

# Aquarius Drilling Services

Water Bore Construction - Pump Installation - Irrigation - Water Treatment

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## Restoring bore pump performance

Do you have a problem with a bore pump that blocks up with red mud like residue?

or

It is apparent that the bore water supply has lost performance through the pump.

Both of these problems are caused by the iron, bacteria and calcium plugging the impellers of your pump and coating the inside of the plumbing causing restrictions and flow failure.



## Explanation

The bore water warms slightly passing the motor drive of the pump, this increased the oxygen activity and calcium bonds with the oxygen, the bacteria feeds anaerobically off the iron and this mess grows into a soft slushy cocktail of compounds commonly known as iron bacteria.

It actually is misnamed as the other substance that bonds the mess is calcium carbonate.

We recognize three major substances in the mix. Calcium as calcium carbonate, iron and bacteria. Manganese will also feed bacteria along with sulphur. The residue can appear in colour from brown to very dark brown.

Bacteria can grow at a very fast rate. Iron being present speeds the growth by supplying a feeding medium.

This muddy looking substance will load up impeller cups and render a pump useless. The pump continues to spin but has actually lost the ability to pump water.

So what is this calcium-iron-bacteria problem? Generally it often produces the result shown below in pipes and bore pumps.

Caused by 22ppm iron, bacteria and low hardness levels



Caused by 11ppm iron and 400 hardness



What you see in these photos is iron affected bore water. This is iron feeding bacteria, becoming slimy, mixing with calcium and making a sticky mess. The water in the photo to the right remained blood red as the bacteria contaminated water keeps the iron so light that it remains colloid like in behavior and will not settle out to clean water.

All bores produce various levels of calcium naturally and calcium will readily crystallize to a solid with oxygen and stick to surfaces. When iron is

present without bacteria it becomes dry, hard as iron oxide and is quite crusty and can take on the appearance of rust.

## **Bacteria**

Add bacteria and the substance becomes quite moist and sloppy as a soup or mud like. That is iron, calcium and bacteria in water.

The calcium content is the major proportion of the mess by percentage and that may be hard fact to accept even though it gives the appearance of a major iron problem.

It can take as little as .4ppm of iron can do the damage.

This red mess plugs up pump impellers, pipes, drippers, filters and usually whatever comes into contact. So how do we deal with it?

## **Solution**

We use an acid that is designed to target the calcium and kill the bacteria so that the substance will lose its grip on surfaces become a liquid and be pumped out easily.

This acid is supplied as a dry powder and is then mixed on site with water and the bore is treated with it.

The picture shown below is a mild example of the treated water being pumped out of the bore with the acid mix. The colour can become quite dark and pungent.



## **Filter and membrane cleaning**

This product has proven to be a must where iron has fouled sediment filters causing costly excessive replacements.

We use the product to clean iron and manganese fouled reverse osmosis membranes on site without membranes requiring removal and keep them clean with regular use.



## **DIY**

This treatment comes with a list of equipment and instructions for use. We encourage efficient use of the product as it is very effective when used properly.

Properly applied the solution will clean the pump, plumbing and bore screens.

### **Bore pump clean up**

The treatment is quite fast, usually within an hour and the method is detailed with the information pack in the treatment. It will successfully clean up any bore problem and restore the flow.

### **Ongoing bore hole treatment**

This treatment will not always provide a lasting solution but it will get the pump back to maximum production.

For a more permanent solution to this problem and to keep the pump at its peak of efficiency each bore supply has to generally be treated on a case by case application as there are many variances involved.

## **Iron removal from the bore supply**

There are a number of ways to remove iron from a bore water or any water supply.

### **Water Softening.**

Water softening is the most efficient and with the correct equipment, enough hardness present, up to 25ppm of iron can be removed direct on line from the bore supply.

### **Aeration**

The most common method and the often the most misunderstood. Successful aeration involves pulling air into a body of water which means a storage tank.

Spraying water into the air is not efficient aeration as it is air-borne for such a short time. Drawing air underwater creates much greater contact time and is much more effective. Iron needs to turn to a solid to be removed from the water supply.

### **Chemical removal**

Chlorine is the first chemical removal method. It oxidizes the iron out more efficiently than air as it artificially raises the oxidant atmosphere. Air can get the oxidant level up to around 250mv as a measure which is quite high for air and chlorine can take it to 800mv. Tank treatment or on line where suitable.

Anti-scalents can hold iron in suspension and make it totally unavailable to compound with oxygen and it remains soluble and inert. Costly to run but highly effective where there is no room to move such as a domestic garden.

Chemical floccing is complex and not for the feint hearted.

Ozone is highly effective. Capital costs are high but the results are very good and this method will knock out bacteria and odour also if applied correctly. Ozone is O<sub>3</sub> but very reactive and quite a powerful oxidizer and needs a treatment tank.