

Oil sands tailings and mine water

What are oil sands tailings?

Mining operations around the world produce tailings and tailings ponds. In the northeast part of Alberta, oil sands ore is located close to the surface and can be extracted using mining. To separate the bitumen from the oil sands ore, the ore is mixed with hot water and chemicals in a vessel. In the vessel, the bitumen (forth) floats to the top where it can be recovered.

When the bitumen is extracted from ore, residual waste known as tailings is produced. Tailings contain a mixture of water, sand, clay, unrecovered bitumen, and solvent, including some organic and inorganic compounds.

Tailings and oil sands mine waters are temporarily stored in large, above-ground engineered basins called tailings ponds.

The use of tailings ponds allows large and medium sized particles, such as sand and silt, to settle out and consolidate to the bottom of the ponds so the oil sands mine water can be reused in extraction and the tailings be more easily treated.

Mine operations in Alberta have reduced the amount of fresh water used per barrel by 23 per cent since 2017. All operators came in below their approved volume limits in 2022.

At the end of 2022, the volume of fluid tailings and oil sands mine waters on oil sands mine sites was 1.392 billion m³ and 464 million m³, respectively (source: State of Fluid Tailings Management for Mineable Oil Sands, 2022, Alberta Energy Regulator).

Tailings Management in Alberta

Tailings management in Alberta is guided by legislation, plans, frameworks and acts that support oil sands development while protecting the environment. This is complimented by a variety of permits and compliance monitoring throughout the lifecycle to ensure production and management goes as planned.

The Tailings Management Framework for the Mineable Athabasca Oil Sands (TMF) was released in 2015 under the Lower Athabasca Regional Plan and is Alberta's main policy around the management of oil sands mining tailings.

The framework provides direction to manage fluid tailings volumes during and after mine operations to reduce liability and environmental risk from the accumulation of tailings on the landscape.

The objective of the Tailings Management Framework is to minimize fluid tailings accumulation by ensuring fluid tailings are treated and reclaimed progressively during the life of a project, and that all fluid tailings associated with a project are ready to reclaim within ten years of end of mine life.

The Alberta Energy Regulator sets the operational requirements for oil sands mines, including the requirement for an operator to submit a Tailings Management Plan that outlines how tailings will be managed to meet the provincial objectives.

Reclamation

At the end of an oil sands mining project's life, the operator is required to decommission and remove all infrastructure, remediate and reclaim the land they disturb to self-sustaining boreal forest, and apply for a reclamation certificate once complete.

Oil sands mine operators are required to submit Life of Mine Closure Plans to the Alberta Energy Regulator that outline the planned closure landscape design for their mine and how/when it will be achieved.

The reclamation process for tailings involves extracting them from tailings ponds, treating them and placing them in a mined out pit. After a period of time has passed, a soil cap can be placed, and the area reclaimed to an upland/wetland.

If water-capping tailings is approved by the Government of Alberta, a water cap can be placed, and the area reclaimed to an aquatic feature.

Oil sands operators use a variety of technologies to treat their tailings, such as, composite tailings, thickened tailings, centrifugation, and water-capping.

Water-caping fluid tailings is approved for demonstration purposes only, until an operator can show that a functioning aquatic ecosystem can be achieved.

The tailings pond structures themselves will need to be dewatered and decommissioned/delicensed before recontouring and reclamation activities can take place.

Alberta uses the Mine Financial Security Program to collect financial security from oil sands (and coal) mine operators to help protect the public from paying for project closure costs.

Oil Sands Mine Water

Oil sands mine water being stored in tailings ponds will need to be addressed for tailings ponds to be reclaimed.

No method of managing oil sands mine water or tailings ponds will be approved unless it is safe to do so.

Options currently being considered are to treat and release oil sands mine water to the Athabasca River, or to use it to fill end pit lakes.

Both the federal and provincial governments are responsible for decisions related to the potential treatment and release of oil sands mine water. Regulatory requirements have not been established yet.

Alberta's Oil Sands Mine Water Science Team is currently studying different approaches and requirements associated with the release of treated oil sands mine water.

Alberta has established the Oil Sands Mine Water Steering Committee to look at all feasible options available to address oil sands mining water and reclaim tailings ponds. Alberta's government will use the committee's recommendations as well as all the research provided to date to help inform an accelerated path forward, while protecting the health of downstream communities and the environment.

For more information, visit:

- alberta.ca/oil-sands-mine-water-steering-committee
- www.alberta.ca/about-oil-sands