

Hydrogen Sulfide Treatment in a Wastewater Collection System

Wastewater collection systems are prone to accumulating high hydrogen sulfide (H_2S) concentrations. Sulfate-reducing bacteria (SRB) produce H_2S in these systems as they break down organic compounds under anaerobic conditions.¹ Collection infrastructure often provides ideal environments for SRB to grow in abundance. Wastewater conditions such as temperature, pH, conductivity, and flow rate, among others, affect H_2S production and gas emissions in these systems.

Excess H_2S production can cause many challenges for wastewater managers. The gas has a strong, unpleasant odor and can contribute to the corrosion of collection pipes, manholes, and other infrastructure components. Additionally, H_2S can be hazardous to human health at high concentrations. To mitigate H_2S , bioaugmentation can be used to limit SRB growth in collection systems. Augmenting cultures of bacteria that can outcompete or inhibit SRB can reduce H_2S production in collection infrastructure. The following case study details the use of BioLynceus® ProBiotic Scrubber® OCC (PBOCC) to treat H_2S in a collection system.

A municipality in Arizona was experiencing high H_2S levels in its lift stations and manholes. The gas was degrading the collection infrastructure and causing strong odors. After several residents in the area filed odor complaints, management actively sought a solution to reduce H_2S production.

The city decided to implement bioaugmentation to decrease SRB populations in the collection system. BioLynceus® PBOCC was introduced into several wastewater lines to reduce H_2S and associated odors. The product contained highly diverse live cultures of wastewater bacteria.

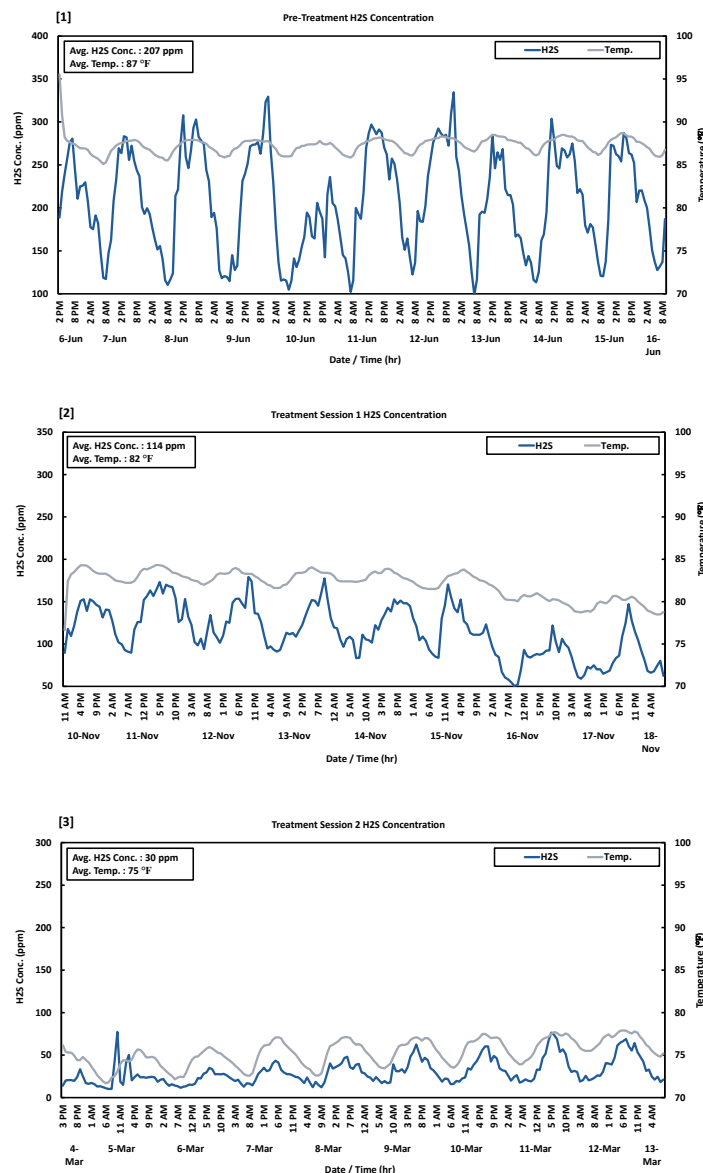


Figure 1. Hourly average H_2S concentrations and air temperatures for line 1 of the collection system. Data were collected over three OdaLog sessions: [1] pre-treatment (November 6-16), [2] PBOCC treatment session 1 (November 10-18), and [3] treatment session 2 (March 4-13).

¹ Gerardi, M. (2016). Wastewater Bioaugmentation and Biostimulation. Lancaster, Pennsylvania: DEStech Publications, Inc. Pp. 20-21.



Collection System
0.2 MGD

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In line 1, the average H_2S concentrations for the pre-treatment session and treatment sessions 1 and 2 were 207, 114, and 30 ppm, respectively. Average H_2S concentrations were reduced by approximately 45% in the first treatment session and 86% in the second. Furthermore, the air temperature decreased by seven degrees between sessions one and three, which may have indicated a decrease in wastewater temperature. Section 2.3.2.5 of the EPA design manual for odor and corrosion control of sanitary sewer systems and treatment plants (1985) reported that the rate of sulfide production by SRB increased seven percent per degree of water-temperature increase, up to 30°C.¹ Considering this information, the decrease in wastewater temperature contributed to lower atmospheric H_2S concentrations. However, the reduction of H_2S from 207 ppm to 30 ppm was significant and cannot be attributed entirely to temperature reduction alone.

During PBOCC treatment, the city did not receive odor complaints. Using PBOCC helped decrease H_2S concentrations and related issues in the collection system.

¹ U.S. Environmental Protection Agency (USEPA). (1985). Design manual for odor and corrosion control in sanitary sewerage systems and treatment plants. EPA/625/1-85/018, Center for Environmental Research Information, Office of Research and Development, Cincinnati.

BioLynceus® ProBiotic Scrubber® OCC helps reduce H_2S production in collection systems.

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