TITUS® TWISTER
MIXING AERATOR

CASE STUDIES

Proven Municipal Wastewater Success Stories

CONTROLS ODORS AT THE SOURCE | ELIMINATES STAGNANT ZONES | IMPROVES MIXING & SOLIDS SUSPENSION | REDUCES COSTS. INCREASES SAFETY.



POWERFUL OXIDATION. | SUPERIOR ODOR CONTROL. | SAFER OPERATIONS.

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TITUS TWISTER MIXING AERATOR

CASE STUDY

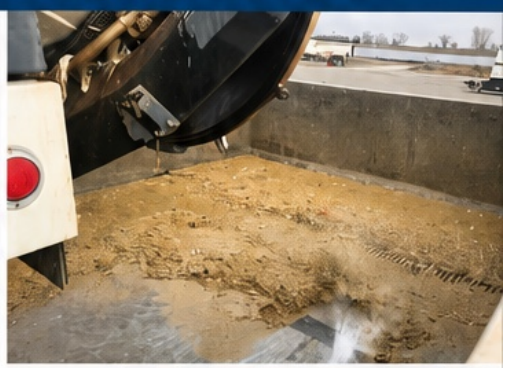
YUBA CITY, CALIFORNIA

ELIMINATES LIFT STATION ODOR & FOG PROBLEMS WITH THE TITUS® TWISTER® MIXING AERATOR

PROVEN PERFORMANCE. REAL RESULTS.

- 95% REDUCTION IN FOG PUMP-OUTS
- ODORS ELIMINATED
- RAGGING ELIMINATED
- RAPID RETURN ON INVESTMENT













THE CHALLENGE

Yuba City's Lift Station No. 2 serves one of the city's busiest wastewater collection areas, conveying approximately 2–3 MGD through a system serving 72,000 residents. Despite previous investments in activated carbon odor control and chemical treatment programs, persistent odor complaints, grease accumulation, and pump ragging continued to create significant maintenance costs.

EXISTING CONDITIONS

- Continuous hydrogen sulfide odors
- Heavy FOG accumulation
- Ragged pumps
- Frequent hydro-vac cleaning
- Carbon odor control system no longer keeping pace
- Approximately $70,000 annually spent on maintenance efforts before the Twister evaluation began.

THE TITUS SOLUTION

After evaluating alternatives, the City accepted a no-cost demonstration of the **TITUS® Twister® Mixing Aerator.**

The demonstration utilized:

- Trailer-mounted regenerative blower package
- Two Twister® mixing heads
- Ozone enhancement
- Air-driven mixing
- Stainless steel piping/manifolds
- No electrical equipment inside the wet well

The Twister creates an air-lift vortex that continuously suspends solids, disperses grease, transfers oxygen and ozone throughout the wet well, and prevents stagnant conditions that contribute to odor formation.

RESULTS

- Odor eliminated during the demonstration
- 95% reduction in FOG pump-outs
- Ragged pumps eliminated
- Improved solids suspension
- Reduced maintenance
- Improved operator safety
- Lower operating costs

> *"Within the first hour, even running at half-capacity, everyone present concluded this was the technology we needed. The odor was gone. Pump-outs for FOG matter have been reduced 95%, and ragged-up pumps have been eliminated."*
>
> – Tim Bybee
> Wastewater Collection Supervisor

PROJECT SNAPSHOT

CLIENT:
Yuba City, California

INSTALLATION:
Lift Station No. 2

POPULATION SERVED:
72,000

COLLECTION SYSTEM

- 200 miles of sewer main
- 2,400 manholes
- 7 operational lift stations

WHY UTILITIES CHOOSE THE TITUS® TWISTER®

- Controls odors at the source
- Eliminates stagnant zones
- Reduces grease accumulation
- Minimizes pump ragging
- Reduces cleaning frequency
- Air-driven design
- No submerged electrical equipment
- Optional ozone enhancement (O_3)
- Proven municipal installations

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TITUS TWISTER MIXING AERATOR

CASE STUDY

A SOLUTION TO SMELL: ADVANCED OXIDATION AT EAST BAY MUNICIPAL UTILITY DISTRICT

POWERFUL OXIDATION. SUPERIOR ODOR CONTROL. SAFER OPERATIONS.



PROJECT SNAPSHOT

CLIENT:
The East Bay Municipal Utility District (EBMUD)

LOCATION:
Alameda, California

INSTALLATION SITE:
Pump Station M

COLLECTION SYSTEM SIZE:
2 million MGD to 5.8 million MGD

CUSTOMERS SERVED:
15,000

CONSULTING ENGINEER/ADVISORS:
West Yost Engineers

TITUS REPRESENTATIVE:
Lewis Titus

THE PROBLEM

Pump Station M (PSM) serves as a crucial pumping station for Bay Farm Island, a residential community of about 15,000 people. The station pumps an average of 2 million gallons of wastewater daily, with peaks up to 5.8 million gallons during winter months.

Prior to rehabilitation, PSM lacked a flow meter, PLC, and any remote monitoring or control system. Odor control also left much to be desired.

For years, PSM used sodium hypochlorite to treat odors. It was ineffective, took too long, required a large storage tank, and created safety risks.

In 2016, signs of leakage in the storage tank highlighted additional safety concerns, prompting a reevaluation of odor control strategies.

LIMITATIONS OF THE HYPOCHLORITE SYSTEM

- Ineffective contact time meant only partially successful odor suppression.
- Chemical delivery and storage required frequent refills, increased facility footprint, and added logistics complexity.
- 2016 inspections revealed tank corrosion, requiring relining and further escalating maintenance costs.

EBMUD needed a more reliable, cost-effective, and sustainable solution to improve odor control, while enhancing safety and reliability.

THE SOLUTION

The design team at West Yost Engineers explored several technologies. The most promising solution was the Advanced Oxidation Process (AOP) using ozone generation combined with carbon adsorption.

AOP SYSTEM COMPONENTS

1. **OZONE GENERATION:** Two Titus Wastewater Solutions ozone generators produce up to 40 grams of ozone per hour (combined) using corona discharge. Ozone is introduced into the wet well via a Twister mixing aeration system.
2. **TWISTER MIXING AERATORS:** Installed in the wet well to distribute ozone throughout the wastewater, break down FOG, and prevent mop heads from forming.
3. **CARBON ADSORPTION:** Two carbon canisters, each filled with 140 pounds of activated carbon, are installed downstream of the AOP system to adsorb any remaining hydrogen sulfide (H_2S) gas.

The ozone generators are housed in stainless steel enclosures with noise-reducing padding, air conditioning, and particulate filters. Integrated ozone sensors automatically shut down the system if ozone levels exceed safe thresholds.

The Twister aerators can also operate without ozone to provide agitation when needed, improving wastewater quality and pump performance.

THE RESULT

- Dramatic reduction in odor complaints
- Hydrogen sulfide (H_2S) gas levels reduced from 2.8 ppm to just 0.4 ppm
- Eliminated need for hazardous chemical deliveries
- Reduced operation and maintenance costs
- Improved operational safety
- More reliable and environmentally friendly wastewater treatment
- Project recognized by the California Water Environment Association for Engineering Achievement on February 7, 2025

> "This upgrade not only resolved odor issues but also eliminated the need for hazardous chemical deliveries and significantly reduced operation and maintenance costs. Most importantly, the switch to AOP technology has created a safer, more reliable, and environmentally friendly wastewater treatment facility for the surrounding community."

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TACKLING ODOR AND FOG

New mixing aerator system solves problematic lift station's constant issues

By Suzan Chin-Taylor

BETTER MOUSETRAPS

PRODUCT:
TITUS Twister Mixing Aerator

MANUFACTURER:
Titus Industrial Group
541-389-1975
www.titusig.com

APPLICATION:
Regenerative blowers, enhanced with ozone generation

BENEFITS:
Odor was gone, FOG was reduced 95%, ragged up pumps eliminated

USER:
Yuba City, California

Yuba City, California, like most cities across the nation, has experienced growth. Parts of its sanitary collections system are now being asked to perform at top capacity and handle more than their fair share of conveyance on a daily basis.

In one such structure, this was creating the ongoing challenge of fighting odor issues without a long-term resolution and with a never-ending maintenance expense. Accepting an offer of a pilot test unit for a new technology designed for wastewater treatment plants is showing itself to be the answer Yuba City has been waiting to incorporate for decades.

Long history

Serving a population of approximately 72,000 with a system comprised of 200 miles of sewer main, 2,400 manholes and 17 operational lift stations, Yuba City's small and efficient collections team has a full plate of work. Tim Bybee, wastewater collection supervisor, and Diana Langley, Public Works director, wanted to see one task eliminated: the weekly cleaning and constant maintenance of Lift Station No. 2.

Built in the early 1950s, the lift station was originally designed to act as the city's wastewater treatment plant. Then in 1979 when the city's new treatment plant came online, the structure was converted into a lift station. In 1992 it was upgraded with three 30 hp submersible pumps, each capable of pumping 800 gpm. Despite the upgrade, the system is pushed to the limit, responsible for moving an average of 2-3 mgd.

Odor issues became prevalent in the lift station over time, so in 1991 a charcoal filtration unit (Purafil - a Filtration Group Co.) was installed. The charcoal system worked for a while, but as the city grew and more flow came through, the unit was not able to keep up with demand and odor became a routine issue.

The right answer

The maintenance team began a preventive maintenance program of replacing the charcoal in the unit annually, but this became challenging as the material was difficult to procure and became increasingly more expensive. Chemical odor control methods were then considered, but these also were costly and carried safety liability for storage and handling.

"Director Langley challenged us to search out a long-term solution and consider other technology," Bybee says. "She opened my eyes and view of our current system — that a solution you start with may simply become obsolete for your situation. It doesn't mean that it isn't a good solution; it just isn't the right answer to meet the current needs."

While they hunted for new options to combat the odor, crews were dispatched to clean the lift station with a jet/vac truck on a weekly basis. The crews extracted on average 1,000 gallons of FOG per week. They also adjusted pump controls, lowering the pump on offset points to reduce detention time. This resulted in minimal odor improvement and created the potential of ragging up the pumps. In the long run, adjusting the pump controls as a solution was not successful and was abandoned. Even with this valiant effort, and an annual cost of nearly $70,000, the odor persisted.

Pilot test

Bybee had been in conversation with Lewis Titus of Titus Industrial Group about various wastewater technologies they offer when the subject of odor control systems came up. Upon hearing about Yuba City's issue, Titus was confident he had a solution with their TITUS Twister Mixing Aerator.

"I was skeptical," Bybee says. "I deal with a lot of different vendors, and sometimes it feels like it's just another sales pitch. But Lewis was adamant that we had to try it and so confident it would work that he offered to bring



Yuba City initially demoed a trailer-mounted TITUS Twister, with a Twister head, regenerative blower and enclosure, and set it up next to the lift station.

us a pilot unit to try at no cost. My director felt we had nothing to lose so we agreed."

Titus delivered a trailer-mounted TITUS Twister and set it up next to the lift station. The patented system consists of a Twister head, regenerative blower and enclosure. The Twister heads are comprised of stainless steel manifolds, stainless steel ballast plates, PVC barrels, HDPE shear blades, HDPE horizontal flow deflector plates and stainless steel coupling connections. The head is connected to the blower by either EPDM hose or stainless steel hard piping. For the Yuba City application, two Twister heads were installed into the wet well, driven by two 3 hp regenerative blowers, and enhanced with ozone generation.

"Within the first hour, even running at half capacity, everyone who was present concluded that this was the technology we needed: The odor was gone."

Tim Bybee



The Yuba City crew at the site of a problematic lift station where a TITUS Twister Mixing Aerator was installed to eliminate odor issues.

Air is generated by the regenerative blower inside the trailer enclosure. The air is then delivered to the aeration units and through the manifold in the lift station through two EPDM hoses. In the Yuba City unit, a 40-gram-per-hour corona discharge ozone generator was used to produce ozone from the ambient air. This was incorporated to enhance the unit's odor control properties. Openings in the manifold create air bubbles that transfer oxygen and ozone into the effluent.

Within the unit's barrel, an air lift column is created. That forces liquid and solid materials up into the static shear blades and flow deflector plate. Solids are broken up and directed back into the cycle. Liquid and solid materials are continuously drawn in through ports located at the bottom of the barrel, creating a constant suspension of materials within the lift station.

"Within the first hour, even running at half capacity, everyone who was present concluded that this was the technology we needed: The odor was gone. Pumpouts for the FOG matter have been reduced 95%, and ragged up pumps have been eliminated," Bybee says.

Permanent solution

Bybee presented the results to Langley, and they were taken to city council and approved for purchase. The city is now installing a TITUS Twister Mixing Aerator into a permanent structure adjacent to the lift station.

The Twister's aboveground components will be housed where the original odor control system was, alongside other control equipment for the lift station. The building is being rehabilitated for this purpose, and instead of the EPDM hoses used during the demonstration and trial, (in conjunction with the trailer-mounted version) stainless steel piping will be run underground into the side of the lift station and onto the heads directly in front of the aeration pumps.

Once the building renovation is complete and the permanent equipment is installed, the city investment will be approximately $85,000.

"We actually predicted that between the maintenance equipment operation costs, the charcoal unit upkeep and labor we were putting in, this new unit will almost pay for itself in one year," Bybee says. "I wish we had tried it sooner, and we're glad that Titus had so much confidence in their system and gave us the opportunity to take it for the test drive."

✦

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CUSTOMER TESTIMONIAL

Four Corners Water & Sewer District WRF

Bozeman, MT

June – September 2021

Problem:

Our district, which has roughly 2,500 connections, has faced a serious FOG issue. Despite having a FOG control program and regulations on commercial food service establishments, FOG has always been an issue with our district. It wasn't until our commissioning of our Sequencing Batch Reactors that we realized how bad the problem was. FOG in large amounts allows the filamentous bacteria Microthrix parvicella to proliferate and outcompete good floc-forming bacteria in the mixed liquor. M. parvicella creates a foam on top of the mixed liquor that leads to poor settling, low nutrient removal and high TSS in treated effluent. We turned to Aquafix who help control filamentous bacteria with enzymes that support floc-forming bacteria. We tried their solution for 6 months while the filamentous bacteria got worse and worse (Figure 1). After desperation and hours of research we discovered that ozone has some affect on saturated fats. It breaks a double bond in the molecule of fat that is responsible for the fat's hydrophobic nature. We discovered Titus Twister had an ozone generator that injected into wet wells and decided to pilot the equipment.

Application:

Our WRF has an influent wet well (IPS) that pumps influent to the headworks. The IPS was designed to have three separate cells that are only connected by a weir gate at the bottom. This allowed rags and grease to accumulate in the IPS because there was no natural mixing in the wet well. We decided to place the Titus Twister in the IPS and start the pilot with the ozone enabled.

Result:

Within hours of the Titus Twister being turned on, the rags, FOG and scum on the surface of the IPS were gone. After a couple days, the FOG that had accumulated in the pre-react zones of the SBR were breaking up (Figure 2 and 3). The foam, which had 8 inches of thickness had reduced to less than an inch in three weeks. After a month of use, we could see mixed liquor in the basins (Figure 4), which had been covered up with foam since start up. As a test, we decided to leave the Titus Twister on but turn off the ozone for 24 hours. Within 6 hours the FOG had returned in the pre-react zones. After 12 hours, the foam had returned to the basins. We had verified that the ozone was the key to treating the FOG issue.

Conclusion

The Titus Twister solved multiple issues that plagued our system. It cleaned up our lift station and kept the scum and rags in suspension and the ozone dissolved the FOG so the filamentous bacteria couldn't access their food source.

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Figure 1: One of the basins in the SBR that is covered in foam produced from the filamentous bacteria. This was before the Titus Twister was started.

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Figure 2: One of the pre-react zones showing floating FOG and some foam accumulating.



Figure 3: The same pre-react zone as Figure 2 but after a couple days of the Titus Twister running. Notice minimal amount of FOG.

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Figure 4: One of the basins after a month of the Titus Twister running. There is no foam on the surface showing just mixed liquor.

For more information:
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(877) 582-9899
www.tituswws.com

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City of La Grande Oregon

If you are experiencing grease and odor problems in your lift stations, I highly recommend installing a Titus Twister Mixing Aerator from Titus Industries! My name is Lyle Bridge and I am the Wastewater Superintendent for the City of La Grande in La Grande, Oregon. I have worked for the City of La Grande for 26 years, with all of those years being spent in the Wastewater Division. We have had issues with grease and odor in our lift stations and at the headworks facility at the City's Wastewater Treatment Plant for a long time. We have tried to chemically treat these issues but have had no success. I had resigned myself to the fact that we were going to have to clean the lift stations every month or two and the headworks wet well every month until the end of time. However, one day, Lewis from Titus Industries arrived at the Wastewater Treatment Plant with a brochure advertising the Titus Twister Mixing Aerator. At first I was very skeptical, but we made the decision to install the Titus Twister Mixing Aerator with Ozone Enhancement in our 26th Street lift station. Within minutes of installation, the grease mat was gone above the pumps and around the floats. Within 18 hours, the grease was gone except for in the very corners of the lift station. This Titus Twister was installed in June 2019 and we have not had to clean this lift station since that time, which has been over six months. This lift station used to be cleaned every few months and, at times, once a month. In December 2019 we purchased another Titus Twister and installed it in our East H Avenue lift station. This particular lift station always had grease and matting problems, along with odor issues; however, within minutes, the foot-deep mat above the pumps and around the floats started breaking up. The following morning, the piping, rails, and floats were free of grease and the odor from this lift station was instantly gone! We could not be happier with our decision to install Titus Twisters from Titus Industries at our lift stations and highly recommend this company to any organizations experiencing grease and odor problems!

Lyle Bridge
City of La Grande
Wastewater Superintendent

Gentlemen,

I would like to thank both of you with my deepest respect. I have worked with Lewis Titus for approximately 10 years with a different company knowing he was passionate with regards to wastewater aerator systems.

Our city purchased two TT20 models, and within minutes of the installation our grease mat and odor were gone. We installed these two systems into a 23-year-old station that has never been odor free and suffered from mating for 23 years.

With constant communication with Joseph Prok (our point of contact from Sound Water Services. Inc.) and Lewis Titus, I never felt left out or ignored. Joe was on-site for startup and I received a follow up call from Lewis later in the day to see how everything went and if I had any concerns.

It was wonderful knowing my team was in great hands.

I suggest any Municipality that has an odor or mat problem with their sewer stations, stop looking and call TITUS WASTEWATER SOLUTIONS! It will be the last call you make for odor and mating control.

Please feel free to contact me with any questions regarding our Titus Twister system.

Sincerely,

Kevin Wagner
City of Fife
Sewer maintenance Lead

Kwagner@cityoffife.org
(253) 778-5637