

HOW IS HYDROGEN SULFIDE FORMED?

Hydrogen sulfide gas (H₂S) is formed by naturally occurring sulfate-reducing bacteria (SRB) present in wastewater. The SRB requires an oxygen source to respire and extract oxygen from sulfate ions (SO₄²⁻) and release sulfide ions (S²⁻) as a byproduct.

Hydrogen sulfide formation is favored in acidic conditions, where H⁺ ions combine with S²⁻ to form dissolved H₂S. The dissolved H₂S can be liberated into the surrounding air via turbulent conditions and where there is decreased solubility in water due to high temperatures or low pH. This often results in the pungent rotten egg odor that results in odor complaints from the surrounding community.

HOW DOES HYDROGEN SULFIDE CAUSE CORROSION?

Hydrogen Sulfide is not only toxic, but it can also accelerate corrosion in sewer collection systems. When hydrogen sulfide is released into the air, it comes into contact with bacteria, known as Acidithiobacillus. The bacteria consume the hydrogen sulfide and convert it into sulfuric acid (H₂SO₄). The resulting sulfuric acid causes corrosion damage, eating through iron, concrete, copper, and other metals. This can lead to dangerous leaks and costly repairs.



Pictured above: Piping removed from a pump station after being refurbished after only 7 years of operation. The increased rate of degradation is due to untreated sulfide in the wastewater stream.

H₂S EXPOSURE

CONCENTRATION (ppm)	EFFECT
0.00011-0.00033	Typical background concentrations
0.01-1.5	Odor threshold. Odor becomes more offensive at 3-5 ppm. Above 30 ppm, odor described as sweet or sickeningly sweet.
2-5	Prolonged exposure may cause nausea, tearing of the eyes, headaches or loss of sleep.
20	Possible fatigue, loss of appetite, headache, irritability, poor memory, dizziness.
50-100	Slight conjunctivitis “gas eye” and respiratory tract irritation after 1 hour. May cause digestive upset. Loss of smell at 100 ppm (olfactory fatigue or paralysis).
200-300	Marked conjunctivitis and respiratory tract irritation after 1 hour. Pulmonary edema may occur from prolonged exposure.

Effective H₂S treatment can create a safer environment for workers and the community, eliminating odor complaints and prolonging the life of infrastructure. Cape Fear Water Solutions offers the leading treatment solutions to prevent and remove hydrogen sulfide in the collection system. Cape Fear Water Solutions offer a broad range of programs to best fit each individual customer needs.