

# CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

ENVIRONMENTAL INNOVATION – LAND AND BIODIVERSITY

## FUNDING DETAILS

### A Field Demonstration of the EKS-DT Process Dewatering Oil Sands Tailings

ElectroKinetic Solutions Inc. (EKS) has developed an innovative technology to dewater mine tailings using electrokinetics. The EKS-DT process consists of parallel pairs of electrodes deployed within a tailings deposit. When direct current is applied to the electrodes, the tailings are dewatered via electrophoresis and electroosmosis. The EKS-DT process contains no moving parts and requires no chemical additives. A successful full-scale field test of the EKS-DT was conducted between October 2019 and April 2021. The purpose of the field test was to demonstrate that the EKS technology scales up as expected to a commercial scale and can operate efficiently year-round.



#### RECIPIENT:

ElectroKinetic Solutions Inc.



#### PARTNERS:

CNRL, Alberta Innovates, SDTC, NRCan



#### TOTAL BUDGET:

\$7,280,133



#### AI FUNDING:

\$1,950,000



#### PROJECT DATES:

SEP 2018 –  
AUG 2021



#### PROJECT TRL:

Start: 6  
End: 8

## APPLICATION

The dewatering of tailings and sludges is a global problem. The *in situ* EKS-DT process can rapidly dewater even tailings with a high fines content and low solids content, such as oil sands tailings. This provides an economical means to reduce the environmental liability posed by tailings, including the risk of catastrophic failure of tailings containment facilities. The EKS-DT process can be deployed in the oil sands or wherever else mine tailings are produced.

# ALBERTA INNOVATES CLEAN RESOURCES

## ENVIRONMENTAL INNOVATION ENVIRONMENTAL INNOVATION – LAND AND BIODIVERSITY

### PROJECT GOALS

The following performance metrics were set for the EKS-DT field test. All metrics were successfully achieved.

- Year-round Operation - The EKS-DT field test performed reliably over two winters as designed.
- High Final Solids Content – A final solids content at depth of >60% (kg/kg) was achieved despite an initial solids content of 18% and an SFR <0.05. If the field test schedule had been extended, further dewatering would have been achieved.
- Low Energy Consumption - The energy consumption was 14.8 kWh/m<sup>3</sup> of water released, significantly less than the target of 30 kWh/m<sup>3</sup>.
- Released Water Quality - The released water quality was better for reuse than the tailings pore water. The pH was higher, and the concentrations of chloride, calcium and magnesium ions were significantly lower.

### BENEFITS TO ALBERTA

Adopting the EKS-DT process at commercial scale to manage oil sands tailings offers the following benefits to Alberta:

- Cost Savings - Significant cost reductions for tailings management will increase the
- Competitiveness of Alberta's oil sands industry, sustaining jobs and economic benefits.
- Reduced Environmental Liabilities - The EKS-DT process can economically consolidate the huge inventory of oil sand tailings, allowing them to be reclaimed, returning the land to natural ecosystems, immediately and not decades into the future. The EKS technology will also prevent the future buildup of tailings over time.
- Reduced GHG Emissions – By rapidly dewatering oil sands tailings, internally produced GHGs are trapped in the consolidated tailings. As a result, a large reduction in GHG emissions from the oil sands can be achieved.



**3 Students  
Trained**



**2 Patents**



**4-23 Project Jobs**



**4-41 Future Jobs**

### CURRENT STATUS

#### SEP 2021

The project was completed in August 2021 and test site was fully decommissioned. EKS demonstrated that the EKS-DT process can be fabricated, deployed, and operated at a commercial scale. The technology scales up better than expected, yielding significant potential tailings management cost savings and ESG advantages compared to current practices. The EKS-DT process is ready for commercial deployment in the oil sands.