

Struvite Dissolver Restores Flow to Fertilizer Operation

Problem: Stubborn struvite buildup clogged facility's solids transport pipe, impeding flow to the fertilizer manufacturing facility.

Solution: Treating the pipes with a struvite dissolver restored their full capacity without compromising fertilizer production or quality.

The Ocean County Utilities Authority (OCUA; Bayville, N.J.) operates three water resource recovery facilities (WRRFs) with a total combined capacity of 318,000 m³/d (84 mgd), serving 34 municipalities in Ocean County and five municipalities in Monmouth County. At its Bayville WRRF, OCUA annually produces 7700 Mg (8,500 ton) of OCEANGRO®, an “Exceptional Quality” Class A granular organic fertilizer made from biosolids. The product exceeds U.S. Environmental Protection Agency and New Jersey Department of Environmental Protection Exceptional Quality Standards. To manufacture this fertilizer, the facility thickens anaerobically digested solids from 2% to 20% solids, then dewater them using rotary dryers.

Struvite Obstructs Flow

Starting around 2015, Bayville facility operators noticed a slight increase in pumping pressure and a decreased ability to maintain a flow rate of 16 to 17 L/s (250 to 275 gal/min) in two 150-mm (6-in.) pipes used to transport anaerobically digested solids to the fertilizer manufacturing facility, a distance of about 320 m (1050 ft). For the next 5 years, the problem progressed from minor to significant, at which point operators excavated several sections of the underground pipe, discovering that the pipe had become so clogged with struvite that its diameter was reduced to 65 to 80 mm (2.5 to 3 in.).



The Ocean County Utilities Authority (OCUA; Bayville, N.J.) excavated sections of solids transport pipe to discover a massive buildup of struvite.

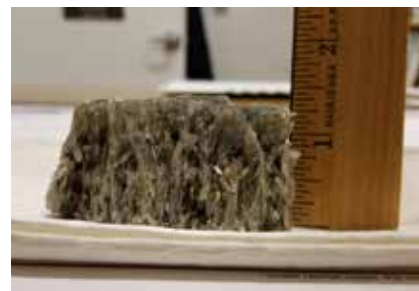
A common problem in wastewater treatment pipes, struvite accumulates in the presence of magnesium, ammonia, and phosphate and builds up inside pipes and other processing equipment as a hard, cement-like mineral. Operators first tried jetting out the blockage using high-pressure water, but struvite is notoriously stubborn, as was the case in Bayville. Another option was to replace the piping, a massive capital project that would have cost upwards of USD \$1 million, not to mention extended downtime that would affect solids control and fertilizer production. In 2020, OCUA decided to explore a struvite dissolver.

Special Conditions

Some extenuating circumstances influenced OCUA's choice of struvite-control product. Since the Bayville facility treats about 113,500 m³/d (30 mgd) of wastewater and produces about 145 Mg (160 ton) of fertilizer per week, it wanted to ensure continued operation during the struvite treatment. Bayville also required a process that would not affect the quality of its fertilizer, so the process it chose would have to keep all chemicals out of the flow

headed to the fertilizer manufacturing facility. Because the Bayville rotary dryers produce a high heat, it was necessary to use a nonflammable product with no risk of combustion. Finally, the facility needed a struvite-dissolver that would not damage its ductal iron piping.

OCUA was able to meet all four of these conditions with a struvite-dissolving product from Grignard (Rahway, N.J.) called Struvicide™. After a successful trial in which the product removed nearly all the struvite in a section of blocked pipe after a 24-hour soak, Bayville decided to proceed with treating both lines.



At more than 2.5 cm (1 in.) thick throughout the pipe, the struvite buildup could not be jetted out.

Restoring Capacity

The struvite dissolver works by removing the limiting ion from struvite, breaking the bond of the chemical structure and putting the mineral into

solution (solubilizing the mineral). A team of Grignard mechanics managed the treatment and assisted with unbolting and rebolting the pipes, support that OCUA found highly valuable.

Because the area Bayville serves is a summer vacation community, facility managers decided to treat their pipes during the off-season. OCUA scheduled the treatment to occur over two consecutive weekends in November 2020 when the fertilizer manufacturing facility typically is closed, first shutting down and treating one line and then

the other. Grignard handled the struvite removal, line cleaning, and removal of the resulting wastewater. The team injected the struvite dissolver, allowed time for soaking, then agitated and recirculated the struvite dissolver for maximum effectiveness. Each line was flushed, rinsed, and returned to service before the facility started up again on Sunday evening.

The product removed virtually every bit of struvite from the two Bayville lines — an estimated 8,238 kg (18,163 lb) — and returned the pipes to their full, 150-mm diameter. Pumping pressure and flow rates returned to optimal levels, ensuring solids treatment and fertilizer production are at full capacity.

Two years after treatment, Bayville facility managers opened the lines and verified that they were still clear of struvite and undamaged from the treatment. OCUA said it is planning to use the struvite remover to clean more lines in other areas of the facility. 🌊



The team let the struvite dissolver soak in the pipes, agitated and recirculated it, then rinsed it out. Pumping pressure and flow rates returned to optimum levels after treatment.

