

Chlorination – background information

Most of the Tasman District Councils water supplies are chlorinated (see table). Many of these supplies have relied historically upon chlorination as the main or only source of treatment.

Chlorine provides excellent protection against the risks of bacteria and from some viruses. It is usually added at a treatment plant before any water is pumped into the water supply network.

Bacteria and viruses can make their way into groundwater or streams from farming activities, feral animals, birds and wastewater disposal systems. We have to assume that they may be present in the raw water of our water supplies all of the time. This microbiological contamination can make you very sick and for some people can lead to long term health complications or even result in death.

Chlorinated schemes	Non-chlorinated schemes
Wakefield	Upper Takaka
Brightwater	Motueka
Murchison	Kaiteriteri*
Collingwood	Richmond*
Tapawera	
Pohara	
88 Valley Rural	
Redwoods Valley Rural	
Dovedale Rural	
Mapua/Ruby Bay	

*These schemes have the ability to chlorinate

Other treatment

Some plants also have ultra-violet (UV) disinfection. UV disinfection uses the UV light generated from special bulbs to kill bacteria and protozoa. As the water is only being disinfected as it passes through the units, there is no residual protection after it leaves the plant.

Some of our treatment plants have filtration and settlement to reduce the amount of sediment in the water. Other sites use 'selective abstraction' which is taking water only when the raw water quality is good (for example turning off the plant during very heavy rain).

Some plants have pH correction using lime or caustic soda. This is to make the water less corrosive and isn't a method of disinfection

Why chlorinate?

Chlorination has been used for water treatment since around 1900 and is now the most widely used method of disinfection in the world.

The 2016/ 2017 Ministry of Health Annual Drinking Water Survey (see link below) reports that approximately 3.1 million New Zealanders (or 82% of people on registered water supplies) receive water that is chlorinated.

More than 98% of disinfected water in the US has been disinfected using chlorine.

The primary focus of a drinking water supplier is to supply water that is always safe to drink. The risk of contamination in the network is very real and is well documented in water supplies throughout New Zealand and around the world.

You may have not previously been sick (or *think* you have not been sick) from a drinking water supply, and so may think that the risk is acceptable, and that chlorine isn't necessary. The water we supply doesn't only go to houses with healthy adults, but also goes to nurseries, hospitals, care homes, doctors and schools.

The elderly, immune-compromised and the very young are more likely to get sick from unsafe water. This might be more than an upset tummy or diarrhoea and can lead to lifelong complications or death. It is these people in particular who we are trying to protect.

In the Havelock North outbreak in 2016, a third of the town (>5000) became sick, with at least three confirmed deaths. There were many more people with long term complications. Most people who were sick were sick for many days and the health system was overwhelmed. This outbreak was so bad that a Government enquiry was set up and this enquiry has led to many changes being suggested for the drinking water sector.

A *multi-barrier approach* to treatment/ protection is recommended by the Ministry of Health and by regulators around the world, including the World Health Organisation. This means taking as many steps to protecting drinking water as possible. This starts at the source (e.g. protecting groundwater from contamination) and then treating the water with one or two different disinfection methods before it leaves the plant, as well as leaving a disinfection residual in the network.

It is possible that the current drinking regulations will change soon and chlorination of all supplies will be a legal requirement.

So, whilst a few people may wish to de-chlorinate the water, and this is an added expense, the whole of the community is receiving a much safer water supply and being protected from waterborne diseases.

Chlorination is the norm in most of the country. Our unchlorinated supplies in Tasman are considered unusual.

How does chlorine work?

Chlorine reacts with the cell wall (and also interferes with other cellular functions) of bacteria to 'inactivate' it, meaning that it can no longer grow. If the bacteria can't grow and replicate, it can't cause disease.

At the level employed in drinking water supplies, chlorine is not generally effective at killing protozoa (such as *Giardia* and *Cryptosporidium* oocysts) as they have a much thicker outer shell, which can withstand the effects of chlorine.

The concentration of chlorine and the time it is allowed to make contact with bacteria is important. At most of our sites, water is delivered to a 'contact tank' where chlorine is added and the 'holding time' is at least 30 minutes. This allows chlorine to have a chance to kill or inactivate bacteria and viruses.

A chlorine residual is left in the water and it makes its way through our network of pipes and reservoirs to the very last house at the end of the line. This 'residual' of chlorine in the network is just as important as the chlorine at the treatment plant. It protects customers from the risk of re-contamination which may occur in the network.

Network contamination risks

Normally water comes from a plant and either makes its way directly to your meter or may go to a reservoir first. The water will be under pressure in the pipes during normal operation.

Sometimes pipes break or burst and during that time there is very low or no pressure in the pipes. When these breaks are repaired, the servicemen are careful to install clean pipes and flush water to waste afterwards, but even the smallest piece of dirt can contain bacteria. If the pipe is deep (and below the natural groundwater level) or the repair is being made during heavy rain, it's hard to keep the pipe totally clean.

Although it's rare, sometimes people make an illegal connection to water schemes or take out /interfere with the backflow protection at their water connection (meter or restrictor). This means that if the pressure in the main line drops, water could siphon back from their property into the main. This water could be unsafe to drink; for example, if someone had a hose filling a stock-trough or a swimming pool straight from the main, and there was a break, water from the trough or pool can be sucked back into the system. If a neighbour is running their tap at this time, they could drink this water.

The Council has a backflow requirement in its Water Supply Bylaw ([LINK](#)) and also a leaflet explaining explain how this can occur in rural properties ([LINK](#)). All of our new water meters contain backflow protection

Reservoir roofs can let in tiny amounts of water in through cracks in the concrete or through loose roofing sections/ or screws after high winds. They need constant attention and repairs to make sure they are water tight. Birds often perch on top of reservoirs and we therefore find bird faeces on all reservoir roofs.

Windy weather can whip up dust and debris around our tanks and this can enter through the breather pipes of reservoirs.

If there is chlorine in the water, it will react with any bacteria which has got in this way and deactivate it, keeping the water safe to drink.

My water tastes odd - is it still safe?

If a supply is being chlorinated after it hasn't been chlorinated before, there will be an odd taste for a while. This is because non chlorinated supplies build up a layer of slime in the pipes. This is normal, and even chlorinated supplies can have slime within the pipes. When chlorine reacts with organic matter it forms 'disinfection by-products'. One form is *chloramines* and these are the same chemical that you can smell at the swimming pool. These can taste quite strong even at low levels and so the water might taste slightly metallic or have an unusual taste that's hard to describe. Once the pipes have been chlorinated for a while, this odd taste will go away and you will be left with just a slight chlorine taste. If you drink water from a supply that has always been chlorinated the taste is quite different. Some people don't really notice it, or don't mind it. Some people find it really puts them off drinking water. This is your personal taste and there is no right or wrong.

Disinfection by products are a health concern and so they are monitored in the scheme where they are at risk of forming – in particular, schemes which take their source water from

streams (Dovedale, Pohara, Upper Takaka, Eighty-eight Valley). They haven't been found to be a concern in any of our supplies.

If your water has always been chlorinated and suddenly tastes (or looks) different please let us know and we will check to make sure that it is safe.

What can I do to make chlorinated water taste nicer?

Purchasing bottled water is always an option, but it is expensive (and not very eco-friendly) as a long term option. For comparison, a one-litre bottle of water in the supermarket might cost anything from \$1-\$4, whilst you only pay around 0.2 cents per litre for water through your meter.

Activated carbon filters can remove a lot of the chlorine and are cost effective for household use. If you are only concerned about the taste of water in your kitchen you have two options:

- 1) Install an under the sink filter (this is best done by a plumber). The filter cartridge will then need to be changed annually or as advised by the manufacturer.
- 2) Use a handheld carbon filter jug which will fit in your fridge. You can purchase these from local kitchen and department stores. This is a simple plastic jug which fits in the door of your fridge. You fill the top section with water and it filters slowly through a removable carbon filter into the bottom section of the jug where water can be poured into a glass. It can be used numerous times.

If you don't like chlorine in your bathroom as well, and have sensitive skin, you may find that the best option for you is to install a filter where the water comes into your house. These are widely available and can be installed by a local plumber. You don't need a multi treatment unit, just a carbon filter.

In a water scheme that has been chlorinated for a long time, the chlorine will more readily come out of the water if left in a jug at room temperature (or poured from one jug to another several times). Chilling water by putting it in a glass bottle in the fridge may also make it taste much nicer.

My skin is itchy- is it the chlorine?

A very limited number of people have very sensitive skin and may find that chlorinated water makes it a bit drier. You may find you have the same reaction after swimming in a chlorinated pool. In this case, you may wish to install a carbon filter where the water enters your property (as noted above).

If the water quality doesn't seem to have changed and you suddenly have itchy skin, it may be linked to something else. We have a couple of recorded cases of this which have been linked to hot water cylinders that are set at too low a temperature. If the water is not hot enough, bacteria can grow in the warm water which can make it unsafe to drink and cause skin irritation. The temperature should be at least 60°C at the cylinder (but not much more) and no more than 55°C at the tap.

If you are concerned it might be the Council water supply, give us a call and we will check that the water is safe.

If you have a rash after spending time in a pool (especially if it's a spa pool or a private pool) or swimming in the sea/river, that could be related to bacteria/parasites and its best to see a doctor.

Can chlorine affect existing health conditions?

Chlorine can be an irritant for an existing condition such as asthma or eczema. If you feel your skin getting dry or itchy, use moisturiser after having a shower or bath. If you notice increased skin irritation, asthma symptoms or other symptoms – seek medical advice from your GP. You can also contact Healthline any time on 0800 611 116 for free health advice.

Where can I buy a carbon filter jug for my fridge?

There are lots of websites selling these types of filters. If you want to buy locally there are also numerous suppliers in the Richmond/Nelson area where you can buy in-store e.g. Farmers, Bunnings, Mitre 10, The Warehouse and Briscoes. Other kitchen shops and hardware stores may also stock them.

Please be aware that there are some other filter jugs available which are more expensive and which claim to produce water which is 'healthier' for you. You only need a basic carbon filter to remove chlorine.

Useful links

[Tasman District Council Water Supply Bylaw](#)

Want to know more about the Havelock North enquiry and the effect of the outbreak?

- The Hastings District Council have lots of links here:
<https://www.hastingsdc.govt.nz/services/water/havelock-north-supply/>
- You can also find information about the Havelock north enquiry here:
<https://www.waternz.org.nz/Havelock>

The New Zealand Drinking Water Standards (NZDWS) regulate how we treat water. you can find the full document free here: <https://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

The Guidelines for Drinking-water Quality Management for New Zealand are an aid to those using the NZDWS and contain lots of information about treatment and acceptable contaminant levels. (Note- these are very large documents if you are going to print them out) <https://www.health.govt.nz/publication/guidelines-drinking-water-quality-management-new-zealand>

Latest published MoH Annual Drinking Water Survey (as of Nov 2018):
<https://www.health.govt.nz/publication/annual-report-drinking-water-quality-2016-2017>

The Water Quality and health Council (based in the US) has numerous articles on water disinfection and health: <https://waterandhealth.org/safe-drinking-water/>

A long, but easy to read factsheet about chlorination produced by the American Chemistry Council: <https://chlorine.americanchemistry.com/Chlorine-Benefits/Safe-Water/Disinfection-Practices.pdf>

This Canadian site <https://www.safewater.org/> has educational resources about drinking water, including a factsheet about chlorine: <https://www.safewater.org/fact-sheets-1/2017/1/23/what-is-chlorination>