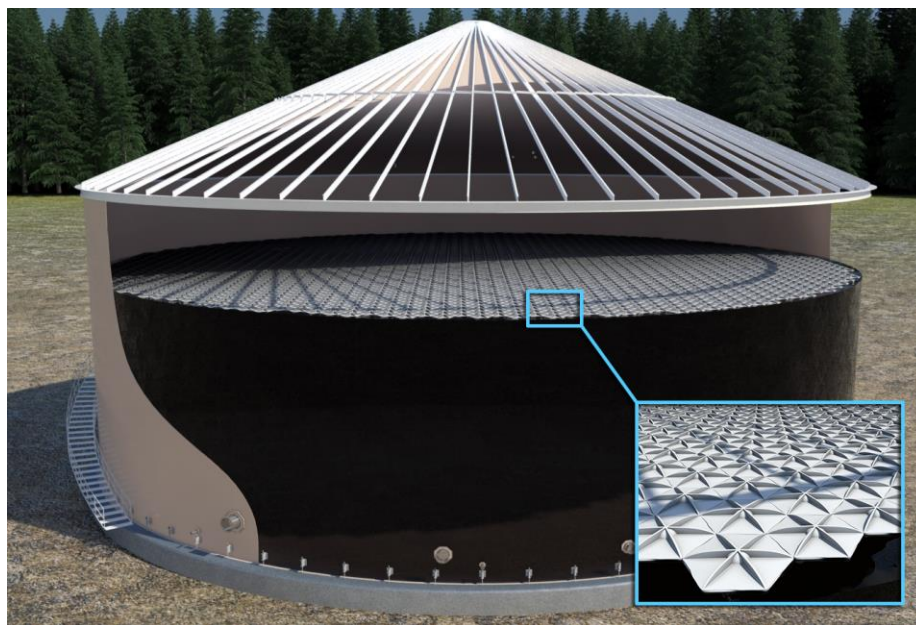


Hexa-Cover technology reduces operating costs

For Ontario-based Greatario Engineered Storage Systems, a technology first developed in Denmark for water and wastewater applications, for which it has exclusive Canadian marketing rights, is proving to be a significant new technology as Canadian heavy oil producers discover its multiple benefits, including improving environmental performance and reducing their capital and operating costs.



SAGD Dilbit Sales Tank with Hexa-Covers reduces Diluent losses by up to 60%.

Greatario, which was founded in 1986, is located in the small town of Innerkip, about midway between London and Kitchener-Waterloo. It has designed and installed hundreds of tanks and dome covers, mostly overtop water and wastewater storage systems for businesses in Eastern Canada. It employs about 60 people.

But it was the distribution agreement Greatario signed in 2010 with Danish-based Hexa-Cover® to be the exclusive distributor in Canada of its tile-based liquid floating cover technology that has led to unprecedented growth for the privately-owned firm, with thousands of the covers now in use in the western Canadian heavy oil sector.

Greatario saw the potential of the Hexa-Cover® Floating Cover System in the Canadian marketplace, which is why it retained exclusive marketing rights. Since the Hexa-Cover® launch in 2004, the systems have been used on numerous sites, as a way of eliminating evaporation, organic growth, emissions and odours.

In a press release the company described how the covers work once installed on a tank or a lagoon.

“The tiles are hexagonal elements with symmetrical ribs on both sides. The rib makes the floating elements distribute themselves naturally and uniformly on the liquid surface without overlapping. The unique design makes them interlock by wind pressure, ensuring that they mechanically constitute a coherent cover.”

Since acquiring rights to the technology, Greatario has dedicated its research and development to develop a suitable version of the technology for use in the oil and gas industry. Oil and gas applications now include the use of the covers in Heavy Oil, boiler feedwater, steam assisted gravity drainage (SAGD) systems, in sour sand slurry tanks, in process water ponds, in purified tailings water ponds and in frac water and process fluid tanks.

The specialty Oil & Gas version covers are manufactured (in Canada) under License agreement with Hexa-Cover® Denmark. Greatario developed the technology with engineered polymers specifically designed to cover hot crude oil and hydrocarbon liquid systems.

Terry Frank, Vice President of Sales for Greatario, says business is good enough that he is moving to Calgary full time to better manage the business.

“I’ve been traveling back and forth (between Ontario and Alberta) a lot,” he said.

One of those trips had him going last winter to Peace River, Alta., where the Alberta Energy Regulator (AER) was holding hearings into complaints from local residents about odours from the heavy oil operations of Baytex Energy Corp.

Frank testified at those hearings, saying the Hexa-Cover® system would be a good way for Baytex to deal with the odour concerns, which received widespread media coverage, with some residents near the plant saying they had moved to escape the odour, which they say had caused dizziness, headaches, fatigue and cognitive impairment.

Last March the AER ruled that Baytex had to act within four months to deal with the odours.

“Odours caused by heavy oil operations in the Peace River area need to be eliminated to the extent possible as they have the potential to cause some of the health symptoms of area residents,” the AER panel said in its ruling.

The company subsequently spent as much as \$20 million installing vapour recovery units (VRUs) at its Reno field operations in the Peace River area (Baytex won’t reveal the exact amount but says it has spent \$52 million in the Peace River area to deal with emissions).

Baytex, like other producers in the area, mostly uses the cold heavy oil production with sand (CHOPS) process to extract heavy oil. CHOPS is used widely in Alberta and Saskatchewan, but emissions with a high sulphur content appear to have been the source of the odour problem at the Baytex plant. Other operators in the area, including Shell Canada Ltd., Penn West Petroleum Ltd. and Husky Energy Inc., have installed VRU at most of their facilities. Before Baytex was ordered to install more of the units about 29 of the 86 tanks in the Reno field had VRUs.

But Frank said he argued at the Peace River hearings - and he continues to believe - that the Hexa-Cover® approach is a much more economical solution for most of what the much more costly VRUs are designed to accomplish.

He said Greatario’s covers cost less than five (5) per cent of the capital and installation cost of a VRU, which can take months to install.

The Hexa-Cover® system can be installed in about 30 minutes. They are installed either through a “thief hatch” opening in the roof of the storage tanks, which is an opening created for observation and other purposes or they can be installed in new tanks through a side door prior to commissioning of the tank.

Just as important, Oil & Gas heated tank operating costs are significantly reduced and the systems, which are easily installed in a few minutes by Greatario's own crew, have a life expectancy of roughly 5 years based on continuous duty in Heavy Oil at 100 Celsius.

At the hearings Frank said it had started testing the Hexa-Cover® approach with a major producer, which it couldn't then identify, which had since installed hundreds of them.

He can now report that that customer is Canadian Natural Resources Canada Ltd. (CNRL), which disclosed in their 2013 Stewardship report that they had, at the time of the report, deployed Hexa-Covers® in storage tanks at 1100 CHOPS sites and were planning on continuing to install them in most of their fleet.

Most oil storage tanks hold about 1,000 barrels of crude and odours aren't the only problems the Hexa-Cover® approach can address, he said.

Because the covers prevent the escape of radiant heat (the heavy oil is stored at high temperatures), they block water vapour and hydrocarbon emissions from escaping into the atmosphere.

Petroleum-based emissions such as benzene, toluene, ethylbenzenes and xylenes (BTEX) as well as related volatile organic compounds (VOCs) are also dramatically reduced (by up to 60 per cent).

The covers also prevent "foam-overs", which can occur when solution gas from the heated crude causes a foam that spills out of the top of the tank through the thief hatch or tank vent

That also produces another benefit, which is that producers don't need to apply defoaming chemicals to the heavy oil, said Frank.

"We're finding customers don't have to spray chemicals for defoaming," he said. "They can cost \$8 to \$10 a litre and producers need five to 10 litres a day (to control foaming in tanks). "They don't need to use the chemicals and they don't need the equipment to spray them."

That represents a significant cost savings.

In fact, Greatario is finding that the economic benefits of its covers are just as important as the environmental benefits. In today's low crude price environment anything that reduces operating costs is appreciated by producers.

CNRL disclosed in their Stewardship report that the use of the Hexa-Cover® system led to operational fuel savings at its CHOPS sites of about 20 per cent and the related reduction of emissions.

There are some other benefits being discovered.

For example, because the Hexa-Cover® system keeps the crude warmer it brings additional cost savings, especially in the winter.

"By keeping the oil hotter, the trucks that are loading the crude at the CHOPS sites (for delivery to cleaning batteries) can load it more quickly," he said. "They can also unload it faster."

This time savings leads to more efficient operations, which represents a cost saving that has not yet been quantified.

There's another advantage.

Because VRUs require some ongoing observation, there are maintenance costs involved. That isn't the case with the Hexa-Cover® system, which can function on its own after installation.

In addition, if water vapours escape and freeze at the thief hatch of the tanks, that can cause tanks to collapse when they are being drained and their oil loaded into a truck. "It's a disaster, causing the need to replace the tank, as well as an environmental clean-up," he said.

Hexa-Covers® significantly reduce water vapour in the headspace of the tanks, reducing equipment related failures due to water vapour freeze ups, icing and the release of odours where the steam is a transport mechanism for the odours to escape.

There have also been instances of ice chunks falling from tanks on workers below and the covers can help prevent workplace injuries that result from that falling ice.

Frank doesn't argue against the use of VRUs in all situations.

In fact, at the Peace River hearings he said the "ultimate solution" was a combination of the use of a Hexa-Cover® installed as a floating internal tank roof, inside of tanks with fixed-roof systems, VRUs and a collection or destruction system for vapours.

"VRU systems are subject to freeze-up and failure, so that combination will help prevent that from occurring," said Frank.

But, in today's challenging crude price environment, the fact that using only the covers can reduce VOCs and BTEXs by 60 per cent, while reducing capital and operating costs at CHOPS sites, is appealing to most operators, he said.

Greatario also sees a role for its technology in the SAGD sector, in combination with VRUs and has modified their Hexa-Cover® design to be suitable in that process.

VRUs are used to capture fugitive diluent vapours in the head space of diluted bitumen (DILBUT) storage tanks used at SAGD plants. The captured vapours are then burned to make steam for the SAGD process, however diluent is a very expensive material to burn for the steam making purposes. The use of a Hexa-Cover® would reduce the amount of fugitive diluent vapours in the DILBUT tanks, potentially saving as much as 30 barrels a day of diluent consumption in a typical DILBUT tank. Cheap natural gas can be used to replace the BTU's that were previously generated by burning the fugitive diluent vapours making for a return on investment that is only a couple of months.

"We're working with a SAGD operator now on a pilot project," he said.

Greatario thinks its covers can reduce diluent vapours by about 50-60 percent.. Diluent, composed of light condensates, is mixed with bitumen to allow the subsequent DILBUT to be transported by pipelines. Each barrel of bitumen is mixed with about 30 percent diluent (less diluent is needed if the bitumen is shipped by rail).

Since diluent trades at a premium to Western Canada Select (WCS) crude - and is substantially pricier than bitumen - it is costly for producers to buy it.

GREATARIO is finding that the economic benefits of its covers are just as important as the environmental benefits. In today's low crude price environment, anything that reduces operating costs is appreciated by producers.

Frank said use of the Hexa-Cover® at SAGD plants can allow producers to reduce significantly the volumes of diluent used at their facilities.

Meanwhile, there's another cost benefit, he said.

Because the covers are reducing the diluent vapour levels inside the DILBUT tank headspace, the VRUs that SAGD producers require can be smaller, with less of a capital expenditure and reduced operating utility costs.

"The capital cost (of buying a larger VRU) is reduced," he said. "It also takes less energy to use the smaller VRUs."

Greatario has retained third party consultants to measure the effectiveness of Hexa-Cover® technology in Heavy Oil and in SAGD operations. The consultants include Exova, one of the world's leading provider of testing, calibration and advisory services, and LEHDER Environmental Services Limited, a leading emissions testing company.

Greatario believes those benefits are significant.

Use of the Hexa-Cover® in fracking can also produce environmental and economic benefits, said Frank.

"We have tested their use in process tanks, where they prevent freezing and stop waterfowl from entering the tanks," he said. "Our covers also reduce heat loss."

Since most fracking takes place in remote locations, where propane must be brought in to maintain heat levels that could also prove to add up to significant cost savings.

He said the water version of the Hexa-Cover® has also been used at Oilsands mining plants to prevent water evaporation from a pilot project to purify tailings water for reuse which reduces the need for freshwater. Syncrude published their story with a picture of the Hexa-Covers® in the 50th Anniversary issue of their Cornerstone Magazine.

The Hexa-Cover® has also been used at other hard rock mining operations in Canada and elsewhere, where they have been utilized in both tailings ponds and a bird deterrent and large high altitude process water reservoirs to reduce water loss due to evaporation.

Frank said Greatario is being seen by more oil and gas producers as a low-cost solution to a variety of environmental issues, as well as a way to reduce capital and operating costs.

"We've had a higher level of interest since oil prices have dropped," he said. "Before the drop in prices we were seen as an environmental story but, with margins being crushed, we're seen as a way to reduce costs. Most of our customers see paybacks (in their investment in the covers) measured in months."