

TREATMENT PLANT OPERATOR

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# Sand Dollars

PARTIALLY SUBMERGED DISC FILTERS ENABLE A PLANT IN NORTHEAST ILLINOIS TO RESOLVE SAND MIGRATION AND GAIN 600 SQUARE FEET OF STORAGE AREA

By Scottie Dayton



Operator Kevin Kurtz greases one of three drum bearings on a SuperDisc filter.



Workers from Manusos General Contracting in Fox Lake, Ill., install a SuperDisc filter assembly in Bay 2.

Hydrogen sulfide and chlorine had eroded the rails on traveling bridge filters over three sand filter bays at the Glendale Heights (Ill.) Wastewater Treatment Plant.

While frequent bridge derailments annoyed the operators, a bigger problem was the sand sucked up by the backwash pump. The return process deposited it at the headworks, where the material ruined the impellers on influent pumps. It also accumulated on the bottom of the digester, affecting the diffusers' ability to aerate and circulate the material.

To resolve these and other related issues, the plant team selected partially submerged disc filters supplied by WesTech Engineering.

## CLOGGING ISSUES

"We have a lot of inflow and infiltration problems," says plant manager Chuck Fonte. "At 8 or 9 mgd, sand clogged our grit system and blinded the bridge filters, causing the excess flow tanks to fill sooner than necessary."

Sludge commingling with the sand in the bays also blinded the filters. "No matter how much we chlorinated, we couldn't get them clean," says Fonte. "We'd have to drain the 5 mgd bays and scoop out the small cells by hand every five or six years."

The sand also had to be replenished annually. Operators risked back injuries when leaning through the handrails to pass 50-pound bags of sand to their co-workers down in the bays. Maintaining the bridge filters took 15 labor hours per week.

In 2011, officials hired Chicago engineering firm Baxter & Woodman to upgrade the tertiary treatment. They suggested the disc filters because they would fit in the 74- by 12.5- by 6.81-foot bays and came closest to matching the plant's hydraulic profile.

"After evaluating the bids, we selected WesTech Engineering," says Fonte. "Besides offering a substantial savings, the filters would provide additional filtration area to handle 21 mgd, which was 3 mgd more than requested in the bid."

Manusos General Contracting installed three units in two months. "Since March 2011, the plant hasn't gone to high flow," says Fonte. "But the best thing is that we no longer have sand issues, nor do we have to replace the material." The filters lowered TSS from



Lead operator Al Fajardo inspects the filter cartridges on a SuperDisc filter.

4 mg/L to 2 mg/L and use 2 kWh per day less electricity than their predecessors.

## LOOK AT THE SPACE

The 10.52 mgd (design) activated sludge plant operating in extended aeration averages 3.5 mgd with 21 mgd maximum flow. The sand filters have a solids loading rate of 30 mg/L. Effluent discharges to the DuPage River and biosolids are land-applied.

Construction began on Bay 3 in November once rain was no longer a concern. Using a Bobcat excavator, Manusos workers removed the sand filter and charcoal filter beneath. Scooping out the material left the floor uneven, so they applied a layer of thin-set concrete to level it. The process was repeated in each bay.

"Doubling up units in the first bay enabled Manusos to convert the third bay into a storage/meeting room," says Fonte. "We gained 600 square feet."

Meanwhile, workers built a knee wall in Bay 1 to divert all the flow to it, then removed the sand filter in Bay 2. Other workers cut a hole in the wall of the building large enough to slide in a 7 mgd filter assembly. It included a support frame with trough, motor, backwash pump and piping, rotor drum with discs, and a fiberglass cover with hatches. "They look like large beer cans on their sides," says Fonte.

Inside the units is a row of 20 eight-foot rotating discs. Each one holds 10 removable filter cartridges

"Previously, it took three bays to treat 15 mgd. Now we can handle 21 mgd in one-and-a-half bays."

## CHUCK FONTE

with 10-micron polyester woven media. During operation, liquid feeds into the center of the drum, passes through the media, and is discharged.

As captured solids collect on the discs, the influent level increases and signals a backwash cycle. A high-pressure spray then cleans the filter and discharges solids into the reject flume.

## 50 PERCENT REDUCTION

After workers lowered the filter assembly into Bay 2, they anchored it to the floor and connected the piping and electrical. Once it was online, they opened the bypass gate and directed flow from Bay 1 into it.

Workers prepared the first bay like the others and cut a hole in the wall opposite it to slide in two 7 mgd units. "Previously, it took three bays to treat 15 mgd," says Fonte. "Now we can handle 21 mgd in one-and-a-half bays." Before leaving, Manusos also installed an actuated bypass gate and SCADA system.

That summer, algae growth in the uncovered clarifiers caused its usual problems, only this time large clumps of it threatened to clog the filter media. Operators tried chlorinating the clarifier, but it didn't work. "We have two trough weirs and had to chlorinate both sides," says Fonte.

Lead operator Al Fajardo had a simpler solution. He built screens ahead of the units to catch the

scum. Every morning, an operator pulls the screens and sprays them to remove the algae. "That's the only maintenance other than greasing the drum bearings once a week," says Fonte. The units are chemically cleaned annually. All work is done at floor level.

## POPULAR ATTRACTION

Many Great Lakes municipalities have visited Fonte to look at the filters. Last September, the facility was host to a monthly gathering of the Fox Valley Operators Association in the new storage/meeting room. "Everybody toured the units and were amazed at how they work," says Fonte. "We are very pleased with them and will show them to anyone who is interested." **tpo**

## Share Your Idea

*TPO* welcomes news about interesting methods or uses of technology at your facility for future articles in the How We Do It column.

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