

Controlling Bacteria in Water Treatment Systems

They're inevitable – death, taxes, and bacteria! If you operate a water system, they're going to show up sooner or later, and depending on how you manage them, they can either be a nuisance or a nightmare.

For industries such as pharmaceuticals, food products, beverages, health care products, etc. that are sensitive to microbial contamination, there are a number of equipment features built in to minimize this issue. Fortunately, in these industries they are addressed at the design stage, and procedures are put in place from the beginning to prevent and/or control this problem. This does not mean that “bugs” aren't a problem for the rest of the world; while they may not shut down your manufacturing process, they can certainly make operation and maintenance of your system (and therefore, your life) difficult.

The primary components of any water system, whether resin or membranes, are not chlorine-tolerant, and once the chlorine is removed from the water, the little guys come out to play – and proliferate! Certain unit operations and materials of construction can exacerbate the problem.

Unless the system is specifically designed for sanitizing with either hot (180°F.) water or steam, these are normally not an option. Fortunately, there are a variety of chemical sanitization processes available to address biofouling in various parts of the system. Before selecting one, however, be sure to review the materials of construction in your system for compatibility with the sanitizing agent(s).

For sand or multimedia filters, an extended backwash with sodium hypochlorite injection is generally effective at removing accumulated biological matter in the media bed, tank sidewalls, piping and internals.

Activated carbon filters tend to be the biggest culprits in contributing to biological contamination, since the media itself is a great breeding ground for bacteria. While hot water or steam is the most effective means of sanitizing carbon beds, epoxy-lined tanks and PVC piping prohibit their use in industrial applications. Activated carbon, as well as ion exchange resins, can be sanitized using a solution of brine and caustic soda.

Reverse osmosis membranes have the widest selection of sanitizing agents. Non-oxidizing biocides can be used in conjunction with a membrane cleaning, periodic (usually weekly) injection for 30 minutes, or continuous on-line injection. Please note that the on-line injection is only an option for non-potable, noningestible, or non-contact (with a body) products!

Membranes can also be sanitized using a hydrogen peroxide/peracetic acid product which is compatible with TFC membranes; however, this is only to be used on clean membranes! If metals (iron in particular) are present on the membrane surface, they act as catalysts in combination with this solution to attack the membrane layer and cause premature failure.

EDI systems can also be sanitized with brine/caustic solutions or cold sterilant; however, once the sanitization is complete, a complete regeneration of the EDI modules is required – normally 8-16 hours – so, be sure to allow for the regeneration time before putting the system back on line.

If recurrent episodes of bacteriological contamination are plaguing your system, you might consider a disinfecting ultraviolet sterilizer as preventive maintenance – zap the little suckers before they get into the system!

For further information or for assistance with a sanitization process, contact your local Process Solutions, Inc. sales representative.