

ULTRAVIOLET Disinfection

Background

The City of Appleton has a long history of providing safe, clean drinking water to its citizens, beginning with construction of a gravity filtration plant in 1912 that has served them for decades. In 2001, the City built the Appleton Water Treatment Facility (AWTF) to replace the aging filtration plant.

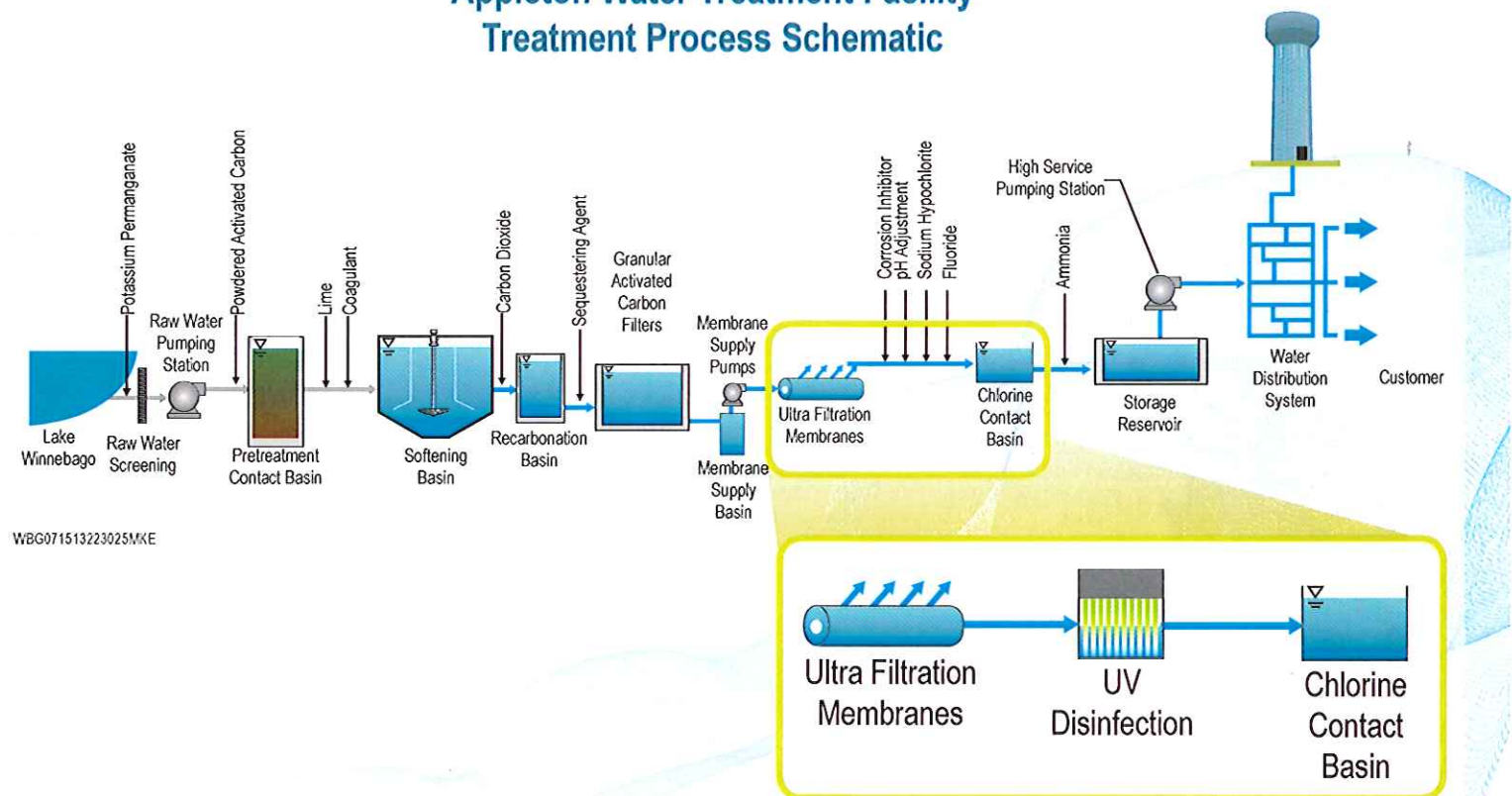
The AWTF comprises numerous treatment processes including lime softening, granular activated carbon filtration, membrane ultrafiltration, and disinfection with chlorine and chloramines (a combination of chlorine and ammonia). Figure 1 is an overview of the AWTF treatment approach.

New Treatment Technology

Appleton continues to evaluate effective water treatment technologies in its quest to provide the highest quality water at reasonable costs. After careful consideration and discussion with the Wisconsin Department of Natural Resources and other professionals, Appleton decided to adopt ultraviolet light (UV) as an additional disinfection barrier in the drinking water system. UV disinfection effectively inactivates pathogens such as Cryptosporidium and Giardia that may be present in the Lake Winnebago water supply. UV disinfection will be installed at the AWTF downstream of membranes, and eventually replace them as a pathogen barrier.

Figure 1

Appleton Water Treatment Facility Treatment Process Schematic



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How UV works

Microorganisms in the water are exposed to ultraviolet light when they pass by special lamps located in pipes (Figure 2). The UV energy instantly damages the organisms' genetic material (DNA). Unable to reproduce, the microorganisms no longer pose a health risk.

UV technology is highly effective against bacteria (streptococcus, cholera), viruses (hepatitis A, polio, rotavirus), and protozoa (Cryptosporidium, Giardia). The UV light leaves no residual in drinking water.

Benefits of UV

UV disinfection at the AWTF has the following benefits to the City of Appleton's water customers:

- » Highly effective disinfection of Cryptosporidium, Giardia, and other pathogens
- » Cost-effective technology with low operating and maintenance costs
- » Reduces formation of chlorine disinfection by-products, since less chlorine contact time in water is required
- » Small footprint allowing for retrofit into existing facilities

Multi-barrier treatment that includes UV disinfection is an important



Figure 2

UV Disinfection Reactor courtesy of Calgon Carbon Corporation

aspect of public health protection. This technology, applied by AWTF's well-qualified operations and maintenance staff, ensures the highest quality drinking water for the City of Appleton's customers.

Why make this change?

Appleton is committed to delivering clean, safe water to its customers now and into the future. The addition of UV disinfection to the water treatment process allows Appleton to cost-effectively protect public health for many years to come. Besides UV disinfection, improvements to the chemical systems, filters, and chlorine disinfection are included in the approximately \$6 million project.



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