

Stevens Point WWTF

By Chris Lefebvre, Wastewater Superintendent, City of Steven's Point



The City of Stevens Point Wastewater Treatment Facility is located in Central Wisconsin and discharges to the main stem of the Wisconsin River. The facility serves a population of approximately 28,000 people, this includes the City of Stevens Point,

the Village of Park Ridge, a portion of the Town of Hull, and the UW-Stevens Point campus. The facility is designed to treat 4.55 MGD. Due to well-drained soils in the area and recent sewer lining projects the facility sees a consistent influent flow that averages 2.4 MGD and rarely exceeds 4.0 MGD.

The original treatment facility was commissioned in 1940, more than 30 years prior to the *Clean Water Act*. The city invested in an activated sludge facility even though the state only required primary treatment. This facility had two rectangular primary clarifiers, two aeration basins, two

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Stevens Point WWTF
(Courtesy of Donohue and Associates)

‘squirrel’ secondary clarifiers, two anaerobic digesters, a sludge lagoon and even a 40kW biogas-fired generator.

In 1972, the *Clean Water Act* made funds available for the first major facility upgrade. This upgrade included converting the existing primary clarifiers to DAFTs for WAS

thickening, new rectangular primary clarifiers, two additional aeration basins, a rim-feed secondary clarifier, chlorine disinfection, a third anaerobic digester, and a second sludge lagoon.

The next major upgrade was in 1992. This upgrade added two influent screw pumps, mechanical fine screens, grit removal, two center-feed secondary clarifiers to replace the original 1940 clarifiers, replaced chlorine disinfection with UV, and added a pair of sludge storage tanks. This upgrade also included an effluent reuse system that utilized an effluent heat pump to heat and cool the wastewater administration building.

The facility received its first effluent phosphorus limit in 1995. This led to one of the aeration basins being modified to accommodate enhanced biological phosphorus removal using an A/O process. This process is still being successfully utilized today.

In 2002 Wisconsin Focus on Energy conducted an energy audit of the wastewater facility. This audit led to the wastewater staff focusing on energy efficiency, which has been continuous through every decision that has been made since. Some of the suggestions from the audit were achievable without any major capital expenses; installing manual switches on outdoor lighting, installing LED light fixtures, adjusting operational setpoints such as target DO, and turning off non-essential equipment. Once the low hanging fruit had been removed, the staff focused on areas of the facility that required more of an investment. The first project was to replace the 50 hp plant air compressor with a more efficient 15 hp compressor. By 2010 these small changes had produced greater than a 20% reduction in energy consumption while removing 20% more BOD/day.

Then, in 2011, the facility added a Linear Motion mixer to the newest digester (1972), a 180kW biogas fueled CHP along with a biogas conditioning skid, and replaced one of the positive displacement aeration blowers with a new screw compressor that offered better efficiency and a wide range of SCFM output to handle the highly variable

BOD loading that the facility was seeing. This variability in loading was caused by the rapid expansion of the Stevens Point Brewery. By 2013 the loadings from the Stevens Point Brewery were consistently causing large filamentous outbreaks in the activated sludge. To solve this problem, the city and brewery partnered to install a high-strength waste lift station on brewery property, a 40,000-gallon, high-strength, waste-holding tank at the wastewater facility, and directionally bored a 3,500-ft forcemain between the two facilities in 2014. This project successfully eliminated slug loading to the wastewater facility, which in turn, avoided a large facility upgrade and gave the brewery a competitive advantage by avoiding additional sewer use surcharges. The added infrastructure also allows the wastewater facility to accept other high strength materials that can be mixed with the brewery waste and fed directly to the anaerobic digesters.

Also in 2014, a VFD controlled 44 hp submersible influent pump was added to handle the normal daily influent flow, the 30-year-old 100 hp screw pumps have since been used only during higher-than-normal flows and for a few hours each day during the winter to keep them from freezing.

The anaerobically digested biosolids have been used as a fertilizer for as far back as records were being kept. Initially, material was removed from the sludge lagoons each fall and land applied on farm fields. As the facility grew the need for better biosolids storage was answered by building two 1.6-million-gallon storage tanks in 1992. This material was land applied as a liquid at 2% solids. In 2002, a Rotary Drum Thickener was installed to process the digested sludge to help mitigate trucking costs. This equipment in conjunction with decanting was able to get the biosolids to 5% to 6% solids.

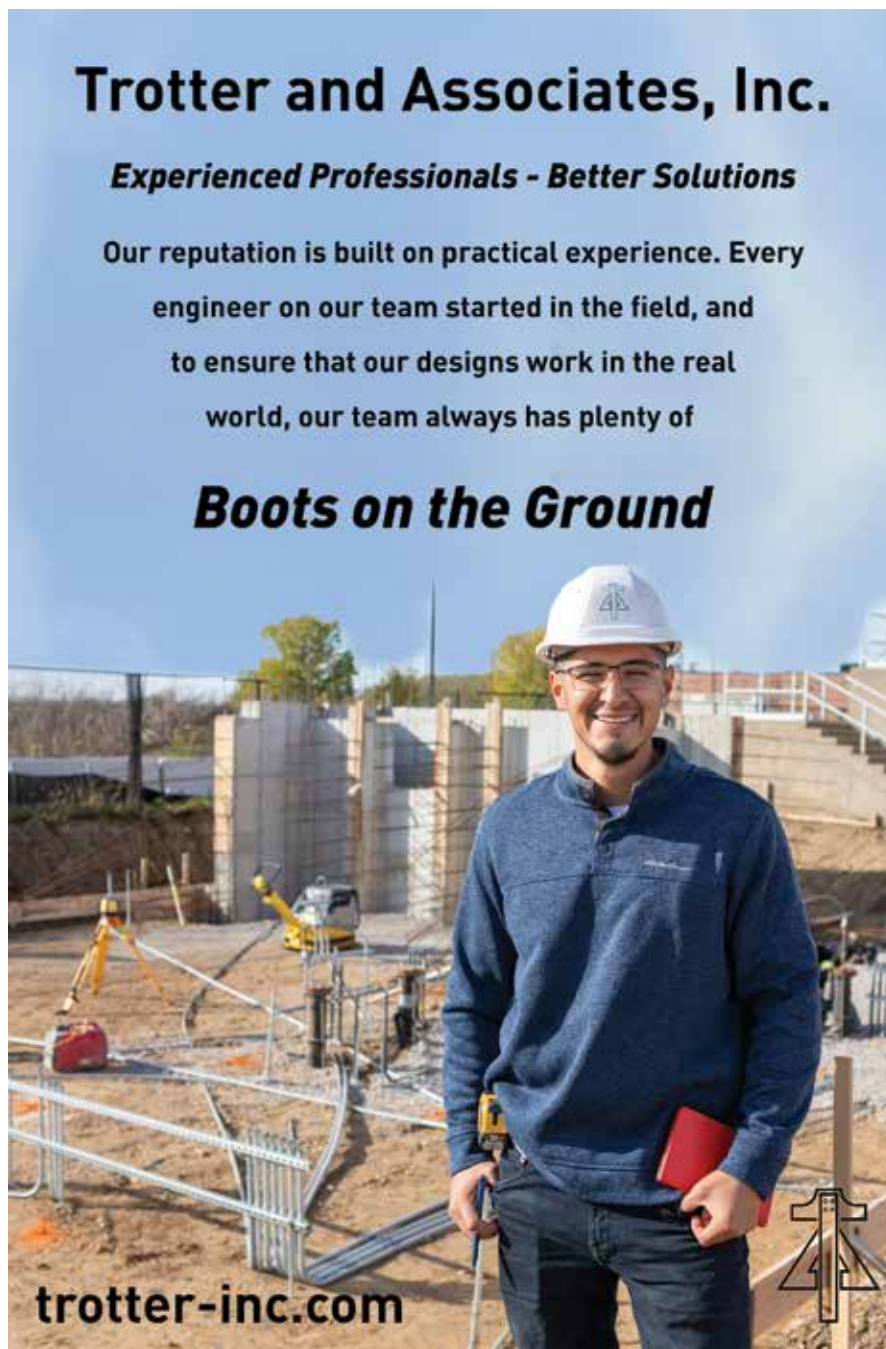
Throughout the 2010s, land application of class B biosolids became much more difficult. The area’s light soils and shallow depth to ground water had always made approvable fields difficult to locate. That issue, along with an increase in competition

for these fields from industrial, municipal, and manure applicators, forced the facility to look to the future. In 2019, the facility started producing BioPOINT a class A heat-dried biosolid fertilizer. This upgrade included a 1.5-meter belt filter press and a thermal oil heated paddle dryer. The class A process eliminated the need for two sludge storage tanks so one of the storage tanks was converted to a 1.6-million-gallon anaerobic

digester with a gas holding cover, giving the facility over 2.2 million gallons of anaerobic digestion capacity. This additional capacity is being utilized to take in high strength wastes and sludges from 15 different entities. The biogas that is produced is utilized to heat the digestion process and as much as 90% of heat for the biosolids dryer. Prior to 2021 biogas was also used to run the 180kW CHP unit, this equipment was decommissioned

due to excessive O&M costs. The final BioPOINT product is being utilized as an agricultural fertilizer with landfilling as an alternative when necessary.

Through these upgrades, existing infrastructure has been attempted to be reused whenever possible. To date, all the tankage and buildings except one of the original 1940s squirrel clarifiers is being utilized. In 2018, one of the original secondary clarifier tanks was converted to



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A truck loaded with BioPOINT

an effluent holding tank to supply water for a heat pump to service a new 50,000-square-foot utility garage. This garage was built to house the Utility's Collection, Stormwater, and Water Department's Staff and their equipment. This building was built with resource recovery in mind, not only is the heat source renewable, but the roof was also used to install a 130kW solar array.

The wastewater facility is operated by a staff of six: a superintendent, a chief operator, and four operators. This staff is responsible for operating and maintaining 15 lift stations, the equipment and processes within the treatment facility, and a full wastewater laboratory. The facility has been able to keep staffing consistent even with significantly more processes by leveraging the available instrumentation and technology to their advantage.

While the facility is consistently meeting all its permit requirements, staff is still looking to the future with plans to add a selector basin to stabilize the biological nutrient removal process and a 200kW solar array. **CS**