

GUIDELINES FOR DRINKING-WATER QUALITY

Provisional guideline value	0.009 mg/l (9 µg/l) The guideline value is considered provisional because of the variations in metabolism between experimental animals and humans.
Occurrence	Concentrations in water samples are usually below 10 µg/l, although much higher concentrations in groundwater may be measured under certain conditions
Basis of guideline value derivation	Multistage modelling of tumour incidence in an NTP bioassay without incorporation of a body surface area correction, recognizing that there are interspecies differences in metabolism between experimental animals and humans, with an important metabolite formed in rats being only a minor metabolite in humans
Limit of detection	0.005–0.01 µg/l by GC with ECD
Treatment performance	0.4 µg/l should be achievable using GAC
Additional comments	The concentration of PCP associated with a 10 ⁻⁵ upper-bound excess lifetime cancer risk is similar to the guideline value established in the second edition, so that guideline value is retained.
Assessment date	1998
Principal reference	WHO (2003) <i>Pentachlorophenol in drinking-water</i>

IARC classified PCP in Group 2B (possibly carcinogenic to humans) on the basis of inadequate evidence of carcinogenicity in humans but sufficient evidence in experimental animals. There is suggestive, although inconclusive, evidence of the carcinogenicity of PCP from epidemiological studies of populations exposed to mixtures that include PCP. Conclusive evidence of carcinogenicity has been obtained in one animal species (mice). Although there are notable variations in metabolism between experimental animals and humans, it was considered prudent to treat PCP as a potential carcinogen.

Perchlorate

Perchlorate is a naturally occurring anion that is frequently detected in the environment. It is used primarily as an oxidizer for solid rocket fuels, automotive airbags, fireworks and road flares. Perchlorate is found in water due to contamination from perchlorate manufacturing or use, natural deposits of perchlorate, use of fertilizers containing natural deposits of perchlorate, and natural formation of perchlorate in the atmosphere and its deposition during rain or snow events. It also forms in hypochlorite solutions to varying degrees, depending on the hypochlorite concentration, age and storage conditions.

Guideline value	0.07 mg/l (70 µg/l)
Occurrence	Generally found in drinking-water at concentrations below 10 µg/l, although concentrations above 40 µg/l have been measured
PMTDI	0.01 mg/kg bw, based on a BMDL ₅₀ of 0.11 mg/kg bw per day for 50% inhibition of iodide uptake, derived from a human clinical study on healthy adult volunteers administered perchlorate in drinking-water, and using an uncertainty factor of 10 to account for inter-individual differences

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Limit of detection	20–50 ng/l (method reporting limits) by LC-MS; 4 µg/l (method reporting limit) by IC with suppressed conductivity detection
Treatment performance	The perchlorate anion is highly stable in water and is difficult to remove using conventional water treatment technologies. Treatment technologies that have been shown to effectively remove perchlorate from water include nanofiltration and reverse osmosis membranes, anaerobic biodegradation and ion exchange.
Guideline value derivation	<ul style="list-style-type: none"> ● allocation to water 20% of unrounded PMTDI (0.011 mg/kg bw) ● weight 60 kg adult ● consumption 2 litres/day
Assessment date	2016
Principal references	EFSA (2014). <i>Scientific opinion on the risks to public health related to the presence of perchlorate in food, in particular fruits and vegetables</i> FAO/WHO (2011). <i>Safety evaluation of certain contaminants in food</i> WHO (2016). <i>Perchlorate in drinking-water</i>

The primary effect of perchlorate is its ability to competitively inhibit uptake of iodide by the thyroid gland. Inhibition of iodide uptake by perchlorate reduces the amount of iodide available for the synthesis of thyroid hormones. Sustained reduction in iodide uptake by the thyroid may result in hypothyroidism, which has adverse implications for structural and functional brain development in the fetus, infant and child, and for metabolism and the functioning of the cardiovascular, gastrointestinal, skeletal, neuromuscular and reproductive systems in adults. As the rat is not a good model for humans for substances known to affect the thyroid and having a mode of action involving inhibition of the uptake of iodide, the guideline value was derived from human studies.

Petroleum products

Petroleum products are used in large quantities, primarily as fuels. They are complex mixtures of chemicals derived from crude oil by distillation and fractionation. They consist primarily of a wide range of aliphatic and aromatic hydrocarbons, many of which are of extremely low solubility in water. Petroleum products are widely stored and handled and are often spilt. The primary concern for drinking-water is the potential for spills into source water, penetration of distribution systems and contamination of drinking-water treatment works.

Reason for not establishing a guideline value	Taste and odour will in most cases be detectable at concentrations below those of health concern, particularly with short-term exposure
Assessment date	2004
Principal reference	WHO (2008) <i>Petroleum products in drinking-water</i>

Exposure to the constituents of petroleum products through drinking-water is frequently short term, as the result of an accidental spill or short-term incident. Such incidents may lead to high concentrations of total petroleum hydrocarbons. However,