

# Oil sands tailings and mine water management

## 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 (froth) 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, engineered structures 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. Recycled water use increased by 37 per cent between 2015 and 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 m<sup>3</sup> and 417 million m<sup>3</sup>, respectively. All operators were below their approved new fluid tailings profiles, total volume triggers, and total volume limits in 2022 (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, regulations and policy. This is complemented by approvals, plans and compliance monitoring throughout the lifecycle of a mine to ensure production and management goes as planned.

The Tailings Management Framework (TMF) for the Mineable Athabasca Oil Sands was released in 2015 as committed in the Lower Athabasca Regional Plan.

The TMF 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 TMF is based on the objective of minimizing 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.

Oil sands mine operators use a variety of technologies to treat fluid tailings, such as composite tailings, thickened tailings, and centrifugation. The Alberta Energy Regulator (AER) 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 provincial policy and legislation.

## Reclamation

At the end of an oil sands mining project's life, operators are required to remove all infrastructure and remediate and reclaim the land they disturb to self-sustaining, locally common boreal forest. Once reclamation work is complete, operators must apply for and receive a reclamation certificate before returning the land to the Crown.

A reclaimed oil sands mine can contain upland (forests and grasslands), wetland and aquatic (lakes and rivers) features. Operators are required to submit Mine Reclamation Plans and Life of Mine Closure Plans to the AER that outline the planned end landscape design for their mine sites and how and when reclamation activities will be undertaken.

Operators are also required to submit annual reports to AER describing the reclamation activities that were completed over the calendar year.

Operators can use treated tailings in constructing upland and wetland areas. This typically involves first depositing the treated tailings into a mined-out pit. Then a cap consisting of suitable materials is placed followed by soil and the area revegetated to an upland, wetland, or combination of the two.

Operators are not currently approved to convert mined-out pits where tailings have been deposited into permanent end pit lakes. There are cases where demonstrations have been conditionally approved and are underway to assess whether tailings capped with water can develop into a self-sustaining, locally common boreal forest aquatic ecosystem.

Future policy direction from the Government of Alberta on end pit lakes with tailings will be informed by the results of these demonstrations.

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 if an operator is unable to fulfil their reclamation obligations.

## Oil Sands Mine Water

Oil sands mine water being stored in tailings ponds needs 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.

The TMF outlines options to manage oil sands mine water including reducing, recycling, reusing and leveraging opportunities to share water regionally. The TMF also enables the treatment and release of oil sands mine water under certain conditions. 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 how oil sands mine water could safely be released at some point in the future.

Alberta has established the Oil Sands Mine Water Steering Committee to look at all feasible options available to address oil sands mine water and reclaim tailings ponds. Alberta's government will use the committee's recommendations as well as all the research provided to date to 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](https://alberta.ca/oil-sands-mine-water-steering-committee)
- [alberta.ca/about-oil-sands](https://alberta.ca/about-oil-sands)