



CORROSION MONITORING IN WASTEWATER PIPELINES

Wastewater pipelines are especially vulnerable to corrosion caused by hydrogen sulfide (H₂S) generated during normal biological activity in sewer systems. Over time, this can lead to significant material degradation, safety concerns, and costly infrastructure repairs. To better understand corrosion activity and monitor pipeline condition, a water utility in Southeast Asia deployed SmartPIMS® 2.0 with installed ultrasonic sensors to continuously track wall thickness and detect early signs of corrosion in critical areas of its wastewater network.

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THE CHALLENGE

Hydrogen sulfide (H₂S) in wastewater systems can cause severe corrosion, leading to rapid pipeline deterioration and safety risks. Traditional inspections provide limited visibility and require frequent site access in hazardous environments.

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THE SOLUTION

SmartPIMS 2.0 with installed ultrasonic sensors continuously monitors pipe wall thickness at critical locations and transmits data to the cloud for remote analysis.

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THE BENEFITS

Continuous monitoring improves corrosion visibility, enabling earlier maintenance decisions while reducing the need for hazardous manual inspections.

The Challenge

Hydrogen sulfide corrosion in wastewater systems, also known as biogenic sulfide corrosion, is driven by sulfate-reducing bacteria operating under anaerobic conditions. These bacteria generate hydrogen sulfide gas, which subsequently reacts with moisture at the pipe crown to form sulfuric acid.

Sulfuric acid aggressively attacks concrete, mortar, and metallic materials, resulting in accelerated material loss. In severe cases, structural degradation can progress rapidly, potentially leading to pipeline failure within 10 years if left unaddressed.

Hydrogen sulfide presents significant safety risks in addition to asset degradation:

- H₂S is a highly flammable and explosive gas that can create life-threatening conditions if not properly controlled. When burned, it produces additional toxic gases such as sulfur dioxide.

- H₂S is also extremely toxic. At high concentrations, it can rapidly desensitize the sense of smell, impair the respiratory system, and cause loss of consciousness or death within minutes. As a result, it is one of the primary target gases monitored by portable personal gas detectors

Corrosion in wastewater pipelines is inherently complex. The interaction of multiple factors (such as chlorides, oxygen, temperature, pH, and flow rate) creates highly variable and often unpredictable corrosion behavior. Traditional inspection methods require frequent site access, increasing exposure risks for inspectors operating in hazardous environments.

The Solution

A water utility company in Southeast Asia deployed SmartPIMS 2.0 to monitor corrosion and assess the extent of hydrogen sulfide (H₂S)-induced corrosion in its wastewater pipeline network. Reliable in-situ corrosion monitoring devices were installed at known critical locations to continuously track early-stage corrosion in real time, including localized pitting and cracking.

Each non-intrusive UT sensor continuously measures the remaining wall thickness of the pipe, providing enhanced insight into asset health and structural integrity. SmartPIMS 2.0 improves corrosion visibility while reducing the need for manual inspections in hazardous or difficult-to-reach areas.

Corrosion data is transmitted via a cellular connection to the cloud-based webPIMS platform, where it is securely stored, visualized, and analyzed to support condition assessment and operational decision-making. By implementing the corrosion monitoring system, the facility can enable earlier intervention and help prevent unexpected failures and unplanned downtime.

The Benefits

The deployment of SmartPIMS 2.0 is not merely part of the utility's digitalization initiative; it is integrated into operational workflows to enhance safety, reliability, and efficiency.

Key benefits include:

- Reliable, continuous asset health data
- Real-time corrosion rate analysis
- Asset failure prediction with automated alert notifications
- Prevention of unexpected failures, enabling planned maintenance and shutdowns
- Reduced safety exposure for inspectors
- Lower operational costs through automated data collection and cellular data transmission
- Reduced time and effort required for site permits and site preparation

