



Automatic/Remote Control Valves

Gas Transmission Pipeline Perspective

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INGAA Members



The greatest safety challenge



IMP, PIPA, CGA and similar efforts protect people. Automating valves has limited benefit.

Guiding Principles of Pipeline Safety



- **Our goal is zero incidents** - a perfect record of safety and reliability for the national pipeline system. *We will work every day toward this goal.*
- **We are committed to safety culture** as a critical dimension to continuously improve our industry's performance.
- **We will be relentless in our pursuit of improving** by learning from the past and anticipating the future.
- **We are committed to applying integrity management principles on a system-wide basis.**
- **We will engage our stakeholders** - from the local community to the national level - so they understand and can participate in reducing risk.



INGAA commitment on valve response



Populated Area	Diameter	Response Time ¹
Class 3, 4 and HCAs	Greater than 12"	One hour
	12" and under	Risk analysis based on IMM ²
Class 1 and 2	All diameters	No change

¹ From notification of the incident to valves closed.

² Incident Mitigation Management

Operators will engage responders and local officials on IMM plans to identify:

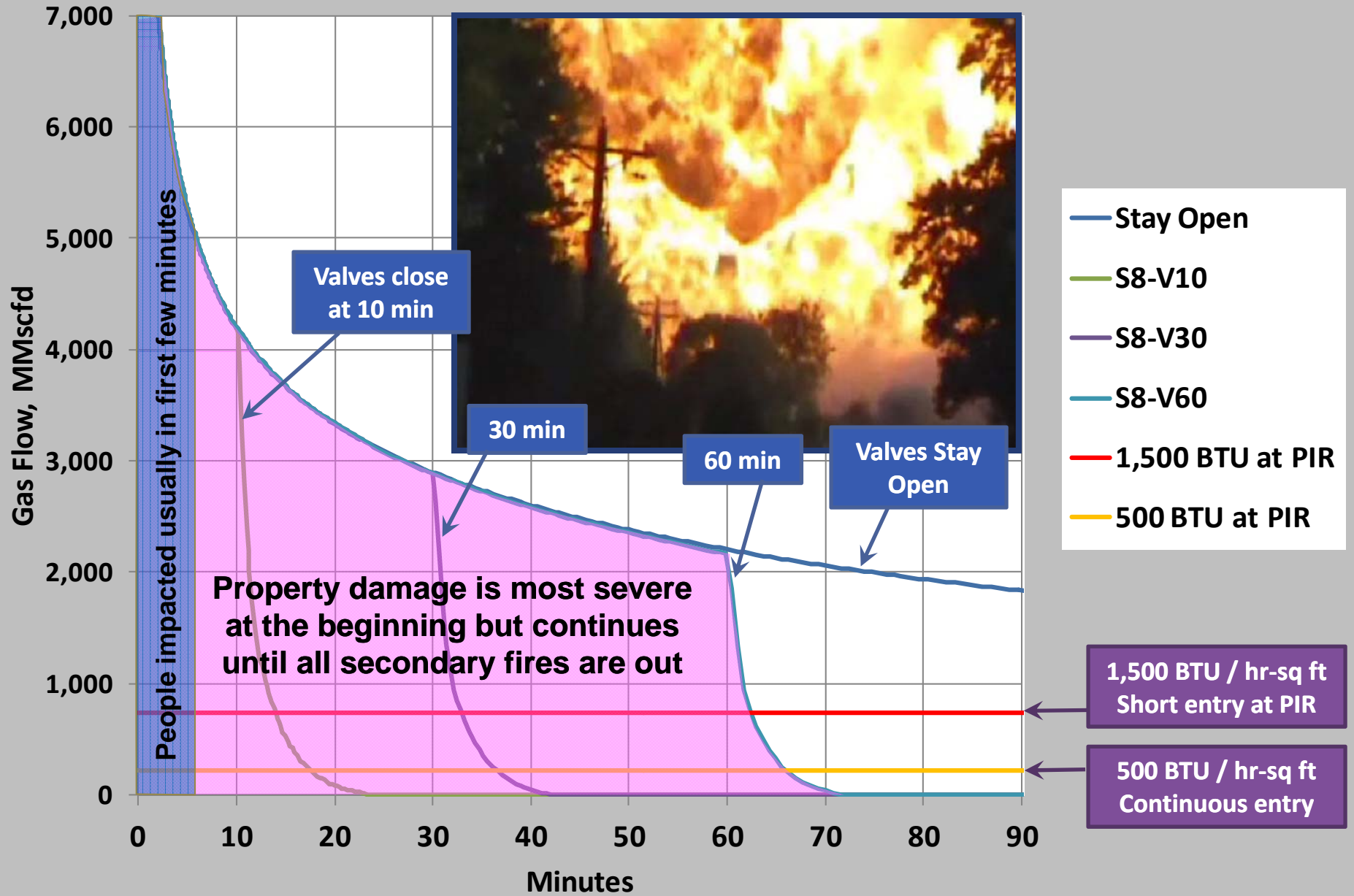
1. Areas of consequence not yet considered, like critical infrastructure (e.g. water lines), and
2. Places where secondary fire effects may be very high consequence, like high-density housing, urban/wild land interface, lack of fire break, people with limited mobility, among others.

Industry Perspective



- Integrity Management Continuous Improvement
 - Team 7 – Emergency Preparedness and Response
- How do we protect people?
 - Risk = Probability x Consequence
 - The best way is on the probability side of risk
 - Even if valves are closed *immediately* people are in grave danger
 - Incident Mitigation Management (IMM)
- Emergency Responder Workshops
 - Keys are planning, preparedness, awareness, communication
 - Prompt closure can mitigate property damage

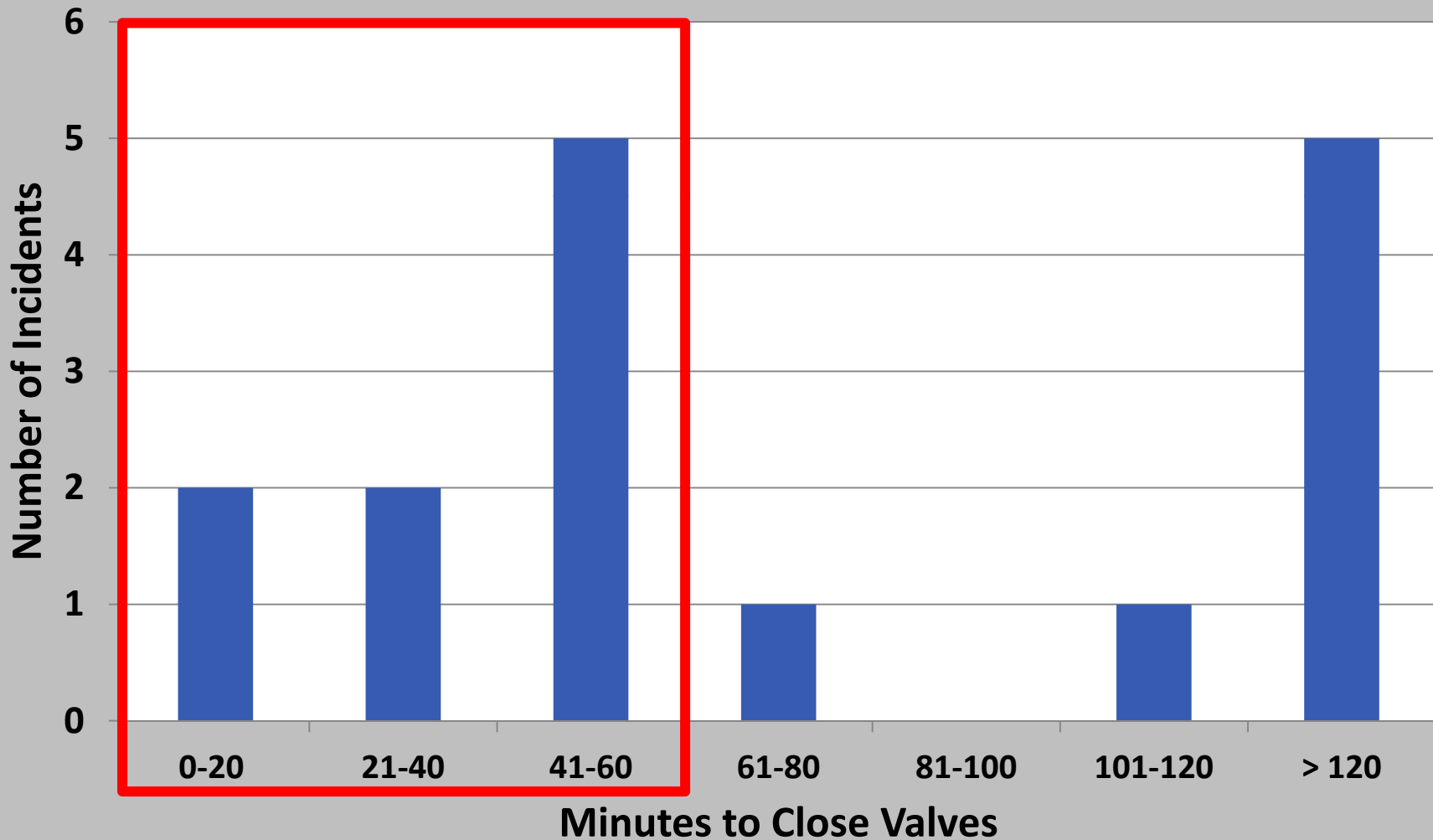
30" Pipeline, 8 mile spacing, vary valve closing time, PIR = 655 feet



Recent Valve Closure Times



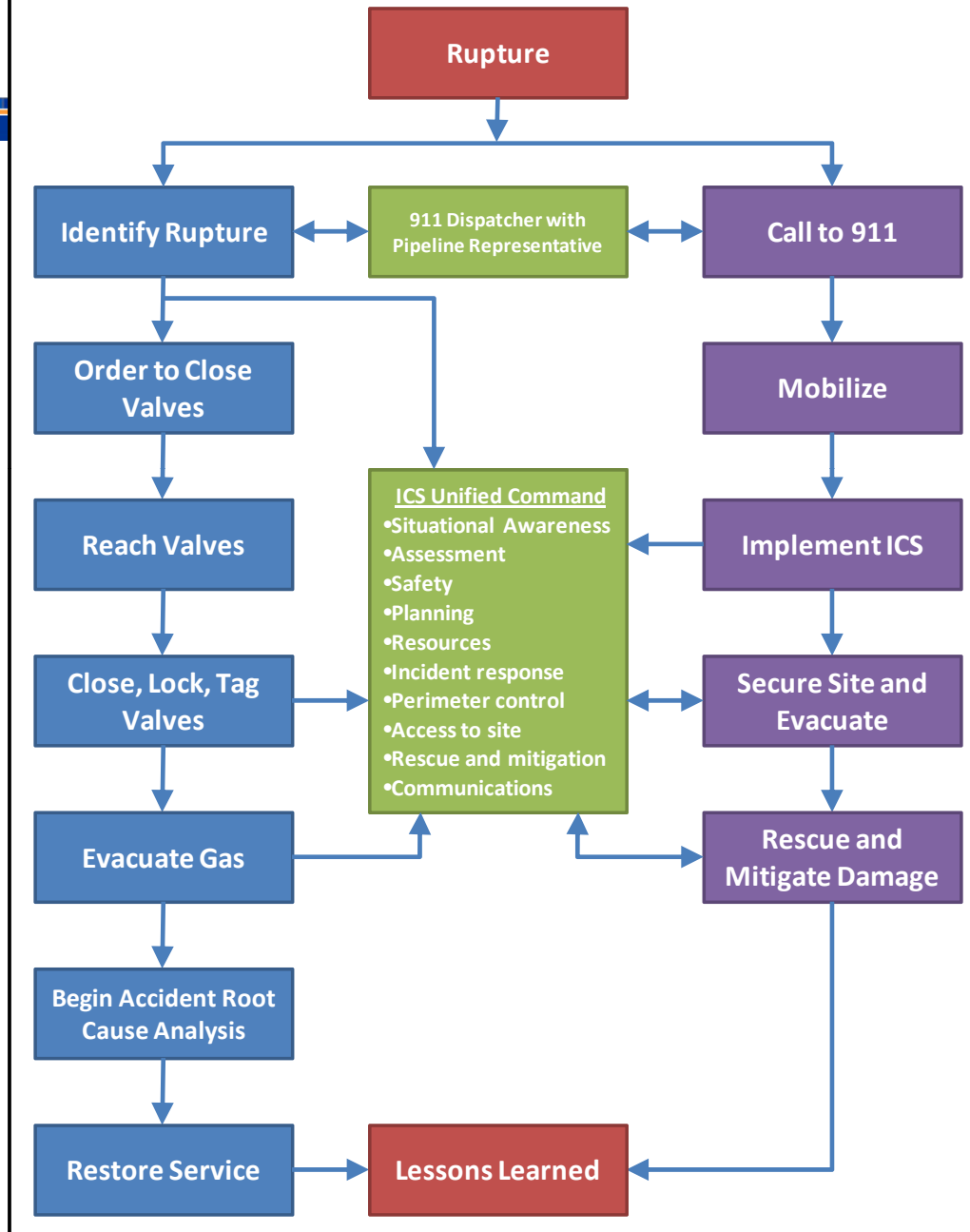
Natural Gas Transmission ROW Accidents, 2010 - early 2011



Pipeline Emergency Response Flow Chart

Pipeline Company

Emergency Responders



People with limited mobility

- Make special provisions for people with limited mobility
 - Incident Mitigation Management (IMM)
 - Pre-planning and preparedness
 - PIPA – avoid having facilities like this next to pipelines
 - IMP and Risk Model – reduce the probability of failure



Valve Types – numbers and usage

- There are roughly 30,000 valves in gas transmission
- We are collecting a count of the mixture of:
 - Automated control valves (ACVs)
 - Remote operated control valves (RCVs)
 - Manual valves



Recent experience since the IMP Rule



- Applying the IMP rule reduces the need to ever operate a valve in an emergency
- New pipelines are often fully automated
 - Iroquois, Gulfstream are examples
- Older pipelines have a mix
 - Some RCV, ACV and manual



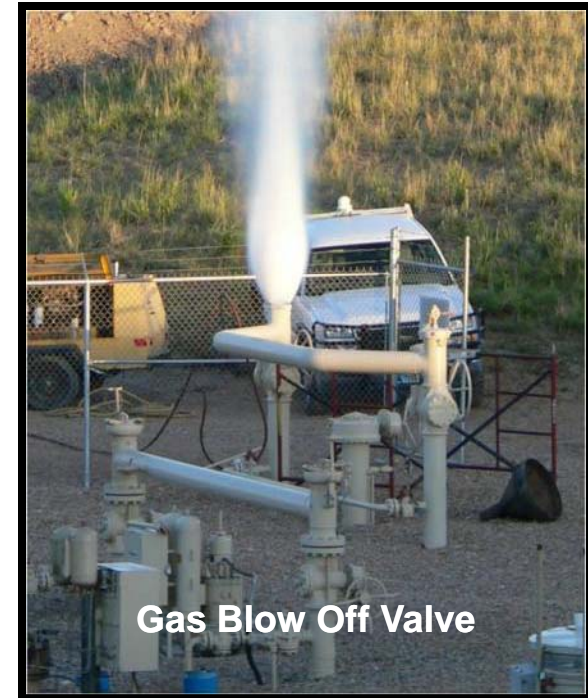
Cost to automate and add valves



- Cost to automate existing valves
 - \$80K to \$200K per valve x 25,000 valves = \$2.0B to \$5.0B
- Cost to install new valves
 - \$500K (open right of way) to \$ 1 MM (inner city)
 - Cost to install 3,000 valves = \$1.5B to \$3.0B
 - Life cycle cost (maintenance + replacement) = \$5K/year
- Benefit is mitigate property damage
 - Typically does not protect people
 - Total property damage for significant gas transmission incidents is \$1.4B in past 20 years
 - Since most damage happens in the first minutes the savings is a fraction of this
 - Homes are much more than dollars, but automation has limited benefit to lessen the damage.

Wear and tear

- Valves' normal use is maintenance
- Mechanical devices can fail
- Powered actuator failure
 - Gas, hydraulic, electric motor actuator
 - Power gas volume bottle (reservoir in case of rupture)
 - Actuator designed to overcome pressure drop
 - Weather proof
- Seal damage
 - Avoid using valve to throttle gas
- Oil, water, pipe scale, welding slag, particulate damage



Valve leakage and blow down times

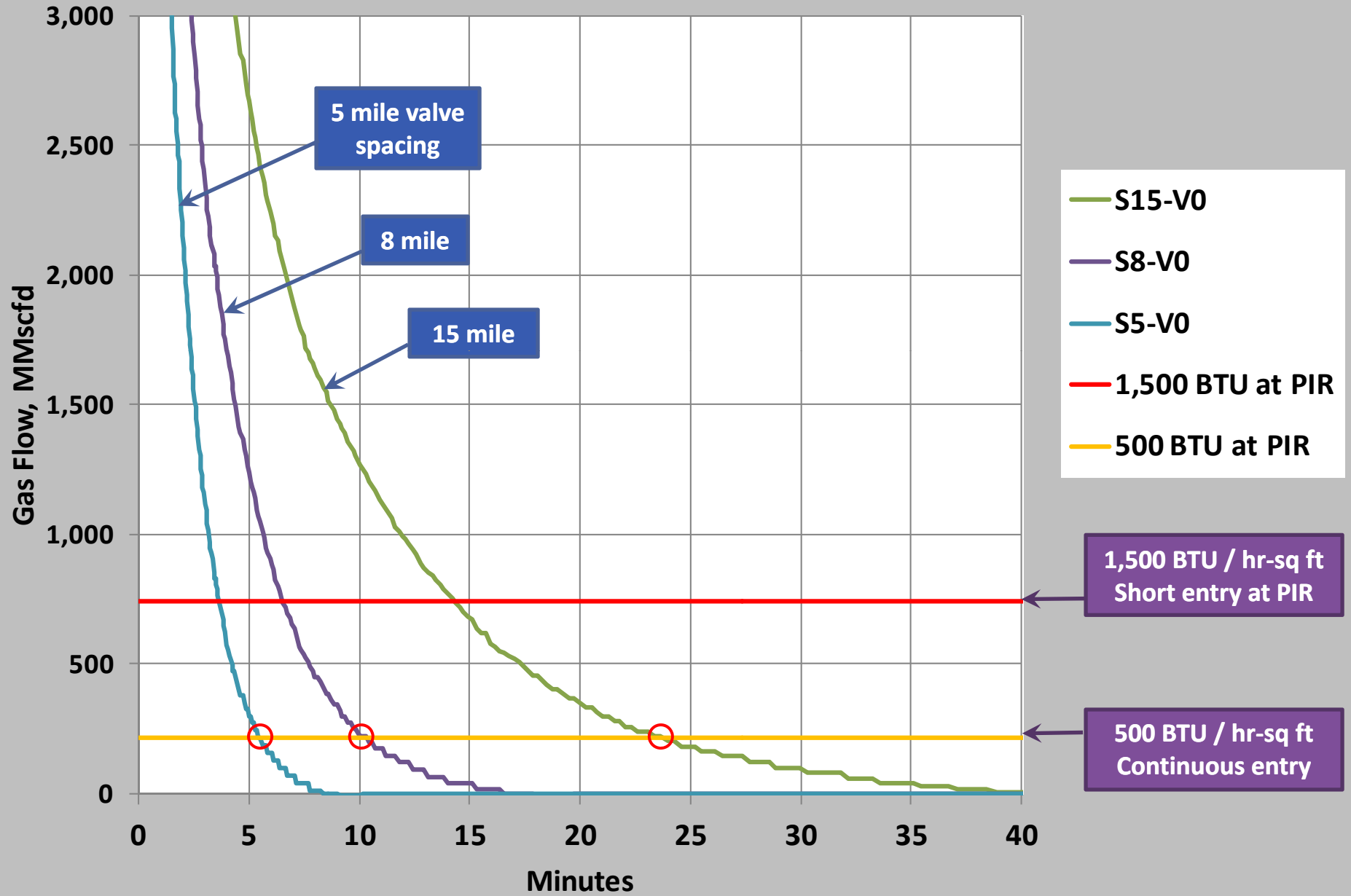


- All valves have potential to leak
 - Most have one seal
 - Some have double seal with internal vent
 - If valves are in series there is no additional leak path



- New intermediate valves improve blow down times
 - But there are more practical ways than adding valves

30" Pipeline, vary valve spacing, immediate valve closure, PIR = 655 feet



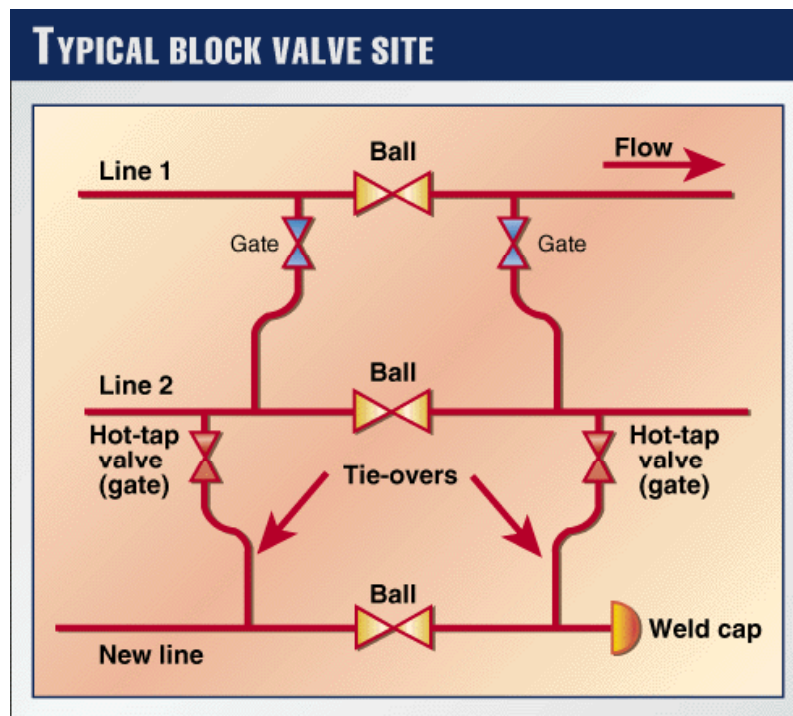
Security concerns

- All new facilities like valves are targets for vandalism and tampering
- Automated valves are targets for a cyber attack
- Security is a concern but is manageable



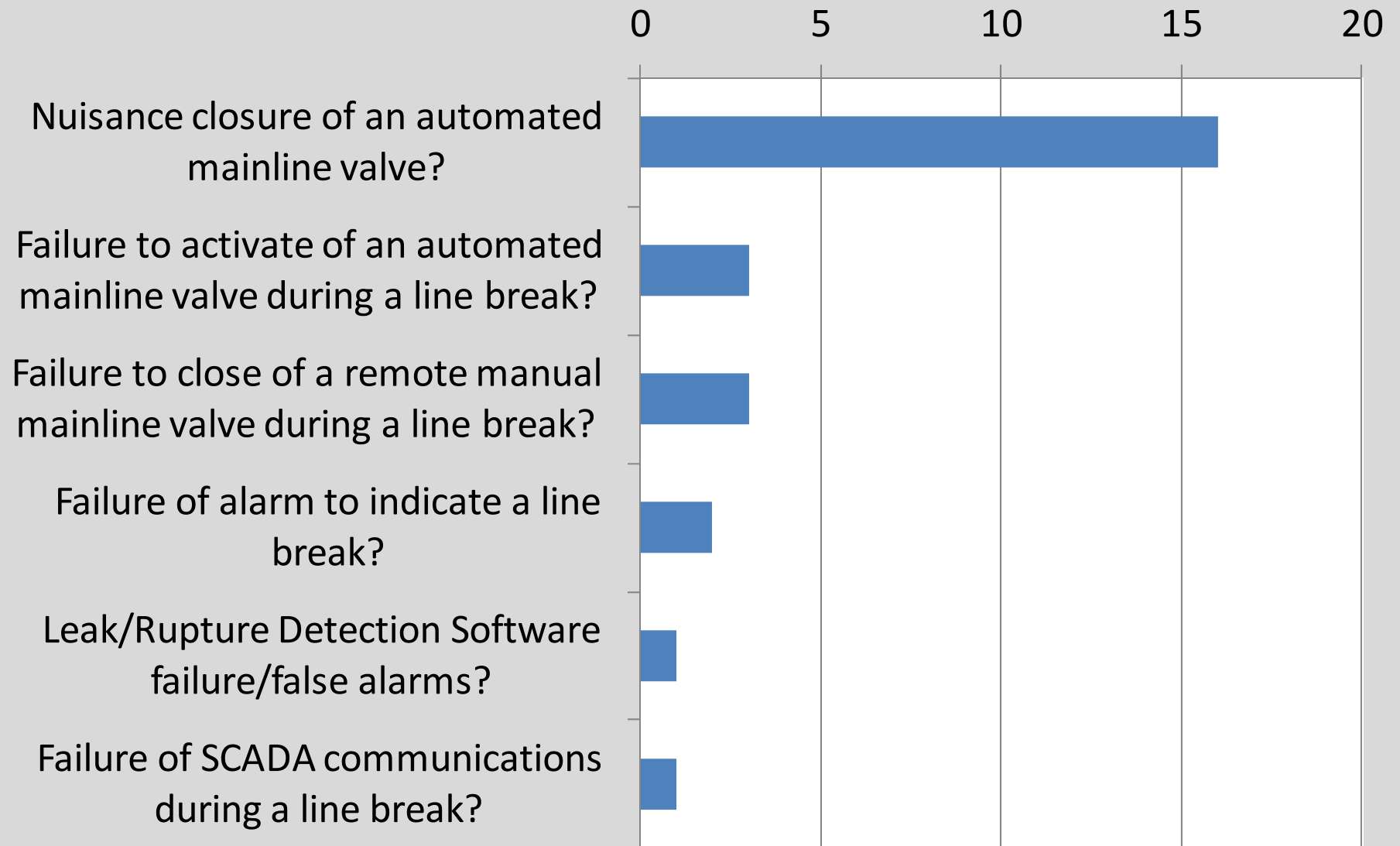
Inadvertent closure of automatic valves

- Inadvertent closure can cause major gas disruption
 - Cut gas flow to major metropolitan areas



- Automated valves (ACVs) need proper tuning and control
 - Sensitive enough to work when needed
 - Not overly sensitive such that they close inadvertently due to flow swings, compressor start up, etc.
 - Systems are complex
- Remote Manual (RCV) are less susceptible to inadvertent failure
 - Operated remotely from a gas control office

Has this pipeline system experienced any of these undesired events?



Summary



- We intend to protect people
 - Valve automation does not change the outcome during the critical first minutes when people are in greatest danger
 - Pre-planning, preparedness, PIPA, IMM all help
 - Preventing ruptures (IMP) is the certain way
- We intend to protect property
 - A one hour response to shut valves (either manually or with automation) allows emergency responders to enter and extinguish secondary fires
- We invest where there is clear safety benefit
- We want a dialogue on these topics

Reminder...



April is National Safe Digging Month!



**Know what's below.
Call before you dig.**

Questions?



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