DRINKING WATER TESTING FACT SHEET

Information for Private Use

Drinking Water should be safe to use and aesthetically pleasing. It should be clear and colourless, with no unpalatable taste or odour, and it should contain no suspended matter, harmful chemical substances or pathogenic micro-organisms. The main sources of drinking water are from mains supplied water (tap water), groundwater (bores), surface water (dams, lakes) or rainwater tanks. Any water intended for human consumption should be tested for microbial and chemical quality.

MAINS SUPPLIED WATER (TAPWATER)

Municipally supplied water providers are responsible for supplying safe, high quality drinking water to their customers. They undergo extensive water quality monitoring programs which are regulated and have to comply with the Australian Drinking Water Guidelines and state health departments. However, unusual events can contaminate water supplies that are usually clean and tap water can be contaminated at the site of the tap itself.

GROUND WATER (E.G. BORES, WELLS) AND SURFACE WATER (E.G. DAMS)

Groundwater and surface water does not have the same level of water quality management and treatment as that provided to domestic households connected to public mains. It is not practical for private owners to constantly test their groundwater or surface water and although water quality may be good on the day of testing, it may change over time. After the initial analysis it should be checked periodically and monitored by the owner. If at any stage there are changes in appearance or odour of the water, additional water quality testing is advised. Groundwater and surface water can be contaminated by sewage, animal wastes, agricultural runoff, industrial pollution, seepage from rubbish tips or polluted stormwater.

RAINWATER

In most areas of Australia, the risk from consuming rainwater is low, providing it looks clear, has little taste or smell and is collected and stored in a well maintained tank and roof collection system. However, the collection and storage of rainwater introduces the potential for chemical, physical and microbial contamination from sources such as contaminated roof runoff, atmospheric pollution, the tank itself and microbial pathogens from animals.

MICROBIOLOGICAL TESTS

The microbiological tests will identify the total bacterial loading found in the water sample and the level of faecal contamination in the water, which will give an indication of how safe the water is to drink.
Sampling for Microbiological tests typically involves:

1. Taking the sample in a sterile bottle leaving an air gap (do not rinse bottle prior to sampling)
2. Chilling the sample to less than 6°C (ice bricks are preferred to ice)
3. Ensuring the sample arrives at the laboratory within 24 hours of collection
4. Labelling the bottle/s with a sample ID and sample date (ensure multiple bottles from the same sample point have the same sample ID to avoid confusion)

Samples not meeting these requirements may deem the sample unsuitable and therefore accuracy of results cannot be guaranteed.

CHEMICAL TESTS

The chemical quality tests are made up of a range of chemical elements and compounds. Some of these are ones that may pose a risk to your health while others may only affect the taste, odour and appearance of the water.

Sampling for Chemical tests typically involves:

1. Taking the sample in a bottle leaving no air gap
2. Chilling the sample to less than 6°C (ice bricks are preferred to ice)
3. Ensuring the sample arrives at the laboratory within 24 hours of collection
4. Labelling the bottle/s with a sample ID and sample date (ensure multiple bottles from the same sample point have the same sample ID to avoid confusion)

Samples not meeting these requirements may deem the sample unsuitable and therefore accuracy of results cannot be guaranteed.

SAMPLING TECHNIQUES

TAPS

When sampling from a tap, open fully and let water run to waste for 2-3 minutes or for a time sufficient to permit clearing of the service line. Fill up the sample bottles and cap tightly. Do not touch the underside of the cap. If tap cleanliness is questionable, clean tap with isopropyl alcohol prior to sampling and allow enough water to flush it away.

RESERVOIRS (eg: Tanks, Dams)

Hold the closed bottle near its base and plunge it below the surface. Remove the top and turn the bottle until its neck points slightly upward and mouth is directed toward the current. If there is no current, create one by pushing the bottle forward away from the hand. Replace cap before pulling the sample out.

WHAT TO TEST FOR?

Water Analysis	
Basic Testing:	Total Coliforms, E.Coli & Thermotolerant Coliforms Fluoride Nitrate & Nitrite Sulphate pH Conductivity Total Dissolved Solids Chloride Alkalinity Hardness Cations (Calcium, Magnesium, Potassium and Sodium) Total Metals (Cadmium, Copper, Iron, Manganese and Lead) Dissolved Metals (Iron and Arsenic)
Extended Testing:	Basic testing plus: Total Suspended Solids Turbidity Volatile Organic Compounds Metals – Aluminium, Antimony, Barium, Beryllium, Boron, Chromium, Cobalt, Copper, Mercury, Molybdenum, Nickel, Selenium, Silicon, Silver, Titanium, Tin, Strontium, Uranium, Vanadium and Zinc.

If you suspect a particular contamination or are unsure where your water is being sourced from, please contact your State Health Department to obtain further testing requirements and information.

BOTTLE REQUIREMENTS

Analysis	Bottle Type
Total Coliforms, E.coli & Thermotolerant Coliforms	1 x Sterile 500mL PET, air gap, keep chilled
Fluoride, Sulfate, Nitrate, Nitrite, Chloride, Alkalinity and Colour	1 x 500mL HDPE no air gap, keep chilled
pH, Conductivity, Total Suspended Solids, Turbidity and Total Dissolved Solids	
Volatile Organic Compounds	2 x 40mL HCl preserved Glass vials, no air gap, keep chilled
Metals	1 x 125mL Acid Washed HDPE, no air gap, keep chilled

If you have a bore or tank that is used for commercial or public purposes the testing requirements may be different. Please contact your State Health Department to obtain further information.

TO PROCEED WITH TESTING

Please contact your local laboratory via phone 1300 42 43 44, email or visit our website www.envirolab.com.au to order your required bottles, eskies and ice bricks for sampling.

Return the attached Chain of Custody Form, along with your samples to your local laboratory within 24 hours of collection.

Sydney Lab - 12 Ashley St, Chatswood, NSW, 2067. (02 9910 6200 or enquiries@envirolab.com.au)
Perth Lab – 16-18 Hayden Ct, Myaree, WA, 6154. (08 9317 2505 or lab@mpl.com.au))
Melbourne Lab – 1a Dalmore Dr, Scoresby, Vic 3176 (03 9763 2500 or Melbourne@envirolab.com.au)
Brisbane Office – 20a, 10-20 Depot St, Banyo, QLD, 4014 (07 3266 9532 or Brisbane@envirolab.com.au)
Adelaide Office – 7a The Parade, Norwood, SA, 5087 (0406350706 or Adelaide@envirolab.com.au)

Important disclaimer
While all advice and recommendations are made in good faith, Envirolab Group does not accept any liability or responsibility for the actions taken by an individual as a result of information provided. You should satisfy yourself that any information you rely on from any source is appropriate for your own particular circumstances.

Result Interpretation
The results of the analysis of water intended for human consumption are compared to the Australian Drinking Water Guideline values. Some chemical parameters however, may not be regulated by the Australian Drinking Water Guidelines.

Please contact the Department of Health in your state for assistance with interpretation of your test results.

Australian Drinking Water Guidelines can be accessed http://www.nhmrc.gov.au/guidelines/publications/eh52 (Chapter 10, page 181, Monitoring for specific characteristics in drinking water)

Further information

For assistance in the development of a drinking water management plan, access the Community Water Planner at:
www.nhmrc.gov.au/publications/synopses/eh39.htm

AUSTRALIAN DRINKING WATER GUIDELINES SUMMARY

Parameter	Guideline Level (mg/L)	Comment
Microbiological		
E coli	Not detected in any 100ml sample	If detected in drinking water, immediate action should be taken including investigation of potential sources of faecal contamination.
Thermotolerant coliforms	Not detected in any 100ml sample	If detected in drinking water, immediate action should be taken including investigation of potential sources of faecal contamination.
Physical		
Turbidity	<5NTU	Based on appearance turbidity should not exceed 5 NTU. If bacterial disinfection is in place, less than 1 NTU is the target for effective disinfection. Less than 0.2 NTU is the target for effective filtration of Cryptosporidium and Giardia. Turbidity in water is caused by the presence of fine suspended particles. Depending on the size and density of these particles, turbidity can be reduced by either filtration or settlement. Water from new bores will often decrease in turbidity after a period of bore use.
pH	pH 6.5–8.5	While extreme pH values (<4 and >11) may adversely affect health, there are insufficient data to set a health guideline value. <6.5 may be corrosive. >8 progressively decreases efficiency of chlorination. >8.5 may cause scale and taste problems. >11 may cause corrosion
Conductivity	n/a	Important for ion balance check. Used to calculate TDS.
Total dissolved solids	600	Based on taste: <600 mg/L is regarded as good quality drinking water. 600-900 mg/L is regarded as fair quality 900-1200 mg/L is regarded as poor quality >1200 mg/L is regarded as unacceptable.
Hardness	200	Hard water can contribute to the formation of scale in hot water systems and fittings, and makes lathering of soap difficult. Hardness is the measure of calcium and magnesium in the water and comes from the dissolving of these materials from soil and rocks.
Chemical		
Chloride	250	From natural mineral salts, effluent contamination. High concentrations more common in groundwater and certain catchments. High chloride levels in water are usually caused by high salt (sodium chloride) levels. High chloride is not thought to cause health problems but high sodium levels that usually accompany it (may cause health effects). The recommended maximum of 250 mg/L is based on taste considerations.
Fluoride	1.5	Fluoride is important for preventing dental decay, but can also be harmful at high concentrations. It is found naturally in rocks and waters, and is sometimes present in industrial air pollution.
Sulfate	500 Health, 250 Asthetic	Natural component of water, and may be added via treatment chemicals. The aesthetic value is based on a taste threshold. >500 mg/L can have purgative effects such as dehydration and diarrhoea. It can also contribute to corrosion of plumbing fixtures.

Parameter	Guideline Level (mg/L)	Comment
Nitrate	50	Occurs naturally. Increasing in some waters (particularly groundwater) from intensive farming and sewage effluent. Guideline value will protect bottle-fed infants under 3 months from methaemoglobinaemia. Adults and children over 3 months can safely drink water with up to 100 mg/L nitrate.
Nitrite	3	Levels of Nitrite above 3 mg/L may cause health problems by interfering with haemoglobin in the blood. Nitrite levels in water can be reduced by oxidation. Nitrite contamination is often associated with sewage contamination as it is generated nitrate reducing bacteria.
Silica	80	An important characteristic for both aesthetics and treatment processes. Can form films on glass and can also affect reverse osmosis filters where levels exceed 5mg/L.
Volatile Organic Compounds	0.001 – 0.1 Vinyl Chloride 0.0003	There are a variety of contaminants of concern that are covered by this list of compounds that can be found in groundwater in highly populated, urban or industrial areas. Some VOCs are dangerous to human health or cause harm to the environment. VOCs are commonly found in products produced by the petroleum industry, paints, solvents and plastics and may be present in groundwater through contamination of water sources by spills or discharges.
Metals		
Antimony	0.003	Antimony is a metal that can be harmful in high concentrations. Its harmful effects are limited at lower concentrations. It is rare in source waters, but may leach from antimony solder or be deposited in pollution from smelters.
Arsenic	0.01	Arsenic is a harmful element. Long term consumption of water with a high arsenic concentration (greater than 0.3 mg/L) has been shown to increase the likelihood of skin cancers and other diseases. Arsenic is found in soil and rocks, but is also released by the burning of fossil fuels, and in drainage from old gold mines and some types of sheep dip.
Barium	2	Naturally occurring in groundwater.
Boron	4	Low levels of Boron can occur naturally in groundwater. High levels of Boron may be associated with seawater intrusion.
Cadmium	0.002	Cadmium is a toxic metal that, in cases of long exposure, can cause kidney problems. Cadmium may enter water supplies from impurities in the zinc of galvanised metal, from solders, or from some fertilisers.
Chromium	0.05	Chromium is a toxic heavy metal, which can cause cancers. Chromium is found in small amounts in most rocks and soils, and has been used in many industrial processes.
Copper	2 Health, 1 Asthetic	Copper in household water usually comes from corrosion of copper pipes caused by low pH water. The taste threshold for copper is 3 mg/L. High concentrations colour water blue/green. >1 mg/L may cause blue or green stains on fittings, wires >2 mg/L can cause ill effects in some people such as nausea, abdominal pain and vomiting .
Iron	0.3	Iron occurs naturally in water, usually at <1 mg/L in groundwater. The guideline of 0.3 mg/L is based on taste and appearance. Above 1.0 mg/L most will consider the water to be of poor quality for drinking. Levels above 1 mg/L can produce brown staining on laundry and fittings.

Parameter	Guideline Level (mg/L)	Comment
Lead	0.01	Lead is a toxic heavy metal. It may enter a water supply from natural sources or from lead plumbing, solder, or roof flashings. The amount of dissolved lead will depend on a number of factors including pH and water hardness. In humans, lead is a cumulative poison that can severely affect the central nervous system. Infants, foetuses and pregnant women are most susceptible.
Mercury	0.001	Mercury can occur naturally in groundwater or enter drinking water as a result of industrial emissions or spills.
Molybdenum	0.05	Molybdenum occurs naturally in soil and groundwater and is used in agriculture and mining.
Manganese	0.5 Health, 0.1 Asthetic	Manganese occurs naturally in groundwater and is likely to enter water supplies from natural sources or from contaminated sites. >0.1 mg/L causes undesirable taste, black staining of laundry & plumbing.
Nickel	0.02	Long term exposure to nickel can cause kidney problems. Nickel may enter water supplies from coal-fired power stations, metal alloy manufacturing or in small concentrations from nickel-plated tap and plumbing fittings.
Selenium	0.01	Selenium can occur naturally in groundwater or enter ground water as a result of burning coal. Selenium is also a by-product of the processing of sulfide ores, chiefly in the copper refining industry and is widely used in industry for the manufacture of electronic components, some insecticides, in hair shampoos as an anti-dandruff agent, and as a nutritional feed additive for poultry and livestock.
Uranium	0.17	Uranium can occur naturally in groundwater as a result of leaching from soils, rocks and natural deposits or from the release of mill tailings, combustion of coal and other fuels, and use of phosphate fertilisers (which can contain as much as 150 mg/kg uranium). Naturally occurring Uranium consists almost entirely of the U-238 isotope, with other isotopes being less than 1% abundant. Uranium is used primarily as a fuel in nuclear power plants.
Zinc	3	The aesthetic guideline value is based on taste threshold. In groundwaters, the concentration of zinc from natural leaching is usually less than 0.01 mg/L. Tap water can contain much higher concentrations as a result of corrosion of zinc-coated pipes and fittings. Zinc concentrations in galvanised iron rainwater tanks are typically 2 mg/L to 4 mg/L but have been reported as high as 11 mg/L.

To convert mg/L to µg/L you need to muliptly the figure by a 1000. For example: 0.001mg/L is the same as 1µg/L.

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CHAIN OF CUSTODY - Client

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Client:	**Client Project Name / Number / Site etc (ie report title):**
Contact Person:	
Project Mgr:	**PO No.:**
Sampler:	**Envirolab Quote No. :**
Address:	**Date results required:**
	Or choose: standard / same day / 1 day / 2 day / 3 day
	Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Phone: **Mob:**	**Report format: esdat / equis /**
Email:	**Lab Comments:**

Sample information					Tests Required										Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample											Provide as much information about the sample as you can

Relinquished by (Company):	**Received by (Company):**	***Lab use only:***
Print Name:	**Print Name:**	**Samples Received: Cool or Ambient (circle one)**
Date & Time:	**Date & Time:**	**Temperature Received at: (If applicable)**
Signature:	**Signature:**	**Transported by: Hand delivered / courier**

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