

ACTIFLO® - Hydrotech Discfilter

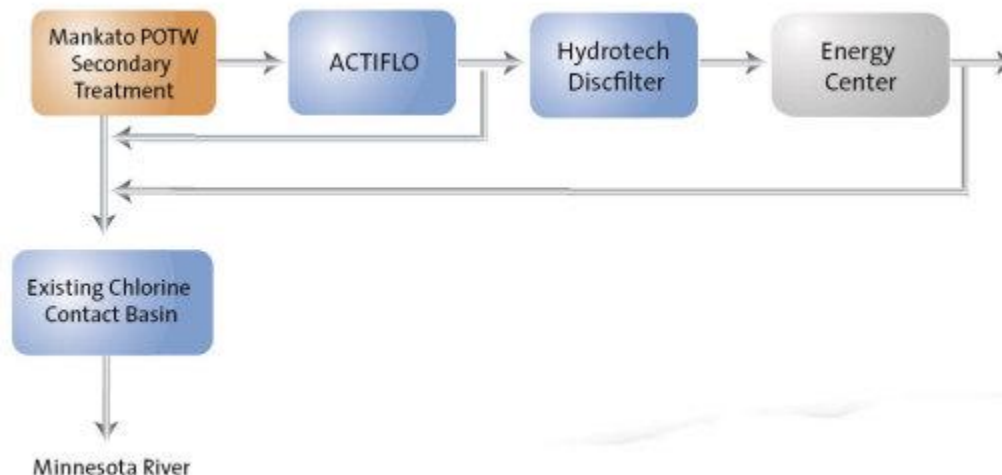
Challenges

The state of Minnesota instituted a new water quality requirement that limits cities along the Minnesota River to a 1 mg/L Total Phosphorus limit by 2015 to prevent algae blooms and resulting pollution problems. The Mankato WWTP also needed to meet the California Title 22 limits for reuse. The recycled water would then be supplied to an energy center for use in the plant's cooling tower.

Plant Overview

The original plant was built in the mid 1950's with a major expansion in 1974 with a secondary treatment system, a 1985 addition of 3 Equalization Basins, a plant upgrade in 2000 which added capacity as well as phosphorus and ammonia reduction and the 2006 construction of the Water Reclamation Facility. The design capacity of the plant is 11.25 MGD, a max month of 22.0 MGD and a hydraulic capacity of 44.0 MGD. Growth, new environmental regulations and the necessity for quality reuse water were the motivating factors behind the expansions.

The Water Reclamation Facility was designed to treat the WWTP effluent to California Title 22 Standards for Water Reuse to supply cooling tower needs for electrical generation while also meeting the new state phosphorus removal regulations. The facility treats effluent from the Mankato Wastewater Treatment Plant (WWTP) to meet specific water reuse criteria before it is conveyed by pipeline to the energy center for use in the facility's cooling tower. The cooling process causes 75% of the treated water to evaporate during cooling, the remaining 25% is sent back to the WWTP where it is mixed with effluent before being discharged back into the river.



Without this system, the city would have faced supplying water from its local surface and groundwater supplies to the turbine in order to accommodate the wishes of the energy facility. It is estimated that the city will save approximately 680 million gallons of water and \$1.5 million

in potable water costs per year with the process changes. Not only did the City of Mankato save its natural water supply and monetary expenses, but it also turned waste into a resource. This water reuse project was the first of its kind in the State of Minnesota, and one of the first in the nation. Previously all wastewater plant effluent had been treated and then discharged to a receiving water body.

The City of Mankato Wastewater Treatment Plant (WWTP) is owned and operated by the City of Mankato and serves the cities/districts of N. Mankato, Eagle Lake, South Bend Township, Skyline Village, Lake Washington District and the City of Madison Lake.

Process solution

The City of Mankato, MN, in partnership with Calpine Corporation retained Black & Veatch to design a solution for the Tertiary Treatment of the Mankato WWTP and the cooling tower water.

The two-stage treatment process uses a combination of Kruger's ACTIFLO® and Hydrotech Discfilter processes. The first stage is the ACTIFLO® process, a compact clarification system that utilizes the combination of coagulation, flocculation, and sedimentation using microsand as a seed for floc formation. The microsand provides surface area that enhances flocculation and acts as a ballast or weight. This first stage is designed to provide phosphorus removal for all of the WWTP's current and future needs. The second stage provides additional filtration to meet reuse requirements (California Title 22 Standards for Water Reuse) which focuses on solids and effluent turbidity reduction.

The treatment facility produces effluent water which is generally:

- Total Phosphorus - < 0.4 mg/L
- Total SS - < 5 mg/L
- Turbidity - < 0.6 NTU
- Biochemical Oxygen Demand (BOD) - < 2 mg/L

General Information

Project Location : Mankato, MN

Client : City of Mankato

Operational Since : 2006

Challenges

To meet new water quality requirements that limits cities along the Minnesota River to a 1 mg/L Total Phosphorus limit by 2015.

To supply Title 22 reuse water to a local energy facility.

Solution

A two-stage treatment process using a combination of ACTIFLO® for current and future phosphorus removal needs and Hydrotech Discfilter for additional filtration to meet reuse requirements.

AWARD

Governor's MnGREAT (2006)
(Minnesota Government
Reaching Environmental
Achievements Together)

AWARD

Minnesota chapter of the
American Public Works
Association - Project of the
Year Award (2007)
(for projects consisting more
than \$10 million).



The Mankato Water Reclamation Facility



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