XCEL ENERGY RCV PROGRAM

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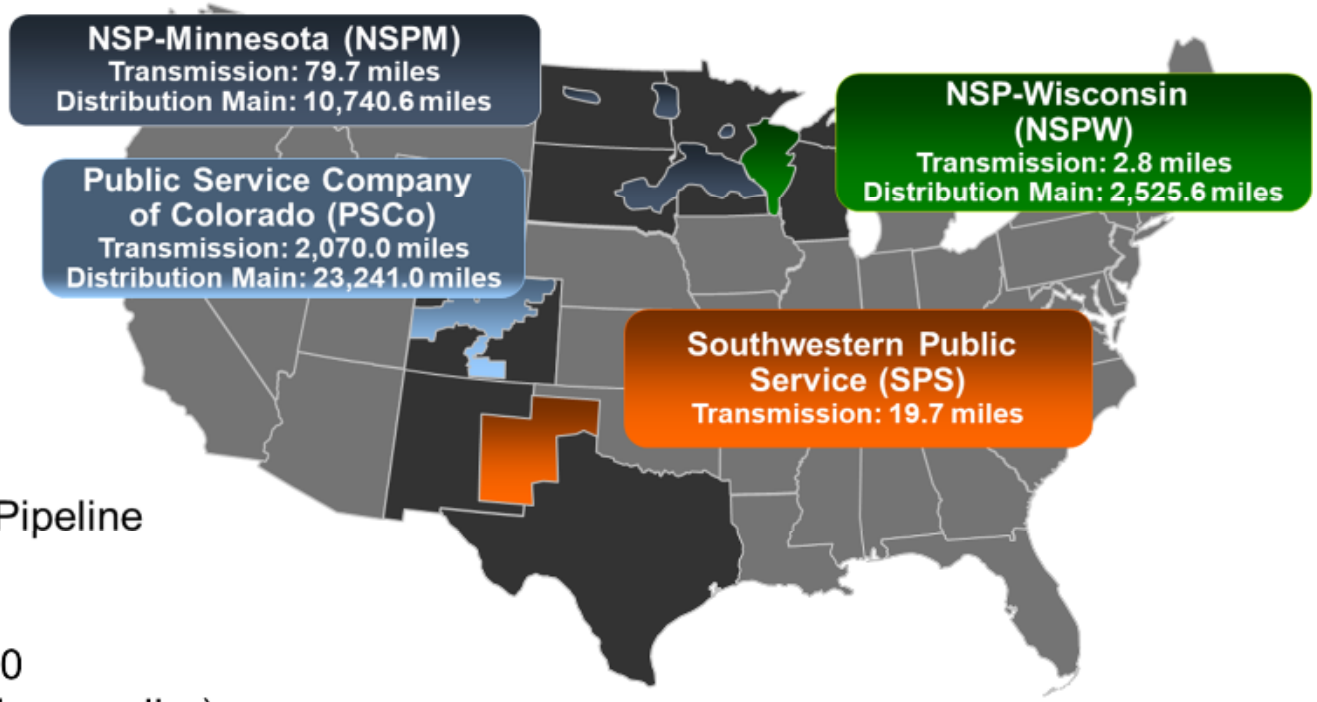
AGENDA

1. Xcel Natural Gas System Overview
2. Regulatory Background
3. History of Xcel Energy RCV Program
4. Results of the Xcel Energy RCV Program
5. Lessons Learned
6. Questions

Xcel Energy Gas System Overview



- 2,172.2 miles Transmission Pipeline
- 237 miles of HCA (~11%)
- 153 miles of MCA
- Vintage: 41% older than 1970
- Diameter 2” to 36” (~60%, 8” or smaller)
- 67% Piggable
- Diverse Operating Environments

Regulatory Background

’One of the existing provisions of the Transmission Integrity Management Program (TIMP) rule is for operators to evaluate if the use of ASVs or RCVs would be an efficient means to add protection to High Consequence Areas (HCAs) in the event of a natural gas release’.

2011: Section 4 of the Pipeline Safety Act requires PHMSA to issue regulations, if appropriate, requiring the use of automatic or remote-controlled shut-off valves, or equivalent technology, on newly constructed or replaced natural gas or hazardous liquid pipeline facilities.

2022: 49 CFR Part 192.634 Transmission line: Onshore valve shut-off for rupture mitigation.

AGA While Paper Automatic Shut-off Valves (ASV) and Remote Control Valves (RCV) on Natural Gas Transmission Pipelines, March 25, 2011, p2 ; **Pipeline Safety: Valve Installation and Minimum Rupture Detection Standards,** Docket No. PHMSA-2013-0255;

History of Xcel RCV Program

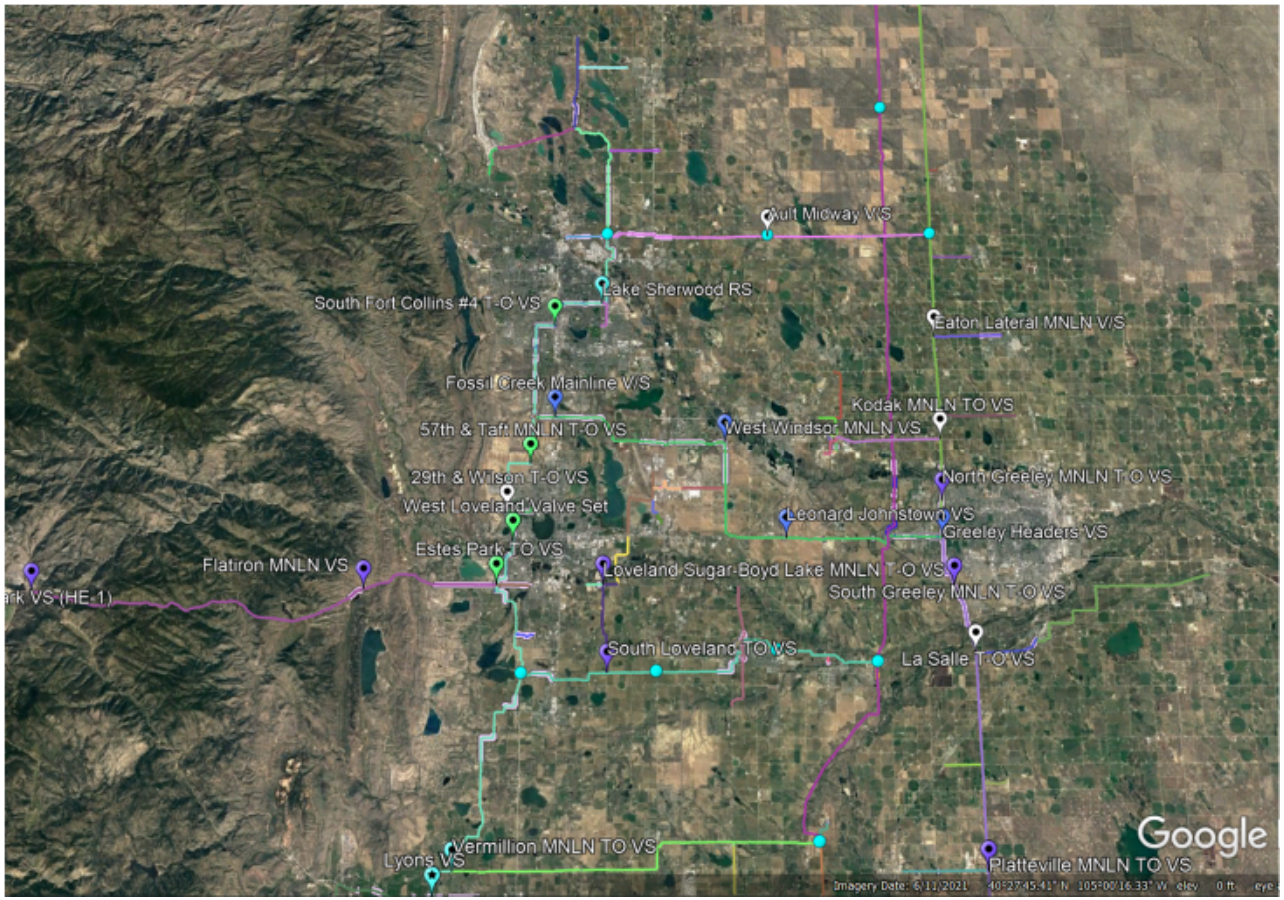
PSCo requested programmatic funding in its 2011 rate case to install remote-control capability on existing transmission isolation valves. The funds were approved as part of a 5-year rider to improve the safety and integrity of Xcel Energy's gas transmission system.

PSCo developed a scoring matrix to prioritize pipelines for remote-control operation of the isolation valves. The score included a component for volume in the pipeline, class location, HCA, Unique Geology Risk, TIMP assessment, Third Party Damage Potential, and Time to Reach Valve.

RCV Coverage

Northern Colorado Area

Showing Class 3, Class 4 and HCA with the RCV installed or in progress.



RCV Coverage

St. Paul Minnesota Area

Showing Class 3, Class 4 and HCA with the RCV installed.

Two examples of Colorado Remote Control Valves

Indiana RCV, receiver barrel is bypass & Lochbuie RCV, overhead bypass

Example of Minnesota buried Remote Control Valve

Park & Maryland RCV, the actual isolation valve is buried. The actuator is within the enclosure between the above ground blowdown valves.

Lessons Learned

Calibrate Scoring Matrix: ensure locations selected reflect the intent to protect public

- First 10 RCV sites: either rural or remote, long way from public
- Reprioritized sites to favor valves nearest to class 3, class 4, and HCA

Consider Lock Out Tag Out requirements in the design and controls

- Original program was remote close, local open, to protect workers
- Changed to add remote open & SCADA “tag out” when issue close

Original Best Practice required a local verification prior to close – had to remove

- Rupture Mitigation requires ability to assess remotely and close within 30 mins
- Added Rate of Change alarms in SCADA and ability to reopen in case of error

Lessons Learned

Component change: pull to close buttons replaced with push to close

- Moisture accumulated, froze and expanded, lifting the “pull to close” button

Taps for pneumatic power and for fuel – need to be able to hot tap

- Older valve sets did not have enough taps for all the connections needed

Power and communications can be a challenge

- Thermoelectric Generators were installed at remote sites – had two lemons
- Cell phone, radio and satellite communications are the typical choices for comms

Create a consistent numbering convention: upstream, downstream and take-off

- Makes setup and training consistent and easy

Questions?