. Establish indicators based on benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, and indeno(1,2,3-cd)pyrene (the parameters regulated by the EU in drinking water). Set a maximum value for total PAHs of 0.05 µg/l and a value for individual PAHs of 0.01 µg/l.

INTEGRATION OF SAFETY PARAMETERS IN SECTION 3.2 INTO THE GSCTFF

43. The Codex Procedural Manual (19th Edition) states that Commodity committees shall examine the GSCTFF (*CODEX STAN 193-1995*) with a view towards incorporating a reference to the General Standard. However, if a Commodity Committee considers that a general reference to the GSCTFF does not serve its purpose, the Manual provides for Committees to provide justification to the CCCF for why a general reference to the GSCTFF would not be appropriate for products concerned.

44. The following parameters were identified as safety parameters by part of the working group: inorganic chemicals in 3.2.1-3.2.16, with the exception of copper (3.2.7); pesticides, PCBs, and PAHs. The inorganic chemicals, PCBs, and PAHs fall under the scope of the GSCTFF. However, the parametric levels established or proposed for these chemicals would have to be evaluated to determine whether they meet the criteria for MLs elaborated in the GSCTFF, since they come from either the CSNMW or other sources, e.g., the WHO standards for drinking water. Under the GSCTFF, the following criteria for the establishment of MLs in food are to be met:

i. Maximum levels should be set only for those contaminants that present both a significant risk to public health and a known or expected problem in international trade.

ii. Maximum levels shall only be set for those foods in which the contaminant may be found in amounts that are significant for the total exposure of the consumer. They should be set in such a way that the consumer is adequately protected.

45. Although they have been identified as safety parameters, pesticide residues fall under the scope of the CCPR and therefore would not be included in the GSCTFF.

[8] The concentrations specified in the methods are as follows: ISO 7981-2:2005 specifies the determination of six PAH (fluoranthene, benzo[b]fluoranthene, benzo[a]pyrene, benzo[k]fluoranthene, indeno[1,2,3-cd]pyrene, and benzo[ghi]perylene) in drinking, mineral and table waters, and ground and surface waters in mass concentrations above 0.005 µg/l. ISO 7981-1:2005 specifies a working range of 0.04 µg/l to 0.24 µg/l for the sum of the same six PAH. ISO 17993 specifies the determination of 15 PAH in drinking and ground water in mass concentrations greater than 0,005 µg/l (for each single compound).

46. If safety parameters for inorganic chemicals, PCBs, and PAHs are moved to the GSCTFF (and pesticide parameters are moved under Codex pesticide standards), these safety parameters will be separated from quality parameters retained in the CSNMW. The CSNMW is a resource for producers of NMWs. Because of the large number of parameters associated with NMWs, the CSNMW may be more useful to producers, especially new producers, when those parameters are consolidated in one place, rather than potentially appearing in multiple locations in the GSCTFF, the CSNMW, and Codex pesticide standards.

47. For these reasons, the working group recommends to CCCF that safety and quality parameters should be maintained in the CSNMW, with safety parameters listed separately from quality parameters.

SUMMARY AND RECOMMENDATIONS

48. In summary, the Working Group makes the following conclusions and recommendations:

i. Definitions have been proposed for safety and quality parameters.

ii. The compounds in Section 3.2 of the CSNMW were defined as safety parameters, with the exception of copper, which was identified as a quality parameter.

iii. For section 3.2.17-3.2.20 of the CSNMW, part of the working group identified PAHs, PCBs, and pesticides as safety parameters, identified mineral oil and surface-active agents as quality parameters, and recommended MLs for safety parameters based on WHO values, where available, or alternate options where appropriate. For pesticides, this part of the working group recommended referral of CCCF recommendations on pesticides to CCPR.

iv. Also, for section 3.2.17-3.2.20 of the CSNMW, another part of the working group identified all the parameters as quality parameters, according to the definition in para. 8. They recommended MLs as low as feasible or based on detection limits or a modification of EU limits for drinking water. They recommended against referral of CCCF recommendations on pesticides to CCPR.

v. The working group recommended that safety and quality parameters be maintained in the CSNMW, with safety parameters listed separately from quality parameters.

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ANNEX 1

Table 1: Substances found in Section 3.2.1 to Section 3.2.16 of the CSNMW and comparable WHO guideline values, U.S. EPA, EU, and Australian standards

Parameter	**Standard (mg/l)**				
	CSNMW	**WHO***	**US EPA**	**Australian NHMRC**	**EU**
Antimony	0.005	0.02	0.006	0.003	0.005
Arsenic	0.01	0.01[a]	0.010	0.007	0.01
Barium	0.7	0.7	2.0	0.7	---
Borate	5, calculated as B	0.5[b,c] (boron)	---	4 (boron)	1.00 (boron)
Cadmium	0.003	0.003	0.005	0.002	0.005
Chromium	0.05, calculated as total Cr	0.05[a]	0.1	0.05, as Cr(VI)	0.05
Copper	1	2	1.3[d]/1.0[e]	2 [g]/1.0[h]	2
Cyanide	0.07	0.07	0.2	0.08	
Fluoride	See section 6.3.2	1.5	4.0	1.5	1.5
Lead	0.01	0.01	0.015[d]	0.01	0.01
Manganese	0.4	0.4[f]	0.05[e]	0.5[g]/0.1[h]	0.05[i]
Mercury	0.001	0.006	0.002	0.001	0.001
Nickel	0.02	0.07	---	0.02	0.02
Nitrate	50, calculated as nitrate	50	10	50, calculated as nitrate	50
Nitrite	0.1, as nitrite	0.2[a] long term 3 short term	1	3.0, as nitrite	0.50
Selenium	0.01	0.01	0.05	0.01	0.01

(a) WHO provisional guideline value (P), as there is evidence of a hazard, but the available information on health effects is limited.

(b) WHO provisional guideline value (T) because calculated guideline value is below the level that can be achieved through practical treatment methods, source protection, etc.

(c) WHO is planning to revise the guideline value for boron to 2.4 mg/L in the Guidelines for Drinking-water Quality, 4th Edition, in 2011 (http://www.who.int/water_sanitation_health/dwq/chemicals/boron/en/).

(d) U.S. EPA National Primary Drinking Water Regulation treatment technique action level

(e) U.S. EPA National Secondary Drinking Water Regulation secondary maximum contaminant level to address secondary (e.g., aesthetic or technical effects)

(f) WHO guideline value (C); concentrations of the substance at or below the health-based guideline value may affect the appearance, taste or odour of the water, leading to consumer complaints.

(g) Australian NHMRC guideline for health considerations

(h) Australian NHMRC guideline for aesthetic considerations

(i) EU indicator parameter

ANNEX 1

Table 2: WHO, U.S. EPA and Australian NHMRC drinking water levels for pesticides in drinking water, and pesticides detected by AOAC 990.06 and ISO 6468[a]

Pesticide	Drinking water levels (mg/l)			Detection by CCMAS endorsed methods	
	WHO	U.S. EPA	Australian NHMRC	AOAC 990.06	ISO 6468
Alachlor	0.02	0.002	---	---	---
Aldicarb	0.01	---	0.001[d,e]	---	---
Aldrin and dieldrin	0.00003	---	0.00001[d] 0.0003[e]	Yes	Yes
Atrazine	0.002	0.003	0.0001[d] 0.04[e]	---	---
Carbofuran	0.007	0.04	0.005[d] 0.01[e]	---	---
Chlordane	0.0002	0.002	0.00001[d] 0.001[e]	Yes	
Chlorotoluron	0.03	---	---	---	---
Chlorpyrifos	0.03	---	0.01[e]	---	---
Cyanazine	0.0006	---	---	---	---
Dalapon	---	0.2	---	---	---
2,4-D (2,4-dichlorophenoxyacetic acid)	0.03	0.07	0.0001[d] 0.03[e]	---	---
2,4-DB	0.09	---	---	---	---
(DDT and metabolites)	0.001	---	0.00006[d] 0.02[e]	Yes	Yes
1,2-Dibromo-3-chloropropane	0.001	0.0002	---	---	---
1,2-Dibromoethane	0.0004[b]	0.00005	---	---	---
1,2-Dichloropropane (1,2-DCP)	0.04[b]	0.005	---	---	---
1,3-Dichloropropene	0.02	---	---	---	---
Dichlorprop (2,4-DP)	0.1	---	---	---	---
Dimethoate	0.006	---	0.05[e]	---	---
Endothall	---	0.1	0.01[d] 0.1[e]	---	---
Endrin	0.0006	0.002	---	Yes	Yes
Fenoprop (2,4,5-TP, Silvex)	0.009	0.05	0.01[e]	---	---
Glyphosate	---	0.7	0.01[d] 1.0[e]	---	---
Heptachlor	---	0.0004	0.00005[d]	Yes	Yes

Pesticide	Drinking water levels (mg/l)			Detection by CCMAS endorsed methods	
	WHO	U.S. EPA	Australian NHMRC	AOAC 990.06	ISO 6468
			0.0003[e] (includes epoxide)		
Heptachlor epoxide	---	0.0002	As above	Yes	Yes
Isoproturon	0.009	---	---	---	---
Lindane	0.002	0.0002	0.00005[d] 0.02[e]	---	Yes
MCPA	0.002	---	---	---	---
Mecoprop	0.01	---	---	---	---
Methoxyclor	0.02	0.04	0.0002[d] 0.3[e]	Yes	Yes
Metolachlor	0.01	----	0.002[d] 0.3[e]	---	---
Molinate	0.006	---	0.0005[d] 0.005[e]	---	---
Oxamyl	---	0.2	0.005[d] 0.1[e]	---	---
Pendimethalin	0.02	---	0.3[e]	---	---
Permethrin	0.3[c]	---	0.001[d] 0.1[e]	Yes	---
Picloram	---	0.5	0.3[e]	---	---
Pyriproxyfen	0.3	---	---	---	---
Simazine	0.002	0.004	0.0005[d] 0.02[e]	---	---
2,4,5-T	0.009	---	0.00005[d] 0.1[e]	---	---
Terbuthylazine	0.007	---	---	---	---
Toxaphene	---	0.003	---	---	---

[a]The EU requires monitoring of pesticides likely to be present in a given water supply, with a parametric value of 0.00010 mg/l for each pesticide, with the exception of aldrin, dieldrin, heptachlor, and heptachlor epoxide, for which the parametric values are 0.000030 mg/l. The summed concentrations of all pesticides may not exceed 0.0005 mg/L.

[b]Provisional guideline value

[c]When used as a larvicide for public health purposes

[d]Guideline value to indicate undesirable contamination, based on the analytical limit of determination

[e]Health value for managing risk associated with inadvertent exposure, based on 10% of the acceptable daily intake (ADI).

ANNEX 1

Table 3: Organochlorine pesticides detected by AOAC 990.06 and ISO 6468

Pesticides	**AOAC 990.06**	**ISO 6468**
Aldrin	Yes	Yes
alpha-Chlordane	Yes	---
gamma-Chlordane	Yes	---
Chlorobenzilate	Yes	---
Chloroneb	Yes	---
Chlorothanlonil	Yes	---
Dieldrin	Yes	Yes
DCPA (Dacthal)	Yes	---
o,p´-DDE	---	Yes
p,p´-DDE	Yes	Yes
o,p´-DDD	---	Yes
p,p´-DDD	Yes	Yes
o,p´-DDT	---	Yes
p,p´-DDT	Yes	Yes
Endosulfan, alpha	Yes	Yes
Endosulfan, beta	Yes	Yes
Endrin	Yes	Yes
Etridiazole	Yes	---
Heptachlor	Yes	Yes
Heptachlor-epoxide	Yes	Yes
Hexachlorobenzene	Yes	Yes
alpha-Hexachlorocycloexane (HCH)	---	Yes
beta-HCH	---	Yes
gamma-HCH	---	Yes
delta-HCH	---	Yes
epsilon-HCH	---	Yes
Lindane	---	Yes
Methoxychlor	Yes	Yes
cis-Permethrin	Yes	---
trans-Permethrin	Yes	---
Propachlor	Yes	---
Trifluralin	Yes	---

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