Information Sheet 1

Ensuring our drinking water is safe

The chlorine debate: to treat or not to treat water

Water is a fundamental taonga (treasure) and is vital for our way of life. Yet in many ways we have taken our quality drinking water for granted. As a country, we have an abundance of clean water as well as a regulatory environment that imposes high standards over our drinking water. However, we still have to manage our water carefully and even with the most pure water from deep aquifers, there is still a risk of the water being contaminated from waterborne pathogens (disease causing microorganisms). These can get into a water supply at just about any stage including river intakes, aquifers, treatment processes, reservoirs and pipes repairs.

Unsafe drinking water is a major problem worldwide. More than 500,000 children die each year from unsafe drinking water and poor sanitation. That equates to 1400 every single day.

Chlorine provides a most effective treatment

In 2000, Life magazine declared the filtration of drinking water, plus the use of chlorine, to be the most significant public health advance of the millennium. Along with inventions and discoveries such as the steam engine, penicillin and telecommunications, filtration and chlorine made the top 100 list of events, inventions, and discoveries that have made a major impact on our lives.

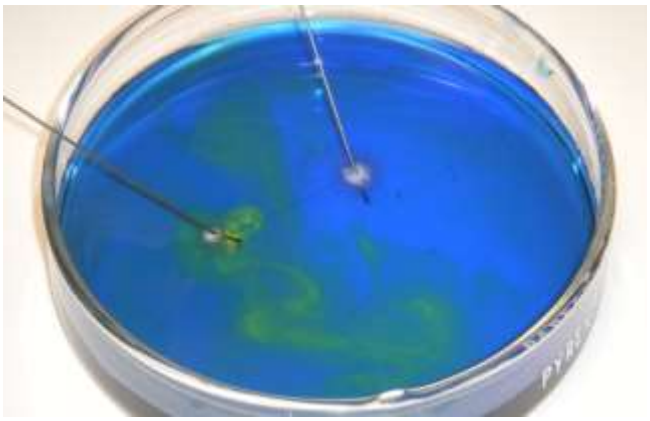
While there are now alternatives, chlorine still provides one of the most effective ways of treating water because it disinfects the water all the way from the source through to homes and businesses.

Chlorine kills small bugs that can get through filtration systems such as bacteria and viruses that cannot be physically removed from water. Included in this are salmonella and *E.coli*.

Why regular testing is important

Chlorine doesn't kill all bugs. That's why, even with treated water, it is important that councils regularly monitor and sample water supplies. Most councils check water for contamination at multiple places within the water supply system at least every few days.

As well, it's important to remember that the tests will only tell us the state of the water at the time of the test - in other words, looking back in time. Therefore it's possible for water to become contaminated between tests - in the time it takes to do the tests and get the results. It can also be a little like fishing. Samples can be collected from several sites but the pathogen organism may not be in those particular samples and it could be sometime before the pathogen population has spread far enough to pick up an alert.



What is tested for?

Escherichia coli (*E.coli*) is the most common bacteria test carried out. It's the canary in the mine and is used as an indicator that other risks may be present in the water supply system. It takes 24 hours to process an *E.coli* test meaning that the by the time you get a result it is telling you that the water that was at the site yesterday at the time was safe.

E. coli bacteria normally live in the intestines of people and animals. Most *E.coli* are harmless and actually are an important part of a healthy human intestinal tract. However, some *E. coli* are pathogenic and can cause illness outside of the intestinal tract.

If a water system has been chlorinated, other tests such as continuous chlorine monitors or manual spot checks of chlorine residuals throughout the water supply system can confirm if there is a low risk of bacteria being present. The rate at which chlorine depletes in the water supply system can also provide an indicator that bacteria may be present. This is because chlorine gets depleted as it destroys organisms.

Other ways to treat drinking water

Chlorine does not protect against protozoa (cryptosporidium or giardia). The need to treat for protozoa depends largely on the risk of them being present in the water supply source. A

secure aquifer source has a very low risk whereas a river intake downstream from a cow paddock would be a very high risk. Protozoa are larger than bacteria and can be removed by micro-filtration of the water to less than 1 micron. This treatment is fairly commonplace in New Zealand now.

Ultra Violet light (UV) is becoming a common method of treatment in New Zealand. It is capable of stalling the growth of bacteria and protozoa. But it does not provide a residual benefit in the water supply system if a contamination occurs after this process such as in the pipes.

Ozone has a different method of disinfecting the water but is similar in that it doesn't provide a residual barrier to the water supply.

Boiling water will kill both bacteria and protozoa. That's why this is the fall back option sometimes used if a risk become present.

Taste

Taste is important when it comes to drinking water. Many people understandably don't like the taste of chlorine. But chlorine is added at very low doses. The Drinking Water Standards (2008) have a guideline dose range 0.6 – 1.0 grams of chlorine per cubic metre of water as the acceptable level to provide drinking water protection. The taste of water can be affected by many things including minerals that occur naturally such as calcium and magnesium.

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