



## TECHNICAL BULLETIN: Wastewater

### **Control of H<sub>2</sub>S Odors in Wastewater Systems with GenClear N**

**GenClear N** is an economical way to control odors and corrosion caused by hydrogen sulfide (H<sub>2</sub>S) in wastewater systems. This chemical technology can control H<sub>2</sub>S throughout a system from relatively few feed points by:

- Providing a preferred metabolic pathway for bacteria so they do not generate H<sub>2</sub>S.
- Enabling bacteria to remove sulfides dissolved in wastewater.

The basis for its use is well documented.<sup>1,2</sup>

GenClear N can be applied to headworks, mains, trickling filters, carbon columns, lagoons and wherever anaerobic conditions can occur during wastewater collection and treatment.

#### Two Mechanisms to Stop H<sub>2</sub>S

Once bacteria deplete dissolved oxygen in wastewater, they access oxygen-containing ions. This occurs in a definite order: nitrite first, then nitrate, and finally sulfate. The first two are scarce in wastewater, so sulfate often serves as the oxygen source in anaerobic conditions. Sulfides formed in this process combine with hydrogen ions to form H<sub>2</sub>S.

Adding nitrite and nitrate oxygen to wastewater affects H<sub>2</sub>S in two ways. First, they replace sulfates as the oxygen source of choice, so H<sub>2</sub>S formation stops as long as nitrite and nitrate oxygen is present. And second, this oxygen source allows bacteria to remove dissolved H<sub>2</sub>S and other reduced sulfur compounds by oxidizing them to sulfates. Adding a product high in nitrite provides a more active way to abate H<sub>2</sub>S than the use of nitrate alone.

These reactions, which occur in the bulk flow and the slime layer on pipes and other submerged surfaces, release harmless nitrogen gas. They also lower BOD by increasing biomass and reduce corrosion of vessels, piping and other components by decreasing H<sub>2</sub>S vapor in the air space above wastewater in pipes and vessels.

#### **Range of Benefits**

- Control odors due to H<sub>2</sub>S
- Control corrosion due to H<sub>2</sub>S
- Reduce BOD
- Easy to store, transport and handle.
- A versatile technology across many types of facilities and conditions.

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#### Use Throughout the System

**GenClear N** can be used in headworks, force mains, wet wells, grit chambers, gravity interceptors, primary clarifiers, filters and wherever anaerobic conditions occur in wastewater.

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## TECHNICAL BULLETIN

It is usually fed upstream of a problem area either as periodic doses or continuously. As stable materials, sodium nitrite and nitrate can remove sulfides added by side streams well below the feed point. It usually takes two or more days after addition starts before enough bacteria are present to abate H<sub>2</sub>S significantly.<sup>1,2</sup>

### Typical Properties of GenClear N

Formula:	NaNO <sub>2</sub> and NaNO <sub>3</sub> in Water
Assay:	NaNO <sub>2</sub> 35%
	NaNO <sub>3</sub> 13%
Odor	None
Specific Gravity	1.375
pH	9.0 (1% Solution)
Buffering	Slightly buffered (0.5% carbonate alkalinity)
Boiling Point	120°C (248°F)
Freezing Point	-1°C (30°F)

This versatile technology can be applied in many types of facilities and under many flow, discharge and weather conditions. Considering sodium nitrate alone, the U.S. Environmental Protection Agency notes that adding "enough oxygen to satisfy 50 percent of the 5-day BOD gives complete protection against odors<sup>1</sup>."

The Water Pollution Control Federation states that "the sodium nitrate required to destroy 1 mg/l of sulfide will range between 10 and 30 mg/l, depending on sulfide concentration<sup>2</sup>."

In one example, adding 27 mg/l of nitrate at a force main discharge having 4.5 mg/l total sulfide reduced sulfide to about 2 mg/l<sup>1</sup>. Less nitrite/nitrate solution may be needed than this since oxygen from nitrite is more readily available than from nitrate.

### Easy to Store and Handle

**GenClear N** is compatible with many common materials, such as high density polyethylene, polyvinyl chloride, polypropylene, stainless steel, reinforced polyester and rubber-lined steel. It can be stored and handled in systems used to handle nitrates alone. It is sold in bulk by tanker truck or rail tank car, or in DOT/MOT-approved plastic drums.

### References

1. "Design Manual: Odor and Corrosion in Sanitary Sewerage Systems and Treatment Plants," U.S. Environmental Protection Agency, EPA/625/1-85/018, Oct. 1985.
2. "Operation of Wastewater Treatment Plants," Manual of Practice No. 11, Water Pollution Control Federation, 1976.

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