POE sediment filtration — your first line of defense

Without it, feedwater from aging city pipes can overwhelm downstream treatment.

By Jim Lauria

Jim Lauria is vice president of sales and marketing for Amiad Filtration Systems, Oxnard, CA, a manufacturer of water filtration systems for agricultural, industrial and municipal applications. He has over 25 years of experience in liquid/solid separation processes and water treatment. Prior to joining Amiad, Lauria owned Team Chemistry LLC, a consultancy that focused on developing new business opportunities for clients' water treatment technologies, and was president of a filter media company. During that time he provided peer review for the World Health Organization's publication on drinking water treatment, and in partnership with a university led a team that pioneered arsenic reduction in drinking water. He holds a bachelor of chemical engineering degree from Manhattan College. The author wishes to thank Bard, Rao + Athanas Consulting Engineers for assistance with this article.

MORE INFORMATION

For more information on this topic, go to **www.watertechonline.com** and enter keyword(s): **microfiltration**.

Around the country, our aging water delivery infrastructure is coated with sediment and scale from a century or more of buildup. Those same tuberculated pipes are constantly challenged by daily tie-ins, repairs, flow tests and fire hydrant use in most cities and towns.

The result is that drinking water that left the municipal treatment plant at top quality arrives in users' glasses — or in their showerheads or medical equipment — carrying large amounts of sediment and scale.

And although turbidity can be unsightly and distasteful, or even destructive of sensitive equipment, there is little hope of a massive infrastructure overhaul in most areas. The result is a boom in point-of-use (POU) filtration to purify water, ranging in sophistication and cost from activated carbon to cartridge filters to POU membranes.

An automatic self-cleaning filter system such as this one at the point of entry can prevent problems due to sediment.

Increasingly, engineers and developers are seeing the value of point-of-entry (POE) filtration as well, which delivers cleaner water to users in their hospitals, hotels, and luxury high rises, and helps POU filtration operate with added efficiency and effectiveness.

Daily hydrant challenges

Sometimes, such as the case of a hotel guest expecting to drink pristine water from their room's bathroom tap, it's a matter of convenience. In other cases, such as a dialysis unit in a hospital faced with turbid feedwater, it's much more serious.

Richard Kulinski, a plumbing/fire protection engineer with Bard, Rao + Athanas Consulting Engineers, a New York City-based engineering firm with research and healthcare clients around the country, has several hospital and laboratory construction projects in the works. In those projects, POE filtration is specified to combat total suspended solids (TSS) coming from aging, overtaxed infrastructure in urban areas that have seen a tremendous amount of development in recent years.

"Over the last 10 years [building] owners are used to daily openings of the [city water] system," Kulinski says. "In the case of a dialysis machine or a laboratory instrument, opening a hydrant in front of the building can release enough sediment to foul the machine's filter instantly. That would shut you down until you can

Point-of-entry filtration allows developers to build "greener" and protect apartments (or hospital rooms) from clogged aerators and showerheads.

replace the cartridge. And even if the disturbance is not in front of your door, you can get debris in your system."

The right tool

Developing any filtration system is a prescription remedy for a specific problem. Activated carbon and fine cartridges are excellent tools for removing dissolved solids that cause off-flavors, unsightly colors or mineral build-up, as well as biological contaminants such as pathogens and viruses. Ultra-fine or reverse osmosis (RO) membranes operate at the molecular level to remove salts and other dissolved contaminants.

But using those specialized systems to remove larger, suspended sediments is inefficient and expensive. The cost of cleaning membranes or replacing fouled cartridges — interrupting the filtration process to do so in both cases — quickly mounts.

Much of that cost can be prevented by POE filtration to remove TSS, paying off the investment in an automatic self-cleaning filter in a very short time.

Look both ways

It is vital to look both ways — upstream and downstream — before designing a water filtration system.

Upstream, take a close look at the incoming water — especially in a worst-case scenario. If possible, take a sample immediately after a disturbance in the supply system. A basic water test, including a particle size distribution (PSD) analysis, will tell you what is entering the building so you can consider your technological options.

Downstream, consider what the water will be used for. Drinking water needs to be free of pathogens and off-flavors. Industrial water will have different purity demands based on whether it is ingredient water, process water (used in processing or cleaning the product) or service water (for seals and cooling). Specialized uses such as laboratory or medical equipment may need to be especially clean to ensure proper functioning and avoid quickly overloading POU filters such as cartridges or membranes.

In the basement of the building, look carefully at the available space. In a tight corner, a set of sand media tanks, a huge settling tank, or a tangle of plumbing is not likely to be a good fit.

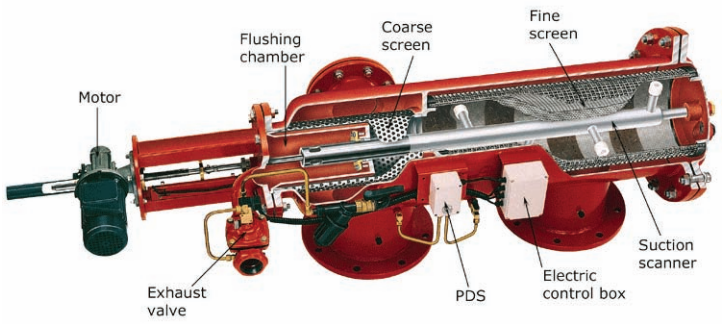
Consider the case of the Amway Grand Plaza Hotel in Grand Rapids, MI, a four-star waterfront property with a stellar reputation that dates back to the 1920s. That city's water delivery system had experienced frequent bouts with high turbidity, and water quality periodically got so poor that hotel management was forced to reimburse guests for their inconvenience or take rooms off the market.

Installing a 10-micron automatic self-cleaning screen filter — mounted on a 6-foot-by-2-foot skid — at the point of entry of the building's water main has kept the hotel's water crystal-clear.

'Green' filtration

Multi-stage filtration can be quite com-

(Concluded on next page)



Cutaway of key components of a self-cleaning filtration system. It has relatively few moving parts.

Save your C/I customer labor $$$

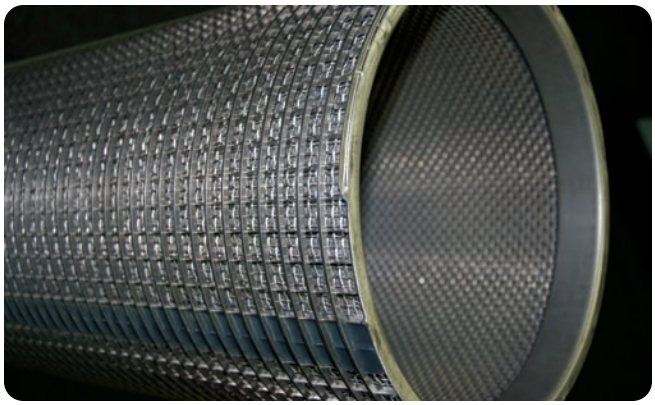
Commercial and institutional water treatment customers are concerned about their labor costs. As plumbing/fire protection engineer Richard Kulinski points out, "Every time a hospital gets a flush of sediment in its water supply, somebody has to go out and clean out every shower head. In a 200-room hospital, that's a lot of work."

Similarly, most facilities maintenance departments have enough to do without having to keep up with filter cartridge replacement or manual clean-outs. Automatic self-cleaning systems reduce maintenance to a much lower level and eliminate concerns about falling behind on cleaning cycles.

Automatic self-cleaning is also important because emergencies don't often happen at a convenient time. Take, for example, a three-car fire that occurred in the parking garage of Mary Washington Hospital in Fredericksburg, VA, causing local firefighters to turn on every hydrant in the area. In that case, the maintenance staff had had the day off.

After the fire was extinguished, the maintenance manager saw that his 10-micron automatic screen filters had flushed an extra 20 times to dispose of captured sediment; his 40-micron cartridge system experienced no additional load. Had the cartridge system been the only line of defense, the hospital's water supply could have been in jeopardy.

— J.L.



A four-layer steel screen in a POE filtration system.

(Continued from prior page)

patible with today's "green" building trends. Today's conservation-minded public is less tolerant of the old approach of letting the tap run for a few minutes to clean out sediment — the water savings enabled by delivering clean water from the first drop is considerable.

Systems that can be operated without chemicals, or that minimize the use of chemicals, such as membrane cleaners or the disposal of filter media such as spent carbon or used filter cartridges, fulfill important environmental goals.

On the operating end, today's self-cleaning technology functions with extraordinary efficiency. Unlike traditional sand media systems, which require large amounts of water for backwash cycles, state-of-the-art self-cleaning filtration systems consume less than 1 percent of the flow for backwash. That's less than 25 percent of the water needed for sand media flush cycles.

Energy demand is minimal, too. Some automatic self-cleaning systems can be operated without electricity at all, using the supply water's pressure to operate their suction scanner nozzles. Motorized suction scanner systems — preferred in urban installations where electrical hookups are readily available — use ¼- or ½- horsepower motors and less than 1 amp of power.

Ensuring clean water — for the sake of convenience, for sanitation or to keep life-saving equipment operating reliably — can be a challenge where aging infrastructure adds turbidity. Fortunately, a bit of forethought and a modest upfront investment that can quickly be recovered allows water treatment professionals and developers to provide clean water with clean technology. **WT**