ALBERTA INNOVATES

CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

WATER INNOVATION

Water Return Demonstration Project

Syncrude's Water Return Demonstration Project (WRDP) was commissioned in 2019 and is a novel application of water treatment based on the principles of adsorption, filtration, and biodegradation. The purpose of the technology is to reduce constituents present in OSPW to ensure the treated water can be returned in a manner protective of human and ecological health. Since 1967, oil sands operators have adhered to a "zero-release" practice for oil sands process water (OSPW). To reduce containment requirements, minimize land disturbances, expedite progressive reclamation, mitigate OSPW salinization, and achieve mine closure outcomes, release of appropriately treated water is required.

FUNDING DETAILS

RECIPIENT:
Syncrude Canada Ltd.

PARTNERS:
Suncor, Imperial Oil, Canadian Natural Resources Ltd., Teck

TOTAL BUDGET:
$6,980,264

AI FUNDING:
$440,000

PROJECT DATES:
MAY 2019 – SEP 2022

PROJECT TRL:
Start: 7
End: 9

APPLICATION

Syncrude recognizes the potential of this technology and is assessing commercialization opportunities. A significant opportunity exists via hydraulic placement of the coke material in a dedicated mined out pit, which would serve as a commercial-scale water treatment facility. The technology has the potential to treat hundreds of millions of cubic meters of OSPW and would impart engineering control to support Syncrude's long-term OSPW management necessary to realize improved environmental performance.

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PROJECT GOALS

- Completion of facility commissioning (i.e., Reactors 2 and 3) in spring 2020.
- Confirm the process produces treated OSPW that is not acutely toxic based on bioassays using bacteria (*Vibrio fischeri*), zooplankton (*Daphnia magna*), and fish (*Oncorhynchus mykiss*; rainbow trout). If these tests indicate that the treated OSPW is acutely toxic, subsequent investigations will be completed to assess cause. This may include a Toxicity Identification Evaluation process.
- Assess the treatment and potential release of treated OSPW with respect to protection of ecological and human health. Evaluation will follow a "triad approach" and include (i) chemical characterization of untreated and treated OSPW for organic and inorganic constituents, (ii) toxicological testing of treated OSPW over an approximately six-week period using a broad suite of toxicity tests, and (iii) the use of mesocosms (i.e., artificial streams) inoculated with periphyton and benthic macroinvertebrate assemblages from the Athabasca River watershed.

BENEFITS TO ALBERTA

The long-term sustainability of Alberta's mineable oil sand industry is reliant on safe return of reclaimed/treated OSPW to enable the industry to improve its environmental performance. In turn, this will improve societal acceptance for the responsible development of Canada's oil sands resource. This is necessary to attract national and international investment to Alberta to ensure the industry continues to be a major contributor to the economy. The successful implementation of this technology could result in the following benefits:

- Commercialization of a novel water treatment technology to treat OSPW for safe release. This will enhance water management practices including minimizing inventories of fluid fine tailings and expediting progressive reclamation activities.
- A vehicle to inform regulatory agencies and facilitate research and development.
- Improved communication and education of downstream indigenous communities to build confidence water release will be done safely.
- Working partnerships between government, industry, academia, and communities.

1 New Product/Service

10-20 Project Jobs

10-20 Future Jobs

CURRENT STATUS

OCT 2022

Project completed. The next step of commercialization (Phase 3) would be a pilot scale return to the Athabasca River for up to two years to further progress the technology and collect scientific evidence to ensure the return of treated OSPW is protective of the Athabasca River system downstream of the return point. Further development of government regulation is required for Phase 3 and all activities related to the pilot system have been paused until this is completed.