

The City of Wisconsin Rapids' Wastewater Treatment Plant



In 1900, the once rivaled towns, Centralia (located on the west side of the Wisconsin River) and Grand Rapids (located on the east side of the river) merged as one and adopted the name 'Wisconsin Rapids'. The name came naturally due to a 45 foot descent the river has over an irregular shaped rock bed. Coupled with a number of small islands, the city makes for an aesthetically pleasing place to live.

The Wastewater Treatment Plant serves a population of about 20,000 people as well as two large cranberry operations, Ocean Spray and Mariani, which make up about 50% of the plants total BOD loadings. Wisconsin Rapids Wastewater also treats wastewater from two outlying communities Biron and Rudolph, WI. In order to effectively treat the city's growing industry, the plant was



upgraded in 2011 by Foth Engineering. The facility treats on average 3.5 millions gallons of wastewater on a daily basis. Peak monthly flow is 5.27 MGD. Peak daily flow is 8.71 MGD. The plant treats 12,000 lbs of BOD per day on average, and meets an effluent phosphorus limit of <1.0 mg/l monthly average. The treatment train consists of 17 lift stations located throughout the city, with the four largest lifts pumping directly to the plant headworks, to start the gravity flowing treatment process.



The WWTP has nine full time employees including a Superintendent, Chief Operator, three Operators, Maintenance Technician, Relief Operator/ Assistant Maintenance, Collections Crew Leader, and Collections Operator. The staff works together to efficiently and effectively operate, maintain, and manage the treatment facility as well as the collection/conveyance system.

PRIMARY TREATMENT/ SOLIDS SEPARATION

At the treatment plant, influent wastewater flows through two 5 mm mechanical screens that remove inorganic material like large coarse solids and rags.

Wastewater flows from the screens to the grit removal system, which consists of a grit vortex working simultaneously with a grit washer to settle out and remove heavy inorganic solids from the raw wastewater. The wastewater is then gravity fed to two 95 foot primary clarifiers where solids are encouraged to settle. Two primary clarifiers effectively remove settled organic solids and reduce downstream BOD load by 30%. This helps lessen the BOD and nutrient load sent to the Integrated Fixed-Film Activated Sludge Process (IFAS).

SECONDARY/ BIOLOGICAL TREATMENT

The IFAS system is similar to a conventional activated sludge process, but with the addition of plastic disks that increase the surface area of the tank and allow organisms to bio-accumulate on the disks. The mixed liquor and the fixed film media disks work in conjunction to effectively treat high loads of BOD and nutrients in the wastewater. The IFAS system consists of two concrete tanks filled with plastic media disks. Three ABS high-speed turbo blowers diffuse air from the bottom of the tank to provide oxygen for biomass as well as keep the mixed liquor and media disks well mixed. The disks allow a better environment for fixed film to thrive in the wastewater treatment process. Other benefits include a more diverse population of organisms, the ability to treat fluctuating loadings from day to day, and the ability to keep a larger biomass on-hand at all times.

The IFAS system is followed by up to four aeration basins that allow for polishing and further reduction of BOD and nutrients in the wastewater. Water then flows into a splitter box where flow is split between two final clarifiers. Floc is settled out and clear effluent water is passed over the clarifier weirs where it is passed through a Trojan 3000+ UV disinfection system before being discharged into the Wisconsin River. Settled activated sludge from the final clarifiers is either returned back to the IFAS system for continued biological treatment or wasted out of the system for thickening prior to digestion.



SOLIDS TREATMENT AND HANDLING/DIGESTION

Waste activated sludge is thickened with two rotary drum thickeners before it is sent to digestion. Two 400 GPM RDTs use an emulsion flocculent to allow water to be filtered out of the WAS, and reduce supernatant load to the digestion process. A thermophilic batch digestion process (TPAD) is used to treat the solids portion of the treatment process, which produces an DNR approved 'Exceptional Quality Class A' biosolid. In the TPAD process both Digesters are heated to 135 degree Fahrenheit and continuously mixed with biogas cannons. The biogas produced is collected and held in the floating digester covers. The two covers allow for gas storage up to 50,000 cubic ft. On average the digestion process produces 110,000 cuft/day. The biogas is then used to power a 330 kw Jenbacher generator that supplies power to the plant and heat for the digesters.



At times the facility is able to produce as much power as is demanded, making the facility energy neutral during these periods. Digested sludge is dewatered with a Fourier fan press to 15% solids and sent to a drying pad for further drying until it is land applied as a soil amendment fertilizer.

LABORATORY

The Wisconsin Rapids Wastewater Treatment Plant staff also operate a Wisconsin State certified Laboratory.

A banner for Greeley and Hansen, a company specializing in urban environments. The banner features the company logo, which consists of three blue wavy lines. To the right of the logo, the company name "GREELEY AND HANSEN" is written in a bold, sans-serif font. Below the company name, the tagline "designing better urban environments worldwide" is written in a smaller, lowercase font. Underneath the tagline, the words "water", "wastewater", and "infrastructure" are listed in a bold, lowercase font. At the bottom of the banner, the phone number "800-837-9779" and the website "greeley-hansen.com" are displayed. To the right of the website, there are social media icons for Facebook, LinkedIn, Twitter, and YouTube.



Certified Laboratory Operators run daily tests on influent wastewater, treatment process checks, and effluent wastewater. These tests are performed to ensure compliance with the WPDES discharge permit parameters issued by the Wisconsin DNR. The main areas of compliance relate to Biochemical Oxygen Demand (BOD) which correlates to biological load the wastewater will put on our treatment process, Total Suspended Solids (TSS) which is the solids content of the wastewater that needs to be treated, Total Phosphorus (TP) which is the main nutrient of concern for the receiving body of water, and pH which is the acidity or alkalinity of the wastewater. Operators rotate through the Laboratory on a weekly basis, ensuring complete staff proficiency for environmental compliance. [CS](#)

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