

## Appendix A - Electrocoagulation

### Electrocoagulation

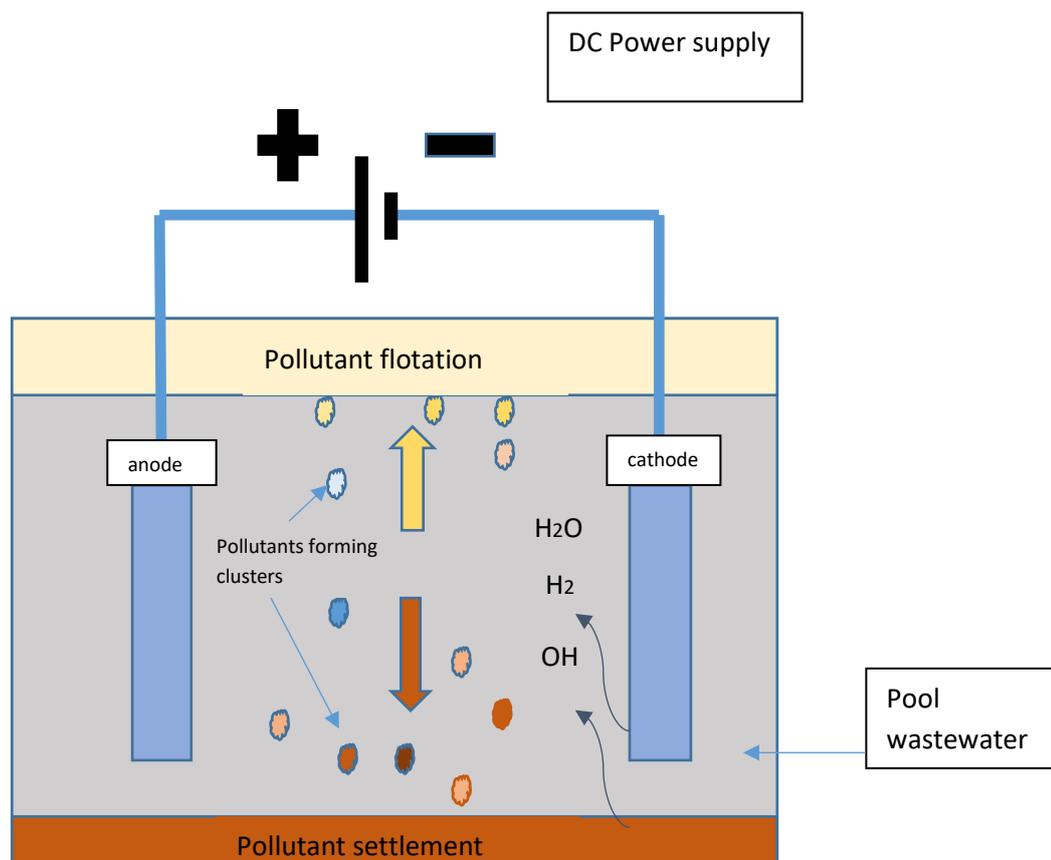
Electrocoagulation is a process using the principles of electrolysis in which oxidation and reduction reactions take place when electric current is applied to a conductive solution (in this case pool wastewater). At its simplest, an electrocoagulation system consists of an anode and a cathode made of metal plates submerged in wastewater. Electrocoagulation is used worldwide treating all manner of wastewater applications typically in the mining, textile, and food industries.

A typical coagulation unit consists of electrodes, settlement tank and associated pipework.

### Basic Principles of Electro Coagulation

Fig 1; The electrodes by electrolysis destabilize pollutants present in the solution causing them to cluster and bunch up and separate from the water by settlement or flotation. Microbubbles ( $H_2$  and  $O_2$ ) released at the electrode surfaces bring about the flotation by adhering to the clusters and carry them to the water surface.

Fig 1



The backwash wastewater at Kingfisher and at any other swimming facility typically contains varying amounts of  $COD^*$ ,  $BOD^*$ , colloids and soap oils. Treatment of this waste by electrocoagulation allows 90-95% of the water to be recycled and reused. The treated water will



already have been heated and will only require limited reheating to achieve the required pool temperature. This compares to the heating of incoming fresh mains water (6-12°C) up to 30°C.

Total dissolved solids (TDS\*) is a problem with pools and especially in hard water areas can cause problems as high levels can erode grout between poolside tiles. The present method to reduce TDS is to drain and backfill with mains water. Electrocoagulation significantly reduces the quantity of TDS and subsequently reduces the requirement for draining and backfilling.

*\***BOD** is related to the biomaterial present in water. The BOD value is most commonly expressed in milligrams of oxygen consumed per litre of sample during 5 days of incubation at 20 °C and is often used as a measure of the degree of organic pollution of water.*

*\***COD** is related to all material present in water. The most common application of COD is in quantifying the amount of oxidizable pollutants found in wastewater. COD is useful in terms of water quality by providing a benchmark to determine the effect an effluent will have on future use.*

*\***TDS** is a general overall measure of the dissolved combined content of all inorganic and organic substances contained in a liquid in molecular, ionized or micro-granular (colloidal soil) suspended form.*