

Introduction

A Seawater Membrane Plant in the North Sea was suffering from particulate fouling of the lead elements of the nanofiltration unit. The pre-treatment system included chlorination, coarse strainers, multi media filters (MMF) and guard cartridge filtration. In addition to membrane fouling the guard cartridge filters were blocking rapidly so a method of improving the MMF performance was sought. Optimisation trials carried out using Avista Technologies RoQuest 3000 showed significant improvements in the feedwater quality. RoQuest 3000 dosing was adopted and a reduction in cartridge filter change frequency and membrane fouling rate was achieved.

Background

Three multi media filters were available on the SRP unit. The particle counts in the filtrate were measured in the 4,000 – 8,000 counts/ml range with a corresponding SDI values of 4.5 – 6.

The CIP system on the SRP was overloaded and the client was experiencing difficulties in maintaining plant throughput and availability.

Recommendation and Implementation

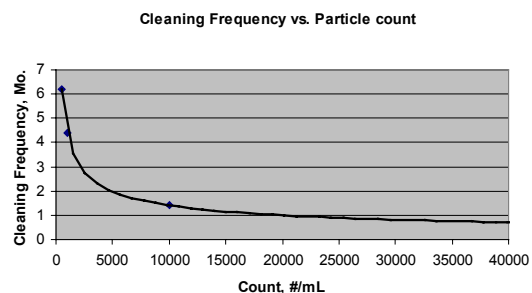
To enhance the filter performance a polyelectrolyte trial was carried out with the Avista Technologies product RoQuest 3000. This product is a blend of high molecular weight organic polymers which is designed to be used in direct filtration applications to assist in the conglomeration of sub micron particulate matter and optimise the filter's performance.

Avista Technologies have shown that the particle count of membrane unit feed water correlates well with cleaning frequency. (See chart.) The aim of the coagulant trial was to optimise the coagulant dose rate to achieve the best feed water quality.

As no two feed sources are identical, it is advisable to carry out optimisation trials on site to establish which polyelectrolyte is required to optimise the filtration process. After the trial has been completed, it is advisable to repeat the test periodically, to ensure that there has been no change in the feed water characteristics that may alter the optimised dose rate first established.

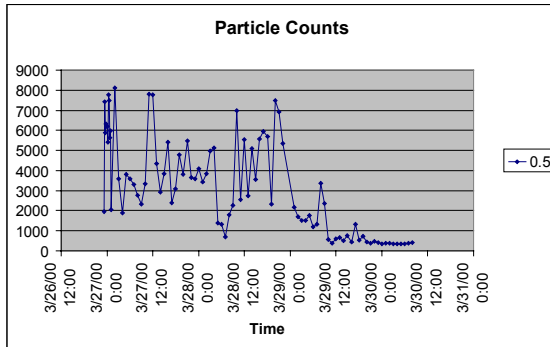
Trials at different dosing rates were performed and an evaluation was carried out on the resulting data to optimise the performance of the MMF's.

The polyelectrolyte was introduced into the



system by rigging up a temporary dosing skid and plumbing into the biocide injection point. This injection point entered the filtration process four metres upstream of the multi media filters. The initial dosing rate was set at 0.5 mg/l and was then varied over a 0 – 2 mg/l range.

The performance of the MMF's was assessed by taking silt density index readings at the combined multi media outlet sample point and by the on line particle counter.



Particle counts were seen to vary initially but dropped to around 500 counts/ml once the optimum dose rate of 0.8mg/l was established. (See chart above.) SDI trends matched the particle count profile. A standard optimisation chart of SDI v's dose was also completed with verified the optimum dose rate.

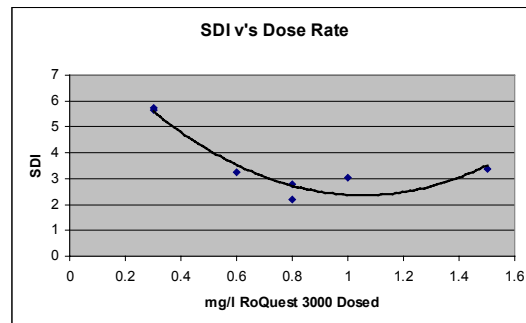
Trial Results

The result of the trial show that significant improvements in filter efficiency and outlet water quality can be achieved by using the Avista Technologies product RoQuest 3000.

The optimum dose rate was found to be at about 0.8 ppm (see SDI graph).

Long Term Results

The client adopted the coagulant dosing injecting coagulant 5 metres upstream of the multi media filters to ensure proper mixing. In the long term this has reduced the system cleaning frequency to between 80 – 90 days.



Caution

Due to the cationic properties of the Roquest 3000, care must be taken not to allow over dosing of the product. In severe cases, over dosing of this product can lead to irreversible fouling of membranes.

Roquest 3000 is incompatible with some of the antiscalants used on SRP systems. If over dosing was to occur with an incompatible antiscalant, then a thick gel like material will form on the feed face of the lead elements. RoQuest 3000 should only be used upstream of the SRP system in conjunction with a compatible antiscalant. The Antiscalants that are compatible with the RoQuest 3000 are as follows: -

Vitec 3000
Vitec 5000

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