

Improving aerobic sludge digestion efficiency

Flygt jet aerators boost profitability

Nestled in the Fraser Valley about 45 kilometers east of Vancouver, British Columbia, is the Langley Wastewater Treatment Plant (WWTP). Its aerobic sludge digester cells required major overhaul. This was due to limited capacity, sludge overspray from surface aerators and icing conditions that resulted in shutdown. To tackle these challenges, Xylem recommended easy-to-install Flygt jet aerators to boost process efficiency and meet regulatory requirements.

The background

The Langley WWTP, a secondary treatment plant operated by the Greater Vancouver Regional District (GVRD), handled an average daily wastewater flow of approximately 9 MLD from a population of 28,000 people.

The plant's configuration was expanded in 1998 as a trickling filter/ activated sludge plant to handle a maximum flow of 17 MLD. Two aerobic digester cells of equal size operated in series. The rectangular digesters with a volume of 1820 m³ each handled sludge thickened to approximately 4 to 6 %. A minimal amount of polymer was added.

The flow was fed from drum thickeners through digester no. 2 to digester no. 1. Digester no. 2 was continuously fed, whereas digester no. 1 was batch operated. No primary sludge was treated in this process.

The digestion system was at its maximum capacity. In addition, the digesters had to be operated at reduced levels because of the overspray generated by the surface aerators. This raised obvious health concerns forcing the operation of the digesters at lower levels to reduce overspray. During cold weather, the aerators were shut down due to icing conditions.

The capacity increase would be easy to achieve since the use of submerged aerators would enable the digesters to be filled to design levels, an increase over former operating levels.



CLIENT:	Greater Vancouver Regional District (GVRD), Canada
CHALLENGE:	Underutilized capacity and reduction of overspray to meet environmental regulations
SOLUTION:	Upgrading five surface aerators with three Flygt jet aerators
PRODUCTS:	Flygt jet aerators JA217 based on N-technology

XYLEM SCOPE:
To improve the operating conditions, plant management had the following objectives in mind:
Replace the surface aerators with submerged aerators to:
- Eliminate overspray
- Increase digester capacity by approx. 20%

Xylem engineers proposed the installation of two Flygt jet aerators, each with a 20 HP N-pump. This would enable plant personnel to become familiar with the operation of the Flygt jet aerator. Digester no. 1 was designated as the test cell and enabled the staff to see the jet aerator in operation. The quietness of operation and lack of overspray was especially noted.

After seeing how the units worked, the plant personnel were ready to go to the next phase. Plant personnel wanted to try a set of Flygt jet aerators JA217 that would provide the 500 l/s of air at 0.5 m from the digester floor. This would be the level at which the introduction of the air would be most beneficial for operation.

The plant personnel were impressed with the ease of installation. The units could be installed without draining the digester. This simplicity saved a considerable amount of time and money. After a 90-day evaluation period, the GVRD purchased the three 35 HP units.

The use of these jet aerators has significantly improved the process efficiency of the digesters at very reasonable cost.

Benefits

- Reduced volatile matter to levels well below regulatory requirements
- Compliance with the Organic Matter Recycling Regulation with fecal coliform levels well below regulatory requirements
- Eliminated overspray contributing to a better working environment
- Reduced operating digester volume by 60% without affecting the process
 - Deactivated one digester
 - Now continuously operating one digester at design level

By replacing five surface aerators with three Flygt jet aerators, the Langley WWTP not only achieved the objectives to eliminate overspray and to increase capacity, but also realized energy savings estimated at approximately \$40,000 per year. The plant now meets current capacity and regulatory requirements - without requiring a costly redesign.



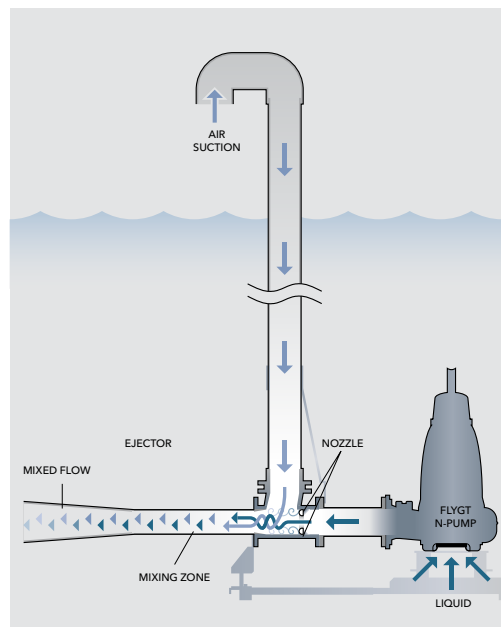
Note freeboard. Low level efforts to contain overspray was not always successful.



Old surface aerator removed from digester no. 1.



Three Flygt jet aerators JA217 were offered for evaluation by Xylem.



Jet aerator working principle

The Flygt jet aerators operate with a venturi section through which water is pumped. The velocity of the water creates air suction which is mixed in the ejector and transferred into the wastewater tank.