

PARTNER PERSPECTIVE

Tackling the Tailings Challenge through R&D

Decades of oil sands development has produced billions of barrels of oil and benefited Canadians from coast to coast to coast. It's a unique industry with its own particular challenges, and one that's been of special interest to researchers is tailings – a byproduct of the bitumen extraction process.

Syncrude's research and development tailings technology program is dedicated to addressing the challenges posed by this byproduct and the results to date may change the way the whole industry manages the material.

Tailings is the mixture of sand, clay particles and water that remains when bitumen is removed from oil sand. Tailings are stored in large settling basins, or tailings ponds, that serve two uses – to recycle water for bitumen extraction and, as a containment area to allow tailings to settle prior to further dewatering and use in reclamation activities.

In the tailings pond, sand quickly drops to the bottom while water

moves to the top and is recycled for use in the plant. The middle layer contains fine clay particles that take much longer to consolidate. Over time they form what's called Fluid Fine Tailings – FFT – which can take many years to shed water. Syncrude's challenge is to develop new ways to reduce the volume of tailings and incorporate the clay into reclaimed landscapes.

Syncrude is a known leader in creating innovative technologies and processes for the oil sands industry. It has a dedicated R&D facility that employs about 100 scientists and technologists, with many more engaged through their work at universities and research institutes.

Syncrude is consistently among Canada's top investors in research and development, and has spent more than \$600 million over the last five years on its programs, with more than 40 per cent of the funds focused on tailings research.

The company's strategy to reduce



Syncrude's Sandhill Fen is a recently reclaimed area that was part of a now-depleted oil sands mine. It was built on a foundation of mine tailings called composite tails.

and reclaim tailings currently incorporates three technologies – centrifuged tails, composite tails and water capping – to draw out the solids and free up water for recycle. Recently, large scale tests have been

conducted on three additional methods with promising results that could become industry standard.

Co-Mixing is a new innovation that mixes the fluid fine tails with overburden material.

Overburden is the layer of earth directly above the oil sand that is rich in clay and has limited use. Co-mixing combines FFT with overburden to make a useful construction material. Depending on its end use the product can be mixed in different ways with varied results. It can be used to build roads, berms, or as a base for reclamation soils.

Clay is difficult to remove from tailings because the composition and structure of clay particles make them attract water. If the clay can't shed water it remains suspended and behaves like fluid.

Syncrude has developed a clay treatment method that draws the water out of the clay. The process involves adding a water treatment chemical called flocculant to the FFT material, followed by another chemical "collector" to make the clay surfaces repel water.

Another technology being reviewed is CT Tremie. The Tremie placement method is used by the

concrete industry to build structures under water. Syncrude researchers have adopted this technology and applied it to Composite Tailings (CT) – a mixture of FFT, gypsum and sand. Tremie technology uses CT to create landforms at the bottom of a tailings pond that release water for recycling and will one day form a reclaimed upland structure.

"Not only can this Syncrude-engineered device be moved around to different locations, the new, smaller design will save us millions of dollars for years to come and establish landforms that will progress our reclamation efforts," said Jim Lorentz, Leader, Syncrude R&D Tailings Technology.

While tailings management is a challenge for the oil sands industry, Syncrude is doing its part to develop new and innovative technologies to address the issue, return more water to its operation, and create materials that can be used to enhance and accelerate reclamation.