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Technical Bulletin

Manganese Control Strategies

In recent years there has been a very strong trend in potable water treatment to switch from aluminum based chemistry to iron based chemistry for coagulation. Since this has been driven by the need to reduce organic contaminants, this trend in many cases has been accompanied by reduction in coagulation pH's and the use of alternative disinfection technologies.

All of these changes to one degree or another will most likely impact the manganese removal efficiency of the water treatment plant. Ozone, while a potent oxidizer capable of oxidizing iron and manganese, usually signifies the removal of chlorine addition before the filters. This is a tried and true manganese capture strategy that may no longer be an option. The lower coagulation pH can also make it more difficult to remove manganese through oxidation. While alum typically does not contain manganese at any significant level, it has been found that its coagulation properties can be adversely affected by ozone use. Also, some by-product based sources of ferric chloride can be quite high in manganese. All of these issues can make manganese control more difficult for the treatment facility, but not impossible.

California Water Technologies recommends the following actions when considering a switch to a new organic control strategy such as enhanced coagulation or ozone use.

1) Understand the manganese sources at your facility and complete a material balance around the plant.

2) If switching to ferric chloride, choose a drinking water quality coagulant with a minimum amount of inherent manganese. Ask your supplier to provide comprehensive manganese information in the form of quarterly historical averages vs. spot analysis. Calculate the impact of manganese contribution from your coagulant.

3) If ozone is added very early in the process, see if there is any oxidation residual available to oxidize coagulant based manganese. If not in many cases 0.25 to 1.0 ppm of sodium or potassium permanganate can be used to oxidize this manganese source.

4) Fully explore the mechanics and chemistry of manganese in the backwash process. This is most likely one of the higher contributors to soluble manganese in the facility. Recycling of septic manganese laden sludge can put soluble manganese back into the system. There are several strategies that can be implemented to minimize this impact including reduction/minimization of the residual recycle volume, investigating and correcting septic conditions in the recycle stream or eliminating recycle altogether through the implementation of drain decants or the pressing of backwash sludge.

Any change in treatment requires careful examination to address all the possible impacts that it could bring to the treatment process. Proper examination of the treatment scheme and collection of important coagulant make-up data can be very useful in minimizing any adverse treatment impacts from these changes. If you are considering the use of ferric chloride for enhanced coagulation or are currently using ferric chloride and are evaluating the use of ozone, contact our technical service group at 866.337.7427. We look forward to assist in properly meeting tomorrow's treatment challenges.