



# Natural gas pipelines: Operational safety

**To ensure our pipelines remain in safe and reliable operating condition, we employ a number of techniques. This includes everything from high-tech inspections and cathodic protection to robust coatings, maintenance activities and 24/7 monitoring of our system.**

## **Gas Control**

Gas Control, our high-tech computer control center, monitors the flow of natural gas throughout the U.S. transmission portion of our 26,000-mile North American gas pipeline network. Staffed 24 hours a day, seven days a week, the center collects data from all of these pipelines so that we always know what's happening along our system.

Based in Houston, our Gas Control Center monitors pressure, temperature and other critical information from across our pipeline network and facilities. For added safety, Gas Control can remotely open and close valves along our network if a potential issue arises, and can dispatch employees who live and work along the pipeline to investigate further.

## **Gas measurement**

We precisely measure the quantity of natural gas when it is received at thousands of points along the pipeline from producers and at interconnections with other cross-country pipeline operators.

We also measure the gas when it is delivered to local distribution companies, power plants and large industrial facilities.

We constantly sample the natural gas at numerous sites to identify potential corrosive components and to ensure we maintain a high standard of quality.

## **Compressor station operations**

As natural gas flows through a pipeline, the pipeline pressure will decrease due to friction and elevation differences.

To maintain pipeline flow and pressure, compressor stations are located along the pipeline route.

Our experienced and well-trained employees operate more than 100 compressor station sites around the clock—with well over two million horsepower in the United States.

***(Continued on reverse)***



### **Cathodic protection**

Cathodic protection — that’s the application of a safe, low-voltage direct current — is applied to surfaces of a transmission pipeline to prevent corrosion. This process prolongs the life of pipelines for many decades, and the level of current applied to the pipelines is harmless to humans, animals and plant life.

We check all rectifiers, the devices that transfer this current to the pipe, along our system every two months to ensure they’re working properly.

### **Coating maintenance**

Pipeline facilities above and below ground are protected by a fusion-bonded epoxy coating, applied under very exacting conditions, that inhibits corrosion.

We conduct routine visual inspections of the coating at all above-ground facilities, and examine the coating during any excavation or maintenance, repairing it as necessary.

### **Inline inspection and cleaning**

Our pipelines pioneered many of the inline inspection techniques currently used by the industry. Inline inspection (ILI) tools — or “smart pigs,” to use industry jargon — are highly complex pieces of machinery that use advanced imaging technology to inspect our pipes inch by inch by inch from the inside of the pipeline, and offer pinpoint accuracy for features that may require follow-up maintenance.

We also use “cleaning pigs” that travel along our pipelines, removing any liquids and debris, to minimize internal corrosion and maintain high flow efficiency.

### **Air and ground surveys**

We patrol pipeline rights-of-way in populated areas and some other areas of interest on foot, by vehicle and from the air.

Ground surveys can reveal leaks and other potential problems, enabling us to quickly repair the problem and minimize impact.

We also conduct air patrols of the pipeline rights-of-way at least once a week — and, in some places, as often as three times a week. Aerial patrols provide a bird’s-eye view of the rights-of-way and surrounding areas, with pilots looking for ground changes, construction activities or other conditions that could affect the pipelines.

### **Leak surveys**

We routinely perform leak surveys on all of our facilities. Although our records show that natural gas leaks rarely occur on our pipelines, these leak surveys look for fugitive emissions of natural gas so we can take action to eliminate them.

### **Waterway inspections**

Locations where our pipelines cross waterways are inspected at the surface every year by our employees to check for bank erosion, visible pipeline exposure and natural gas leaks indicated by bubbles. Many of these crossings are inspected at the bottom of the waterway each year by contract divers under our direction. If the pipeline does not have adequate cover, any coating damage is repaired, and the pipe is re-covered with grout bags or other suitable material.

### **Right-of-way (ROW) maintenance**

Mowing and clearing the right-of-way allows us to patrol the area by ground and air to discover activity that could lead to pipeline damage. It also allows us to easily discover leaks and natural earth movement that could damage the pipeline facilities.

This right-of-way maintenance also makes the location of our pipelines clearly apparent to the public and to any other individuals who might consider excavation in the area.

### **ROW signs and markers**

We place markers and signs along pipeline rights-of-way to inform the public of the presence of Enbridge’s natural gas pipelines. The markers are placed at street and road crossings, railroad crossings and other significantly visible points along the right-of-way to reduce the possibility of damage to or interference with the pipeline.

Markers and signs include our company name and the phone number to call in the event of an emergency, abnormal condition or suspicious activity.