

Québec farmers install new hog manure containment system



A robot welder was used to heat-weld two panels together.

As the size of Québec's hog industry has exploded over the past 25 years, so has the number of waste containment tanks used to store manure for subsequent use as fertilizer. Census statistics estimate that there are upwards of 6,000 of these tanks in the province.

The expansion of Québec's hog industry, which represents \$3 billion in revenue and 40 percent of Canada's total pork export business, has prompted the provincial government to study the impact of livestock operations and its phosphorous-laden manure supply on water quality.

In 2002, water quality concerns and public complaints over manure odour led the Québec government to grant rural municipalities control over the development of hog farms in their territory. Many suburban neighborhoods are within a kilometre of hog farms.

Increasingly strict governmental regulations regarding hog waste containment are leading many farmers in Québec to consider new options for manure management. Early in 2007, the Robitailles family contacted Paul Larouche of Agri-Ventes Brome about installing new covers on 40 of their hog waste containment tanks.

The Robitailles wanted to use their largest liquid manure containment tank, which has a capacity of 3.2 million litres, to test a cover that could eventually be used on all of their tanks. The three most important requirements for the cover were that it contain odour, keep rainfall out and be cost-effective. Mr. Larouche ultimately recommended fPP-R Geomembrane by Firestone Specialty Products, which is a reinforced polypropylene membrane with puncture resistance and tensile strength, and is said to be ideal for exposed applications, due to its UV, oxidation and ozone resistance.

Unique system design

Designing an effective cover for the concrete tank had its challenges. First, the flexible cover could not sag to the bottom of the tank during times of low content. Before the farmers can spread fertilizer onto the fields, they have to pump manure off the bottom of the tank and then pump it back in onto the top of the manure. This process mixes the manure. If the cover is in the way, this mixing process would become difficult and could damage the cover.

To prevent excessive sagging, Agri-Ventes Brome designed a system of 25 straps to criss-cross the top of the tank. Each strap has its own winch that can be

tightened, or loosened, depending on the manure level. The design allows the membrane to rest on top of the straps, keeping the membrane a minimum of eight feet above the tank floor at all times.

A tight seal was imperative, not only to keep odour in, but to prevent rainfall from entering the tank. "We average 900 mm of rain each year here, which equals a quarter of the depth of this particular tank," Mr. Larouche stated. "If that much water was added to the manure, the resulting fertilizer would be tremendously diluted and not nearly as valuable to the farmers."

Cover installation

The project began in September 2007. The first step was to drain and clean the tank. Then, a thick, felt protection mat was laid on top of the concrete walls around the perimeter of the tank to protect the straps and cover membrane from friction damage. Next, the 25 straps were stretched at regular intervals across the tank and attached to power-assisted cranking tools mounted into the exterior concrete walls. Smooth plastic sleeves were slipped over each strap at the point where they rest against the tank for added protection from wear.

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A system of 25 straps, each with its own power-assisted cranking tool, prevents the membrane from sagging down onto the tank floor.

Once the straps were securely in place, the tank was ready for the cover installation. Two 23-metre by 46-metre, 1.1 mm thick (45-mil) fPP-R Geomembrane panels arrived onsite, and were unfolded to their full length and overlapped. A protective layer of geotextile and fiber board was installed at the seam overlap for added strength. Then, a robot welder was used to heat-weld the 46-metre seam, which was completed in just 20 minutes.

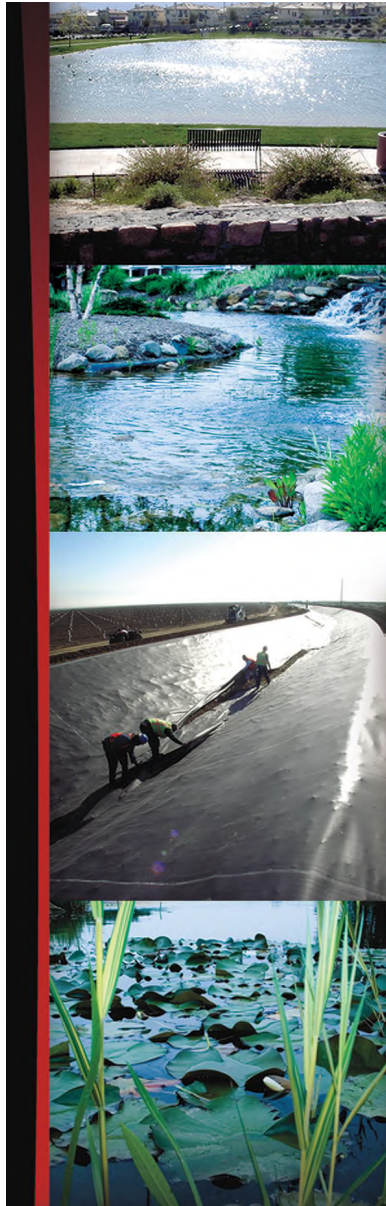
When the seam was set, the 2,100-square-metre membrane was lifted with a crane and positioned over the centre of the tank. It was then unfolded toward one side of the tank and then toward the other side.

After the cover was in place and draped over the sides of the tank, the membrane was folded up and under a plastic strip to prevent water access. Then, an aluminum strip was installed above this pocket fold and bolted into place at 300 mm (12-inch) intervals around the tank's perimeter.

"This fastening system actually locks the membrane into place because the plastic strip cannot slip up past the aluminum fastening strip. Odour is locked in and rain is locked out," Mr. Larouche said.

In all, the installation of the cover system took only three days, and the entire project was completed in less than three weeks.

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