NASEM TRB Information-Gathering Meeting

Committee on Criteria for Installing Automatic and Remote-Controlled Shutoff Valves on Existing Gas and Hazardous Liquid Transmission Pipelines

Presentation of John Stoody
Association of Oil Pipe Lines

April 26, 2022

Liquids Pipelines Are Safe

Overall Safety Record of Liquids Pipelines Is Excellent

- 99.999+% of barrels of liquids petroleum products delivered by pipelines each year reach their destination safely (PHMSA & FERC data)
- Total incidents from liquids pipelines down 17% over last 5 years (PHMSA data)
- Incidents Impacting People or the Environment down 31% over last 5 years (PHMSA data)
- Pipelines have fewer incidents, release less into the environment, and emit fewer GHG emissions than rail (Obama admin KXL FSEIS, 2014)
- Ruptures on pipelines are relatively rare (approx. 5 per year, PHMSA 4/26/22)
- Low Probability High Consequence incidents too rare to analyze empirically (PHMSA 4/26/22)

Risk and Financial Costs of Potential Existing Valve Mandate Are Substantial

AOPL
Association of Oil Pipe Lines

Replacing Existing Valves Very Costly

- Many liquids valves are buried below grade, so not as easy as just adding actuator
- Operators estimate often costs +$1 million to replace valve, some circumstances stretch to $5-$10 million per valve (valve, construction, communications systems, downtime)
- Thousands of valves replaced at millions of dollars each adds up to a multi-billion-dollar mandate

Replacing Valves Adds Own Risks

- Disrupting existing pipeline through construction has risks (excavation damage)
- Moving valve above-grade increases risks of future damage, tampering, malfunction
- Inspection tools can damage check valves yielding higher failure rates
- Storms can knock out communications, lead to malfunction

Automatic Valves on Liquids Lines Pose Additional Safety Concerns

- 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 pressure surge phenomena because of the compressible nature of the gas.
- The Government Accountability Office confirmed the risk of automatic shutoff valves on liquids pipelines in a Congressionally mandated report. (GAO, 2013)
- During original Congressional debate of a valve mandate, the pipeline industry documented 9 pipeline incidents from conditions similar to an automatic valve closure, one resulting in a 4,000-barrel release.
- Liquids operators do use automatic valves in rare situations (e.g. river crossings), but those are in controlled and specifically-designed situations

Pipeline Operators Regularly Review Valve Decisions

- PHMSA regulations require operators review regularly the preventive and mitigative measures they are taking in high consequence areas:

  "These measures include conducting a risk analysis of the pipeline segment to identify additional actions to enhance public safety or environmental protection. Such actions may include, but are not limited to, implementing damage prevention best practices, better monitoring of cathodic protection where corrosion is a concern, establishing shorter inspection intervals, installing EFRDs on the pipeline segment, modifying the systems that monitor pressure and detect leaks, providing additional training to personnel on response procedures, conducting drills with local emergency responders and adopting other management controls." 49 CFR 195.452(i)

- PHMSA regulations provide risk analysis criteria:

  "(i) Terrain surrounding the pipeline segment, including drainage systems such as small streams and other smaller waterways that could act as a conduit to the high consequence area; (ii) Elevation profile; (iii) Characteristics of the product transported; (iv) Amount of product that could be released; (v) Possibility of a spillage in a farm field following the drain tile into a waterway; (vi) Ditches along side a roadway the pipeline crosses; (vii) Physical support of the pipeline segment such as by a cable suspension bridge; (viii) Exposure of the pipeline to operating pressure exceeding established maximum operating pressure; (ix) Seismicity of the area." 49 CFR 195.452(i)(2)

- Operators must determine whether emergency flow restriction devices are needed:

  "In making this determination, an operator must, at least, consider the following factors - the swiftness of leak detection and pipeline shutdown capabilities, the type of commodity carried, the rate of potential leakage, the volume that can be released, topography or pipeline profile, the potential for ignition, proximity to power sources, location of nearest response personnel, specific terrain between the pipeline segment and the high consequence area, and benefits expected by reducing the spill size." 49 CFR 195.452(i)(4)

Data Does Not Support Extensive Replacement of Existing Valves

- Operator EFRD Analysis Rarely Yields Risks Supporting Costs of Valve Replacement
- Issue boils down to substantial cost of valve replacement compared to marginal difference in product released above drain down
- PHMSA incident data does not seem to support benefits of remote valves over manual valves
    - Initial review of incidents with valve type noted in incident report showed higher per barrel releases with remote valves

Analysis of PHMSA Incident Database - HL Incidents 2010 to Present
Incidents with Valve Type Noted

Total Incidents

	Upstream Valve		Barrels Released	Barrels / Release
Manual	737	59%	253,775	344
Auto	118	9%	142,559	1,208
Remote	399	32%	383,585	961
	1254			

IPE Incidents

Manual	384	57%	125,320	326
Auto	54	8%	32,168	596
Remote	238	35%	191,001	803
	676			

Crude IPE Incidents

Manual	260	64%	79,699	307
Auto	28	7%	20,143	719
Remote	119	29%	110,401	928
	407			

Refined Product IPE Incidents

Manual	124	46%	45,621	368
Auto	26	10%	12,026	463
Remote	119	44%	80,600	677
	269			

Operational Actions Make Sense Even if Hardware Changes Do Not

- Marshall, MI incident showed integrity management, control room management, and emergency response were the key factors
- PHMSA has taken multiple actions based on NTSB recommendations and Congressional mandates to improve pipeline safety with existing valves
  - Control room management rulemaking
  - Hazardous liquids rulemaking
  - Rupture reaction rulemaking
- Industry has taken multiple actions based on lessons learned:
  - RP 1173 – safety management systems
  - RP 1174 – emergency preparedness
  - RP 1175 – leak detection program management
  - RP 1176 – crack management

Operational Actions Make Sense Even if Hardware Changes Do Not (cont.)

- Industry has taken multiple actions based on lessons learned (cont.):
  - Technical Reports – data integration, hydrotesting
  - Guides – Learning & Sharing Lessons

- Pipeline operators continuing with industry-wide safety improvement efforts:
  - RP 1160 – integrity management program update
  - RP 1176 – crack management update
  - RP 1187 – geohazards
  - RP 1183 - public engagement
  - Corrosion strategic objective
  - Leak detection strategic objective

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