ENIGMA
ELECTRONIC WATER DESCALER

Scalewatcher™
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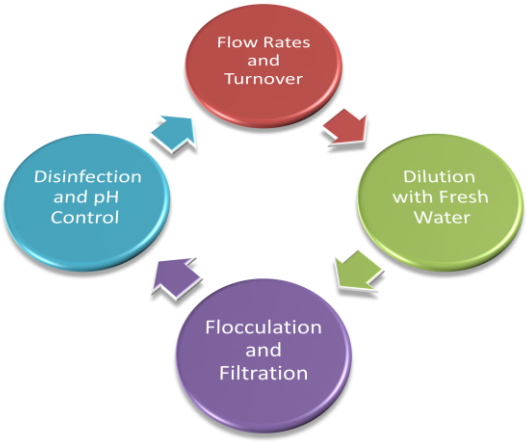
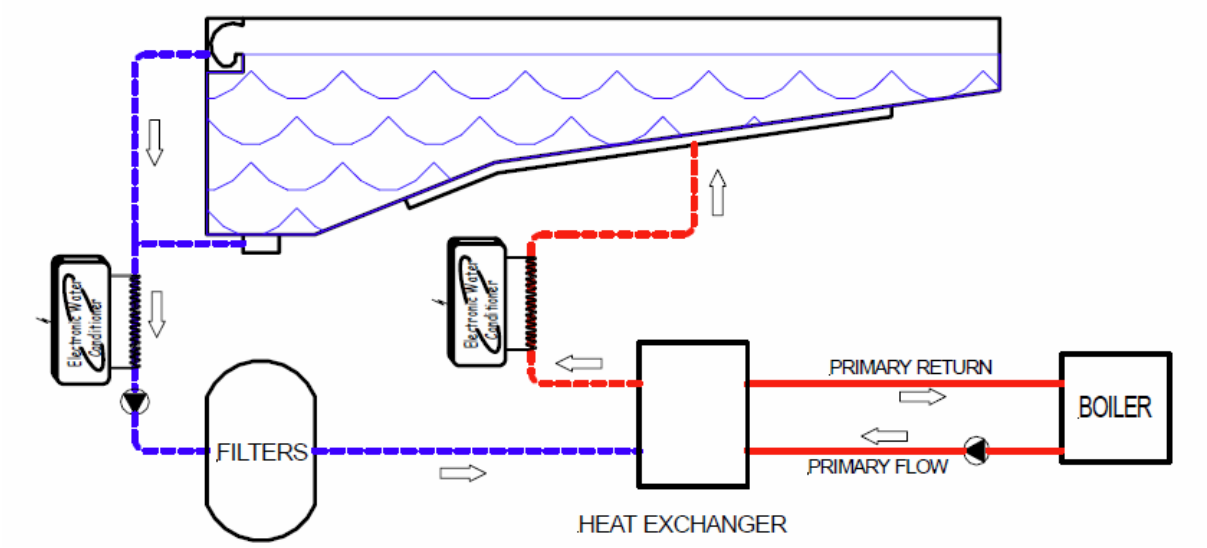
INSTALLATION ON A SWIMMING POOL

Swimming pools present a unique problem with regard to scale prevention, and general water cleanliness. The primary aim of any pool operator is to provide safe and pleasant bathing conditions, summarised by the list below;

- keeping the water free from harmful bacteria and algae
- ensuring the water is neither toxic or irritable to swimmers
- preventing the formation of smells and undesirable tastes
- the prevention of corrosion
- the prevention of calcium scale in the pool and filters



Maintaining the water balance is a difficult task as a change to one parameter can negatively affect another. The solution is to install **Scale*watcher* *OLYMPIC*** on the pool. The **Scale*watcher* *OLYMPIC*** electronic water conditioner helps vital equipment perform better, ensuring improved water balance and subsequent cost savings.



A typical installation layout for a swimming pool

HELPING FILTRATION

The main purpose of filtration is to remove suspended solids and colloidal material to maintain water clarity. However very fine colloidal material will often pass through a pool filter and build up in the pool water causing the water to become cloudy and "dull". Traditionally pool operators have added flocculants (such a polyaluminium chloride) to cause the colloidal material to form together as larger particles and be removed by filtration. They also have the added advantage of flocculating bacteria so that they can be removed through filtration.

However products such as these are very acid and present handling and dosing issues. Further, iron based flocculants will leave residual iron in the water that can cause staining.

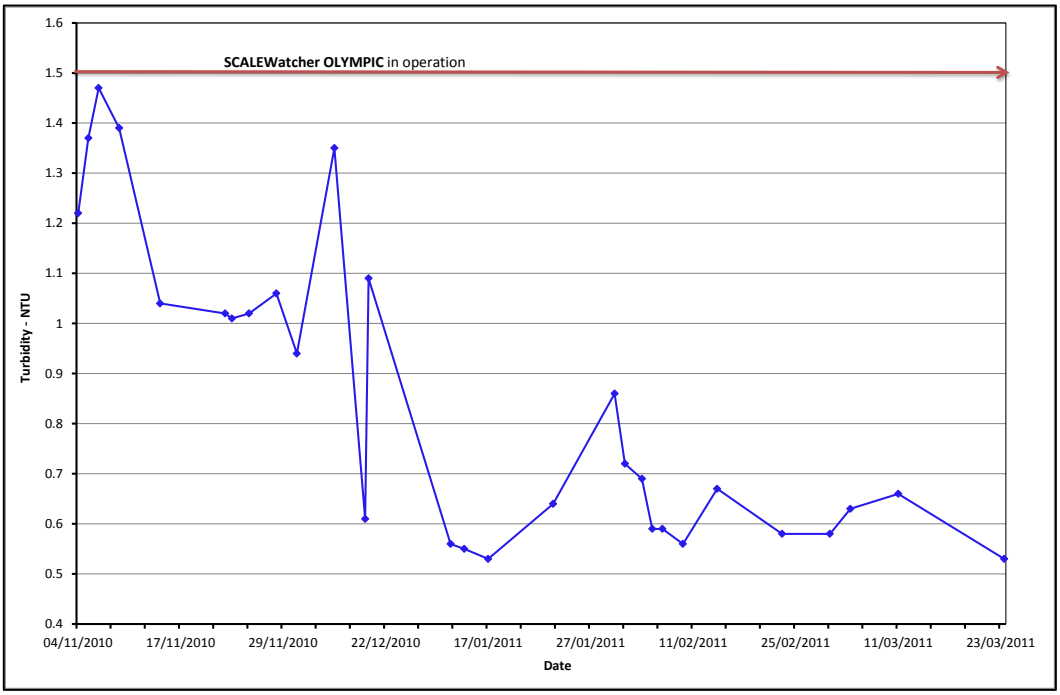


Fig.1. Leesland School Pool Turbidity

The solution is to install **Scale*watcher* *OLYMPIC*** to the filter feed line. The oscillating frequency waveform used in our product induces flocculation by increasing the particle charge on the surface of colloidal material. Figure 1, shows the effect of **Scale*watcher* *OLYMPIC*** on the turbidity of the swimming pool water at Leesland School in Hampshire. The turbidity has been reduced by >50%.

REDUCING CHLORINE DEMAND

Pool water disinfection is essential for the health and safety of bathers, and it is critical that the levels of bacteria and algae are kept to an absolute minimum. At the same time it is also crucial to ensure that nitrogen compounds are kept to a minimum as they react with free chlorine to form chloramines which give of the a characteristic "bleach" smell and can irritate the eyes and throat.

The use of hypochlorite based bleaching agents is the most common method of disinfection in pools. Whereby the hypochlorite ion breaks down in water to form hypochlorous acid (free chlorine). Inefficient flocculation and heavy calcium scale (a bacterial nutrient) in a pool can lead to an increased demand for chlorine. Excessive chlorine dosing can lead to the following problems;

- increased pH and subsequent increased addition of acid to reduce pH
- increased alkalinity and hardness if calcium hypochlorite is being used
- increased costs and manual labour
- increased backwashing / dilution to remove chloramines

Because **Scale***watcher* ***OLYMPIC*** can improve filtration and remove scale deposits it can help reduce chlorine consumption and help maintain a better pH. Figure 2, shows the effect of **Scale***watcher* ***OLYMPIC*** on hypochlorite consumption at Warlingham County Secondary School.

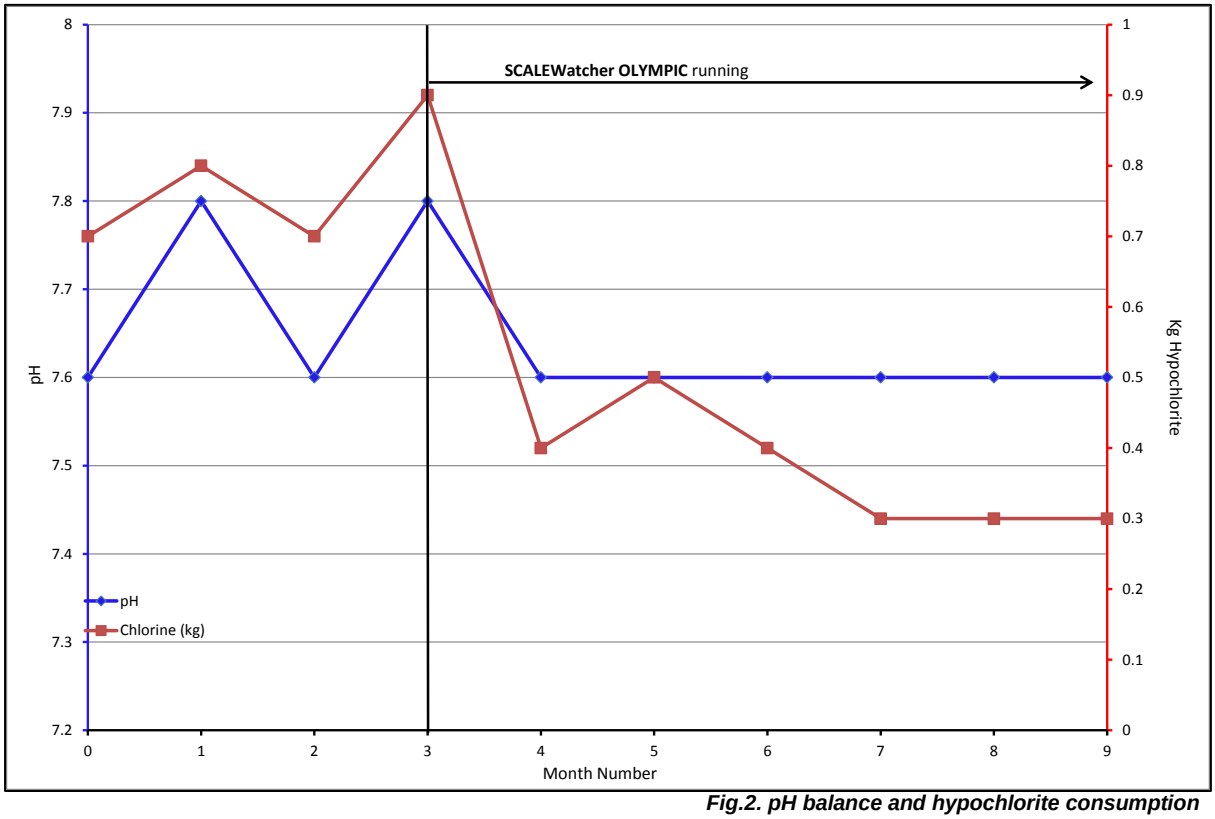


Fig.2. pH balance and hypochlorite consumption

GENERAL POOL QUALITY

The appearance of a pool is critical in a competitive commercial environment. A clean sparkling pool will entice customers to come back, as will the general experience of their bathing. Total Dissolved Solids or TDS is a measurement of the total sum of dissolved compounds in the water, such as minerals and chemicals, and therefore gives a good indication of the general water “health”. High TDS levels (>1500 mg/L) can lead to a number of unwanted side effects such as;

- a salty taste to the water
- a general dull / lifeless appearance

Because Scale*watcher* ***OLYMPIC*** works to improve filtration and reduce chlorine consumption the level of TDS in treated water is also reduced, giving the pool water a “crystal like” quality. The diagram below shows the reduction in TDS at Leesland School.

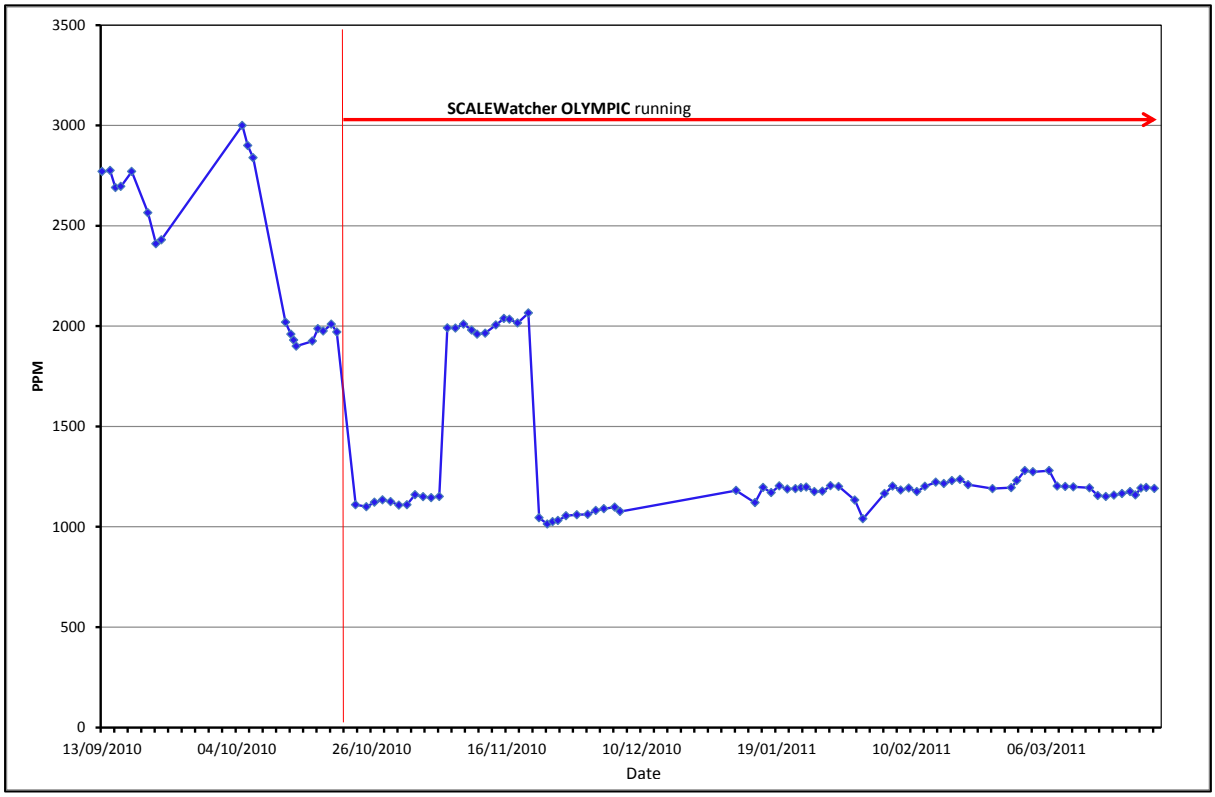


Fig 3. Pool water TDS at Leesland School

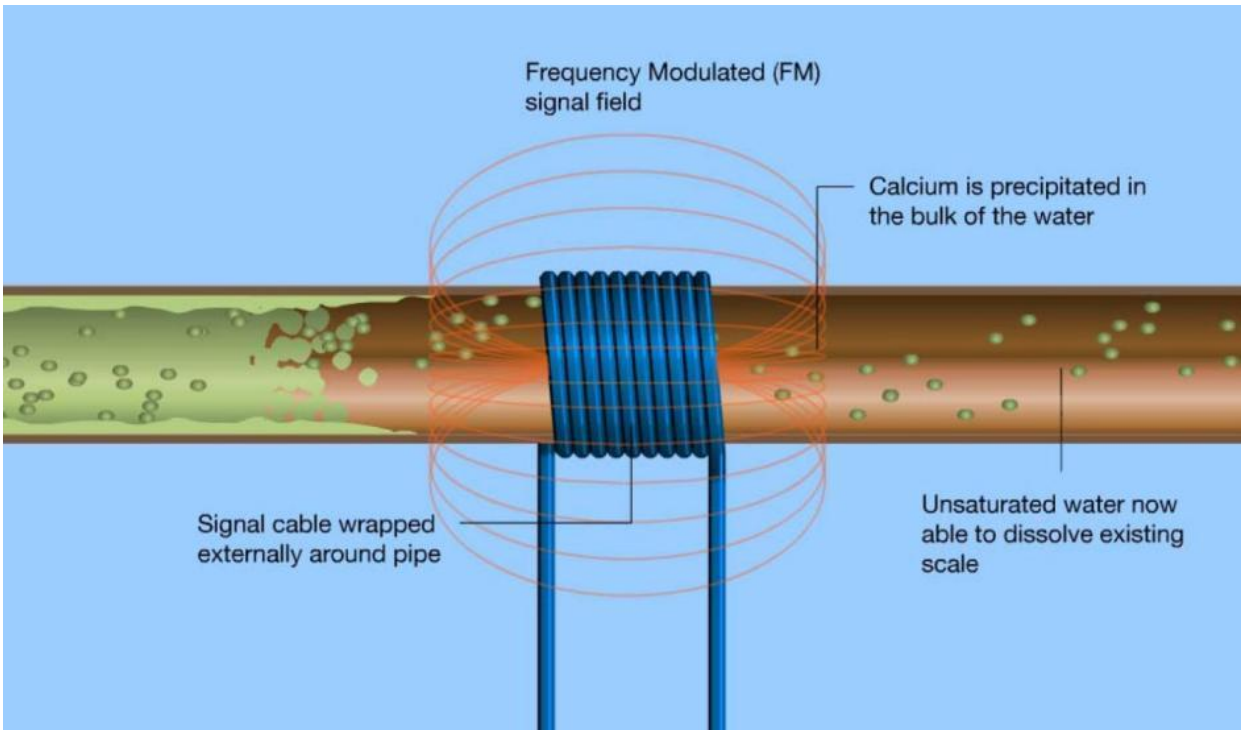
HOW DOES SCALE OCCUR?

When hard water is subjected to energy, either in the form of heat or pressure, the dissolved calcium bicarbonate in the water is precipitated as calcium carbonate. A small positively charged hard crystal forms, which immediately gets attracted to an opposite charge. This is usually something man-made, such as pipe walls, heating surfaces, etc. Further precipitated crystals then seed onto this surface and a hard scale continues to grow in an accelerated fashion.

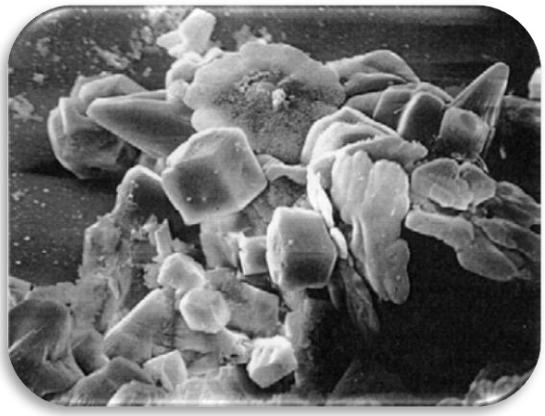
The picture above shows this hard, Velcro like crystal magnified 1500 times.

THE SOLUTION TO PREVENT AND REMOVE SCALE

The patented **Scale***watcher* **E*NiGMA*** generates a complex frequency modulated signal, which is applied by simply forming a coil around the outside of the pipe. The objective of applying these thousands of differing frequencies simultaneously is to induce a voltage in the water, match the resonant frequency of the dissolved ions and thereby give them sufficient energy to release the carbon dioxide and break their bond with the water molecules.
The principle of resonance is well known and widely used by engineers. It uniquely results in more energy being created than is applied. A practical illustration can be demonstrated by an opera singer who, when maintaining the coincident pitch (frequency), creates sufficient energy to shatter a glass.



This enforced precipitation results in a crystal forming which seeds onto other ions in the water, (such as zinc, iron, etc). The picture to the right clearly shows the different crystal formation resulting from being prematurely precipitated by **Scale***watcher* **E*NiGMA***.
This simply gets carried through the water system and down the drain.



INSTALLATION ON HUMIDIFIERS

There are various methods of humidification in current use for steam generation applications and all of them, naturally, involve turning a body of water into millions of tiny droplets so that the air passing through the device becomes more humid before being passed into the ductwork system for distribution. Unless the humidifier is kept free of scale and corrosion the process becomes costly and less effective. Of course the humidifier must also be kept sterile or the process is bound to transmit unwanted microbes into the distribution system.

Untreated humidifier bottle

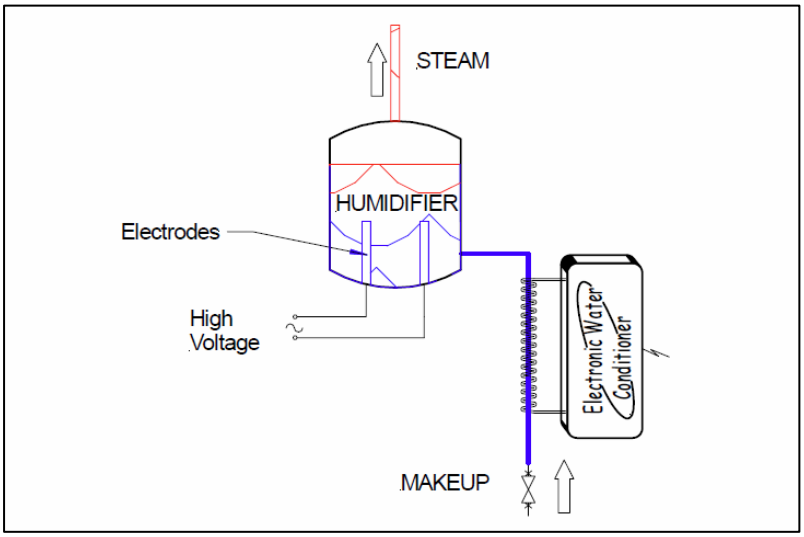
The humidifiers quickly became encrusted with scale necessitating the frequent replacement of cylinders. An insulating build-up of calcite on the heating element will prevent efficient heat transfer and lead to premature failure of the element.

THE SOLUTION

Install Scalewatcher on the cold water feed. This will limit scale deposition to a manageable level of soft powder, which is easily removed by regular draining and flushing. This last function is important to prevent scale migration to the hottest point of the system i.e. the element. It is of particular importance in pressurised systems. Best results are obtained by the de-scaling the complete unit prior to the installation of Scalewatcher.

Treated with SCALEWatcher ENiGMA

The build up of scale in humidifiers not only increases the costs of maintenance and capital equipment but also may have detrimental health effects as scale can provide a breeding ground for bacteria. Electronic descaling not only saves costs on maintenance, downtime and capital equipment but also ensures that the environment being humidified remains germ free.



Typical installation humidifier / steam generator