2,4-DB

The half-lives for degradation of chlorophenoxy herbicides, including 2,4-DB, or 2,4-dichlorophenoxybutyric acid (CAS No. 94-82-6), in the environment are in the order of several days. Chlorophenoxy herbicides are not often found in food.

Guideline value	0.09 mg/l (90 µg/l)
Occurrence	Chlorophenoxy herbicides not frequently found in drinking-water; when detected, concentrations usually no greater than a few micrograms per litre
TDI	30 µg/kg body weight, based on a NOAEL of 3 mg/kg body weight per day for effects on body and organ weights, blood chemistry and haematological parameters in a 2-year study in rats, with an uncertainty factor of 100 (for interspecies and intraspecies variation)
Limit of detection	1 µg/l to 1 mg/l for various methods commonly used for the determination of chlorophenoxy herbicides in water, including solvent extraction, separation by GC, gas–liquid chromatography, thin-layer chromatography or HPLC, with ECD or UV detection
Treatment performance	0.1 µg/l should be achievable using GAC
Guideline value derivation	
• allocation to water	10% of TDI
• weight	60 kg adult
• consumption	2 litres/day
Additional comments	The NOAEL used in the guideline value derivation is similar to the NOAEL of 2.5 mg/kg body weight per day obtained in a short-term study in dogs and the NOAEL for hepatocyte hypertrophy of 5 mg/kg body weight per day obtained in a 3-month study in rats.
Assessment date	1993
Principal reference	WHO (2003) *Chlorophenoxy herbicides (excluding 2,4-D and MCPA) in drinking-water*

Chlorophenoxy herbicides, as a group, have been classified in Group 2B (possibly carcinogenic to humans) by IARC. However, the available data from studies in exposed populations and experimental animals do not permit assessment of the carcinogenic potential to humans of any specific chlorophenoxy herbicide. Therefore, drinking-water guidelines for these compounds are based on a threshold approach for other toxic effects.

DDT and metabolites

The structure of dichlorodiphenyltrichloroethane, or DDT (CAS No. 107917-42-0), permits several different isomeric forms; commercial products consist predominantly of *p*,*p*′-DDT. Its use has been restricted or banned in several countries, although DDT is still used in some countries for the control of vectors that transmit yellow fever, sleeping sickness, typhus, malaria and other insect-transmitted diseases. DDT and its metabolites are persistent in the environment and resistant to complete degrada-

tion by microorganisms. Food is the major source of intake of DDT and related compounds for the general population, although exposure has significantly decreased as a consequence of the greatly reduced use of DDT for all except specialist applications.

Guideline value	0.001 mg/l (1 µg/l)
Occurrence	Detected in surface water at concentrations below 1 µg/l; also detected in drinking-water at 100-fold lower concentrations
PTDI	0.01 mg/kg body weight based on a NOAEL of 1 mg/kg body weight per day for developmental toxicity in rats, applying an uncertainty factor of 100 (for interspecies and intraspecies variation)
Limit of detection	0.011 µg/l by GC using ECD
Treatment performance	0.1 µg/l should be achievable using coagulation or GAC
Guideline value derivation	
• allocation to water	1% of PTDI
• weight	10 kg child
• consumption	1 litre/day
Additional comments	DDT is listed under the Stockholm Convention on Persistent Organic Pollutants. Hence, monitoring may occur in addition to that required by drinking-water guidelines.
	It should be noted that the level of DDT and its metabolites in food has been falling steadily, and the allocation of 1% of the PTDI may be very conservative.
	The guideline value is derived on the basis of a 10 kg child consuming 1 litre of drinking-water per day, because infants and children may be exposed to greater amounts of chemicals in relation to their body weight and because of concern over the bioaccumulation of DDT.
	It should be emphasized that the benefits of DDT use in malaria and other vector control programmes outweigh any health risk from the presence of DDT in drinking-water.
Assessment date	2003
Principal references	FAO/WHO (2001) *Pesticide residues in food—2000 evaluations* WHO (2004) *DDT and its derivatives in drinking-water*

A working group convened by IARC classified the DDT complex (the mixture of the various isomers of DDT and associated compounds) as a non-genotoxic carcinogen in rodents and a potent promoter of liver tumours. IARC has concluded that there is insufficient evidence in humans and sufficient evidence in experimental animals for the carcinogenicity of DDT (Group 2B) based upon liver tumours observed in rats and mice. The results of epidemiological studies of pancreatic cancer, multiple myeloma, non-Hodgkin lymphoma and uterine cancer did not support the hypothesis of an association with environmental exposure to the DDT complex. Conflicting data were obtained with regard to some genotoxic end-points. In most studies, DDT did not induce genotoxic effects in rodent or human cell systems, nor

was it mutagenic to fungi or bacteria. The United States Agency for Toxic Substances and Disease Registry concluded that the DDT complex could impair reproduction and development in several species. Hepatic effects of DDT in rats include increased liver weights, hypertrophy, hyperplasia, induction of microsomal enzymes, including cytochrome P450, cell necrosis, increased activity of serum liver enzymes and mitogenic effects, which might be related to a regenerative liver response to high doses of DDT.

1,2-Dibromo-3-chloropropane

1,2-Dibromo-3-chloropropane (CAS No. 96-12-8), or DBCP, is a soil fumigant that is highly soluble in water. It has a taste and odour threshold in water of 10 µg/l. DBCP was detected in vegetables grown in treated soils, and low levels have been detected in air.

Guideline value	0.001 mg/l (1 µg/l)
Occurrence	Limited survey found levels of up to a few micrograms per litre in drinking-water
Basis of guideline value derivation	Linearized multistage model was applied to the data on the incidence of stomach, kidney and liver tumours in the male rat in a 104-week dietary study
Limit of detection	0.02 µg/l by GC with ECD
Treatment performance	1 µg/l should be achievable using air stripping followed by GAC
Additional comments	The guideline value of 1 µg/l should be protective for the reproductive toxicity of DBCP.
Assessment date	1993
Principal reference	WHO (2003) *1,2-Dibromo-3-chloropropane in drinking-water*

On the basis of data from different strains of rats and mice, DBCP was determined to be carcinogenic in both sexes by the oral, inhalation and dermal routes. DBCP was also determined to be a reproductive toxicant in humans and several species of laboratory animals. DBCP was found to be genotoxic in a majority of in vitro and in vivo assays. IARC has classified DBCP in Group 2B based upon sufficient evidence of carcinogenicity in animals. Recent epidemiological evidence suggests an increase in cancer mortality in individuals exposed to high levels of DBCP.

1,2-Dibromoethane

1,2-Dibromoethane (CAS No. 106-93-4), or ethylene dibromide, is used as a lead scavenger in tetraalkyl lead petrol and antiknock preparations and as a fumigant for soils, grains and fruits. However, with the phasing out of leaded petrol and of the use of 1,2-dibromoethane in agricultural applications in many countries, use of this substance has declined significantly. In addition to its continued use as a petrol additive in some countries, 1,2-dibromoethane is currently used principally as a solvent and as an intermediate in the chemical industry.