

## FACT SHEET - NITRATES IN WATER

### WHAT ARE NITRATES?

Nitrogen is the most common element in air (78%). Nitrate and nitrite are naturally occurring oxides of nitrogen formed as part of the cycling of nitrogen between air, land and water environments. Nitrate is formed from the oxidation of organic wastes such as manure, by the action of nitrogen-fixing bacteria in soils or from lightening strikes through the air. Nitrates can also be manufactured from chemicals and combined to form explosives and inorganic fertilisers.

Water runoff from farming lands, intensive agriculture, effluent disposal to inland waterways, and percolation of water into groundwater have, in many areas, led to increased levels of nitrate in water bodies from which drinking water supplies are drawn.

### WHAT ARE THE HEALTH ISSUES SURROUNDING NITRATES?

In poorly oxygenated water, nitrates can be reduced to nitrite ions, highly unstable entities which will quickly seek a partner ion such as food components rich in secondary amines to form N-nitroso compounds in the stomach. Many of these compounds are known cancer causing agents (carcinogens) in animals though a relationship between nitrate and gastric cancer in humans remains unproven.

In very young children, these same nitrite ions can compete with oxygen ions for binding sites on the blood haemoglobin molecules to form methaemoglobin which is unable to fulfil the same role. The resultant condition is called methaemoglobinaemia - the "blue baby" syndrome.

The toxicity of nitrates in humans is thought to be due solely to its reduction to nitrite in both infants (risk of methaemoglobinaemia) and adults (potential carcinogen). Conventional water treatment is not effective in removing nitrate.

### AUSTRALIAN GUIDELINES

The Australian Drinking Water Guideline value for nitrate in drinking water is 50mg NO<sub>3</sub> per Litre (as nitrate). This value is based on health considerations and has been set to protect bottle fed infants under 3 months of age. Up to 100mg NO<sub>3</sub> per Litre (as N) can be safely consumed by adults and older children (references below).

Monitoring frequency: monthly

### HOW DO HUMANS INGEST NITRATES?

Food, particularly vegetables and cured meats - both of which contain varying levels of amines -



is the major source of nitrate intake for humans. Amyl nitrate may be taken as a recreational drug and can cause methaemoglobinaemia in adults.

In Australia, the major public supplies of drinking water record nitrate concentrations up to 18mg NO<sub>3</sub> per litre with levels typically less than 15mg NO<sub>3</sub> per Litre. Nitrite is generally not present in significant concentrations although occasional intrusions do arise in public systems. Only in some rural areas have very high levels of nitrate been recorded in groundwater.

#### MORE INFORMATION

- Australian Drinking Water Guidelines 2004 NHMRC & ARM CANZ ISBN 1864 96118X
- WHO 3rd edition Guidelines for Water Quality, 2004



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