

Panel 3 - Valve Capabilities, Limitations and Research

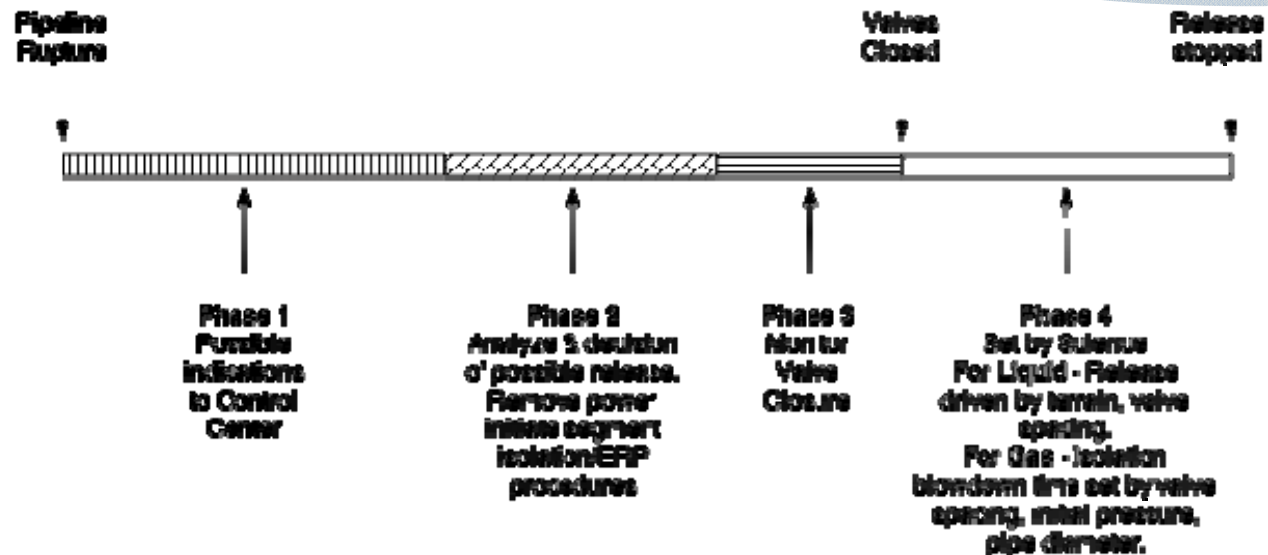
3-28-12 Public Event

Understanding the Application of Pipeline
Automatic/Remote Control Valves

Gas or Liquid Pipeline Valving

- * Everyone is a “valve” expert
 - * Moving valves from “maintenance” to “safety” role is a big change!
 - * “Safeties” demand special process attention
 - * Paradigm shift required in industry
 - * Avoid the scare “propaganda” tactics
 - * Suggest try following the laws of science
- * Control rooms getting more complex
 - * Highest potential for more emergency response delay
- * Safety isn’t free

Phases of Gas or Liquid Pipeline Rupture*



**Phase 1, 2, & 3 Determined by Pipeline Operator
Phase 4 Set by the Laws of Science**

An "Inefficient" pipeline organization can cause phases 1, 2, or 3 times to easily exceed phase 4 times.

* From Data in GRI-95/0101 Remote and Automatic Main Line Valve Technology Assessment

Liquid Pipeline Valving

- * Manual vs Remote (RCV) vs Automatic (ASV)
 - * Automation shortens rupture release tonnage
 - * Little impact on leaks
 - * Quicker closure needed in many situations
 - * Especially for large diameter pipelines

Liquid Pipeline Valving

- * Terrain – Hydraulic Profile
 - * Plays a major role in valve placement/automation
 - * Gravity moves liquids very quickly
- * Valve automation should not create a surge risk!
 - * Demands special well-documented safety evaluation
 - * Bellingham 1999 tragedy - very poor “valving” decisions
 - * New pipeline operator developed a more prudent valve safety design
- * See levels of safety slide No. 10

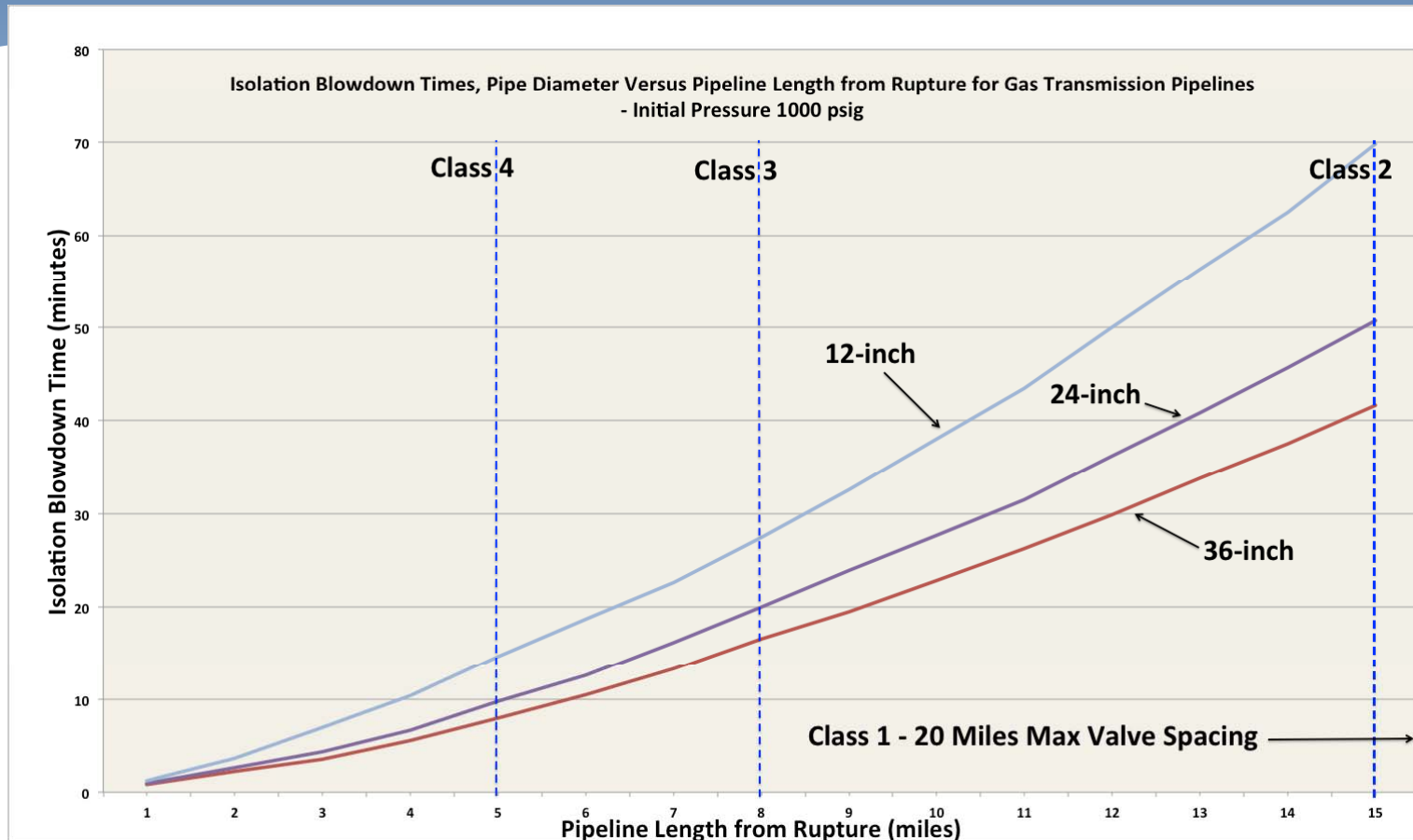
Gas Transmission Valving

- * Emergency Response Priority on Rupture!
 - * Extremely high heat flux events, especially in early stages
 - * Cut off gas supply as quickly as possible
 - * Especially for large diameter pipelines
 - * California after San Bruno learning curve
 - * Adding automated valves
 - * Valve diameter, spacing, and whether RCV or ASV?
 - * Setting 30 minute goal for triage access
 - * See levels of safety slide No. 10 to prevent false closure

Gas Transmission Valving

- * Manual vs Remote (RCV) vs Automatic (ASV)
 - * Shorten rupture gas release tonnage and time
 - * On large diameter pipelines
 - * Getting to and closing large manual valves can take more time than isolation blowdown (phase 4)
 - * RCVs/ASVs cut serious time out of large manual valve shutoff
 - * Forget Blowdown Valves
 - * = illusion of safety
 - * Can't negate the laws of science

Gas Rupture Isolation Blowdown Times vs Pipe Size and Valve Spacing*



Isolation blowdown = time to vent after valve closed

* From data in GRI-95/0101 Remote and Automatic Main Line Valve Technology Assessment

Gas Transmission Valving

- * RSVs or ASVs can seriously reduce gas venting tonnage
 - * Especially for large diameter pipelines (≥ 24 -inch) & valves spaced up to class 3 (max. 8 miles)
- * RCVs dependent on SCADA monitoring/rupture detection capability and Control Center operator!
- * ASV's take Control Room operator out of the loop, reducing release time.
- * RSV vs ASV decision driven by “the rupture is real” decision point
 - * Via Control Room Operator = RCV
 - * Need alert, trained, knowledgeable operator getting right information
 - * Via Automatic Design = ASV
 - * Prudently designed safety (see slide 10)
- * Properly designed ASVs are definitely much faster

Level of Safeties for Liquid/Gas RCVs/ASVs

- * To Avoid RSV or ASV Accidental Closure
- * “Smart Valve” Design Approach
 - * Conventional industry approach very inappropriate
 - * Two levels of independent signals confirming need for closure
 - * Not redundancy, but independency
 - * Not pressure
 - * Design for Control Room to stop closure
 - * Recommend “HAZOP” team design approach
 - * Failsafe approach in either RCV or ASV design
- * Never design to move problems in facilities to mainline!