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# Bring On the Rain

## Target Field receives LEED certification with innovative rainwater reuse system

BY WILLIETTE NYANUE

In 2007, Major League Baseball's Minnesota Twins organization began constructing Target Field, an approximately 40,000-seat stadium located in the heart of Minneapolis.

The organization's goal was to make it a LEED-certified professional sports venue, which would recognize its sustainable building strategies and practices. Although the Twins had its own strategies for greening the stadium, the organization approached Pentair in 2009 to find additional opportunities for green innovation that would reduce the stadium's reliance on municipal water.

### Striking Water

With the stadium already near completion and limited time for design and implementation, the opportunities to reduce municipal water use were limited. During assessment, however, Pentair identified a possible solution: rainwater reuse.

"We were fortunate that there was, buried

along the whole entire length of the warning track in the outfield, a 420,000-gal, 12-ft-diameter pipe that collected all of the rainwater that came off the seats and the field," said Dr. Phil Rolchigo, vice president of technology for Pentair. The rainwater percolated through the stadium's field into this pipe, which then drained into the Mississippi River. Using this source, Pentair designed a rainwater recycling system (RWRS) that would provide water for irrigation and stadium washdown.

### Working Against the Clock

During the design phase, there were several obstacles that needed to be overcome—the most apparent of which was time. "We had 10 months to go from an idea to implementation, so that on day one, when the stadium opened for its inaugural event, the system was working," Rolchigo said. Pentair worked cooperatively with the general contractors and the Twins organization to meet tight design and construction deadlines.

### Recycling the Rain

The RWRS works like a miniature drinking water plant. After rainwater is collected in the pipe, it goes through a four-step treatment process, which brings the water to a near-potable standard. First, the water is filtered to a minimum level of 100  $\mu$  using a backwashable filter. The backwash from this filter is discharged to the sanitary sewer, and the water is further filtered through a Pentair AquaLine filtration system to a level of approximately 5 to 10  $\mu$ . The water then is disinfected using ultraviolet (UV) light technology before it is filtered to a level of 0.025  $\mu$  using a hollow-fiber ultrafiltration system. The rate of filtration is adjustable to between 125 and 250 gal per minute. Lastly, chlorine is added to the water to maintain sterility.

Following the treatment process, the water is transferred to a holding tank, where it is again disinfected using UV technology to maintain water quality. The water then is readily available

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Installation of Target Field's rainwater cistern

for irrigation and washdown, and is drawn from the holding tank via booster pumps that supply the water at the right pressure and flow rate. During baseball season, the rainwater is collected, treated and stored—always on demand, always ready to go. During the off-season, the system is shut off.

The system is remotely monitored and can be remotely controlled for start up and cleaning. While it can be inspected and serviced as needed, the system is designed to be as automated and easily monitored and controlled as

possible. “Everything needs to be stored for the ‘balmy’ winters that we have here in Minnesota, and in the springtime we need to start everything up and make sure it’s working,” Rolchigo said. “We also monitor it throughout the season, and if we see there’s an issue, we’ll get over there. But, for the most part, they run it and operate it, and we monitor it.”

### Discoveries Upon Implementation

Once the system was designed, constructed and installed, Pentair and the Twins organization ran into an unexpected issue that slightly changed the course of the design. “During startup, we realized that the water that would have originally been dumped into the Mississippi had a lot of organic matter in it,” Rolchigo said. This included fertilizer and other organic matter from the washdown of the stadium seats. To address this issue, the entire cistern was retrofitted into a bioreactor to digest all of the organic matter—a project that required an additional two to three weeks to complete.

As the Twins organization

continued to run the system, it discovered another unexpected setback: The amount of water needed to wash down the stadium was more than anticipated. Today, almost 100% of the rainwater that is captured in the RWRS is required to completely washdown the 18,500 seats in the stadium’s lower seating bowl, with not much left for other uses.

This is a situation that Rebecca Osborn, senior manager of communications for Pentair, said could be more readily addressed if considerations are made during the initial design and construction, rather than after structures are already built. “We were able to implement this design within 10 months, but in an ideal situation we would be involved in the initial design and planning phases,” she said.

Rolchigo agreed: “If we were involved from the beginning of the project, we would have worked with the engineering and architecture firms designing the stadium to maximize the amount of water captured and reused throughout the stadium. The ultimate design of the water reuse system would have been even more efficient.”

### Exceeding Expectations

Despite these unexpected issues, the RWRS has become one of the most prominent features of the stadium, helping the Twins organization exceed its goal. The system is helping the stadium reduce its reliance on municipal water by almost 50%. Under normal conditions—when there is no drought—the system is designed to save about 2 million gal of water per year.

While the RWRS is a major part of the stadium’s green efforts, Pentair also was able to identify an additional way to green the venue and limit waste in the suites. By adding point-of-use water filtration systems into the suites as an alternative to bottled water, the company was able to provide the stadium with better-tasting water while also eliminating waste.

With the RWRS and the additional greening done by the Twins organization and Pentair, Target Field was able to achieve its ultimate goal of obtaining LEED certification. The stadium received two LEED points—one for reuse and another for innovation—for its focus and dedication to green practices. The stadium is only the second LEED-certified professional sports stadium in the U.S. **CW**

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The RWRS treats rainwater collected from the baseball field for reuse.