



MODIFYING PLANT OPERATION FOR ADVERSE CHANGES IN RAW WATER QUALITY

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The Problem:

During February 2005 the Goulburn region received heavy rainfall, 117mm recorded over 2 days and this was uncharacteristic for February.

The previous years February had only 5mm recorded and January had been dry both years with only 5mm recorded.

Run off from farms and a build up of organic matter in the Broken River was washed down through the Goulburn River resulting in sudden increase of colour, turbidity and erratic pH.

Compared to previous years the colour was high and turbidity relatively low requiring changes to be made to plant operation and chemical dosing to successfully maintain supply of good quality water.

With low turbidity it was more difficult to form floc due to the colour having no suspended particles to adhere to.

Our options:

1. Add Bentonite clay to aid coagulation and colour removal through absorption and ion exchange, allowing a larger floc formation with suspended solids that can be precipitated out of the water then more easily filtered.
2. Use Powder Activated Carbon where particles adhere to the surface by charge differences and organics are absorbed by the porous carbon.
3. Increase the polyelectrolyte dose to create longer chains of more robust floc, increasing the surface area and weight to allow better settling or floatation dependant on the plant type.

Solution:

The 3 options work on similar principles however increasing the polyelectrolyte dose was decided on because of the time involved implementing the other options. The poly dosing system was already in place making this the most cost effective and quickest option.

Doses were approximately doubled for a period of 14 days

The DAFF plant usually dosed at 0.03mg/l of 1% poly solution was increased to 0.07mg/l

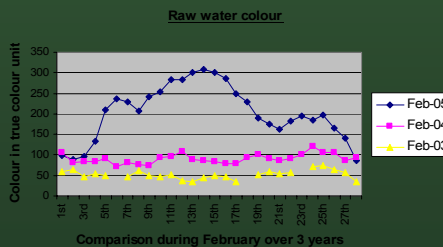
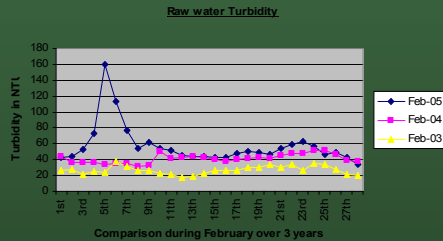
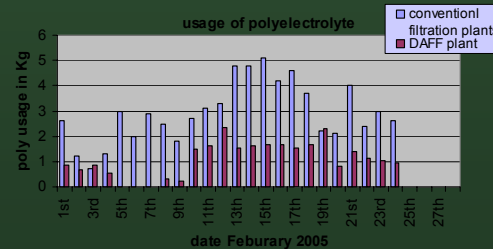
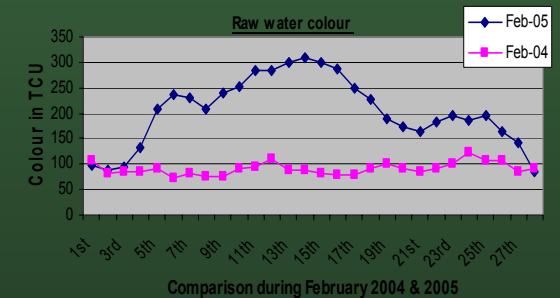
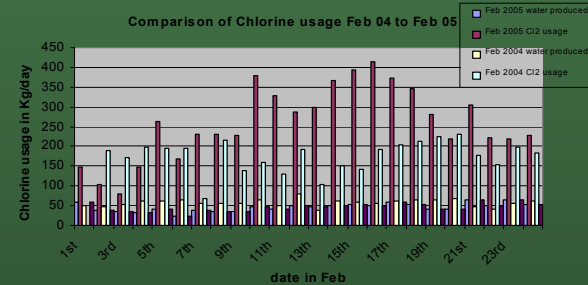
The conventional filter plants usually dosed at 0.07mg/l were increased to 0.14mg/l

Considerations:

Increasing polyelectrolyte dosages can cause the formation of mud balls in the filter media or filter binding where the sticky characteristics of the polymer cause the media to bind together.

The downfalls of increasing the polymer dosages include reduced filter run times, cost of power, loss of water associated with more frequent backwashing and loss of production time.

An increase in consumption of other chemicals was also necessary. Increased Chlorine demand is related to higher organic content associated with the high colour. The 2 graphs below show the relationship between raw water colour, Cl₂ usage and the amount of water produced during February 2005 compared to February 2004.



Shepparton Water Treatment Facility is situated on the Goulburn River and comprises 4 separate treatment plants, a Dissolved Air Floatation (DAFF) plant and 3 conventional plants. Raw water is supplied straight from the Goulburn River system (above).

Normal Operation:

Aluminum Sulfate solution is added to raw water to coagulate dirt particles. A polyelectrolyte (FLOPAMFO 4190 PWG granular powder) is then added as a flocculant aid. This forms larger chains of floc to facilitate turbidity and colour removal through settling or floatation.



Raw water (2) settled water (3) filtered water (4)

In conclusion, even given the abnormal conditions, the changes made enabled us to deliver safe drinking water to the community and in compliance with Australian drinking water quality guidelines.