PIPELINE ISSUES SERIES:

SHUTOFF VALVES

Bottom Line:

While experts agree decisions on the type and placement of pipeline valves should be made on a case-by-case basis, remotely controlled valves can improve a liquids pipeline operator's ability to limit the impacts of a pipeline release.

Frequently Asked Questions

Why Did Congress Require PHMSA to Examine 'Automated' Valves in the 2011 Pipeline Safety Reauthorization Law?

A 2010 natural gas incident in San Bruno, CA generated concern after it took too long to find, travel to and close a manual valve at the incident site.

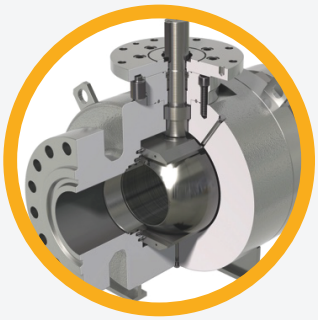
What Do the Experts Say About When and Where to Use Remotely Controlled or Automatic Shutoff Valves?

GAO and Oak Ridge National Laboratory on behalf of PHMSA and atthe direction of Congress both studied automatic and remotely controlled shutoff valves after the 2011 pipeline reauthorization law.[1] Both GAO and Oak Ridge concluded remotely controlled and automatic shutoff valves can reduce the size of a pipeline release. However, GAO found automatic shutoff valves for liquids pipelines "can cause an incident, when a valve closes and the subsequent pressure buildup causes the pipeline to rupture." Given differences in site-specific conditions, both GAO and Oak Ridge recommended decisions on shutoff valves be made on a case-by-case basis.

What Are the Concerns with Automatic Valves on Liquids Pipelines?

Automatic closure of a valve on a liquids pipeline can cause a pressure surge from the energy buildup of the liquid traveling through the pipeline, potentially leading to a rupture upstream. Natural gas pipelines do not experience this phenomena because of the compressible nature of the gas. The Government Accountability Office confirmed this risk in a Congressionally mandated report.[2] Pipeline operators have documented 9 pipeline incidents from conditions similar to an automatic valve closure, one resulting in a 4,000 barrel release.[3]

Pipelines operators use valves to control the flow of petroleum products through their pipelines. Valves are shut during pipeline incidents to limit the amount of product released from the pipeline.



Frequently Asked Questions

What types of valves do pipelines use?

- Manual – operated by an employee in the field manually turning a wheel or handle to close the valve
- Automatic – activated automatically in the field by a sensor or gauge preset to close the valve under certain conditions. Uses a motor at the valve site to close the valve
- Remote – activated remotely by a pipeline employee at a central control room. Uses a motor at the valve site to close the valve
- Check – allows one-way flow, preventing reversal of flow direction

What Factors Guide Engineers Designing and Operating Pipeline Valves?

Pipeline engineers examine a number of factors when determining a valve's type, location and safe operations including: topography of the location (incline or decline), pipeline diameter and operating pressure, product being transported, proximity of operator personnel to the valve location, and existing shutdown capabilities. Engineers shutting down a pipeline manually or remotely will consider the hydraulics and engineering of the specific valve location to ensure a safe closure.

What Are Examples of Pipeline Releases Due to Valves and Pressure Surges?

Liquids pipeline incidents from 2002 to 2014 involving valve closures or pipeline shutdowns causing pressures greater than maximum operating pressure and resulting in release include:

DATE	PRODUCT	BARRELS	STATE	NARRATIVE
3/30/02	Refined	62	HI	Malfunctioning control valve caused pressure surge
1/23/07	NGL	14	TX	Improper valve closure lead to high line pressure
6/24/07	Refined	307	OH	Power supply failure caused valve closure
10/28/09	Refined	205	NJ	Improper alarm lead to valve closure and pressure surge
3/14/11	Refined	23	NJ	Accidental valve closure during maintenance caused pressure surge
2/4/13	Refined	1,100	TX	Improper valve closure caused a pressure spike
3/21/14	NGL	3,992	TX	Sudden pump shutdown caused a pressure surge
9/5/14	Crude	15	WY	Improper valve closure caused pressure spike
11/18/14	Crude	1	TX	Alarm induced sudden shutdown caused pressure surge

1. U.S. Government Accountability Office, Pipeline Safety: Better Data and Guidance Needed to Improve Pipeline Operator Incident Response, Jan. 2013, at http://www.gao.gov/assets/660/651408.pdf and Oak Ridge National Laboratory, Studies for the Requirements of Automatic and Remotely Controlled Shutoff Valves on Hazardous Liquids and Natural Gas Pipelines with Respect to Public and Environmental Safety, Oct. 2012, at http:// 1.usa.gov/1cjjZDK
2. Id.
3. American Petroleum Institute analysis of hazardous liquid events from 2002-2014 involving pressures greater than maximum operating pressure due to valve closures or shutdowns, Jul. 2014.