DOUGLAS SHIRE COUNCIL

Environmental Health Unit

Private water supplies

If you are not connected to a town water supply—if you collect rain water or draw from a bore or creek, for instance—then your water may be unsafe due to a number of factors.

The following information is provided to help you ensure that your water is safe to drink.

The principal risks to human health from drinking water are *microbiological* and *chemical* contamination. This refers to the presence of:

- pathogenic micro-organisms, and
- harmful chemicals.

Physical characteristics are not usually directly related to human health may be indirectly related. Physical characteristics include pH, turbidity, taste, colour and odour.

Management of private drinking water supplies

A water supply management plan can help you to make the most of the resources available to you and can keep the risks of water contamination to a minimum. A good management plan for private water supplies involves the following elements:

- Choosing the best water source;
- Maintaining the water supply system;
- Consideration of water treatment options;
- Testing the water quality.

1. Choose the best water source

There are three main sources of drinking water. The following points outline the main health risks of each type:

- *Rainwater*—generally safe when well implemented but may be a limited supply;
- *Groundwater*—water drawn from deep underground is less likely to be affected by organic and faecal matter and is therefore less likely to contain pathogenic micro-organisms. If the supply is infiltrated by shallow groundwater, however, and especially by water from septic systems or cattle areas, the risks of microbial contamination are greatly increased. These factors should be considered when a bore location is first chosen or when a septic system is first installed. Groundwater is susceptible to chemical contamination but the chemical quality of the water is generally stable and once diagnosed as safe is likely to remain safe.
- *Surface water and shallow groundwater*—the main risk is microbial contamination due to the presence of organic and faecal matter. The quality of this water is liable to change at any time due to environmental factors. Generally, surface water or shallow groundwater should not be used as a source of drinking water without treatment.

2. Maintain your water supply system

You should regularly inspect your system to check for any direct or potential sources of contamination. Materials and equipment used should comply with relevant Australian Standards.

- *Rainwater*—see Council's brochure on the safe use of rainwater tanks;
- *Groundwater*—bores should be encased to a reasonable depth and bore-heads should be sealed to prevent ingress of surface water or shallow groundwater. Bores should not be located near septic systems or cattle. If the water is contaminated by minerals/chemicals it may not be treatable;
- *Surface water or shallow groundwater*—disinfection is required and in some cases filtration.

3. Consider treating your water

Various treatment options exist for private water supplies; for example filtration, disinfection and pH stabilisation. If your water repeatedly fails water quality tests, you should treat your water. Operators of licensed premises may also be required to treat their water in these cases.

- *Microbial contamination*—pathogenic micro-organisms can be destroyed by disinfection. Chlorine is normally used but there are other disinfecting agents and systems available. In order for Chlorine disinfection to be effective the turbidity must be low and the pH must not be higher than 8.5;
- *Chemical contamination*—if your water is contaminated by chemicals it may not be treatable. You should consult an expert;
- *pH* — pH neutralizing systems are available in cases where your water has a high or low pH. In this case you should also test your water for chemical contamination;
- *Turbidity*—filtration systems are available where your water is turbid (cloudy). Note - water that requires disinfection should be filtered first; disinfection will not be effective until the suspended/dissolved particles are removed from the water.

4. Test your water quality

Water tests for microbial contamination (*E. Coli*) should ideally be conducted weekly. As this is not practical for many private water suppliers, more frequent visual inspections of the system to check for any likely contamination should be done. Council requires licensed premises to submit at least one test per year for *E. Coli*, pH and turbidity to a NATA accredited laboratory. Logs should be kept of all test results and available for Council Officers when required. These logs may assist in resolving ongoing water supply problems. Warning signs should be displayed when health risks are identified.

E. Coli

Escherichia Coli (E. Coli) is the bacteria used to test for faecal contamination. *E. Coli* is not necessarily pathogenic but if present it is an indication that pathogenic bacteria may also be present. There should be zero *E. Coli* detected in a 100ml sample of your drinking water. If *E. Coli* is detected you must disinfect (or boil) your water before using it.

If your water contains *E. Coli*, consider the following management procedures:

- Immediately disinfect your water supply;
- Inspect your supply system for the source of contamination;
- Test your water supply at the source, if possible, and compare the results with those taken from the point of use;
- Consider choosing another water source;
- If necessary you may need to install a disinfection system.

pH

Potential hydrogen (pH) refers to the acidity or alkalinity of the water and is expressed in the range of 1 to 14. Neutral pH is 7 and is the value of pure water. Lower pH (less than 7) values are more acidic; higher pH (greater than 7) values are more alkaline.

The guideline pH values for drinking water are 6.5–8.5, although typical values in Australian drinking water supplies are 6.0–10.8.

Water with a pH between 6.5 and 8.5 should deposit a protective coating of calcium carbonate and prevent corrosion in pipes and fittings. High pH can cause scaling and encrustation problems, while lower pH can result in corrosion. Extreme pH levels can cause chemical leaching (eg lead and copper) from pipes into water supplies; moreover it may be a sign of possible chemical contamination. Chlorine disinfection can be impaired when the pH is too high (above 8 or 9). On the other hand low pH combined with high chlorine levels can be especially corrosive to pipes and fittings.

If your water has a high or low pH, consider the following management procedures:

- Inspect your supply system for contamination;
- Test your water supply at the source, if possible;
- Test for chemical contamination (if chemicals are present the water may not be treatable or usable);
- Consider choosing another water source;
- Consider buying a pH neutralising system.

Turbidity

Turbidity is a measure of the 'muddiness' or 'cloudiness' of your water. A turbidity of 5 NTU is just noticeable in a glass of water. You would not be able to see through a glass of water if the turbidity was more than 60 NTU. Crystal clear water would be less than 1 NTU.

Turbidity is not a direct health concern but the suspended particles that cause the turbidity can harbour pathogenic bacteria or harmful chemicals. You cannot simply disinfect cloudy water because it is not effective. You must filter the water first, then disinfect.

The maximum allowable turbidity is 5 NTU. Where disinfection systems are used the turbidity must be less than 1 NTU.

If your water has high turbidity consider the following management procedures:

- Inspect your system for contamination;
- Check the turbidity at the point of intake;
- Consider selective withdrawal from the water source during periods of low turbidity;
- Consider catchment management Water sourced from undisturbed or protected areas will generally have lower turbidity than areas under intensive cultivation;
- Storage can significantly reduce turbidity as the suspended matter settles over time;
- Consider installing a filtration system;
- Consider an alternative water source.

Tank management

1. Disinfecting the tank

Tanks should be emptied and cleaned by a professional tank cleaner every two years or if there is sludge on the bottom. Treating the tank water may not be effective if there is sludge on the bottom.

Other than being professionally cleaned, tanks can be disinfected without being emptied. To disinfect the tank add Chlorine to a concentration of 5 mg/l available Chlorine and do not use the water for an hour. The Chlorine residual may last up to 2 weeks.

Liquid sodium hypochlorite (liquid pool Chlorine) typically has 12.5 % v/v available Chlorine which requires 40 ml per 1000 L water to achieve 5 mg/l of available Chlorine.

Granular calcium hypochlorite (granular pool Chlorine) typically has 75% available Chlorine which requires about 7g per 1000L water to achieve 5 mg/l of available Chlorine. Granular chlorine should be dissolved in a bucket of water before being added to the tank.

Household bleach typically has 4% available Chlorine which requires about 125 ml per 1000 L water to achieve 5 mg/l of available Chlorine.

Contact Council if you wish to be emailed an Excel-based 'tank disinfectant calculator'.

The following excerpt is from the *Guidance on use of rainwater tanks 2004* published by the federal government's enHealth Council (p.28).

Chlorination

Regular chlorination of rainwater held in domestic tanks is not considered appropriate in most cases and is generally only recommended as a remedial action. The effectiveness of chlorine is short lived and it will only act on water in the tank at the time of dosing. Fresh run-off into the tank after chlorination will probably not be disinfected.

Chlorination is effective against harmful bacteria, many viruses and *Giardia* but it has limited effect against *Cryptosporidium*. Chlorination can also remove odours from rainwater by oxidising the responsible chemicals. When chlorine is added to water, it reacts with organic matter and other impurities in the water – the amount of chlorine needed for disinfection will depend on the concentrations of these impurities.

To achieve effective disinfection, it is necessary to add sufficient chlorine to provide a free chlorine residual of at least 0.5 mg/L after a contact time of 30 minutes. This can be measured using a suitable chlorine test kit (for example, a swimming pool kit) if available.

As a general guide, the addition of 40 mL of liquid sodium hypochlorite (12.5% available chlorine) per 1000 L of water or 7 g of granular calcium hypochlorite (75% available chlorine) per 1000 L of water will give a reasonable assurance of effective disinfection. Both methods will provide chlorine doses of approximately 5 mg/L. Sodium and calcium hypochlorite can be purchased from large supermarkets, hardware stores or swimming pool stockists. Stabilised chlorine (chlorinated cyanurates) is not effective in enclosed tanks and should not be used.

Methods for calculating the volume of water in a tank are provided in Appendix A.

The chlorine will not make the water unsafe to drink, but it will impart a distinct taste and odour that should dissipate in 10 to 14 days (depending on temperature). Boiling the water will remove most of the taste and odour associated with chlorination.

Calcium hypochlorite should be dissolved in rainwater, in a clean plastic bucket, in the open air, before adding it to the tank. Always add the disinfectant to the water rather than vice versa. When adding the concentrated chemical mixture to the tank, spread it as widely across the surface as possible to promote mixing (this will often be limited by restricted access) and let it stand for at least one hour before use.

Note: When handling and storing chemical compounds, it is important to carefully read and follow safety directions given on the package label.

This fact sheet was written by the Environmental Health Unit of Douglas Shire Council. The *Australian Drinking Water Guidelines* published by the Australian Government's National Health and Medical Research Council was used as a resource for this fact sheet.

2. Tank Maintenance

Keep roof clean and clear of leaves and debris. Remove overhanging branches. Regularly inspect screens and clean and repair if necessary.

Check tanks for sludge accumulation at least every 2–3 years. If sludge is covering the bottom of the tank, siphon it out or completely empty the tank. (Professional tank cleaners operate in many areas).

Check all associated infrastructure to ensure that infiltration of contaminants into the system cannot occur. Repair or redesign where necessary.