CASE STUDY

Optimized dosing for H_2S control at wastewater treatment plant

TasWater's Ti Tree Bend Sewage Treatment Plant faced persistent odor incidents and high chemical costs due to inefficient dosing for H_2S control. By adopting automated dosing control with a SulfiLogger™ H_2S sensor for real-time, liquid-phase monitoring, the plant dynamically matched dosing rates to actual H_2S levels. This approach optimized chemical use and cut expected annual costs by up to 87% or $250,000.

Background

Hydrogen sulfide (H_2S) dosing control in wastewater operations presents a complex challenge due to the difficulty of setting the correct dose rate for varying sulfide loads. Traditional dosing methods are often static and fail to adapt to fluctuations in H_2S levels, which leads to either over- or underdosing. Overdosing results in unnecessary chemical costs, while underdosing fails to mitigate the negative consequences of H_2S, such as corrosion of sewer infrastructure, health risks for operators, and persistent odor issues.

As H_2S levels can vary throughout the day due to changes in flow rates, temperature, organic load, and other factors, a dynamic rather than static approach to dosing is optimal. Without real-time adjustments, operators risk either excessive chemical use or ineffective treatment, both of which contribute to inefficiencies and increased operational costs. Addressing this challenge requires smarter, data-driven solutions that can account for varying H_2S levels.

Challenge

At TasWater's Ti Tree Bend Sewage Treatment Plant in Launceston, Tasmania (Australia), iron salts ($FeCl_2$) are dosed to precipitate sulfides (S^{2-}) and minimize H_2S gas release. Historically, chemical dosing was flow-paced, with operator-set rates adjusted seasonally. While effective, this approach did not account for the nature of sulfide concentrations which fluctuate daily, particularly in a combined sewer and stormwater system.

The SulfiLogger™ H_2S sensor measures directly in the wastewater.

Industry

Wastewater

Business needs

- Reduce chemical consumption
- Avoid H_2S induced odor incidents

Solution

Sensor-controlled dosing of $FeCl_2$ using continuous, liquid-phase H_2S measurements

Benefits

- Up to 87% reduction in chemical costs (estimated annual savings of up to $250.000)
- Improved environmental compliance
- No odor incidents
- Streamlined sulfide detection system with no need for reactive maintenance

Ti Tree Bend STP required a more dynamic and cost-effective dosing solution to address these challenges. The existing wet-chemistry H_2S analyzer used for monitoring proved unreliable due to frequent maintenance needs, calibration difficulties, and inaccurate readings caused by filtration system issues. The inefficiency of these methods resulted in unnecessary chemical consumption and inconsistent odor mitigation.

Solution

A SulfiLogger™ H_2S sensor was installed at the plant's inlet, downstream of a rising main discharge and the dosing point, to provide real-time monitoring of the residual sulfide after the dosing. Designed specifically for harsh environments, the sensor requires minimal maintenance and offers superior reliability compared to the previous system. It measures sulfide levels directly in the liquid phase and feeds data into the plant's SCADA system.

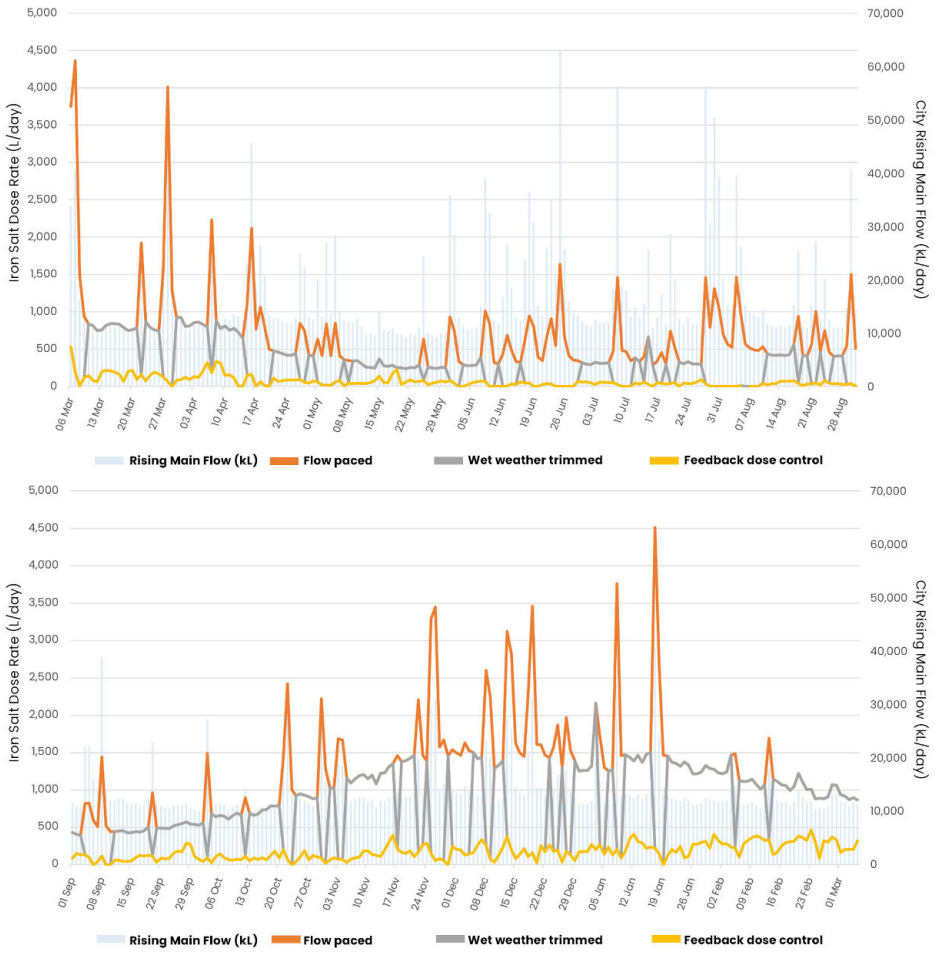
This automated feedback setup enabled precise, real-time control of iron salt dosing in a 1-year trial period. The actual cost of the feedback-controlled dosing was compared against two estimated dosing scenarios: 1) strictly flow-paced dosing, and 2) flow-paced dosing with wet weather trim. These scenarios represent what the chemical consumption and costs would have been if dosing had been managed solely based on flow rates.

Results

The integration of the SulfiLogger™ H_2S sensor with automated feedback dosing control led to significant improvements in chemical usage, odor management, and overall operational costs. By enabling the automated dosing strategy, iron salt consumption was reduced by 77% compared to the wet weather trimmed strategy, and 87% when compared to the strictly flow paced dosing.

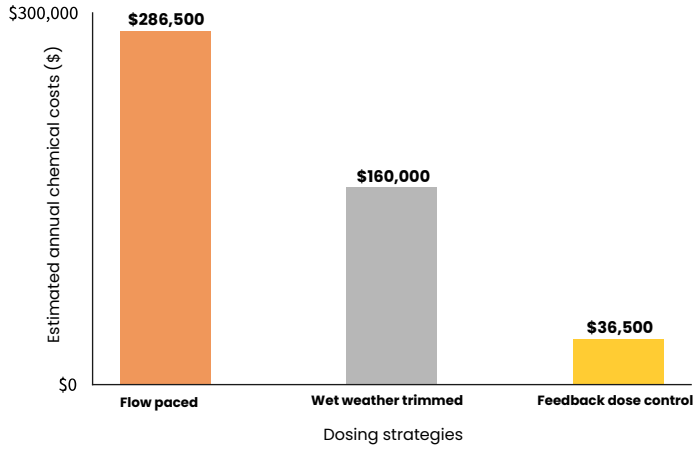
Real-time monitoring also ensured precise dosing, effectively preventing odor complaints and minimizing the risk of H_2S-induced corrosion. Throughout the one-year trial, no odor complaints were received from nearby residents. Additionally, the sensor streamlined sulfide detection, reducing operational complexity and eliminating the need for reactive maintenance. Beyond cost and efficiency gains, optimized dosing also lowered the demand for chemicals, reducing the environmental impact of operations while maintaining effective odor control.

Chemical consumption over time



The two graphs show chemical dosing rates for the first (top) and second (bottom) halves of the year-long trial for the SulfiLogger™ H_2S sensor-controlled feedback dosing (**yellow**) compared with the two estimated dosing scenarios: strictly flow-paced dosing (**orange**) and wet weather-trimmed dosing (**grey**).

Estimated annual chemical costs



The estimated annual chemical dosing costs of the three different dosing strategies reveal an estimated savings potential for the feedback dose control method of 77% ($123.500) a year compared to the wet weather trimmed scenario, and 87% ($250.000) a year compared to the strictly flow paced scenario.