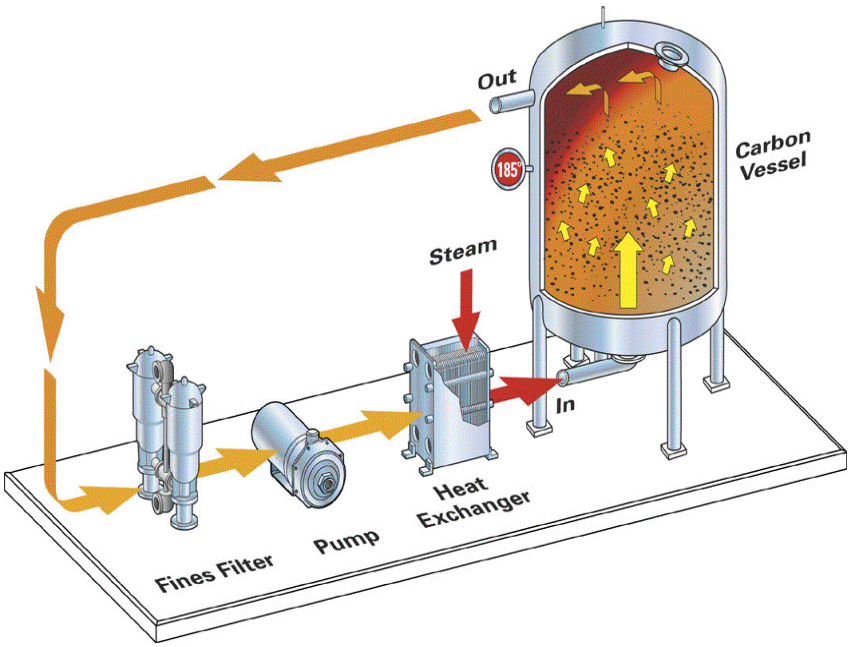
Contamination Control

Putting Bacteria on the Hot Seat: Heat optimized technology, or HOT, can sanitize carbon towers and control bacteria growth and organic fouling.

By Harry DeLonge



Faced with an increasing need to maintain carbon and carbon towers in a sanitary condition, the food and beverage industry requires a consistent, reliable sanitization method, and heat optimized technology (HOT) helps address this need. Carbon towers are very efficient in removing chlorine, chloramines and a wide range of organic contaminants.Yet, they are vulnerable to bacterial growth and organic fouling, and therefore require backwashing and periodic sanitization. When fed with surface waters, they also require steam stripping to remove accumulated volatiles such as trihalomethanes (THMs).

HOT is a patented process used for sanitizing carbon towers to control bacterial growth and organic fouling. By combining the carbon tower's backwash and sanitization steps with a recirculation process in one cohesive step, this technology greatly increases the effectiveness of the sanitization, while reducing water consumption. The fully automated HOT system operates in two modes:

• For daily or weekly backwashing: The tower is backwashed for five minutes with the water into the drain, removing sediments, contaminants and debris. This also expands the carbon bed, which is critical to avoid channeling.

Backwashing continues (back-flushing) in a recirculation mode through a filter to remove any fines. This allows a highly efficient backwash with a water savings of approximately 75

percent.

Valves automatically position themselves in the filter-to-waste position, and the system is ready for production.

• For weekly or scheduled sanitization: Exactly as above, but when the unit starts the recirculation (back-flushing mode), the heat exchanger is activated and the temperature is raised to 180º to 185º F. The entire sanitization process takes 65 minutes. A thorough bacteria “kill” is achieved, as the heating is accomplished while the carbon is fully expanded.

A complete HOT carbon filter system (Figure 1) consists ofa carbon tower, heat exchanger, optional cooling heat exchanger, recirculation pump, cartridge filter and control panel. For both the backwashing mode and the periodic sanitization, a water savings of 75 percent is typical, along with savings in energy, manpower and time. During the sanitization process, no steam is in contact with the carbon bed.

Heat optimized technology has been proven in field studies to provide better microbial kill than conventional steaming because of the uniform heating of the carbon bed in the recirculating stage, and reduced potential for cold spots. conventional steaming and even steam stripping cannot maintain consistent heating because of the way steam is fed into the tower.

How often you need to sanitize your HOT carbon system depends on your feed water quality and your final water quality specification. Most HOT system installations are sanitized once a week as a safety precaution, with good results. When the HOT system is installed on a carbon tower that is located in the treatment chain after a reverse osmosis or nanofiltration membrane, sanitizing every two weeks has produced excellent results.

When surface waters are used and there is a concern about contaminants such as THMs, steam stripping is required on a periodic basis to remove the THMs to the greatest possible extent. This is done with food quality steam, usually on an “as needed” basis. Steam stripping can require up to eight hours, and the HOT system can extend the period between stripping while helping to maintain extremely low THM levels.

For food and beverage manufacturers, the heating system included with HOT carbon systems can serve double duty and sanitize both the loop distribution piping, polishing filter and other in-line equipment.

Below are some case study examples of food and beverage manufacturers that have used heat optimized technology for their process.

Ensured Microbial Control, Reduced Water Use

A leading juice manufacturer needed to improve performance of its carbon towers. Specifically, it needed to control microbial counts; slow the development of biofouling and

organic build-up within the carbon bed; keep carbon pores clean and available for small molecule organics such as THMs; and reduce waste water associated with carbon backwashing to support a corporate water conservation program.

The plant's current water treatment process included pre-filtration, carbon purification, ultraviolet (UV) sterilization and 0.5-micron (µm) final filtration. The system was fed with city water, and the flow was directed to several points of use in the facility. Sanitization was a time-consuming chemical process, and the normal backwashing and sanitization routines did not produce the desired results.

The manufacturer wanted a protocol that would ensure less than 10 cfu/ml bacteria counts on a day-to-day basis, resulting in a clean carbon bed.

Plant personnel researched several treatment processes, and chose heat optimized technology for its process improvements and the reduced operating cost of sanitizing the carbon media in backwash mode. By using the HOT process, the production plant would save 4,500 gallons of water per day (based on a daily backwash regimen). It purchased a complete turnkey recirculating water system, which included a 5-µm pre-filter, a HOT carbon tower, a UV system and a 0.45-µm final filter. The water treatment package was designed to automatically be hot water sanitized along with the distribution loop within a one-and-a-half-hour window.

The new system was installed in a research and development facility to feed a new sanitary-designed recirculation loop. The system had a constant available flow of 150 gallons per minute, while maintaining a loop velocity of five feet per second.

After the system was started up, organism counts were closely monitored, and maintained within specified limits for the desired time period before sanitization was required again. Micro counts were well below specification maximums. In addition, water use decreased by 75 percent, and the plant was able to eliminate the use of sanitization chemicals.

Ensuring Quality

When a dairy that manufactures milk, ice cream and juices wanted to introduce a high quality bottled non-carbonated beverage with a long shelf life, it first had to make sure its water treatment system could remove chlorine, chloramines, taste and odors, with low microbial counts. It also wanted to ensure that its carbon stayed clean and sanitary.

The dairy installed a HOT carbon tower with a flow rate of 1 gallon per minute per cubic feet of carbon. The system was customized so that the polishing cartridge filter is sanitized on a daily basis in just 20 minutes.

Twice a week after the day's production, plant operators automatically initiate the backwash and sanitization mode. The system is reducing organism counts to less than 1 cfu/ml. It consistently removes chlorine and produces water that is clear and free of sensory

concerns.

When a soft drink plant experienced difficulty in maintaining very low THM levels in its water, the plant found that using HOT technology allowed them to consistently remain below 15 ppb, and also extended the period between steam stripping. It saw a significant increase in quality, cost savings and water savings, and reduced wastewater to the drain. n

Harry DeLonge is President of Tri-Lake Group and a consultant for USFilter's Food & Beverage Market Team. He can be reached at mailto:DelongeH@usfilter.com.