NAME:
Prairie du Sac Water Utility

LOCATION:
Prairie du Sac, Wis.

PLANT SIZE:
600,000 gal per day

INFRASTRUCTURE:
Until recently, the village did not disinfect its groundwater-sourced drinking water supply. As part of an EPA-funded research project, a UV reactor was installed in each of the village's two well houses. The village chose to purchase the reactors and implement UV disinfection after the study's data collection was complete.

One of the two Wedeco UV reactors the village purchased after participating in the study.

Installing the equipment in existing well houses was a major challenge.

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By Rebecca Wilhelm

Small Town, High Tech

Research project gives a Wisconsin village the opportunity to implement ultraviolet (UV) disinfection of its groundwater-sourced drinking water supply

Prairie du Sac, a village of 3,400 located in southcentral Wisconsin, recently became one of the first groundwater-sourced communities in the U.S. to use UV technology to disinfect its groundwater.

The village's journey to UV disinfection began when it was selected as one of 14 communities in the state to participate in a $2.3-million, U.S. Environmental Protection Agency (EPA)-funded study focusing on the role of drinking water in childhood illnesses—The Wisconsin Water and Health Trial for Enteric Risk—conducted by the Marshfield Clinic Research Foundation in Marshfield, Wis.

"There has been growing evidence that our groundwater is fairly heavily contaminated with human pathogenic viruses," said Mark Borchardt, Ph.D., a microbiologist and research scientist at the Marshfield Clinic Research Foundation who led the study.

Amendments to the Safe Water Act required studies to estimate the amount of waterborne illnesses in surface water- and groundwater-based systems, but groundwater studies were never done.

"It wasn't until 2003 that the EPA put out a request for proposals to answer this question," Borchardt said.

Communities were selected for the study based on: number of wells; number of families with children; and hydrogeology (sandstone aquifers as opposed to limestone). Families in each community who voluntarily participated in the study recorded their children's illnesses for four three-month periods. Approximately 40,000 people participated in the study.

"We are still analyzing water samples and at the same time conducting statistical analyses," Borchardt said. "We plan to be finished by the end of this year."

Before participating in the study, the village "had nothing in regard to disinfection—we were not putting any chemicals in," said Patrick Drone, Prairie du Sac director of public works and utilities.

The village, with 1,800 water connections, was outfitted with two Wedeco UV reactors, one in each of its well houses. The largest has 18 bulbs and can handle 1,500 gal per minute, Drone said. The village elected to keep the equipment after the data collection phase of the study was completed in December 2007. "I don't like to put chemicals in water, that was one of the big reasons we went with UV, and that is why we chose to install the equipment after the study," Drone said.

"This was a massive undertaking done with a shoestring budget, really, for the size of the project," Borchardt said. "Then all the communities had the opportunity to purchase the equipment at research cost, and Prairie du Sac was the only one interested in doing that. Other communities are interested; they are just waiting to see the results."

Participating in the study did not interrupt daily operations, according to Rick Rothmann, water operator. "They came out and did all the cleaning and sampling, we didn't have to do a lot besides let them know how much we pumped, the days we would have to chlorinate, stuff like that," Rothmann said.

Installation & Performance

The biggest challenge to overcome—"an engineering feat," according to Borchardt—was putting the UV equipment in existing well houses.

"When you install, you have to leave space to clean the bulbs," Drone added. "After it is put in, you need 6 to 7 ft in front of it for the cleaning."

Staab Construction of Marshfield, Wis., did the installation work for both the study and the village. "They did a very good job," Drone said. "So far, the equipment is performing very well."

In Prairie du Sac, cleaning the equipment is also a challenge. "Our water is higher in iron; that gets on the light and it takes quite a bit to get it clean," Drone said.

"For the sand and gravel aquifers in Wisconsin, oftentimes there is plentiful water, but oftentimes the sand contains iron oxides," Borchardt said.

The success of this study lies in the cooperative effort put forth by the industry players involved. Borchardt used EPA grant funds to purchase 17 UV disinfection reactors from Wedeco (recently acquired by ITT Industries) at a significantly discounted price. Staab Construction also provided installation services at a reduced cost. Energenecs, Wedeco's manufaturer's rep, serviced the UV lights during the study. Greg Harrington, associate professor of civil and environmental engineering at the University of Wisconsin-Madison, led the team that did the design work.

For the community, Drone said the implementation of UV is significant because: "Number one, we do not have to use chemicals. Number two, we are taking care of a lot of bacteria that will not go out to the people in Prairie du Sac."

This is going to turn out to be a very fruitful study, what we are learning thus far," Borchardt said. "I know it is already shaping Wisconsin regulations, and it is likely to shape U.S. policy for quite a few years to come. Prairie du Sac is anticipating where the federal Groundwater Rule is going, and I think they are trying to stay ahead of the game. They are thinking ahead." WWD

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