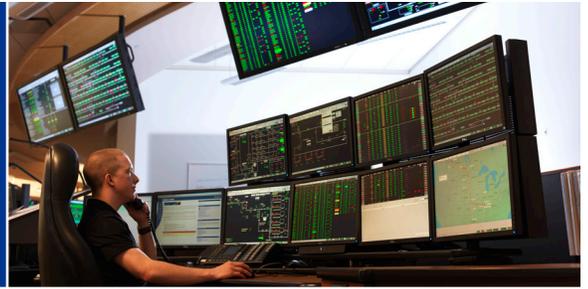


Keystone XL Pipeline Leak Prevention and Detection



Steel pipelines provide the safest and most efficient means to transport crude oil and other liquid petroleum products. Each year, billions of gallons of petroleum and petroleum products are transported from production fields and terminals to refineries and then on to major users and distribution centers throughout North America.

The Keystone XL Pipeline will employ industry-leading best practices in engineering design, pipe fabrication, system testing before operation, and in pipeline maintenance and operation. It will meet or exceed all regulatory requirements of the Pipeline and Hazardous Materials Safety Administration (PHMSA), an agency of the U.S. Department of Transportation that provides codes and regulations for the design, construction, maintenance and operation of more than 2.3 million miles of pipeline in the United States.

TransCanada will take several major steps to minimize the chances of a pipeline leak and to detect any leaks quickly:

- A formal quality control program will be implemented at the pipe fabrication plant during pipe fabrication and at the pipe coating facility during coating application. TransCanada inspectors will be present at the pipe mills to ensure that the pipe is manufactured and coated to Company standards and in accordance with Federal regulations.
 - Proven external corrosion prevention technology will be implemented, including a fusion-bonded epoxy coating and cathodic protection system.
 - Each weld made during pipeline construction will be examined utilizing radiographic or ultrasonic technology to ensure integrity. Prior to operation, the pipe will be hydrostatically tested to a minimum of 125 per-cent of the maximum allowable operating pressure, in accordance with Federal regulations. The hydrotesting, done with a water medium, has two aspects: a strength test to ensure that the pipe will not break; and a leak test to ensure that there are no defects in the pipe that would allow leakage of the crude oil during operations.
 - Periodic internal cleaning inspections to sweep the interior of the pipeline and random product sampling will occur to mitigate internal corrosion. Chemical corrosion inhibitors, biocides, corrosion coupons or probes will be used as necessary.
 - High-resolution in-line inspection tools ("smart pigs") that can detect internal and external defects will be used during operations. If any defects are found, investigations and the necessary repairs will be performed proactively to ensure the safe operation of the pipeline.
 - In the unlikely event that a leak were to occur, Federal safety regulations require pipeline operators to have emergency response and oil spill clean up plans in place and to conduct clean up activities in accordance with federal and state laws.
- Federal safety regulations require the ground cover above the top of the pipe to be two feet six inches (0.7 metres). The Keystone XL Pipeline will have a minimum ground cover of four feet (1.2 metres). To minimize the chance of excavation damage to the pipe, TransCanada will utilize an integrated public awareness and damage prevention program, in accordance with Federal regulations, that includes:
 - Participation in the One Call program in each area we operate. This program ensures utilities and pipelines in the work area can be marked so damage to those underground facilities can be prevented.
 - Regularly providing pipeline safety information to landowners, public officials, local emergency responders, and members of the public.
 - Installing pipeline signs and markers along the right-of-way at road crossings and other locations such as fence lines, water crossings, etc. to alert the public that a pipeline is in the vicinity. The signs will identify TransCanada Oil Pipeline Operations Inc. as the operator of the pipeline and will provide a toll-free emergency telephone number: 1.800.447.8066 in the U.S. or 1.888.982.7222 in Canada.
 - Periodic inspections and aerial patrols of the pipeline right-of-way will help to promptly address any issues that could affect the integrity of the pipeline. Pipeline patrol not only looks for evidence of leaks but also looks for any construction activities near the pipeline that could eventually encroach the pipeline right-of-way. If the patrol observes a condition that could affect the pipeline's integrity, a field technician will be dispatched to investigate and take appropriate action.

Keystone XL Pipeline Leak Prevention and Detection



Operations Control Center

TransCanada's Keystone XL Pipeline will be remotely controlled from our Operations Control Center where highly trained pipeline controllers monitor the operation of the pipeline and provide 24-hour pipeline monitoring 365 days a year. The pipeline controllers ensure that the pipeline is running safely and efficiently. The Control Center includes an operational control system, a leak detection system, and a satellite communication network.

Remote control of the pipeline uses a computer case system known as Supervisory Control and Data Acquisition (SCADA) to monitor and control the pipeline system. Data from all sites is read and sent to the Control Center approximately every five seconds.

The SCADA system will include:

- Redundant, fully functional back-up computers and a second control center in case there is a failure in the main control center.
- Automatic functions that will not allow the pressure at any station or anywhere in the pipe to exceed safe values.
- Local safety limits at pump stations that will provide pipeline pressure protection if SCADA communications are interrupted.

In addition to the SCADA system, the pipeline will feature complimentary and overlapping leak detection methods and systems, including:

1. Remote Monitoring: Operators at the Operations Control Center monitor, on their computer screens, all of the pressure and flow data received from pump stations and valve sites. Remote monitoring is typically able to detect large leaks immediately so the line can be shutdown and all valves closed, to limit the size of the spill.
2. Software-based Volume Balance Systems: This system compares the injection and delivery volumes and provides alarm to the pipeline controller when there is a difference between what is input to the pipe and what is delivered.
3. Computational Pipeline Monitoring: The approach, also known as model-based leak detection, uses all the pipeline pressures and flow rates to calculate flow balances on smaller sections of the pipe. This system uses the SCADA data to create a sensitive leak detection model. TransCanada selected leak detection model will be capable of detecting leaks down to a level of approximately 1.5 per-cent to 2 per-cent of pipeline flow rate. In addition, TransCanada will employ an over/short calculation to identify leaks below this threshold.

4. Direct Observation: TransCanada will also utilize aerial patrols, conducted 26 times per year – approximately every other week – as well as public and landowner awareness programs designed to encourage and facilitate the reporting of suspected leaks and events that may suggest a threat to the integrity of the pipeline.

Overall, the Keystone XL Pipeline will employ industry best practices and materials to prevent leaks and to detect them if they do occur so that appropriate actions may be taken. Our number one priority continues to be employee and public safety through all our activities.

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