Bird Island WWTP - Buffalo, NY

Project Profile

Objective

Grit passing through an under performing grit removal system had buried fine bubble diffusers in 1-2 feet of grit significantly increasing energy requirements. Plant personnel sought an effective means to remove accumulated grit which was flexible and portable.

Solution

A portable SlurryCup™ / Grit Snail® system was used to remove the accumulated grit from the 16 aerated grit basins and optimize the aeration system's performance.

Plant Equipment

- (1) 42" SlurryCup™
- (1) 3 yd^3 / hr Grit Snail®
- (1) NEMA 4X control panel
- Pre-assembled and skid mounted

Project Parameters

- 400-650 gpm operating capacity
- Dewatering capacity of 3 yd^3 / hr

The Bird Island Wastewater Treatment Plant in Buffalo, NY, is one of the largest capacity treatment plants in the Northeast, serving about 550,000 residents in the city and surrounding suburbs. The plant has provided primary treatment of sewerage since it opened in 1938. A $200 million upgrade project added secondary treatment processes in the late 1970s. The plant has no shortage of capacity, processing flows of up to 180 million gallons on a dry day, 600 MGD during wet-weather periods and 360 MGD in its secondary treatment processes.

One of the Bird Island plant's principal challenges over the years has been grit removal. For the first 65 years of operation, the plant relied on a rudimentary grit-removal system consisting of longitudinal channels with chains, buckets, and scrapers to lift the grit from the channels. The channels slowed flows to about 1 fps and the buckets and scrapers removed grit from the bottom of the channels into a hopper. This captured some of the grit but allowed a significant volume of material to pass through the headworks and settle in the aeration basins.

The plant's operator, the Buffalo Sewer Authority, installed a new paddle-wheel, mechanically-induced vortex type system in 2004, improving the performance of the grit-removal operation. But a problem remained. The grit that had passed through the basic chain-and-flight system for years had accumulated in the aeration basins to the point where it had buried the fine-bubble diffusers in 1-2 feet of grit. The plant operators needed to clean out years of grit accumulation and set up a process to remove similar build-ups in the future. "This was a major issue," said Jim Keller, Plant Superintendent.

> *"We had so much grit deposited in the system, it was forcing us to use more energy to run the blowers in the aeration basins. It had gotten to the point of diminishing returns."*
>
> - Jim Keller, Plant Superintendent

Grit removal is an important process which protects centrifuges, digestion systems, solids handling equipment, high-pressure progressive cavity and diaphragm pumps, and other expensive mechanical equipment by reducing unnecessary abrasive wear.

The Sewer Authority considered a number of solutions to clean the grit out of the 16 aeration basins. Leaders considered hiring contractors, but found the costs too high. They considered using pumps, vactor trucks or centrifuge systems, which had downsides. Some involved the use of harmful chemicals while others required the plant to implement difficult work processes.

During his search, Keller discovered an alternative solution – a portable skid mounted system to remove and degrit the grit laden slurry accumulated in the basins. Keller saw an open vortex grit removal model in operation at a local WEA conference displayed by manufacturer representative Fred Falleson of Falleson Associates, and he was convinced. "I looked at this demo and I said, 'Hey, maybe this could work,'" Keller recalled.

In plants such as Bird Island where grit removal processes do not remove enough grit from peak flows, it is not uncommon for grit to deposit in process tanks such as aeration basins. Degritting of these accumulations is typically performed with liquid cyclone/screw separators. But these units cannot remove fine grit particles (<200 micron) which make up a large portion of the grit load that passes through the headworks. The SlurryCup™ and Grit Snail® are specifically designed to target fine grit down

Project Highlights

- Over 60 tons of grit removed from aeration basins over six months
- Portable system allows equipment to be used on multiple basins
- Substantially improved the performance of aeration systems which previously required extra energy to deliver sufficient aeration through the grit that was covering them
- 95% removal of grit 75 micron and larger
- System outputs clean, dry grit with <20% organics for cost effective landfilling

Grit accumulated in one of Bird Island's sixteen aeration basins

Buffalo's Portable SlurryCup™ / Grit Snail® Sludge Degritting System

to 75 micron. Utilizing centrifugal forces and a secondary rinse process, the Eutek SlurryCup™ also produces grit with less than 20% organics content.

Today, the Bird Island WWTP uses a portable sump pump to feed grit slurry to a SlurryCup™ grit-washing unit from the eration basin, while a Grit Snail® dewatering escalator is used to remove water from the captured grit. Both systems are supplied by Hydro International's Wastewater business based in Oregon. The SlurryCup™ and Grit Snail® used at the Bird Island plant aren't installed permanently in one area of the plant. They are positioned on a portable steel skid that can be moved around by a forklift or a crane.

The Sewer Authority used the mobile system to remove grit from 4 of the 16 aeration basins during the summer of 2008. In the first phase, the system removed about 60 tons of grit over six months. The Sewer Authority plans to maneuver the system around the plant, cleaning out the remaining 12 tanks, four at a time, in three phases over the next couple of years.

The SlurryCup™ provides high-performance degritting, removing grit and fineabrasives as small as 75 microns, with minimal organic solids. Its open free-vortex operates as a centrifugal solids separator and classifierwithsecondarywashing.

The liquid-particle separation occurs within the unit as a result of centrifugal forces exceeding fluiddragforces.Classi ficationandseparationofparticlesaccordingtosize occurs within the boundary layer. Once the particles are captured in the boundary layer and swept to the center, the SlurryCup's Hydraulic Valve™ uses rinse water for secondary washing to separate attached organics. This allows the SlurryCup™ to remove and wash over 90 percent of grit as small as 50 microns in diameter in both headwork and sludge-degritting applications.

The Grit Snail® captures fine grit by providing sufficient clarifier area to retain 75-micron particles. A slow-moving, cleated belt gently lifts grit from the clarifierpool without re-suspending captured fine grit particles, which would allow them to escape with the clarifier overflow.The combined SlurryCup™ and GritSnail® degritting system delivers clean, dry grit with 60% total solids and less than 20%organic solids.

During the aeration basin cleaning operation, grit and other deposited solids are washed to one end of the basin using a firehose.The slurry is pumped to the degritting system. Degritted effluent is stored in an adjacent basin and chlorinated to destroy filamentous bacteria prior to re-entering the treatment process. Washed grit is loaded into dumpsters and disposed of in a local landfill.The low organic content of the resultant grit attracts no rodents and there have been no complaints about odors.

Keller estimates that the Hydro International equipment will save his plant more than a million dollars over the life of the project. Some of the savings come from being able to avoid the costs of hauling heavily weighted organic sludge away from the plant. By not using belt presses or centrifuges, the plant was able to avoid having to pay for polymers and large amounts of costly high-quality city water needed for belt press sprays.

The biggest cost savings, Keller said, has been from the reduction of electricity. As the grit covered the diffusers their effectiveness was significantlyreduced.The superintendent said the diffusers had lapsed so badly that he had to add another blower to the system, further increasing electricity costs. Since the grit has been removed from the four tanks, Keller said that electricity consumption in that area have dropped by more than 15 percent. Keller said: "We needed a way to clean out the grit that's been sitting in these tanks for over a decade. We feel like we made the right decision, we've invested in equipment that performs well, needs minimal manpower and significantly lowers our operating costs."