CASE STUDY

Liquid-phase H_2S sensor cuts end-of-pipe dosing by 50%

The SulfiLogger™ H_2S sensor has demonstrated its ability to optimize H_2S managament activites and reduce operational costs. A Danish water utility used the continuous signal of a SulfiLogger™ sensor as a dynamic control input for the dosing of $FeSO_4$ end-of-pipe. Injecting the correct dose of chemicals - and only when needed - the effectiveness of the dosing system improved while chemical consumption dropped by 50%.

Background
Hydrogen sulfide (H_2S) causes severe problems when wastewater is pumped long distances. To prevent the subsequent release of rotten-egg odors and the premature deterioration of infrastructure assets, utilities often add neutralization agents to the wastewater. But without a full and dynamic overview of the development of H_2S - and thus without knowing the specific quantity of chemicals required - these chemicals are often added in excess.

Challenge
A Danish water utility wanted to optimize the end-of-pipe dosing of ferrous sulfates ($FeSo_4$) in an end-of-pipe well to reduce the consumption of chemicals and optimize the migitation of potential H_2S related odor and corrosion issue further downstream.

Solution
Unisense installed a small, self-contained dosing system consisting of a SulfiLogger™ H_2S sensor connected to a dosing pump, a control unit and a chemical tank at the end-of-pipe well. Using continuous measurements of dissolved H_2S performed directly at the end-of-pipe transition, the sensor signal was used as a direct control input for the dosing pump. Measuring in the liquid-phase when water was pumped, and reacting quickly to changes in the composition of the wastewater, the SulfiLogger™ sensor allowed the fast reacting chemicals to be added only when needed, and in just the right quantity using proportional dosing. To measure the effect of the dosing setup, an additional SulfiLogger™ sensor was installed in the sewage in a manhole 1.2 km downstream in the gravitational system, and using these two measurement points, different dosing strategies were performed, analyzed and compared - as shown on the next page.

The SulfiLogger™ sensor measured in the liquid sewage at the inlet of the well.

Industry
Wastewater

Business needs
- Reduced chemical consumption
- Mitigation of H_2S problems end-of-pipe and downstream in the gravitational system
- Improved odor control

Solution
Sensor-controlled dosing of $FeSO_4$ end-of-pipe using liquid-phase, continuous H_2S measurements

Benefits
- 50% reduction in chemical use
- Improved mitigation of H_2S problems end-of-pipe & downstream in the gravitational system
- Increased lifespan of sewer assets (corrosion control)
- No odor complaints

For more information, visit:
www.SulfiLogger.com/cases

Results

With dynamic H_2S sensor-controlled dosing, the consumption of chemicals was optimized, and all H_2S related problems fully mitigated downstream where only negliable H_2S levels were observed.

With a constant dosing strategy, using twice the total quantity of chemicals used for the sensor-controlled dosing strategy, the dosing was sufficient to mitigate the effect of low H_2S variations but unable to capture the full effect of spikes above 1 mg/L.

Without any dosing, the majority of the dissolved H_2S detected end-of-pipe was transported to the downstream verification site 20 mins later, where odor and corrosion issues would persevere.

The pitfalls of constant dosing

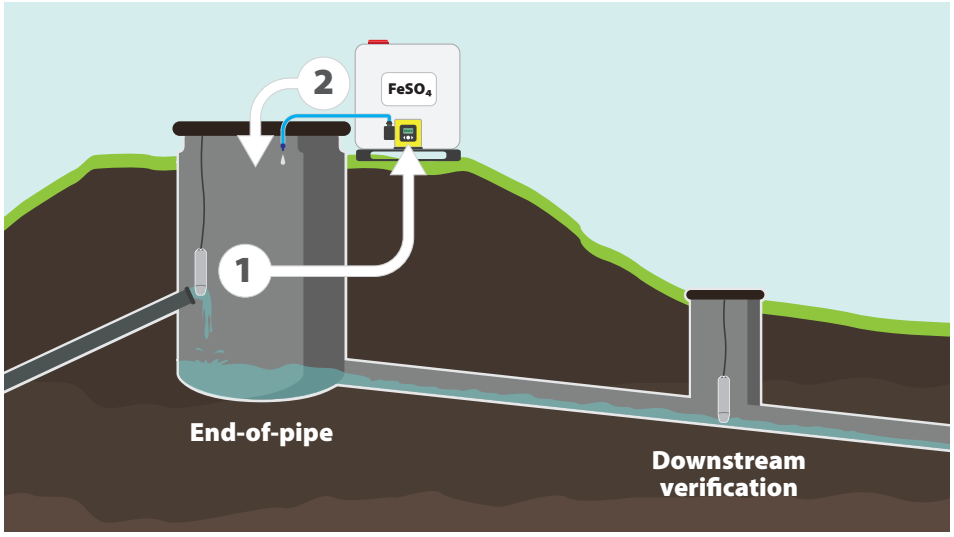
Globally, constant dosing is still the dominant chemical dosing strategy for H_2S mitigation in the wastewater industry, but although straightforward to approach, this strategy is not efficient. As the composition of the wastewater changes during the day, a fixed dosing strategy is excessive throughout long periods of the day, yet also insufficient to capture the effect of H_2S spikes.

Savings potential

The H_2S sensor-controlled dosing strategy improved the effectiveness of the dosing system, thereby minimizing the impact of corrosion and odor issues, while using 50% less chemicals compared to a constant dosing strategy.

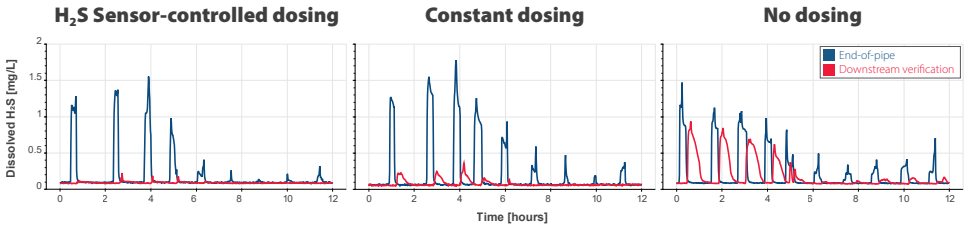
This case has proven that a dynamic, sensor-controlled dosing strategy - using the SulfiLogger™ sensor - can enable utilities to optimize the effectiveness of H_2S management activities while reducing costs.

Dosing setup

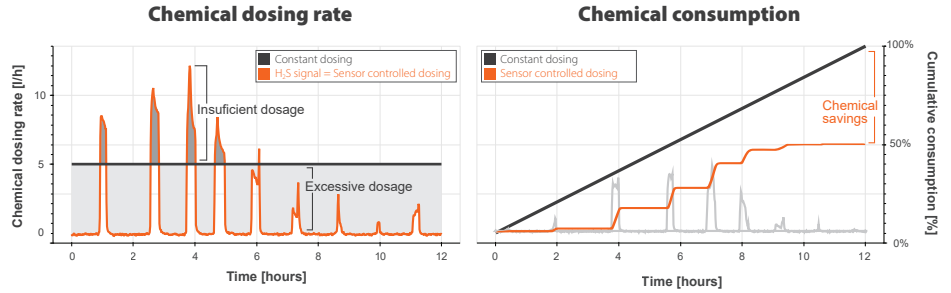


The SulfiLogger™ sensor delivered continuous H_2S data to a chemical dosing pump (1), which dynamically adjusted the rate of chemical injection proportional to the sensor signal (2). The effectiveness of the system was measured and compared to other approaches using a second SulfiLogger™ sensor measuring in the sewage 1.2 km further downstream.

Effectiveness



Chemical consumption



NORDITEC

www.norditec.no

SulfiLogger™

Sensor by UNISENSE