

## CASE STUDY

# New sensor provides better H<sub>2</sub>S insights in sewer networks

This case study shows that a new sensor technology provides better insights into how hydrogen sulfide impacts sewer networks by continuously measuring H<sub>2</sub>S directly in or just above untreated wastewater. This new approach to H<sub>2</sub>S monitoring delivers true and reliable data that allow wastewater utilities to manage and optimize H<sub>2</sub>S mitigation activities on a fully informed basis.

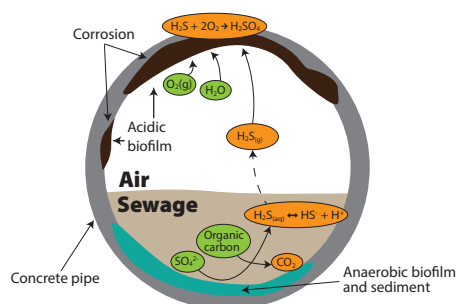
## Background

The toxic, foul-smelling, and highly corrosive gas hydrogen sulfide (H<sub>2</sub>S) poses a major challenge to wastewater utilities. H<sub>2</sub>S is formed when wastewater is pumped through force mains, and the H<sub>2</sub>S induced odor and corrosion issues are commonly found in hotspots right after the discharge into the gravitational sewer system. Here, part of the dissolved H<sub>2</sub>S is released into the air, while another part remains in the sewage where it is transported further downstream in the network if left untreated.

## Challenge

Wastewater utilities typically use gas loggers to monitor H<sub>2</sub>S concentration changes in the diluted air below manhole covers. However, seeing as H<sub>2</sub>S is produced and transported in the wastewater and not in the air, wouldn't it make more sense to measure it there?

This case study thus investigates if continuous, liquid-phase measurements



H<sub>2</sub>S is formed in the sewage by the reduction of sulfate. Part of the dissolved H<sub>2</sub>S may be released to the air where it can cause corrosion after being transformed into sulfuric acid.\*

\*Model adapted from Hvitved-Jacobsen, Vollertsen, and Nielsen (2013) - Sewer Processes: Microbial and Chemical Process Engineering of Sewer Networks & Li, Kappler, Jiang, and Bond (2017) - The Ecology of Acidophilic Microorganisms in the Corroding Concrete Sewer Environment.

can provide a better approach to H<sub>2</sub>S monitoring than gas-phase measurements and deliver better insights into how H<sub>2</sub>S impacts sewer hotspots.

## Industry

Wastewater

## Business needs

- ▶ Full knowledge of H<sub>2</sub>S impact at network hotspots
- ▶ Ability to make H<sub>2</sub>S management decisions on an informed basis

## Solution

Continuous H<sub>2</sub>S measurements in the wastewater and in the air

## Benefits

- ▶ Complete and dynamic overview of H<sub>2</sub>S challenge
- ▶ Proactive and data-driven approach to H<sub>2</sub>S management
- ▶ Real-time data in SCADA & cloud
- ▶ Reliable monitoring unaffected by external factors
- ▶ Uninterrupted measurements



## Setup

To analyze the benefits of measuring  $H_2S$  directly in the wastewater, 3 SulfiLogger™  $H_2S$  sensors were installed in the same 3-metre deep force main discharge well at a Danish wastewater utility. Capable of continuously measuring  $H_2S$  in both gas and liquid phase, the SulfiLogger™ sensors were installed in the raw wastewater (A), in the headspace just above the wastewater (B), and in the headspace just below the manhole cover (C).

## Results

As seen on the graph, the liquid-phase measurements (A) provide a full overview of how  $H_2S$  impacts the sewer hotspot. The gas-phase measurements in the air above the sewage (B) were correlated with the liquid-phase measurements, while the gas-phase measurements in the diluted air just below the manhole cover (C) were unable to reveal the severity of the  $H_2S$  challenge.

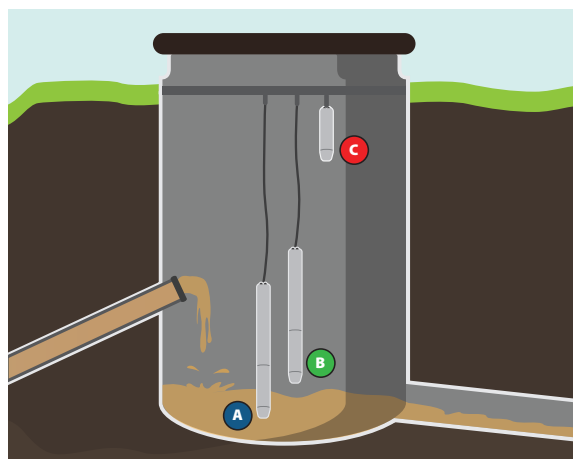
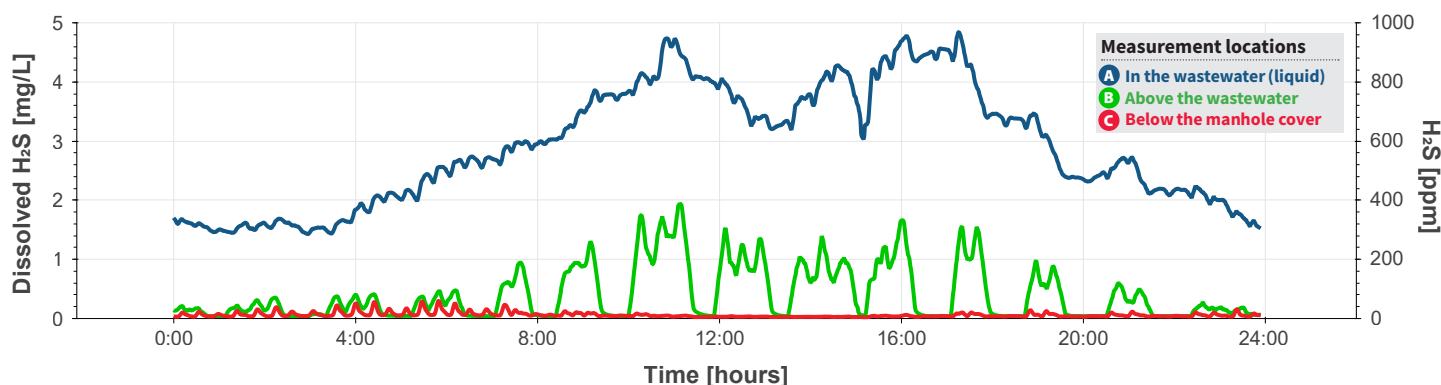
The major deviation in the gas-phase data (C) suggests these measurements were heavily affected by external factors such as turbulence, ventilation, and pumping rhythms.

## A data-driven approach to $H_2S$ management

The SulfiLogger™ sensor's liquid-phase measurements reveal the true scope of a utility's  $H_2S$  challenge. This knowledge enables a data-driven approach to  $H_2S$  management for greatly improved corrosion control, optimized chemical dosing, effective root cause analysis, and optimized planning of new infrastructure projects. Finally, the SulfiLogger™ sensor's unique ability to measure both in and above wastewater makes it a flexible tool suitable for odor detection campaigns as well.



The SulfiLogger™ sensor measures  $H_2S$  directly in wastewater and in the air above.



### Measurement locations

- A In the wastewater (liquid)
- B Above the wastewater
- C Below the manhole cover

## Liquid-phase $H_2S$ measurements provide better insights that enable you to...

- **Make data-driven decisions** when prioritizing  $H_2S$  management activities.
- **Minimize  $H_2S$  odors** by focusing odor control activities on confirmed hotspots.
- **Extend the lifespan of assets** and prevent critical infrastructure collapse.
- **Optimize chemical dosing stations** using direct  $H_2S$  sensor-controlled dosing - or by verifying the effect of your dosing efforts with downstream control measurements.
- **Solve  $H_2S$  problems at the source** by mapping individual sewer lines.
- **Prevent planning errors** caused by a lack of knowledge or underestimation of the  $H_2S$  challenge.

