

MADE IN  
CANADA

# SAFELY TRANSPORTING CANADA'S LARGEST RESERVE OF CRUDE OIL

## A SAFE & RELIABLE ENERGY RESOURCE

Underground pipelines run alongside roads, power line corridors and across farmland to safely and quietly deliver millions of barrels of liquid petroleum every day from the Canadian oil sands region to refinery markets in Canada — including Ontario and Quebec.

Enbridge has been transporting crude oil produced from Canada's oil sands region since 1968. Our pipeline system is a safe and reliable way to transport this vital energy resource. We continue to work toward a goal of zero pipeline spills.

Pipelines are the safest way to transport petroleum from oil reserves to refineries.

## IS THERE MORE RISK IN TRANSPORTING CRUDE OIL FROM THE OIL SANDS?

No. All crude oil must meet pipeline quality specifications to be transported in our pipelines. These strict specifications were made so Enbridge could prevent damage or internal corrosion to pipes, pumps and other facilities. Many years of transporting heavy oil sands crude proves there is no evidence that pipelines delivering oil sands crude are more susceptible to internal corrosion than other pipelines transporting other petroleum products.

## SOPHISTICATED MONITORING AND CONTROLS

Our maintenance and monitoring system is aimed at avoiding incidents for our entire pipeline system, whether it's transporting natural gas liquids or crude oil (including heavy crudes, diluted bitumen, and light grades of oil). To ensure reliable delivery, our pipeline system is closely monitored 24-hours a day, seven days a week.

Enbridge makes safety a high company priority by investing heavily each year in maintaining sophisticated pipeline control systems, conducting internal pipeline inspections, performing regular aerial inspections, and utilizing other measures to check for compromises and ensure our pipelines are running safely.





## DID YOU KNOW?

As part of our comprehensive integrity management program, Enbridge uses internal inspection tools that travel inside our pipelines to collect data and evaluate the condition of the pipeline. In some cases, the inspection tool locates a feature that requires a visual inspection to determine if a repair or other action is required. This is called an integrity dig.

## PREVENTING PIPELINE CORROSION

Canadian pipeline safety regulations and standards are very comprehensive. They require prevention, monitoring, and mitigation to avoid both internal and external corrosion. National Energy Board regulations require pipeline operators to monitor for corrosiveness of materials transported, and inspectors check for our compliance with these regulations. Pipeline operators monitor for corrosion using internal inspection devices and other technologies to detect early signs of internal corrosion before a leak occurs.

**Enbridge uses many tools to mitigate common causes of corrosion including:**

- Lab testing where we receive crude oil to ensure it meets quality and product specifications.
- Tools used inside of the pipe—known as scraper pigs—to clean impurities that can lead to corrosion where there is internal corrosion risk.
- Adding corrosion inhibitors.
- Using biocides that kill corrosion-inducing microorganisms.
- Cathodic protection and external coatings that protect against external corrosion.

## THE DIFFERENCE BETWEEN OIL SANDS OIL AND OTHER CRUDE OIL

It's comforting to know that right here in North America, in addition to other energy resources, there are billions of barrels of recoverable petroleum from the oil sands region in western Canada. And potentially there is enough oil in this region for more than 100 years of production. Canada has one of the largest oil reserves in the world, and 97 per cent of these reserves are in the oil sands.

The raw product in the oil sands is called bitumen, a form of dense oil that does not flow in its natural state. Processing is needed to separate sand and extract the bitumen oil. Once this occurs, the crude oil resembles other heavy crudes transported by pipeline throughout the country. There are two ways the bitumen is processed. Either it is upgraded and initially refined to form “synthetic oil” or syncrude, or it is diluted to create a liquid with the viscosity and density to flow in a pipeline (diluted bitumen or “dilbit”). Either way, the quality of the crude oil meets pipeline and shipper specifications to deliver to refineries, and in turn meets their requirements for quality.

While called “oil sands” and sometimes referred to as “tar sands” or dilbit (for diluted bitumen), there is no significant difference in transporting this heavy crude oil than the normal product specification and quality assurances required for transporting other petroleum commodities. Heavy crude, like dilbit, is no more and often much less volatile than transporting natural gas, butanes, jet fuel and other energy products that are delivered safely every day.

In fact, refineries in Canada and the U.S. have for decades used Canadian heavy crude from both conventional fields in western Canada and the oil sands region as another resource of reliable North American crude oil supply. Once delivered to the refinery, this heavy crude oil, syncrude or dilbit becomes fuel to operate vehicles, fuel our military, make asphalt for roads and roofs, serve as feedstock for our farms' fertilizers and countless other petroleum-based products used by millions of people every day.