

A PROVEN TECHNOLOGY TO TREAT WATER USED IN OIL SANDS MINING

PROUDLY MADE IN CANADA

WHAT ARE OIL SANDS TAILINGS?

Tailings generated from oil sands mining operations contain a mix of residual water, bitumen, solvent, critical minerals, and suspended solids. These tailings are stored in large ponds on oil sands mining sites and are a source of dissolved organics and carbon emissions including methane. Additionally, they are a source of critical air contaminants, volatile organic compounds (VOCs), secondary organic aerosols (SOAs), naturally occurring radioactive material (NORM), and pyrite.

TWO DIFFERENT TYPES OF TAILINGS EXIST

Froth Treatment Tailings

Froth treatment tailings (FTT) are generated while preparing the bitumen froth for upgrading by treating the froth with a solvent. It is within these tailings that the greatest concentration of challenging elements such as solvent, bitumen, and other solids are found.

Extraction Tailings

Extraction tailings are comprised primarily of water and coarse sands, do not contain significant quantities of challenging substances, and are relatively benign when compared to FTT. Extraction tailings represent the bulk of tailings volume in an oil sands mining operation.

Naphthenic acids are contained within bitumen and are drawn into process affected water. Since up to two thirds of the bitumen in a tailings pond is sourced from FTT, these are responsible for up to two thirds of the potential naphthenic acid volumes that may enter the pond and its water.

Solvent lost to FTT fouls water and serves as a substrate for methanogenic greenhouse gas releases. Additionally, acid generating and radioactive heavy minerals, such as pyrite and monazite, are concentrated in FTT.

CHALLENGES & ENVIRONMENTAL IMPACTS

Water fouling, such as solids re-suspension, bitumen mats, and oil slicks, result from the deposition of residual particulate and dissolved organics (combined, total organic carbons) into tailings ponds from FTT.



Naphthenic acids may present toxicity risks to fish, algae, and microorganisms.



Solids contained in FTT are elevated in NORM and pose exposure risks.



Pyrite causes 'acid mine drainage', which is the leaching of heavy metals into pond water and subsequent tailings reclamation deposits.



Bitumen and solvent contaminate water with organic compounds, degrading water quality and potentially threatening local ecosystems.



Methane is a major contributor to global warming, with a global warming potential 28 times that of CO₂.



VOCs cause eye, nose, and throat irritations, and headaches. They contribute to the formation of airborne particles (SOAs) that affect air quality and climate.

THE SHOVEL-READY SOLUTION

Creating Value from Waste (CVW™) is an Alberta-made innovation that reprocesses FTT, addressing the most challenging components before they enter the tailings pond.

CVW™ recovers over 85% of the bitumen and more than 90% of the solvent contained in FTT, supporting a 95% reduction in suspended solids and a 80% decrease in naphthenic acids.

Reduce Total Organic Carbon

Recover bitumen from FTT before deposition into ponds. This improves water quality, contributing to a reduction of total organic carbon by over 95%.

Recover Petroleum Hydrocarbons

Recover over 90% of solvents in FTT, preventing fouling by stopping biogenic methanogenesis and re-suspension of fines and bitumen from fluid fine tailings.

Reduce Total Suspended Solids

Reduce the total suspended solids of FTT through thickening and ultrafiltration, capturing these fine particles as regulatory-compliant and ready to reclaim, avoiding contributions to fluid tailings inventories.

Reduce Methane and VOCs

Reduce mineable oil sands greenhouse gas emissions by up to 12% by abating up to 1.8 million tones of methane per year.

Manage Pyrite and NORM

Recover up to 85% of the pyrite found in FTT and reduce NORM by up to 50% of the current baseline radioactivity levels.

Reduce Freshwater Draw

Produce treated water which is fit-for-reuse in low-grade utility applications, decreasing industry-wide freshwater draw by over 18 million cubic meters annually, and cutting water-use intensity by over 30%.

Mitigate Naphthenic Acids

Prevent over 80% of the current naphthenic acids deposition from FTT. This reduction is crucial as naphthenic acid contamination is one of the main reasons why water cannot be safely discharged.



ECONOMIC OPPORTUNITY & MEETING CANADA'S CLIMATE GOALS

Industry-wide deployment of CVW™ technology has the potential to directly support Canada's economic, climate, and environmental targets by:

Boosting Canada's GDP by up to \$47.4 billion

Contributing between \$960 million and \$1.6 billion in annual after-tax free cash flow

Creating over 144,000 person-years of employment in Canada

Contributing to the global objective of reaching net-zero by 2050