

Retractable Geomembrane Covers

Provide Odor Control and Ease of Access to Wastewater Treatment Aeration Basins

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.

The Vallejo facility is permitted to treat 15.5 million gallons per day (mgd), but has the capacity to provide full secondary treatment of 35 mgd. During wet weather, the plant is capable of processing 25 mgd primary treatment, combined with the 35 mgd secondary treatment for a total of 60 mgd.

Vallejo's Wastewater Treatment Process

Passing through Vallejo's primary water treatment units – its headworks, grit chamber and primary clarifiers – where the solids are separated out, the liquid part of the waste stream flows to the plant's secondary treatment for biological processing.

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caption

Vallejo's secondary treatment process is a trickling filter/solids contact process, consisting of four main treatment steps – biotowers, contact aeration basins, secondary clarifiers and disinfection.

Streamlined Aeration Basin Covers

The Vallejo plant's two secondary process aeration basins were originally built in 1988, and are each 15 feet deep, 15 feet wide and 110 feet long. Every few weeks, the Vallejo operators conduct a

visual inspection into the aeration tanks from the top. Once a year they drain the tanks, go down inside to conduct a physical inspection of the blowers and diffusers at the bottom, and hose down the sides of the basins.

For almost 20 years the basins remained uncovered, but as part of the plant's odor control upgrade, the district looked into options of how to cover them. Carollo Engineers, an environmental engineering firm specializing in the planning, design and construction of water and wastewater facilities, was retained by Vallejo to handle the design and construction management for the plant odor control upgrade, and began reviewing different cover options for enclosing the basins.

"We wanted the covers first for odor control, so they needed to be corrosion resistant," says Tim Tekippe, Carollo Project Manager handling the Vallejo project. "But we also needed the covers to be

visual inspection into the aeration tanks



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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 water 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 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.

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.

Attractive Option for Municipal Wastewater and Drinking Water Plants

"The expected life of these retractable covers is about 15 years," explains Tekippe. "And the cost is very attractive compared to other cover systems. If a cover did have to be replaced it would be easy to change out, and could be done in minimal time. These retractable covers are very well-suited for both municipal wastewater and drinking water plants. We have since specified them for use in other public water and wastewater projects."

Municipalities are looking for more efficient tank cover systems to contain off-gases, reduce algae growth, simplify maintenance and repairs, and cut expenses. Retractable, structurally-supported geomembrane covers have become an increasingly attractive option for streamlining wastewater plant operations. **L&W**



Project location:

Lat. 38.0917488

Long. -122.2502066

by Jim McMahon

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About EIA Geomembranes

by Chris Kelsey

Ethylene Interpolymer Alloy (EIA) geomembranes are actually an alloy of PVC resin with a special ethylene interpolymer that creates a flexible but tough material. EIA geomembranes have the flexible advantages of PVC and a higher-degree of durability, UV resistance and chemical resistance. This is true in relation to hydrocarbons and extreme temperatures.

As such, you might specify EIA geomembranes for or find them installed at secondary containment sites, like fuel depots and other tank storage applications. Some other applications include floating covers, floating curtains, and digesters.

EIA membranes are typically fabricated with a high-strength reinforcing scrim; meaning: strong mechanical resistance (break strength, tear resistance and puncture resistance).

You may find them also listed by a registered trademark, Elvaloy®. Specialty applications are the main uses of this class of geomembrane.

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