EN

CASE STUDY

New sensor provides better H_2S 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_2S directly in or just above untreated wastewater. This new approach to H_2S monitoring delivers true and reliable data that allow wastewater utilities to manage and optimize H_2S mitigation activities on a fully informed basis.

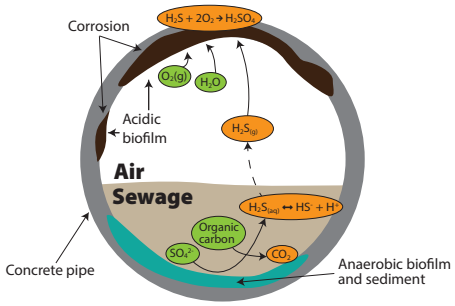
Background

The toxic, foul-smelling, and highly corrosive gas hydrogen sulfide (H_2S) poses a major challenge to wastewater utilities. H_2S is formed when wastewater is pumped through force mains, and the H_2S 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_2S 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_2S concentration changes in the diluted air below manhole covers. However, seeing as H_2S 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 can provide a better approach to H_2S monitoring than gas-phase measurements and deliver better insights into how H_2S impacts sewer hotspots.



H_2S is formed in the sewage by the reduction of sulfate. Part of the dissolved H_2S 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.

Industry

Wastewater

Business needs

- Full knowledge of H_2S impact at network hotspots
- Ability to make H_2S management decisions on an informed basis

Solution

Continuous H_2S measurements in the wastewater and in the air

Benefits

- Complete and dynamic overview of H_2S challenge
- Proactive and data-driven approach to H_2S management
- Real-time data in SCADA & cloud
- Reliable monitoring unaffected by external factors
- Uninterrupted measurements

SulfiLogger

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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

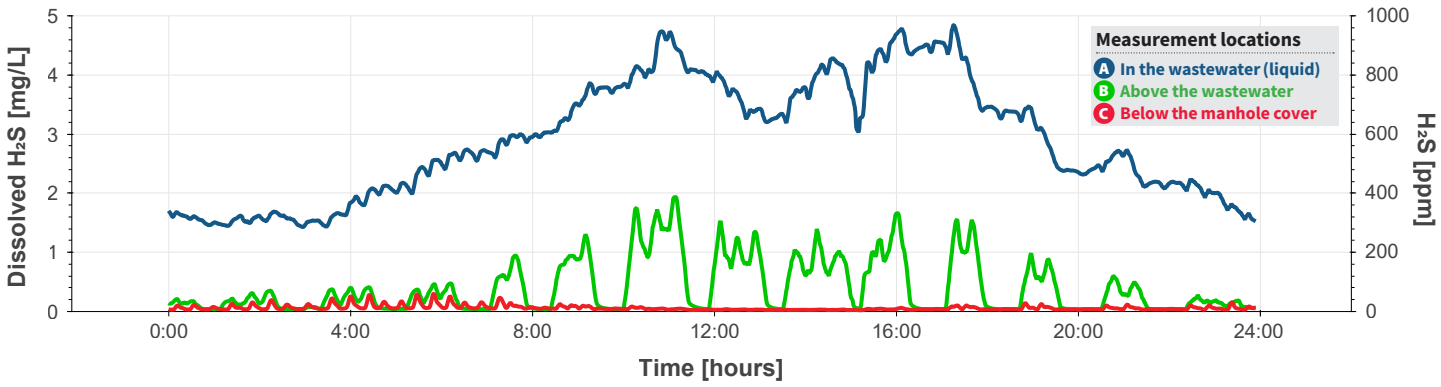
As seen on the graph, the liquid-phase measurements (A) provide a full overview of how H_2S impacts the sewer hotspot. The gas-phase measurements in the air above the sewage (B) were correlated with the liquid-phase measurements, while the gas-phase measurements in the diluted air just below the manhole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

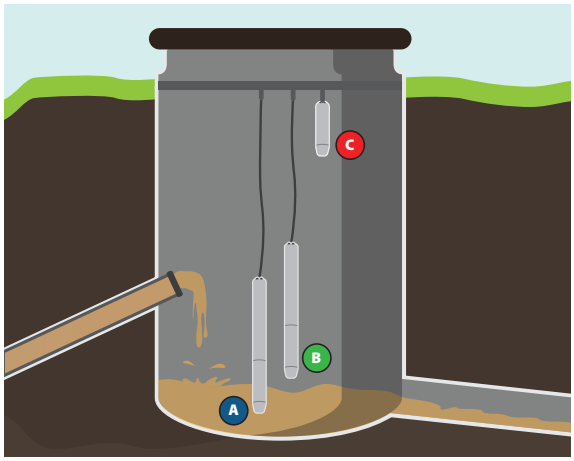
The major deviation in the gas-phase data (C) suggests these measurements were heavily affected by external factors such as turbulence, ventilation, and pumping rhythms.

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.