

Corrosion

No. 10

About Pipelines is a series, dedicated to sharing the facts about transmission pipelines in Canada and their role in Canadians' lives. This information is provided by the Canadian Energy Pipeline Association (CEPA).

How do pipeline operators prevent corrosion?

Myth

MYTH VS. FACT

Pipeline corrosion

All pipelines corrode.

FACT: With proper maintenance and monitoring, a pipeline can be safely operated for many decades.

Myth

Diluted bitumen causes pipeline corrosion.

FACT: Diluted bitumen doesn't have characteristics that cause more corrosion – it's virtually the same as conventional crude oil.

Myth

Retired pipelines are left to rust.

FACT: Retired transmission pipelines are subject to specific regulatory requirements to make sure they remain safe.

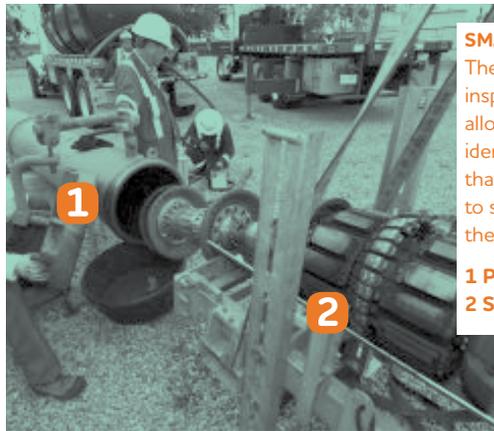
Transmission pipelines cover over 115,000 kilometers of Canada, going through different types of terrains (farmland, rivers, wetlands, mountains and urban areas). A pipeline operator's job is to safely deliver the oil and gas products that Canadians rely on, and that means that pipelines need to be properly protected from potential threats like corrosion.

Corrosion is a naturally-occurring phenomenon that happens when metal is exposed to air and the environment it's in, such as water or soil. It's a gradual process – one common example of corroded metal is rust. Left untreated, corrosion will impact the strength and appearance of metal.

But corrosion is preventable, and pipeline operators are committed to protecting pipelines from corroding using different techniques, including cathodic protection.

A layer of protection

Pipelines are made of high-quality steel, and one of the most effective ways to prevent pipelines from corroding is to prevent the steel itself from



SMART PIGS

These in-line inspection tools allow operators to identify problems that may be difficult to see from outside the pipeline.

- 1 Pipeline
- 2 Smart Pig

having direct contact with the water or soil that can cause corrosion. That's why pipeline operators apply a protective coating on the pipes when they are being manufactured or during construction.

The most common type of coating is an epoxy coating, which is a paint-like substance that seals the surface of the pipeline. The epoxy prevents the metal pipeline from being in direct contact with the environment.

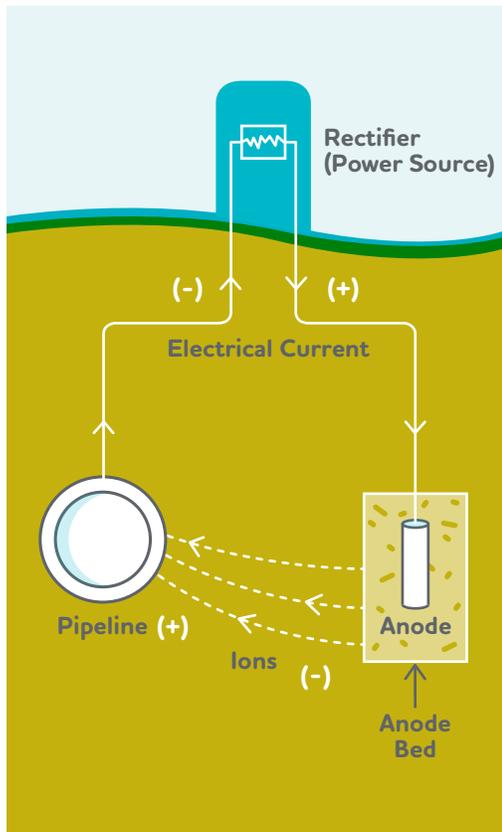
Because pipelines go through such diverse terrain, operators will use different coatings for different environments. For instance, if a pipeline



Did you know?

Cathodic protection is also used to prevent corrosion on the Christ the Redeemer statue in Rio de Janeiro, Brazil and the Eiffel Tower in Paris, France!

Corrosion



HOW IT WORKS

Cathodic protection

1

A specialized piece of metal (anode) is placed alongside the pipeline (cathode) in the ground or body of water. Both the pipeline and the anode are connected to a power source called a rectifier.

2

The rectifier charges the pipeline (cathode) with released electrons from the anode.

3

The electrical discharge in the anode is higher than the electrical discharge in the pipeline, and therefore the electrons pass to the pipeline in order to balance the electrical current. This basically consumes the electrons out of the pipeline and draws the corrosion away from it.

The deal with diluted bitumen

- Diluted bitumen has been transported in Canada for 30 years
- It's a heavy oil product mixed with a diluent to lower its viscosity (thickness) so it can flow easier through the pipeline
- The diluent is made up of natural gas condensates such as naphtha
- The characteristics of diluted bitumen are no more corrosive than other forms of crude oil
- Numerous scientific studies have concluded that diluted bitumen is no more corrosive than other forms of crude oil

Read the report on diluted bitumen here: bit.ly/WCSBcV

is going through a river, a pipeline operator may use a cement coating that prevents corrosion from occurring, while also weighing the pipe down and protecting against mechanical damage during installation.

With the current

Pipeline operators also prevent corrosion from occurring using a technique called cathodic protection. Corrosion is an electrochemical process, and cathodic protection basically drains the electrons out of the metal to inhibit its potential to corrode.

A clean sweep

Corrosion is more likely to occur on the outside of the pipeline than the inside of the pipeline because the outside is exposed to a corrosive environment, such as soil or water. Pipeline failures caused by corrosion are *extremely* rare because pipeline operators thoroughly monitor and maintain their pipelines, using tools and techniques like:

Scrapers – Large wire brushes rotate through the pipeline, cleaning the pipe and preventing product build-up. As extra protection, sometimes a substance called a corrosion inhibitor will be used during this process.

In-line inspection tools (smart pigs) – Inserted into the pipeline, these large plunger-like devices have digital sensors. As they move through the pipe, they detect cracks, deformations and metal loss on the pipe's surface. If an irregularity is detected, the operator will take action to repair or replace that section of the pipe.

Visual surveillance – Pipeline operators have employees who walk the pipeline right-of-ways, looking for signs that something is out of the ordinary, like changes in the environment or leaking product. Aerial inspections also give operators a birds' eye view of the right-of-way. If there are any signs that the pipeline's integrity is at risk, the operator will immediately investigate the situation and repair the affected pipe.

GET INFORMED

CEPA
aboutpipelines@cepa.com
[@aboutpipelines](https://twitter.com/aboutpipelines)
facebook.com/aboutpipelines
aboutpipelines.com



canadian energy pipeline association
 association canadienne de pipelines d'énergie