



City of Stevens Point Wastewater Treatment Plant

By Jeremy Cramer, Stevens Point Wastewater Superintendent

The City of Stevens Point, located on the Wisconsin River in Central Wisconsin, has always placed great importance on the water that flows to and from this small community. This is evident as you enter the city and see the inscription along the highway that depicts Stevens Point as the “City of Wonderful Water.” From the city’s earliest beginnings, water has played a valuable part in shaping this community. In the 1800s the water in the Wisconsin River was used as a highway to transport logs to mills that thrived in Stevens Point and the surrounding communities. In the late 1800s and early 1900s the river provided a source of drinking water for the residents of Stevens Point. Today, the river provides a great source of recreation to the area, boosting the

tourist industry and providing beauty to the residents that call Stevens Point home. The community has and always will value this great resource and will protect it and keep it clean.

In its effort to keep the Wisconsin River clean, the city has owned and operated a wastewater treatment plant for the past 73 years. In 1940, the city built a secondary treatment plant as its first wastewater treatment facility. The original facility, designed by Consoer, Townsend, and Quinlan Consulting Engineers, used the activated sludge process, anaerobic digestion, a 40 kW biogas generator, and a vacuum filter on digested sludge. This 1940 facility was built with great foresight as the facility was a fairly advanced treatment plant for the size of the community. To

this date, most of the original tanks and building are still in use. Since its initial inception, the facility has undergone three upgrades, one in 1965, one in 1972, and another in 1993. These three major upgrades which helped increase capacity and efficiency were all

Table 1:
Influent Flows and BOD5 Loadings

Year	Influent Flow (mgd)	Influent BOD5 (lbs/day)
2008	3.01	6080
2009	2.85	6633
2010	3.14	7175
2011	3.15	7879
2012	2.77	8103

designed by Strand Associates. There have been some minor additions and changes at the facility over the past 10 years. The most recent addition at the facility was a biogas CHP project that was designed by Donohue & Associates in 2012. Over the many years of its existence, this facility has been operated quite efficiently and effectively while consistently producing a very high quality effluent. In 1980, the facility was the recipient of an EPA award for exceptional operation and maintenance and in 2007 the facility received the WI DNR lab of the year award. Just recently, the superintendent and the operating staff were the recipients of the Central States Water Environment Association's Wisconsin Section Treatment Facility Operation's Award at the 86th Annual Meeting.

Plant information

The Stevens Point WWTP staff consists of four operators, one chief operator, and the superintendent. The wastewater facility serves a population of approximately 27,000 people as well as the UW Stevens Point campus. The largest industrial customer that discharges to the facility is the Stevens Point Brewery. The collection system in Stevens Point consists of over 140 miles of sanitary sewer and 15 liftstations.

The treatment plant is designed for an average daily flow of 4.6 mgd and a peak hourly flow of 11.8 mgd. Design BOD₅ and TSS loadings are 10,300 lbs/day and 10,400 lbs/day. Average influent flows and BOD₅ loadings from 2008 through 2012 are summarized in

Table 1. As seen in the table, influent loadings have gone up every year for the past five years. This increase in loadings is due to accepting more septic and holding tank waste and the recent expansion of the Stevens Point Brewery.

Influent pumping and preliminary treatment

The raw wastewater that enters the facility is carried up thirty feet by one of two 78-inch diameter screw pumps. Each screw pump has a capacity to pump 11.8 mgd. After the screw pumps, flow is sent through two Vulcan fine screens with 3 mm spacing to capture and remove any solids or screenings greater than 3 mm. The screenings are then washed and compacted and sent to the landfill. Flow is then sent through a Pista Grit vortex grit removal system to remove sand or grit from the system. The grit that is removed from the flow is then sent to a Huber grit washer before it is sent to the landfill. After grit removal, flow is then sent to two rectangular primary settling tanks. Sludge is removed from the bottom of the primary tanks via two ODS air driven diaphragm pumps and sent to the anaerobic digesters.

Secondary treatment

Stevens Point uses the anaerobic/oxic (A/O) process for biological phosphorus removal. After primary treatment, flow is sent to the anaerobic basin and then through three aeration basins operating in parallel. The aeration basins use fine bubble membrane diffusers and air is supplied via a 150 hp variable speed

Atlas Copco positive displacement screw blower. The total treatment volume of the activated sludge basins is 1,107,856 gallons. After the aeration basins, mixed liquor is sent to two 75-foot diameter final clarifiers.

Disinfection

After final clarification, secondary effluent is sent through a Trojan 3000+ UV light system from May 1 through September 30. After all treatment, water is discharged to the Wisconsin River.

Biosolids and anaerobic digestion

Excess activated sludge is sent to dissolved air floatation thickeners for thickening prior to digestion. Primary sludge and waste activated sludge is sent to one of three mesophilic anaerobic digesters that have a total treatment volume of 735,000 gallons or 98,300 cubic feet. Two of the digesters have Perth gas lance mixing systems and the other digester is mixed via an Ovivo linear motion mixer. There is also a substantial amount of high strength waste added to the digesters. The high strength waste material that is added to the digesters includes dairy waste, FOG, liquefied food waste, and beer waste. The digesters are currently producing approximately 103,000 cubic feet of biogas per day. After digestion, biosolids are sent to a rotary drum thickener. Thickened biosolids are sent to one of two 1.6 million gallon sludge storage tanks. Liquid biosolids are land applied for beneficial reuse on local farm fields in spring, summer, and fall.



Biogas treatment and utilization

Biogas that is produced in the anaerobic digesters is beneficially used around the facility. The biogas is either burned in the digester boilers or in a MAN 180 kW internal combustion CHP unit.

Before use, the biogas is sent through a Unison Solutions gas treatment system comprised of hydrogen sulfide, siloxane, and moisture removal. Currently the facility is approaching being 95% energy sustainable.



Table 2:
WPDES Permit Limits (Monthly Ave)

CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)	TP (lbs/day)
25	30	0.93	35

Table 3: Effluent Quality

Year	CBOD5 (mg/L)	TSS (mg/L)	TP (mg/L)
2008	3.31	4.22	0.79
2009	3.28	4.05	0.74
2010	3.96	4.61	0.71
2011	4.76	5.70	0.54
2012	5.02	5.68	0.63

Plant performance

The treatment plant consistently meets its WPDES permit limits which are summarized in Table 2. The effluent quality from the Stevens Point WWTP has been very consistent and is summarized in Table 3. The treatment plant staff is not only proud of producing a high quality effluent, but doing so in a very cost effective manner. Over the past 10 years the facility has taken full advantage of biological phosphorus removal and has consistently met permit limits without using any chemical or metal salts. Besides spending little money on chemical costs the facility is also run in a very energy conscience manner. The facility's current average of purchased electricity cost per million gallons is at 343 kWh/mgal. The Stevens Point wastewater facility will continue to treat wastewater in an energy efficient manner while producing the valuable end products of clean water, biosolids, and biogas. [CS](#)