Liquid-phase H$_2$S sensor provides new insights at treatment plants

Despite causing severe odor, corrosion, and worker safety issues, H$_2$S is still a neglected process parameter at wastewater treatment plants (WWTPs). This case study examines how two of Veolia's French subsidiaries; Klearios and Société des Eaux de Marseille (SEM), gained new insights into the H$_2$S challenges at two WWTPs. These insights were obtained using a novel sensor for permanent and real-time monitoring of H$_2$S in untreated sewage.

Background

H$_2$S is a major challenge in wastewater collection systems where it causes odor and corrosion issues. If the H$_2$S challenge isn't mitigated, all of these problems are transported to the wastewater treatment plant (WWTP), where H$_2$S also poses a significant worker-safety concern. Finally, studies have found that H$_2$S inhibits biological wastewater treatment processes. Yet despite the severity of the issues caused by H$_2$S, it is still largely a neglected process parameter. Existing measurement solutions are unable to provide a dynamic overview of the true H$_2$S challenge. This lack of information limits the plant operators capabilities to fully optimize the H$_2$S management at the WWTP.

Challenge

Two Veolia subsidiaries in France wanted to achieve a better understanding of their H$_2$S challenges. At Saint-Nazaire in Western France, Klearios wanted a better overview of H$_2$S in the plant's combined inlet to see how the existing H$_2$S treatment could be optimized using sensor data. And at Cassis in Southern France, SEM wanted to map H$_2$S from two separate inlet sources - a pressurized line and a gravitational line.
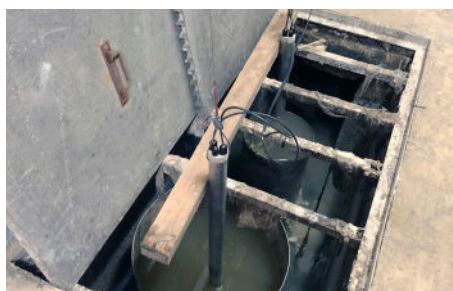
Two SulfiLogger™ sensors were permanently monitoring dissolved H$_2$S in the raw sewage at two influents at the wastewater treatment plant in Cassis.

Setup

Three SulfiLogger™ H$_2$S sensors were installed directly in the raw wastewater at the inlets of the two plants in a 'gatekeeper'-like setup. A single sensor was installed at the combined inlet at the WWTP in Saint-Nazaire, while two sensors were installed at the two influent sources at the WWTP in Cassis.

All sensors were connected to a cloud based IoT solution, which provided detailed graphs of the H$_2$S development over time.

Industry

Wastewater

Business needs

▶ Overview of H$_2$S challenge at WWTP
▶ Locate source of H$_2$S challenge

Solution

Liquid-phase H$_2$S sensors installed at the inlet(s) of two WWTPs in France.

Benefits

▶ Full, dynamic overview of H$_2$S concentrations in sewage from the collection system
▶ Profile of separate H$_2$S impacts from multiple inlet sources
▶ Proactive and data-driven approach to H$_2$S management
▶ Improved worker safety

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sulfilogger.com/cases

Results

In both cases, it was possible to achieve a full, dynamic overview of how H$_2$S impacted the plants. These insights enable future H$_2$S mitigation activities to be started on a fully informed basis. To track the root cause of the issues, the operators could also initiate further measurement campaigns upstream in the collection system.

At the Saint-Nazaire plant, Klearios gained insights into the plant's combined inlet (blue), which showed regular patterns with varying daily peaks between 0.2 and 1.0 mg/L H$_2$S.

At the Cassis plant, two different H$_2$S profiles were observed from two influent sources. The H$_2$S profile from the pressurized system (blue) followed a predictable pattern with consistently low H$_2$S levels below 0.4 mg/L, while a different profile was observed at the gravitational line (red), where frequent and irregular spikes above 5 mg/L were observed. The flow rate was significantly lower than in the pressurized line, indicating that the effect of the spikes would be less visible on the plant's combined inlet.

Perspectives

H$_2$S remains a neglected, dangerous, and expensive parameter at the WWTP. Although WWTP operators possess all the tools and techniques needed to mitigate the unwanted gas, readily available data is needed to optimize the effectiveness of the chosen H$_2$S mitigation activities. The SulfiLogger™ H$_2$S sensor delivers this knowledge by providing a true, reliable and dynamic overview of how H$_2$S impacts the WWTP.

Why is H$_2$S a problem at the treatment plant?
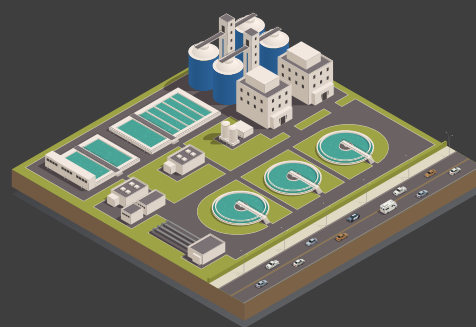
- H$_2$S causes rotten-egg **odors** affecting quality-of-life for nearby residents and plant staff.
- H$_2$S induced **corrosion** significantly reduces the lifespan of valuable plant assets.
- H$_2$S inhibits wastewater **treatment processes** and is a major problem in **biogas** production.
- H$_2$S is a **worker safety** concern causing several undesirable health effects. The gas is potentially lethal at concentrations above 500ppm.

Saint-Nazaire WWTP

Combined inlet

Cassis WWTP

Pressurized sewer **Gravity sewer**
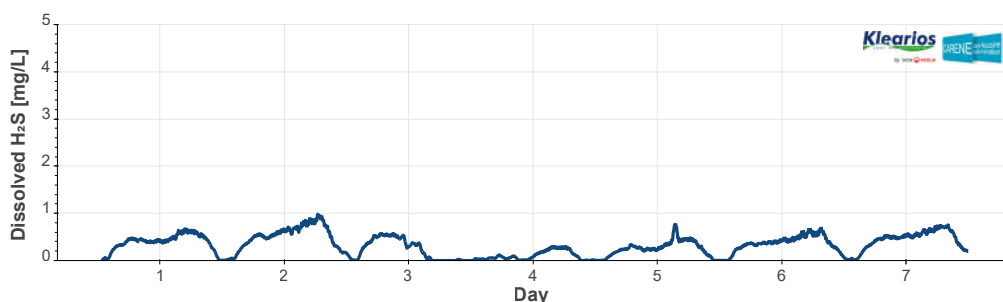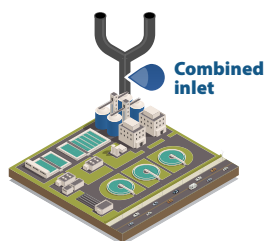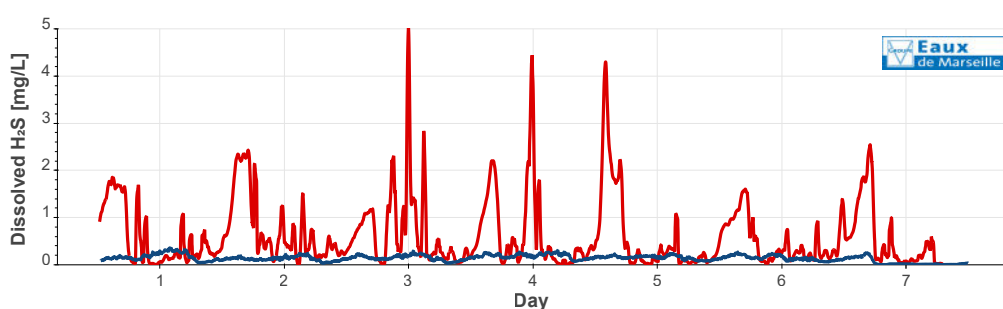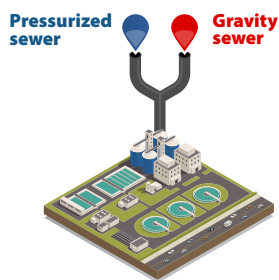
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