

## **How to Selectively Collect Mutli-Tonne Oil Sands Samples from a Greenfields Project Site: Teck Resources Limited's Frontier Oil Sand Project, Fort McMurray, Alberta, Canada**

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### **Summary**

Teck Resources Limited (Teck) is a diversified resource company committed to responsible mining and mineral development with major business units focused on copper, steelmaking coal, zinc and energy. Teck is currently seeking regulatory approval for its Frontier Oil Sands Project; a proposed 260,000 bbl/day oil sands mining and bitumen production operation located 110 km north of Fort McMurray, AB. As part of the feasibility design process for the Project, 70 tonnes of oil sand were collected from the Frontier leases during the winter of 2014 to determine oil sands processing characteristics of specific geological facies and bitumen grades.

### **Introduction**

Normally such a large amount of oil sands would be collected from an exposed operating mining face. While testing of oil sands from another mine site can provide information on general process design, it was preferred to perform detailed testing on oil sands locally sourced from the Frontier leases. The proposed Frontier Oil Sands Project site is a "greenfield" site. There are no clearings or existing infrastructure, no existing exposures of oil sand, and access is limited to winter access via an ice bridge across the Athabasca River and approximately 50 km of winter access roads. The challenge was to devise a method to selectively collect 70 tonnes of oil sands that: 1) represented all the major geological facies found within the Project limits, 2) was able to be collected from various depths below the 20 metres of overlying Quaternary sediments, 3) utilized a small footprint with minimal surface impact to the Project site, and 4) would receive regulatory approval from the Alberta Energy Regulator to collect the material.

### **Method**

Teck Resources Limited elected to utilize a large diameter coring rig (Fig. 1) to collect the oil sands in 6 inch diameter PVC tubes then cut to 1.5m lengths for ease of transport (Fig. 2). While similar to mini-bulk sampling in the hard rock industry, this was the first time that this specific type of coring had been performed for controlled collection of multiple tonnes of oil sands. There were several unknowns as to how the rig could be adapted to perform in this type of application. Core recovery was a chief concern.



Figure 1 – Mud rotary coring rig adapted for 6” coring and wireline core retrieval.



Figure 2 – Example of oil sands core inside 6” PVC tube.

Six sites were selected for collection of oil sands based upon the data from existing resource evaluation holes drilled previously at each site. Target depths were identified and up to 8 large diameter core holes were planned on each 100 metre by 100 metre drill lease. The large diameter holes were drilled in a ring around the existing resource hole on average 10 metres apart. Between January 6, 2014 and March 4, 2014, 44 large diameter core holes were drilled and over 70 tonnes of oil sands were collected and trucked to Fort McMurray where the oil sands was described, sorted, homogenized and batched for processability testing. The oil sands was then shipped in prepared batches to: 1) Apex Engineering in Edmonton for testing in Teck’s Large Batch Extraction (LBE) unit, and 2) Saskatchewan Research Council in Saskatoon for conditioning and pipe loop testing.

## Results

The targeted collection of 70 tonnes oil sands from a remote Greenfield sites via large diameter coring was completed with no first aids, medical aids or lost time incidents. Productivity exceeded expectations with core recovery of 100% and an average coring time for each of the 44 holes (from rig setup to tear down) of 30 hours. Overall, the 2014 large diameter coring program was a tremendous success and offers a proven methodology for other operators looking to collect large bulk oil sand samples from remote greenfield sites.

The presentation describes in further detail the scope and learning’s from Teck’s 2014 Large Diameter Coring Program.

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