The Vallejo Sanitation & Flood Control District, in the San Francisco Bay area, has been engaged in a program to scrub off-gas odors from all aspects of its wastewater treatment plant. Early in the project, the district had covered all of the facilities in its headworks and primary treatment steps to control off-gas. Later, it developed a novel approach for the management and disposal of its biosolids, including designing a specialized hopper for storage of the plant’s dewatered solids and an automated truck-fill process for transportation of the solids to a district-owned landfill – Tubbs Island – again minimizing off-gas release. Recently, the wastewater plant has focused on scrubbing off-gas odors from its secondary treatment processes, and specifically its two open aeration basins. To contain these odors, the district opted to use a retractable, structurally-supported geomembrane cover system from Geomembrane Technologies Inc. (GTI), which has not only proved effective for the collection of off-gas, but has also provided an unprecedented level of flexibility and ease-of-access for tank monitoring, maintenance and repairs.

The Vallejo Sanitation District

The Vallejo Sanitation & Flood Control District is an independent special district created by the State of California to collect and treat wastewater, and to protect the Vallejo community from flooding. Since 1952, the District has protected public health and the San Francisco Bay by collecting and treating the wastewater generated by more than 115,000 residents of Vallejo and the surrounding area.

The district has a tradition of innovative use of technology in wastewater handling. It has been recognized by the EPA and awarded the National First Place Award as the most outstanding project involving land application of biosolids in the United States. The plant disposes of 20,000 cubic yards of biosolids per year, where it is used as a soil amendment to improve farmland. The plant differs from most in that it uses no digesters in its process.
Tekippe, Carollo Project Manager handling the Vallejo project. “But we also needed the covers to be easy to open and close for access to the tanks for sampling, scheduled maintenance and repairs. We felt structurally-supported covers would be the best system for the plant’s needs because of the better access they provide over other systems, like floating covers. We first looked at rigid type covers such as aluminum and fiberglass, but both of these proved more labor intensive for operators to gain access to the basins.”

Depending on their size, aluminum panels can be heavy, and both aluminum and fiberglass covers being rigid, can be bulky and difficult to maneuver for workers while perched above an open tank. This tricky maneuver requires a fair amount of labor – both to take the aluminum panels off, place the covers aside and later put the covers back on – but also poses a potentially significant safety hazard for the workers.

“Along with our engineering firm, Carollo, we looked at a number of other wastewater plants, and what they were using to cover their aeration tanks,” says Barry Pomeroy, Director of Operations and Maintenance at the Vallejo Sanitation & Flood Control District. “The aluminum and fiberglass covers we looked at were big plates, and seemed hard to handle and remove. Then we went to a wastewater treatment plant in Colorado that was using retractable, structurally-supported covers made with a geomembrane fabric. They looked like they would be very easy to remove for maintenance, and watched how easy they were to open and close. We even walked on them while they were in place over the tank, to see how strong and durable they were. Based on that trip, we decided to design these retractable covers into our aeration basins.”

Vallejo’s new retractable, structurally-supported geomembrane cover system – designed, engineered and built by GTI – consists of a composite sheet of high-strength, UV-protected, coated fabric tensioned across a series of low-profile aluminum arches which span the tank’s opening. Intermediate aluminum walkways spanning the tank are used to divide the fabric cover sections into appropriate lengths for easy retractability.

The geomembrane cover fabric used by GTI is made up of a laminated sheet of 40 mil specialty PVC (Ethylene Interpolymer Alloy) that acts as a gastight barrier to keep the off-gas from passing through. It incorporates a highly specialized weave design that provides maximum strength-to-weight ratios. Since this topsheet is exposed to the sun, it is also equipped with advanced UV inhibitors. The material can withstand temperatures to minus 30 degrees F. This cover has exceptional seam strength, extreme puncture and tear resistance, low thermal expansion and contraction properties, a wide range of chemical resistance, high flexibility, and dimensional stability under high loads and temperature fluctuations, making it ideal for wastewater cover applications.

Not all geomembrane cover designs work this efficiently, however. Polyethylene topsheets, for example, typically have a poor coefficient of expansion and contraction. The material expands in warm temperatures and contracts as it cools down. Over time, this growing and shrinking causes the shape of the cover, creating a series of hills and valleys that retain rainwater.

GTI’s cover system has overcome these deficiencies. Vallejo’s covers are gas-tight, operating under negative air pressure. A ventilation system draws air through the tank and underneath the covers, and pulls along with it the off-gas from the aeration process. Off-gas removal piping is connected directly to the cover system and out to a soil filter for odor scrubbing.

Although the membrane covers are gas-tight, they can be quickly detached and easily rolled up along the frame. This gives operators access to inspect and maintain internal components of the basins. Reattaching the membrane covers is quick and easy, making for a time-efficient and safe process. Additional hatches in the intermediate aluminum walkways allow access by plant operators without retracting the covers.

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