



COLLECTION SYSTEMS ARE TOUGH!

With miles of pipe and multiple pumping stations, managing the complexity of a wastewater collection system is a full time job. The main task is to maintain the system and keep it flowing. But also near the top of that task list is preventing nuisance odors.

When the phone starts ringing, you become a detective. First, you have to find the site or sites of odor release. Then, you have to determine why and when the problem occurs. Finally, you have to decide how to eliminate the odor. What about all of those system variables? You have to consider elevation changes, gravity lines and force mains, pipe lengths and diameters, average daily flow rates, hourly flow variations, wastewater turbulence, free-fall into wet wells, and weather influences. All of those factors can contribute to the difficulty of controlling the problem. Collection systems are tough!

THE SULFIDE PROBLEM

The main cause of odor complaints in sewer systems is hydrogen sulfide (H₂S). While sulfides are sometimes introduced into the system from outside sources (ground water, industrial discharge) they are usually generated in pipelines by the biological reduction of sulfate ion (SO₄⁼). Collection system conditions are usually perfect for the anaerobic bacteria to produce sulfides:

- Sufficient organic loading (BOD)
- Low oxygen levels (DO, ORP)
- Warm temperatures
- Unlimited dissolved sulfate

Gravity lines can produce sulfides, but pressure mains and surcharged gravity sewers almost always create sulfides because they flow full all of the time. When the pipe is full, there is no air space that allows for oxygen exchange into the water. Odor-generating conditions prevail when the dissolved oxygen drops to zero.

WHAT TO DO

The sulfide problem can be solved by feeding TOTALOX™ Odor Eliminator. TOTALOX solves the odor problem in a two-step approach. First, it immediately destroys sulfides, mercaptans, amines and other odor compounds using oxidation chemistry. Second, it prevents the formation of the sulfides during the long retention times in the pipe.

Step 1: Rapidly Destroy. When sulfides have already formed, destroying the sulfides before they escape into the air works very well. In this case, you want to be quick and thorough so you can treat near the point of odor release. TOTALOX uses permanganate oxidation chemistry to rapidly attack the odor compounds in the wastewater. It's effective and proven over many years of successful use.

Step 2: Prevent Sulfide. Preventing the formation of sulfides is always a good plan and should be a top priority. There are several ways to do this, but most aren't easy in an existing system. For example, all that's necessary is to lower the wastewater's BOD content, increase the velocity through the pipes, raise the oxygen content of the waste, or eliminate the sulfate. OK, maybe those changes aren't so easy to accomplish.

Here's a better idea. Convince the anaerobic bacteria to "chew" on something they'll like better than sulfate. It turns out that they really prefer nitrate (NO₃) a key component in TOTALOX odor eliminator. Adding TOTALOX has another advantage in a collection system: its persistence. When retention times are long, you need a treatment that will last a long way down the pipe. TOTALOX does this.



A CASE HISTORY- ODORS FROM THE HIGHWAY LIFT STATION

The public may not be able to see a lift station that is located near a highway, but they sure can smell it when they drive by. That's what occurred in a county-owned collection system in the southern United States.

The "highway" lift station, as its name implies, is located on a busy county road. This is great for accessibility to the station, but its proximity to the road and its visibility mean that any odors can be easily detected and traced to the source. At this site, there is an additional complication. A junior high school is located on the adjacent property. At the end of the school day, students, parents and teachers were exposed to unpleasant odors. Such public exposure results in "dozens of telephone calls each week" according to the system superintendent.



Further, the highway lift station electrical control box and the components on the inside of the box were so severely corroded that they had to be completely replaced. The County knew something had to be done.





SURVEYING THE SYSTEM

Developing a treatment plan starts with reviewing system pipe diagrams, checking flows, visiting pump stations, and popping some wet well covers and measuring sulfides. The county staff and Carus technical representatives conducted a preliminary survey of the pump stations and force main.

As collection systems go, this situation was relatively straightforward. The lift station receives wastewater from only two points. The main flow, 105,000 – 110,000 gallons per day, comes through a force main originating at a smaller, up-stream pump station. The line is a 12-inch diameter pipe about 3.41 miles (18,000 ft) long, so it can hold 106,000 gallons. On a normal day, the retention time in the pipe will average 24 hours. The second wastewater source was the small pump station serving the junior high school. It is contributing 4,000 to 5,000 gallons per day when school is in session.

During the survey they found that wastewater discharge into the highway station contained 4–5 mg/L dissolved sulfide. As the wastewater cascades into the station wet well, the turbulence strips H₂S into the air. Because of its low odor threshold it doesn't take much for students at the school or drivers on the highway to detect the "rotten egg" smell.

SOLVING THE PROBLEM

Because of the long, 24-hour retention time in the force main, anaerobic conditions create sulfides as the wastewater travels along the line. To prevent this, a TOTALOX odor eliminator treatment program was recommended.

TOTALOX is available in a 250 gallon intermediate bulk container (IBC) made of HDPE plastic and protected within a metal cage. With a small peristaltic metering pump, the feed system was quickly installed and started. Locating the TOTALOX feed system at the up-stream lift station permitted the permanganate-nitrate treatment to be mixed into the wastewater before it is lifted into the force main.

The combination treatment of permanganate and nitrate worked perfectly. At the injection point, the permanganate rapidly destroyed any sulfides and other odors. The stable nitrate ion remains in the water as it flows down the pipeline. The anaerobes, preferring nitrate to sulfate for their energy source, no longer produce sulfide.

TOTALOX DOSAGE

An initial dosage of 10 gallons TOTALOX per day was chosen as a starting treatment. It worked well, but some fugitive odors would still occasionally escape from the Highway lift station. Readjusting the dosage to 15 gallons per day completely eliminated all odors. With the new dosage level, county workers report that no odor complaints have been received. Dissolved sulfide levels in the force main discharge are being held to 1 mg/L or less.

When winter weather approaches, it is anticipated that the dosage will decrease and further testing will show whether returning to a 10 gallon TOTALOX per day dosage is practical.

COUNTY SATISFACTION

The treatment program has been a great success. The county staff is already planning to introduce the TOTALOX solution at other lift stations.

