

Aquarius Drilling Services

Water Bore Construction - Pump Installation - Irrigation - Water Treatment

Factory 28, no 94-102 Keys Rd.
Moorabbin Vic 3189
Website: www.aquariusdrilling.com.au

Tel: 03 9555 2524
Fax: 03 9553 2090
Email: aquariusdrilling@hotmail.com

BACTERIA CONTAMINATED WATER SUPPLIES

Private Water supplies are always at risk of bacteria contamination. This can make people quite ill.

Water supplies included in this discussion are limited to

- **Dam water**
- **River water**
- **Spring**
- **Rainwater**

The subject of this information sheet is to relate the importance of removing bacteria from water supplies for potable use.

The most common contamination problems are from harvested rainwater and dam water.

Dam Water

This is harvested as run-off water, usually collected and stored in a clay base dam and from that moment soaks up colloids (fine clay particles) and turns to a light brown, yellow or milky colour.

No one would normally choose to consume such obviously affected water. The supply needs to be treated, filtered and often chlorinated before use.

Dam water treatment

The treatment can include but is not limited to:-

- chemically flocced into a properly designed treatment tank and that will remove all contaminants including bacteria, or
- filtered by Ultra Filtration without use of chemicals and the same result will be achieved.

There are pitfalls for the latter where some substances cannot be removed by UF and they will damage the membranes. Dam water can be considered somewhat difficult to clean up successfully and each treatment approach is based on a case by case application.

River water supplies

These vary enormously in flow and quality during seasonal changes and can be treated as dam water but this changes when the mineral content increases and then the mineral content has to be dealt with also.

Spring water

This type of water supply can vary considerably from being such high quality to not much better than poor quality bore water. A “spring” is a water supply that flows without support (pumping) out of the ground. This fact does not control the quality and it can be quite poor.

Rainwater

Rainwater is well known as also potentially a high risk for contamination of any water supply during the catchment and reticulation. It falls free from the sky, drops on roofs, flows into guttering, collects bird poo laden with bacteria, dust, dirt, tannin or colour from leaves lying in the guttering.

Rainwater carries very little mineral base and is aggressive in behavior so what it flows against is what is absorbed. If the roof is inert such as colourbond, or properly sealed roof construction then it cannot absorb much more than described previously (bacterium) and that is enough to cause fouling.

Other roofs where various types of metals are present such as copper, aluminium, zinc, etc will cause all those metals to be absorbed by the flow of water and this again renders the water non-potable.

Bacteria grows in plumbing

The private water supply then flows through down pipes which are full of bio-film from all contaminants as previously mentioned and fouls it further with water that has been left sit from the previous rainfall event and that bacterium has grown to high levels and it can really create quite a strong earthy odour at this moment.

Storage and reticulation

The rainwater is then stored and reticulated through plumbing to taps for use.

Bio-film growth

The bio-film grows faster on the inner walls of the delivery pipes as it is in a tight area. The bacteria explodes in number and starts forming a community developing a protective membrane over itself on the inner walls of a pipe and we see or feel it as slime.

It develops faster and more often on regular use taps and more so in hot water services where it is warmed up so that it can grow even faster. When developing the membrane covering it changes form from one to another and during warming by water heaters.

Bacteria in excess of 30,000 plus colony forming units in 1ml can form into salmonella.

So, is your water supply safe to drink?

Responsibility on suppliers

All persons supplying drinking water to the general public in any premises must take the appropriate steps to ensure that such drinking water is potable.

There are guidelines called the Safe Water Drinking Guidelines as adopted by all states. Some of these bacterium types are listed below to assist you to have a basic understanding.

Bacterium

Esherica Coli (E Coli) should not be detected in 100ml of water of drinking water and if detected immediate action should be taken.

Salmonela grows out of E high Coli levels

Legionella is a risk factor from warm water systems where mist spray is apparent and can come from E Coli but mores so the bacterium following. Legionella can cause Legionnaires disease.

The effect of bacteria contaminated water consumed by persons will show as stomach aches, ear aches and lethargy in that person.

Cysts

Cryptosporidium is a cyst

Giardia is a fellow cyst

Both the above cysts will cause diarrhoea to humans.

Testing for bacteria

The standard tests adopted in Victoria in recent years for a good picture of bacteria contamination on a sample of drinking water to meet the guidelines are quite simple.

E Coli

Total Plate Count

Note: There are strict protocol on the sampling and handling of all bacterium samples for acceptance by an approved water science laboratory.

Removal of bacteria

Bacteria is best disinfected out of the supply water.

Chlorination

Australian water authorities adopt or re-sellers generally adopted chlorination. This chemical, when released in water, creates a high oxidant atmosphere that kills organisms and carries a chemical residual for long distances that continues to kill or disinfect the organisms out of the water supply as it travels to the user.

This is a cheap chemical but also requires high maintenance to keep its effectiveness. The pH of the water supply being treated is critical or it will not release the chemical into water as chlorine. Unfortunately it has many by products that can be problematic known as Post Chlorine By-products. The taste and the smell of the water is often also rejected by many these days and they choose to buy bottled water to drink.

Ozone

Extremely effective, highly efficient but with very little residual effect and will not retain the disinfection ability of long distances. It has no by-products and is basically very dry air with another molecule of oxygen attached. It has very high oxidizing ability as it is highly unstable and highly reactive thus very good at oxidising organics, including bacteria.

Ultra Violet

In the simplest terms this method produces intense ultra violet waves of light that are contained in a chamber with water flowing around. The water supply needs to be extremely clean for this to be effective as it will not pass through sediment or colour particles but will simply bounce off and the kill or disinfection effect is lost.

Effective filtration prior is critical. Ultra Violet carries no residual ability outside the chamber. It is quite passive in operation.

The plumbing down-line must be disinfected after installation. This is usually performed by a potable chemical that leaves no residue.

Ultra Filtration

This is advanced membrane filtration designed to remove, colour, fine sediment, bacteria from water supplies, then pump into a storage tank following. This is an excellent system for water supplies such as the Murray River.

Recommendation for disinfection

In most cases, effective, good quality filtration, followed by Ultra Violet disinfection and a bio-strip of the plumbing after will cure all bacteria problems.

Accurate 1 micron sediment filtration will guarantee the removal of cysts.