

# Drinking Water Standards for New Zealand (Draft) 20 December 2021

## The Standards

The standards set limits for the concentration of determinands in drinking water. The limits are referred to as maximum acceptable values (MAV). The MAVs for any determinand should not be exceeded at any time.

The standards apply to all drinking water supplies, regardless of the nature of the source water in use and the number of people served by the supply. All consumers on a supply should receive water that meets these standards; therefore the standards must be met at all points in a water system after treatment.

While the standards establish limits on the composition of the water all consumers should receive, they do not specify the monitoring required to show, to an acceptable level of confidence, that they are being met. Monitoring requirements and other compliance criteria are contained in operational rules produced by Taumata Arowai.

## Maximum Acceptable Values

The MAV of a microorganism is its concentration in drinking water above which there is a significant risk of contracting a waterborne (enteric) disease. MAVs are not given for all microorganisms of health significance (pathogens). Instead, MAVs are provided for representative organisms: *Escherichia coli* (*E. coli*), representative of bacteria, and *Cryptosporidium* plus *Giardia*, representative of protozoa. *E. coli* is used as an indicator of bacterial risk. Its presence is evidence of recent faecal contamination and therefore of the possible presence of pathogens.

The MAV of a chemical determinand is the highest concentration of the determinand expected, on the basis of present knowledge, not to cause any significant risk to the health of the consumer over 70 years of consumption of 2 litres per day of that water. MAVs for carcinogenic determinands are conservatively set, where possible, as the concentration in drinking water associated with an estimated excess lifetime cancer risk of  $10^{-5}$  (or one additional case of cancer per 100,000 of the population ingesting drinking water containing the substance at the guideline value for 70 years).

Advances in scientific knowledge may lead to changes in the MAVs. When evidence for these changes becomes available, revised MAVs will be included in later editions of the Standards.

**Table 1: MAVs for Microbiological Determinands**

Determinand	MAV <sup>1</sup>
<i>Escherichia coli</i> <sup>2</sup>	Less than 1 in 100 ml of sample
Total pathogenic protozoa	Less than one infectious (oo)cyst per 100 L of sample <sup>3</sup>

1. These are maximum acceptable values for regulatory purposes. They do not represent a dose/response relationship that can be used as the basis for determining acceptable concentrations of pathogens in drinking water.
2. Indicator organism.
3. The methods available for enumerating pathogenic protozoa are becoming less expensive and more reliable, but they are not yet suitable for routine monitoring of treated water quality. Although new methods of assessing the infectiousness of protozoa by using human cell cultures have been developed, they are not yet suitable for routine monitoring of *Cryptosporidium* contamination of drinking water. The referee method cannot identify the species of *Giardia* or *Cryptosporidium*; nor can it determine the viability or infectivity of detected cysts or oocysts. Until the methodology improves, results are to be reported as verified (oo)cysts.

**Table 2: MAVs for Inorganic Determinands**

Determinand	MAV	Units	Notes
Aluminium	1	mg/L	Health-based value derived by WHO, but no guideline value established. Concentrations near the MAV in some NZ supplies.
Antimony	0.02	mg/L	
Arsenic	0.01	mg/L	For excess lifetime skin cancer risk of $6 \times 10^{-4}$ . Limited by analytical and treatment difficulties.
Barium	1.5	mg/L	
Boron	2.4	mg/L	
Bromate	0.01	mg/L	For excess lifetime cancer risk of $7 \times 10^{-5}$ .
Cadmium	0.004	mg/L	
Chlorate	0.8	mg/L	Disinfection must never be compromised.
Chlorine	5	mg as Cl <sub>2</sub> /L	Disinfection must never be compromised.
Chlorite	0.8	mg/L	Disinfection must never be compromised. DBP.
Chromium	0.05	mg/L	Total chromium.
Copper	2	mg/L	
Cyanide	0.6	mg/L	
Cyanogen chloride	0.4	mg/L	
Fluoride	1.5	mg/L	
Lead	0.01	mg/L	Based on WHO GV but WHO states there is no safe level for lead and level should be as low as reasonably practical. EU MAV is 0.005 mg/L.

Determinand	MAV	Units	Notes
Manganese	0.4	mg/L	Health-based value derived by WHO, but no guideline value established. Concentrations near the MAV in some NZ supplies.
Mercury	0.007	mg/L	Inorganic mercury.
Monochloramine	3	mg as Cl <sub>2</sub> /L	
Nickel	0.08	mg/L	
Nitrate, short term	50	mg/L	
Nitrite, short term	3	mg/L	
Nitrate and nitrite	The sum of the ratio should not exceed 1		The sum of the ratio of the concentration of each to its respective MAV should not exceed 1.
Perchlorate	0.08	mg/L	Disinfection must never be compromised.
Selenium	0.04	mg/L	
Uranium	0.03	mg/L	

**Table 3: MAVs for Organic Determinands**

Determinand	MAV	Units	Notes
Acrylamide	0.0005	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Alachlor	0.02	mg/L	Pesticide. For excess lifetime cancer risk of 10 <sup>-5</sup> .
Aldicarb	0.01	mg/L	Pesticide.
Aldrin + dieldrin	0.00004	mg/L	Pesticide. Sum of, not each.
Anatoxins	6	(µg/L)	Cyanotoxin. PMAV. Expressed as anatoxin-a toxicity equivalents.
Atrazine	0.1	mg/L	Pesticide. Sum of atrazine and its metabolites.
Azinphos methyl	0.1	mg/L	Pesticide.
Benzene	0.01	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Benzo(a)pyrene	0.0007	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Bromacil	0.4	mg/L	Pesticide.
Bromodichloromethane	0.06	mg/L	DBP. For excess lifetime cancer risk of 10 <sup>-5</sup> .
Bromoform	0.1	mg/L	DBP.
Carbofuran	0.008	mg/L	Pesticide.
Carbon tetrachloride	0.005	mg/L	
Chlordane	0.0002	mg/L	Pesticide.
Chloroform	0.4	mg/L	DBP.
Chlorotoluron	0.04	mg/L	Pesticide.
Chlorpyrifos	0.04	mg/L	Pesticide.

Determinand	MAV	Units	Notes
Cyanazine	0.0007	mg/L	Pesticide.
Cylindrospermopsins	0.8	(µg/L)	Cyanotoxin. PMAV. Expressed as cylindrospermopsin toxicity equivalents.
2,4-D	0.04	mg/L	Pesticide.
2,4-DB	0.1	mg/L	Pesticide.
DDT + isomers	0.001	mg/L	Pesticide. Sum of all isomers.
Di(2-ethylhexyl) phthalate	0.009	mg/L	
1,2-Dibromo-3-chloropropane	0.001	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Dibromoacetonitrile	0.08	mg/L	DBP.
Dibromochloromethane	0.15	mg/L	DBP.
1,2-Dibromoethane	0.0004	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Dichloroacetic acid	0.05	mg/L	DBP.
Dichloroacetonitrile	0.02	mg/L	DBP.
1,2-Dichlorobenzene	1.5	mg/L	
1,4-Dichlorobenzene	0.4	mg/L	
1,2-Dichloroethane	0.03	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
1,2-Dichloroethene	0.06	mg/L	Total of cis and trans isomers.
Dichloromethane	0.02	mg/L	
1,2-Dichloropropane	0.05	mg/L	
1,3-Dichloropropene	0.02	mg/L	Total of cis and trans isomers. For excess lifetime cancer risk of 10 <sup>-5</sup> .
Dichlorprop	0.1	mg/L	Pesticide.
Dimethoate	0.008	mg/L	Pesticide.
1,4-Dioxane	0.05	mg/L	For excess lifetime cancer risk of 10 <sup>-5</sup> .
Diuron	0.02	mg/L	Pesticide.
EDTA (editic acid)	0.7	mg/L	
Endrin	0.001	mg/L	Pesticide.
Epichlorohydrin	0.0005	mg/L	
Ethylbenzene	0.3	mg/L	
Fenoprop	0.01	mg/L	Pesticide.
Hexachlorobutadiene	0.0007	mg/L	
Hexazinone	0.4	mg/L	Pesticide.
Hydroxyatrazine	0.3	mg/L	Atrazine metabolite.
Isoproturon	0.01	mg/L	Pesticide.
Lindane	0.002	mg/L	Pesticide.

Determinand	MAV	Units	Notes
MCPA	0.8	mg/L	Pesticide. Health-based value derived by WHO, but no guideline value established. Occasionally found in NZ bores, at concentrations an order of magnitude below the MAV.
Mecoprop	0.01	mg/L	Pesticide.
Metalaxyl	0.3	mg/L	Pesticide.
Methoxychlor	0.02	mg/L	Pesticide.
Metolachlor	0.01	mg/L	Pesticide.
Metribuzin	0.07	mg/L	Pesticide.
Microcystins / Nodularins	1	(µg/L)	Cyanotoxin. PMAV. Expressed as microcystin-LR toxicity equivalents.
Molinate	0.007	mg/L	Pesticide.
Monochloroacetic acid	0.02	mg/L	DBP.
Nitrilotriacetic acid (NTA)	0.2	mg/L	
N-nitrosodimethylamine (NDMA)	0.0001	mg/L	
Oryzalin	0.4	mg/L	Pesticide.
Oxadiazon	0.2	mg/L	Pesticide.
Pendimethalin	0.02	mg/L	Pesticide.
Pentachlorophenol	0.009	mg/L	Pesticide. For excess lifetime cancer risk of approximately 10 <sup>-5</sup> .
PFHxS <sup>2</sup> + PFOS <sup>3</sup>	0.00007	mg/L	Sum of.
PFOA <sup>4</sup>	0.00056	mg/L	
Picloram	0.2	mg/L	Pesticide.
Pirimiphos methyl	0.1	mg/L	Pesticide.
Primisulfuron methyl	0.9	mg/L	Pesticide.
Procymidone	0.7	mg/L	Pesticide.
Propazine	0.07	mg/L	Pesticide.
Pyriproxifen	0.4	mg/L	Pesticide.
Saxitoxins	3	(µg/L)	Cyanotoxin. PMAV. Expressed as saxitoxin-equivalents.
Simazine	0.002	mg/L	Pesticide.
Sodium dichloroisocyanurate (as cyanuric acid)	40	mg /L	
Styrene	0.03	mg/L	
2,4,5-T	0.01	mg/L	Pesticide.
Terbacil	0.04	mg/L	Pesticide.

Determinand	MAV	Units	Notes
Terbutylazine	0.008	mg/L	Pesticide.
Tetrachoroethene	0.05	mg/L	
Thiabendazole	0.4	mg/L	Pesticide.
Toluene	0.8	mg/L	
Trichloroacetic acid	0.2	mg/L	DBP.
Trichloroethene	0.03	mg/L	
2,4,6-Trichlorophenol	0.2	mg/L	For excess lifetime cancer risk of $10^{-5}$ .
Triclopyr	0.1	mg/L	Pesticide.
Trifluralin	0.03	mg/L	Pesticide.
Trihalomethanes (THMs)	The sum of the ratio should not exceed 1		DBP. The sum of the ratio of the concentration of each to its respective MAV should not exceed 1.
Vinyl chloride	0.0003	mg/L	For excess lifetime cancer risk of $10^{-5}$ .
Xylenes (total)	0.6	mg/L	
1080, short term	0.035	mg/L	Pesticide acute exposure.
1080, long term	0.0035	mg/L	Pesticide chronic exposure.

1. PHfXS – perfluorohexane sulfonate.
2. PFOS - perfluorooctane sulfonate.
3. PFOA - perfluorooctanoic acid.

**Table 4: MAVs for Radiological Determinands**

Determinand	MAV	Unit
Total alpha activity	0.5	Bq/L excluding radon.
Total beta activity	1	Bq/L excluding potassium-40.
Radon	100	Bq/L.