

## Tailings Triumph

SUNCOR'S TRO TECHNOLOGY SLASHES THE TIME TO RECLAIM OILSANDS TAILINGS BY TWO-THIRDS

By Mike Byfield



Photo: Suncor Energy Inc.



### drying beaches

*The Suncor TRO process includes pumping a slurry of mature fine tailings over a gently inclined slope for drying.*

**SUNCOR ENERGY INC.** estimates that its tailings reduction operations (TRO) technology will slash the time required to reclaim oil sands tailings from 30 years to 10 years or less.

"Thanks to this development, we've eliminated the need to construct new tailings ponds at our bitumen mining operation," says Bradley Wamboldt, TRO director for Suncor in Fort McMurray, Alta. "In addition, we plan to reduce the eight existing ponds to just one over time."

Oilsands producers use hot water to separate bitumen from sand and clay. The clay is then stored in shallow ponds, which currently cover a total area of 170 square kilometres. (This figure, equivalent to an area 13 by 13 kilometres, includes all oil sands mining companies.)

The clay particles are suspended in water with traces of hydrocarbon, forming a thick soup that requires centuries to consolidate on its own.

Consolidated Tails (CT), a process pioneered by Suncor in the 1990s, accelerates consolidation by adding sand and gypsum.

As oilsands bitumen output continues to increase, however, the CT time frame wasn't fast enough to halt the expansion of the huge slurry ponds. Suncor began experimentation with drying out tailings in 2003.

The TRO process, first field tested in 2008, is based on clay particles clinging to a polymer material. The resulting flocs readily come out of suspension in water. (The chemical term is flocculation.)

"Mature fine tailings [MFT] and polymer solution are both viscous materials. They must be mixed, but not too much. Over the past two years, we've worked out operating parameters which we can now pretty much just dial in," Wamboldt explains.

After flocculation, the MFT/polymer flocs are dried in thin layers over gently sloped sand banks, then left in place or moved to another location for final reclamation. From time to time, the flocculent beds are ploughed, exposing more wet material to the air. The entire drying process occurs within weeks. The TRO process can only take place in months without a firm freeze-up. During that period, Suncor's project work force rises to the range of 200.

Suncor processes 180 million tonnes of oil sands annually, ingesting 50,000 tonnes per day of fine clays. Half of these fines are captured in the tailings beaching operation as they are pumped into the big ponds. The remaining 25,000 tonnes per day eventually settle into MFT and will be treated by the TRO process.

"In 2009, our team processed MFT at a rate of 1,500 dry tonnes per month, utilizing 30 hectares of land," Wamboldt says, while 2010 "was our big ramp-up." At year-end, the company had four drying sites totalling 350 hectares, capable of handling 25,000–30,000 tonnes per month. "Remember, though, that we can't dry in winter. So we plan to add 90 hectares annually for the next three years—it's mostly a matter of clearing the land."

In 2009, the Alberta government introduced regulations that impose

annual targets for reducing MFT.

"We are in a position to meet or beat those targets," Wamboldt says. The company has spent "in the low hundreds of millions" of dollars developing the TRO method, he says, with a further billion dollars budgeted for MFT processing in the years ahead. The patented process remains confidential. Suncor is willing to share its innovative methodology with other oil sands miners—if they help pay some of the TRO technology research and development cost.

### TAILINGS BREAKTHROUGH WILL SAVE MONEY

Wamboldt rejects the notion that enviro-lobby groups bullied Suncor into cleaning up its tailings act. "Tailings management has always been integral to this industry's planning, long before it became a high-profile issue beyond Alberta," says the chemical engineer, a graduate of McGill University in Montreal. "Any oil sands operator is legally obliged to restore its leases back to their original condition or a comparable state. Nothing new there."

The key question was never if, but how. "Producers have been chasing a solution for MFT for a long time," admits Wamboldt, who has worked overseas as well as in Canada. He came to the oil sands in 1997, helping with initial development of Shell Canada's Muskeg River Mine project. "Technically, tailings have proven to be a challenge, as they are for many other mining industries," says Wamboldt. "Now we have the necessary technology to address the problem."

Before TRO technology was developed, Suncor planned to construct five more tailings ponds. "Dikes aren't cheap to build, and these would have been large structures," Wamboldt says. "Suncor will also generate a significant cost saving by shortening the distance that mine waste material has to be transported. We crunched the numbers and TRO came up the winner both economically and environmentally. That's not really surprising. New technology that's environmentally sound often makes financial sense as well." ■