

Benefits of MIEX® Pretreatment to GAC

Cost Comparisons of GAC Pretreatment Options

V1208

Introduction

Significant increases in the price of GAC as well as faster than expected carbon exhaustion rates have driven many utilities that have installed GAC adsorbers to investigate ways to extend the GAC service life to reduce operating costs. As the GAC service life is directly proportional to the TOC loading, attention has been focused on reducing the amount of TOC that the GAC is required to remove. Viable pretreatment options to remove TOC include enhanced coagulation and the MIEX® ion exchange process.

TOC Removal Provided by Pretreatment Options

Enhanced coagulation is the practice of increasing coagulant dose and/or lowering coagulation pH to optimize the removal of TOC. The extent of additional TOC removal that can be removed over conventional coagulation practices is limited in many cases due to the fraction of TOC in the water source that is amenable to removal by coagulation, primarily larger molecular weight organic acids.

The MIEX® Process removes TOC by anion exchange and can typically remove both high and low molecular weight organic acids, resulting in a greater net removal of TOC than enhanced coagulation. When used as pretreatment to an existing coagulation plant, the MIEX® Process can often reduce downstream coagulant doses by up to 80% while resulting in a lower final treated water TOC than could be achieved with enhanced coagulation.

Impact of Pretreatment on GAC Service Life

The GAC service life is directly proportional to the TOC loading. Pretreatment with the MIEX® Process will therefore allow a longer service life than enhanced coagulation. A study was conducted at the City of Scottsdale, Arizona's Chaparral WTP to evaluate the impact that different pretreatment options would have on the service life of existing GAC adsorbers. The raw water source for this plant is primarily the Salt River Project with TOC levels of 4.5 to 5.5 mg/L. The target treated water TOC level was set at 1.5 mg/L to achieve the EPA TTHM standard at simulated distribution system (SDS) disinfection conditions consisting of a 72-hour incubation period at 30 deg C. The results of the study, shown in Figure 1, demonstrated that enhanced coagulation could extend the GAC service life from 28 to 47 days while MIEX® Pretreatment extended the service life to 128 days. GAC replacement cost.

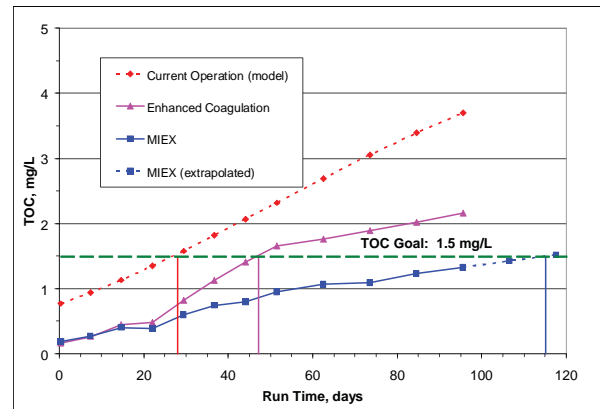


Figure 1: Effect of Pretreatment on GAC Service Life

Operating Cost Comparison

The study conducted at the Chaparral WTP compared operating costs of GAC adsorbers with pretreatment using enhanced coagulation and the MIEX® Process to GAC adsorber operating costs without pretreatment to meet the treated water TOC target of less than 1.5 mg/L (Figure 2). This comparison demonstrated that MIEX® Pretreatment would result in significant operational cost savings compared to pretreatment with enhanced coagulation due to a substantial increase in the GAC service life.

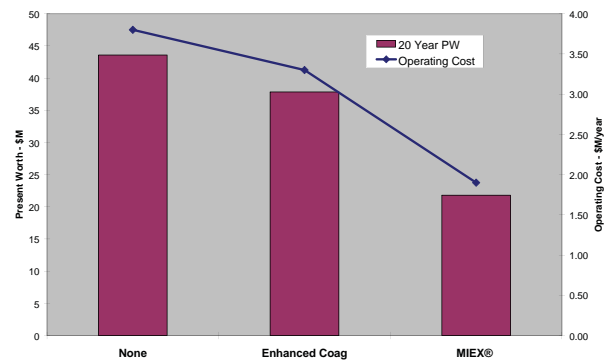


Figure 2: Overall Operating Costs at the 30 MGD Chaparral WTP with GAC Pretreatment Options¹

¹ B Talabi; R Bond; "South Scottsdale DBP Reduction Study", Arizona Water and Pollution Control Association Annual Conference Proceedings, May 2008.