Surface water or groundwater supply

1 Goal

To ensure water from surface (streams, creeks, lakes) or underground (bore) sources is clean and safe for making food, for cleaning food areas and for serving to customers.

2 Why?

Water taken from surface or groundwater sources can carry harmful microbes and chemicals that can cause illness.

3 How this is done

The water source is (tick which applies):

☐ surface or insecure groundwater *(follow instructions on this page).*

☐ secure groundwater (a supply that meets the definition of 'secure' in the Drinking Water Standards for New Zealand. *While you continue to meet this definition you need do nothing further).*

☐ a supply that is currently subject to a Public Health Risk Management Programme. *(While you continue to follow this programme you need do nothing further).*

Surface or insecure groundwater

Wherever possible on-site water intakes are protected from:

- livestock – fenced-off from access to the water source (eg, stream, lake, bore)
- animal effluent – manure spreading does not take place on pastures near the water source
- silage – is not stored near the water source
- human waste – there is clear space (buffer zone) between the water source and land used for human effluent disposal (eg, septic tank drainage fields, long drop toilets).

The local council has been contacted to determine naturally occurring chemicals that are likely to be present in source water.

These are: _____

Checks have been carried out for activities that may cause chemical contamination of the water supply (eg, industry, landfills, chemical storage areas) upstream of, and surrounding, the water source.

The following activities/contaminants might be of concern to the water supply:

_____

The potential hazards identified above have been taken into account in water treatment.

Regular checks are made to identify any new sources of hazards or changes to hazards (see *Maintenance* section).

Groundwater sources

The bore head has been designed correctly and maintained so that it is protected against surface contamination (see extra information on next page).

Water Treatment

A water treatment system should be installed on all surface or insecure groundwater sources. See additional information overleaf on identifying an appropriate treatment system.

3 How this is done

The water treatment system used is: (tick appropriate box/es)

☐ filtration

☐ chlorination

☐ UV disinfection

☐ other _____

The water treatment system is installed and maintained in accordance with the manufacturer's instructions.

Checking the treatment system is working:

The treatment system is regularly checked against the manufacturer's instructions to ensure it's working effectively.

4 What if there is a problem?

Whenever there is a problem

If you suspect the water supply might not be safe, don't use it unless it has been boiled for one minute, or disinfected by adding chlorine. Alternatively use a temporary supply of safe water (eg, bottled water, or water from a registered water tanker).

Throw away food that might have become contaminated by the water and clean contaminated surfaces used for food.

Water contaminated on-site

If there's a possibility the water source has been contaminated on-site, identify the cause and arrange for this to be fixed (see Maintenance section). Safely dispose of contaminated water or arrange treatment to remove the contaminant.

Treatment system is not working

If the treatment system is not working, arrange for repairs to be carried out and checks made so the treatment system is operating properly before using the water again.

Water shortage

If there is a water shortage, arrange a safe alternative water source and transport the water using a registered water tanker.

Record any maintenance action taken in the *Maintenance schedule* (see Diary).

Consult your water specialist for advice about any repairs.

Contact your verifier and advise them of action taken.

Write it down

– see next page

Surface water or groundwater supply

Write it down

Write in your Maintenance schedule the ongoing inspection and maintenance of the water treatment system (eg, pumps, bore head, changing the filters etc).

Write in your Cleaning schedule any cleaning of treatment equipment (eg, UV light).

Write in the Diary the results of any water testing (eg, for Free Available Chlorine (FAC), other chemicals or microbes) that you or your local council carry out.

Write in the Diary any problems with the water supply and what you did about it.

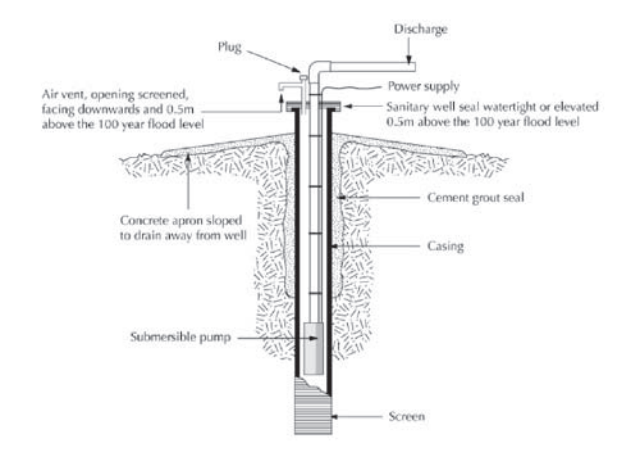
Extra information about managing your surface or groundwater supply

Bore head security for groundwater supplies

Poorly constructed and maintained well bore heads can introduce contamination into the ground water.

- Seal the area between the casing and the surrounding ground with concrete to stop rain or surface water carrying contaminants into the well.
- Seal between the casing and any hoses or cables going down the well shaft.
- Lock a protector cap on an unused well.
- Keep rubbish, pesticides, fertiliser, animals and compost away from the well bore head.
- Seal any free-flowing wells.
- Regularly check that the well bore head is protected from surface contamination.

Sanitary protection of a typical bore



Source: Ministry of Health (2005), *Source Waters, The Guidelines for Drinking-water Quality Management for New Zealand, pg 22*

Identifying possible microbial contamination

Identify anything that could contaminate your water source. You can do this by inspecting the intake point or bore head and the area within 50 metres of your water source. Things to be concerned about include a faulty bore head, offal pits/soak holes or effluent discharge (see above for more examples).

To confirm whether contamination has affected your water source it might be necessary to test for *Escherichia coli (E.coli).* Testing should be carried out by an accredited laboratory[1]. *E.coli* is found in human and animal faeces, so its presence in the water sample indicates contamination and possibly disease-causing microbes like *Campylobacter* and *Salmonella*.

If the water source has become contaminated with *E. coli,* stop using the water and take immediate action. Consider measures to protect the water source from contaminants or water treatment (see part **4** above).

Identifying possible chemical contamination

Identify anything that could contaminate your water source. You can do this by inspecting the intake point or bore head and the area within 50 metres of your water source. Things to be concerned about include local agricultural activity, mining operations or geothermal activity (see above for more examples). Your local council is a good source of information for likely naturally occurring chemicals in the area. Discuss any potential issues with your verifier.

To confirm whether contamination has affected your water source it might be necessary to test for the chemical of concern. Testing should be carried out by an accredited laboratory[1]. NZFSA doesn't expect food business operators to test their water for all possible chemicals found in water, but to concentrate on the chemicals that are most likely to be an issue for your water source and could be a possible risk to food.

If the water source has become contaminated with chemicals, stop using the water and take immediate action. Consider measures to protect the water source from contaminants or water treatment (see part **4** above).

1 An accredited laboratory will be able to advise you how to take a sample and the testing process. When selecting a laboratory, choose one that has been accredited to perform the test you require. A useful resource is the Drinking Water for New Zealand website www.drinkingwater.org.nz

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Treating your surface or groundwater

A private water supply is unlikely to be safe for consumers unless it's disinfected before use. However, if you have a secure well bore head, as defined in the Ministry of Health's Drinking Water Standards (www.moh.govt.nz/moh.nsf/indexmh/drinking-water-publications), disinfection won't be necessary.

A range of treatment processes is available, but the effectiveness of each type depends on the contaminants that require control. A water treatment professional will be able to assist you select and design a water treatment system that best suits your particular water supply and business needs. (Look in the 'Yellow Pages' under 'Water treatment'.)

Treatment processes include:

1. Filtration
2. Chlorine disinfection
3. UV disinfection

1. Filtration

Filtration can remove particles, chemicals, algal toxins and parasites.

You'll need a filtration system if your water supply:

- is turbid or contains a lot of suspended particles (above 1NTU – defined below). Filtering the water first will help ensure further treatment (chlorination and UV) is successful
- is at risk of contamination with sewage, farm run-off, animals that may contain parasites such as *Cryptosporidium* and *Giardia*
- contains chemical contaminants or is at risk of chemical contamination.

Topics to discuss with your water professional

- Factors determining a filter's ability to remove specific types of contaminants include the material the filter is made from, the filter grade (how fine the filter is) and the flow rate of water through the filter.
- Filters are usually installed in the reticulation system between the water source (eg, tank, bore, dam, creek) and other treatment steps (eg, chlorine disinfection, UV light disinfection).
- Cloudy or dirty-looking water will require filtration before it can be disinfected. Particles and dirt in the water make disinfection less effective. Filtering water with a high sediment load can be made more effective by adding a coagulation chemical before the water is filtered. Coagulation chemicals cause small particles in the water clump together.
- Types of filter include cartridge filters, filters containing sand or silica, ceramic filters, activated carbon filters and reverse osmosis filtration. The choice of filter and filtration method will be determined by the contaminants to be removed.
- Turbidity suspended particles in water can be measured and expressed as nephlometric turbidity units (or NTU). Water filtered for disinfection should measure 1 NTU or less.

Maintenance

Ensure filters are regularly replaced or cleaned (in accordance with the manufacturer's instructions) in order to remain effective. Filters should allow a steady flow of clean water to pass through them. Dirty filters enable bacteria to grow which can then be released and re-contaminate the filtered water. Clogged filters can also lead to more wear on the pump and the need for more maintenance. The manufacturer's operating and maintenance instructions must be carefully followed.

Monitoring

Water quality should be regularly checked after filtration. If the flow-rate decreases or the water becomes turbid (dirty or cloudy), the filter might need replacing. Some filter systems include a pressure gauge that indicates when filters need replacing.

Proving your water supply is safe

You might need to consider testing the effectiveness of your treatment (eg, by turbidity testing). Ask your water professional for advice.

What if there is a problem?

See part 4 above.

2. Chlorine disinfection

Chlorine controls many harmful microbes, but is not very effective in controlling parasites such as *Giardia* and *Cryptosporidium*, or treating water with a high sediment load. Parasites and sediment are better dealt with by filtering the water before adding chlorine (see above).

Topics to discuss with your water professional

- Chlorine can be manually dosed directly into the tank (a good method for emergency disinfection) but treatment is better carried out using an automated system to regularly inject and maintain a suitable level of chlorine.
- Chlorine is an accessible, economical and effective means of treating a large volume of water.

Maintenance

Maintain the chlorine dosing equipment so the correct amount of chlorine is used. It's important to make sure there is enough chlorine in the water.

Monitoring

If checking for free chlorine, and an online chlorine meter is not incorporated into the treatment system, a suitable test kit (such as a swimming pool chlorine kit) may be used. This will measure and monitor levels of chlorine and pH in the system and identify whether your chlorine dosing needs adjusting. You should regularly (eg, weekly) monitor the amount of chlorine in the water as it leaves the taps, to check the level of disinfectant - especially if the treatment system has not been used for a while. It is desirable to have at least 0.2 mg/L free chlorine in water used for drinking, hand washing and food preparation.

For chlorine to work effectively, the pH of the water must be 7- 8.5. A pH of greater than 8 can decrease the efficiency of chlorine disinfection.

Proving your water supply is safe

It is recommended that the water is tested weekly for checks on the level of free available chlorine (FAC) or regularly for *E. coli* (at least every three months). Ask your water professional for advice.

What if there is a problem?

See part 4 above.

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3. Ultraviolet (UV) light disinfection

Ultraviolet (UV) light kills many kinds of harmful microbes. Some UV light systems are effective against *Giardia* and *Cryptosporidium*. You'll need to check this with your water professional.

Topics to discuss with your water professional

- UV light can't penetrate dirty or cloudy water so filtration is often necessary (see Filtration above).
- In a power outage alternative disinfection (eg, chlorination) will be needed.

Maintenance

A UV light system needs a reliable power source, and regular and careful maintenance to ensure it remains effective.

A UV light system needs regular inspection and maintenance to ensure it remains effective. Always follow the manufacturer's instructions. UV lamps have a limited effective life span and need to be replaced regularly in accordance with the manufacturer's instruction, or every six months whichever is the most often.

A UV light system should be checked to ensure:

- it has a stable power supply and the system is switched on
- the lamps are intact, operating, and free from a build-up of scum.

Any repairs or replacement identified should be carried out promptly.

Proving your water supply is safe

It is recommended that the water is tested regularly for *E. coli* (at least every three months). Ask your water professional for advice.

What if there is a problem?

See part 4 above.