[Note – the changes are seen below using strikeout for removal of old text and gray highlights to show the suggested text. ONLY the highlighted text is within the scope of this ballot.]

NSF/ANSI Standard
for Drinking Water Additives —

Drinking water system components – Health effects

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3.4 Products manufactured from annex C acceptable materials

Products manufactured entirely from annex C materials shall not be required to undergo extraction testing for material-specific analytes of interest. However, extraction testing for contaminants contributed by processes specific to a production site shall be considered formulation-dependent analytes. Annex C contains the evaluation requirements for qualification as an acceptable material.

Table 3.1 – Material-specific analyses

Material type	Required analyses
Pipe/fitting/device materials	
asphaltic-coated ductile iron	GC/MS base/neutral scan (specific for carbonyls and non-aromatic hydrocarbons)[1], volatile organic chemicals (VOCs), polynuclear aromatic hydrocarbons (PNAs), regulated metals[2], molybdenum, vanadium, manganese
brass	regulated metals[2], zinc, nickel
concrete	regulated metals[2]
copper	regulated metals[2]
galvanized steel	regulated metals[2], zinc, nickel
stainless steel	regulated metals[2], nickel
Plastic materials	
acetal (AC)/polyoxymethylene (POM)	formaldehyde, VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1], acetal oligomers (by GC/MS base/acid scan)[1]
acrylonitrile-butadiene-styrene (ABS)	acrylonitrile, 1,3-butadiene, styrene, regulated metals[2], VOCs, phenolics (by GC/MS base/acid scan)[1]
cross linked polyethylene (PEX)	GC/MS[1], VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1], methanol, *tert*-butyl alcohol[3]
nylon 6	caprolactam, nitrogen-containing extractants (by GC/MS base/neutral scan)[1], VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
other nylons	nitrogen-containing extractants (by GC/MS base/neutral scan)[1], VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1], nylon monomers

Table 3.1 – Material-specific analyses

Material type	Required analyses
polybutylene (PB)	VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polyethylene (PE)	VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polyphenylene oxide (PPO)	dimethyl phenol, VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polyphthalamide (PPA)	hexamethylene diamine, terephthalic acid, isophthalic acid, VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polypropylene (PP)	VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polysulphone including poly[phenylene sulphone] (PPSU)	sulphone monomer, VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polyurethane (PUR)	GC/MS[1], VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1]
polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC)	regulated metals[2], phenolics[1], VOCs, tin[4], antimony[5], residual vinyl chloride monomer (RVCM)[6]
polyvinyl chloride (flexible)	VOCs, regulated metals[2], phenolics (by GC/MS base/acid scan)[1], phthalates[7], RVCM[6], tin[4], zinc[8]
Elastomer materials	
ethylene-propylene-diene monomer (EPDM)	GC/MS[1], VOCs, phenolics (by GC/MS base/acid scan)[1], phthalates[7], PNAs[1]
fluoroelastomer	GC/MS[1], VOCs, phthalates[7]
isoprene	GC/MS[1], VOCs, phenolics (by GC/MS base/acid scan)[1], phthalates[7], PNAs[1], isoprene monomer
neoprene	GC/MS[1], VOCs, phenolics (by GC/MS base/acid scan)[1], phthalates[7], PNAs[1], chloroprene
nitrile-butadiene rubber (NBR, BUNA-N)	GC/MS[1], VOCs, phenolics (by GC/MS base/acid scan)[1], phthalates[7], PNAs[1], 1,3-butadiene, acrylonitrile
styrene-butadiene rubber (SBR)	GC/MS[1], VOCs, phenolics (by GC/MS base/acid scan)[1], phthalates[7], PNAs[1], 1,3-butadiene, styrene
Barrier materials	
asphaltic coatings	regulated metals[2], molybdenum, vanadium, manganese, VOCs, GC/MS base/neutral scan (specific for carbonyls and non-aromatic hydrocarbons)[1], PNAs[1]
epoxy coatings (liquid and powder)	GC/MS (base/neutral/acid scan), bisphenol A, bisphenol A-diglycidyl ether[9], bisphenol A-diglycideryl ether[9], bisphenol A-propoxylate[9], epichlorohydrin, VOCs, solvent and reactive diluent additives[10]
polyester coatings	GC/MS (base/neutral/acid scan), VOCs, residual monomers[11]
polyurethane coatings	GC/MS (base/neutral/acid scan), VOCs
Portland and hydraulic cements	GC/MS[1], regulated metals[2], dioxins and furans, radionuclides, glycols and ethanolamines[12]

[1] see annex B, section B.7

[2] antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, selenium, thallium

NOTE – When chromium is detected it shall be evaluated against the pass/fail criteria of chromium VI as a screening level. If the results exceed this criteria, the chromium shall be differentiated into the chromium III and chromium VI species and evaluated individually.

[3] *tert*-Butyl alcohol analysis is required for PEX materials except those crosslinked via e-beam methodology.

[4] The analysis for tin is required when tin-based stabilizers are used.

Table 3.1 – Material-specific analyses

Material type	Required analyses
[5] The analysis for antimony is required when antimony-based stabilizers are used. [6] The level of RVCM within the walls of PVC or CPVC products and materials shall be directly determined (annex B, section B.7). [7] The analysis for phthalates is required when phthalate ester plasticizers are used. Analysis shall be for the specific phthalate ester(s) used in the formulation. [8] The analysis for zinc is required when zinc-based stablilizers are used. [9] Analysis shall be performed using liquid chromatography with ultraviolet detection (LC/UV). [10] Analysis shall be performed for the specific solvent and reactive diluent additives used in the individual product formulation, such as benzyl alcohol. [11] Analysis shall be performed for residual concentrations of the specific ester monomers used in the individual product formulation. [12] Glycol and ethanolamine analyses shall be performed on cements containing these compounds as grinding aids.	

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B.7.3 Metals analysis

Analyses for metals shall be performed, except as otherwise provided for herein, in accordance with currently accepted U. S. Environmental Protection Agency (EPA) Methods (see 40 CFR Part 141 and Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020). When no EPA method is provided, analyses shall be performed in accordance with *Standard Methods for the Examination of Water and Wastewater* (most current edition). If neither of these two documents addresses the required parameters and matrix, or if an alternate method is desired, method validation shall be completed prior to the application of the method (see annex B, section B.7.2.5).

NOTE – When chromium is detected it shall be evaluated against the pass/fail criteria of chromium VI as a screening level. If the results exceed this criteria, the chromium shall be differentiated into the chromium III and chromium VI species and evaluated individually.

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Table D1 – U. S. Environmental Protection Agency and Health Canada NSF/ANSI 61 drinking water criteria

Contaminant (Reference)[1]	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
• • • **Regulated metals**		
antimony	0.006	0.0006

Table D1 – U. S. Environmental Protection Agency and Health Canada NSF/ANSI 61 drinking water criteria

Contaminant (Reference)[1]	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
(40 CFR §141.60, §141.62)		
arsenic Issue date: 10/01	0.010	0.001
barium (40 CFR §141.60, §141.62)	2	0.2
beryllium (40 CFR §141.60, §141.62)	0.004	0.0004
boron issue date: 09/90	5	0.5
cadmium (40 CFR §141.60, §141.62)	0.005	0.0005
Regulated metals		
chromium (total) (40 CFR §141.60, §141.62)	~~0.~~1Refer to chromium III and chromium VI[9]	~~0.01~~ Refer to chromium III and chromium VI[9]
copper (40 CFR §141.80; 65 FR 1950)	TT[2] (action level 1.3 mg/L)	0.13
lead (at tap) (40 CFR §141.80; 65 FR 1950)	TT[2, 3, 8] (action level 0.015 mg/L)	0.0015[8]
mercury (inorganic) (40 CFR §141.60, §141.62)	0.002	0.0002
selenium (40 CFR §141.60, §141.62)	0.05	0.005
thallium (40 CFR §141.60, §141.62)	0.002	0.0002
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[1] The references for criteria based on U. S. primary drinking water regulations are from the U. S. Code of Federal Regulations, Title 40 (Protection of Environment), revised as of July 1, 1999. This document is available on-line at http://www.access.gpo.gov/nara/cfr/cfr-table-search.html. Issue dates are given for criteria based on Health Canada guidelines. Additional information on the guidelines for these chemicals is available at http://www.hc-sc.gc.ca/ehp/ehd/bch/water_quality.html.

[2] TT = treatment technique

[3] For section 9 products, a Q statistic value of 11 µg lead for a 1 L (0.26 gal) draw is used as the evaluation criteria. This is based on the assumption that sources other than the Section 9 device contribute 4 µg for a 1 L (0.26 gal) draw, resulting in a total limit of 15 µg lead for a 1 L (0.26 gal) draw.

[4] MFL = Million Fibers per liter, with fiber length > 10 microns

[5] Beginning January 2005, the Single Product Acceptable Concentration (SPAC) for bromate will be lowered to 0.003 mg/L, unless it is demonstrated to the Joint Committee on Drinking Water Additives by the manufacturers of hypochlorite treatment chemicals that the drinking water industry demand for hypochlorite chemicals cannot be adequately met unless the SPAC remains at 0.005 mg/L.

[6] Value represents the maximum residual disinfectant level (MRDL)

[7] "Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States," August 17, 2001

Table D1 – U. S. Environmental Protection Agency and Health Canada NSF/ANSI 61 drinking water criteria

Contaminant (Reference)[1]	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
/ Morbidity & Mortality Weekly Report 50 (RR14); 1-42 [8] Revisions to lead requirements of this section have been made and are located in Annex F of this Standard. Please refer to that annex for additional details. The revisions contained in Annex F are informational at this time and are scheduled to be incorporated into this section July 1, 2012. [9] When chromium is detected it shall be evaluated against the pass/fail criteria of chromium VI as a screening level. If the results exceed this criteria, the chromium shall be differentiated into the chromium III and chromium VI species and evaluated individually.		

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Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation[1, 2, 3]
Inorganics				
chromium III	16065-83-1	10[4]	1[4]	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 04/28/1998
chromium VI	18540-29-9	0.02[4]	0.002[4]	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 04/28/1998
manganese	7439-96-5	0.3	0.03	Derived from the oral RfD on

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation[1, 2, 3]
				the USEPA IRIS database, with a 3x modifying factor because of the large contribution from food sources and a default 20% relative source contribution for drinking water. Verification date: 05/12/1995
molybdenum	7439-98-7	0.04	0.004	USEPA Draft Health Advisory issue date: 1993
silver	7440-22-4	0.1	0.01	USEPA Lifetime Drinking Water Health Advisory Issue date: 1992
strontium	7440-24-6	4	0.4	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 06/23/1992

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation[1, 2, 3]

[1] Criteria are derived from the oral RfD on the USEPA IRIS database as follows:

Oral RfD (mg /kg-d) x (70 kg /2 L/d) x relative source contribution factor = TAC (mg/L)

where:
70 kg = assumed adult body weight
2 L/d = assumed adult water consumption
relative source contribution factor = percentage of daily exposure to the substance represented by drinking water (default value is 20%)

Other criteria have been used directly, unless otherwise noted.

[2] The IRIS verification date represents the date the oral RfD or the cancer risk assessment was peer reviewed by the USEPA. Refer to the online IRIS database for the complete update and revision history of the IRIS files: (http://www.epa.gov/ngispgm3/iris/subst).

[3] Toxic Equivalency Factors (TEFs) have been established as a means to compare the potency of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) to individual congeners of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs). The USEPA uses an approach to dioxin risk assessment methodology in which levels of dioxins and furans are analytically determined, the concentration of each congener is multiplied by its respective TEF value, and all the products are totaled to a single 2,3,7,8-TCDD equivalent.

Van den Berg et al. 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives 106(12):775:792.

U. S. Environmental Protection Agency. 2000. Chapter 9: Toxic Equivalency Factors (TEFs) for Dioxin and Related Compounds. From Exposure and Human Health Risk Assessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Part II: Health Assessment for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds. NCEA-I-0386. September 2000. SAB Review Draft. http://www.epa.gov/ncea/pdfs/dioxin/part2/fm-chap9.pdf

[4] When chromium is detected it shall be evaluated against the pass/fail criteria of chromium VI as a screening level. If the results exceed this criteria, the chromium shall be differentiated into the chromium III and chromium VI species and evaluated individually.

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