

6 Drinking water

Drinking water for Australians and New Zealanders should be safe to use and aesthetically pleasing. Authoritative drinking water guidelines for both countries are summarised in the sections below.

6.1 Guidelines for users in New Zealand

Guidance on what constitutes good quality drinking water is provided for New Zealand by *Drinking-water Standards for New Zealand* (New Zealand Ministry of Health 1995a) and the *Guidelines for Drinking-water Quality Management* (New Zealand Ministry of Health 1995b).

6.2 Guidelines for users in Australia

In Australia guidance on what constitutes good quality drinking water is provided by the *Australian Drinking Water Guidelines* (NHMRC & ARMCANZ 1996), a companion document of the National Water Quality Management Strategy.

The Australian Drinking Water Guidelines are intended to meet the needs of consumers and apply at the point of use; for example, at the tap. They are applicable to any water intended for drinking irrespective of its source (municipal supplies, rainwater tanks, bores, point-of-use treatment devices, etc.) or where it is used (the home, restaurants, camping areas, shops, etc.).

The Guidelines provide an authoritative Australian reference on good drinking water quality, covering a wide range of the microbiological, physical, chemical and radiological characteristics that determine water quality. They are not intended as guidelines for environmental water quality, nor, as the document stresses, should they ever be seen as a licence to degrade the quality of a drinking water supply to a guideline value.

While the individual guideline values apply at the point of use, the document deals extensively with good system management. It points out that successful management of water quality in a water supply system requires an understanding of the processes and practices which can affect water quality within the system. In this context, the term 'system' is defined to include everything from the point of collection of the water, usually the catchment area, to the consumer's tap. It includes streams and rivers in the catchment, storage and service reservoirs, treatment and disinfection facilities, trunk and service mains, and consumer plumbing and appliances. Water quality can be affected at each of these points, but all are inter-related, and integrated management is essential.

The following sections summarise the key issues contained in the *Australian Drinking Water Guidelines* (NHMRC & ARMCANZ 1996).

6.2.1 Microbiological quality of drinking water

The Guidelines devote a special chapter to the microbiological quality of drinking water because the most common and widespread health risk associated with drinking water is contamination, either directly or indirectly, by human or animal excreta and the micro-organisms contained in faeces. Microorganisms, including

pathogenic organisms, can enter water supplies at every stage of the collection and distribution cycle. To ensure the microbiological safety of a water supply there should be a wide-ranging program of protection, treatment and monitoring, with barriers to the entry and transmission of pathogens throughout the system. The first of these barriers should include protection of the selected source from contamination by human or animal faeces and the maintenance of an active catchment protection program.

The Guidelines include a general section on Catchments and Raw Water Quality and a more specific section on Protection of the Water Catchment from Sources of Human and Animal Faecal Matter. It is recognised that intelligent management of land use and water resources in catchments is essential to a safe water supply. In particular, the Guidelines emphasise the need for an active watershed protection program, including an emergency plan for responding to major pollution events such as spillages or contamination. Detailed advice is given on the problems of surface and groundwater supplies, and the approaches that should be taken for their management.

6.2.2 Chemical and radiological quality of drinking water

The same principles of catchment management are critical in dealing with issues of chemical and radiological characteristics of drinking water. Many of these are difficult and expensive, if not virtually impossible, to remove by treatment of the raw source water. This applies to naturally-occurring characteristics, as well as to contaminants introduced from human activities.

Nitrate is an important example of a chemical that occurs naturally in groundwater supplies in some parts of inland Australia but that enters water as a result of intensive farming or poor waste disposal practices in more densely populated coastal settlements. The existing technologies for removing nitrate from source waters are rarely practicable in areas where nitrate is likely to be a problem. As nitrate is a health-related characteristic, the options may be to search for a better water source, or to arrange an alternative supply of water for consumption by those at risk, typically infants under three months of age.

Pesticides are an example of contaminants that can be introduced by improper use or accidental spillage in a catchment area, and can be difficult, if not impossible, to remove by practicable treatment processes. The Guidelines set out the method for control of pesticide use in Australia through a national scheme of registration, and recommend that their use in water or water catchments be authorised only where necessary. Pesticides not authorised for such use should not be present in drinking water.

6.2.3 Small water supplies

The Guidelines also contain a special chapter on the problems of small water supplies, regarded as those serving less than 1000 people. For small communities, economic constraints often mean that only untreated water can be supplied or that treatment is limited in extent. Furthermore, monitoring may be infrequent or absent. In such circumstances, sanitary assessment and the use of a clean and unpolluted water source are of paramount importance. It is therefore

recommended that small communities carry out regular sanitary inspections of their water supply.

Several measures can and should be taken to reduce the risk that supply to a small community may become unsafe. A strict protocol of practices should be established to ensure, among other things, that:

- raw water sources and storages are inspected regularly for any source of contamination (animals, birds, drainage inflows);
- cost-effective treatment is provided where the quality of raw water is poor (e.g. biological and pre-roughing filters).

Where problems occur, they should be thoroughly assessed. It may turn out that the best option for a small community is to seek an alternative source of raw water.

The Guidelines give detailed advice on the way in which regular inspections should be carried out to check for direct or potential sources of contamination. Inspection is especially important when water is obtained from streams flowing through areas developed for agricultural, industrial or residential purposes. The sources of contamination of groundwater are also discussed.

The frequency of sanitary inspections of a catchment will depend on the characteristics of each site and the source of raw water. Every catchment where there is human habitation or free public access should be comprehensively inspected at least once a year for potential sources of pollution.

6.2.4 Individual household supplies

Finally, consideration is given to the question of individual household supplies. For such supplies, the emphasis should be on selecting the best quality source water available, and on protecting its quality by the use of barrier systems and maintenance programs. Whatever the source (ground, surface or rainwater tanks), householders should assure themselves that the water is safe to drink. Information on the quality of surface and groundwater may be available from state or local governments which may monitor the particular source water as part of a state or local water monitoring program. Alternatively, the individual should consider having the water tested for any key health characteristics identified as being of local concern. Where the raw water quality does not meet the relevant guidelines, a point-of-use device may be used to treat water.

6.2.5 Guideline values

The individual guidelines cover a wide range of measurable characteristics, compounds or constituents that can potentially be found in water and affect its quality. They fall into the following categories:

- microorganisms, including
 - bacteria
 - protozoa
 - toxic algae
 - viruses;
- physical characteristics
 - radionuclides;

- chemicals, including
 - inorganic chemicals
 - organic compounds
 - organic disinfection by-products
 - pesticides.

A **health-related guideline value** is the concentration or measure of a water quality characteristic that, based on present knowledge, does not pose any significant risk to the health of the consumer over a lifetime of consumption.

An **aesthetic guideline value** is the concentration or measure of a water quality characteristic associated with good quality water.

The guideline values are intended for use in two separate but complementary ways:

- as ‘action levels’: that is, if the guideline value is exceeded, some form of action is initiated. This will generally be short-term and immediate. For example, if the guideline value for a health-related characteristic were exceeded, the response should be to take immediate action to reduce the risk to consumers, and, if necessary, to advise the health authority and consumers of the problem and the action taken. If the characteristic were not related to health, the action might be to advise the community of a deterioration in water quality;
- as a basis for assessing how well a water supply system meets, over time, levels of service agreed with the community (‘performance assessment’ as presented, for example, in an annual report). When used in this way, the data are largely of historical rather than immediate interest, and any resulting action to improve the quality of the supply will generally be longer-term.

In the case of pesticides, two values are provided:

- a *guideline value*, intended for use by regulatory authorities for surveillance and enforcement purposes;
- a *health value*, intended for use by health authorities when managing health risks associated with inadvertent exposure such as from a spill or misuse of a pesticide.

The document emphasises that health-related guidelines define water which, based on current knowledge, is *safe* to drink over a lifetime: that is, it constitutes no significant risk to health. For most water quality characteristics covered by the Guidelines, there is a grey area between what is clearly safe and clearly unsafe, and the latter has often not been reliably demonstrated. Thus the guidelines always err on the side of safety, and it follows that, for most characteristics, occasional excursions beyond the guideline values are not necessarily an immediate threat to health. The amount by which, and the duration for which, any health-related guideline value can be exceeded without raising public health concern depends on the particular circumstances. Exceedance of a guideline value should be a signal to investigate the cause and, if appropriate, to take remedial action. If the characteristic is health-related, the relevant health authority should be consulted.

For the individual guideline values, the reader is referred to the *Australian Drinking Water Guidelines* (NHMRC & ARMCANZ 1996). This document can be downloaded from:

<http://www.nhmrc.health.gov.au/publicat/pdf/eh19.pdf>