U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

PHMSA
Office of Pipeline Safety

Gas Transmission –Understanding the Application of Automatic and Remote Control Shutoff Valves

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Know what's below.
Call before you dig.

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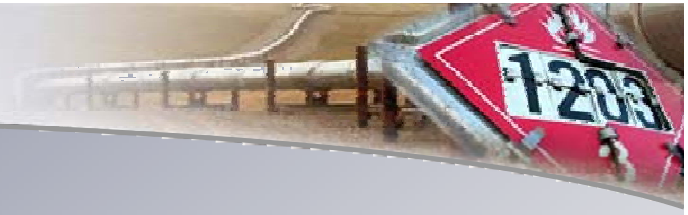
Outline

- Automatic and Remote Control Shutoff Valves
  - Code Requirements and specific considerations
  - Emergency response
- San Bruno Incident
  - NTSB Investigation and Recommendations
  - ANPRM for Automatic and Remote Control Shutoff Valves
  - Pipeline Safety, Regulatory Certainty, and Job Creation Act
- Study
  - ASV/RCV Concerns and further considerations



General Perspective

- Public safety and environmental stewardship are paramount
- Recent accidents necessitate a comprehensive study on the installation of Automatic and Remote Control Shutoff Valves
- Technical, operational, and economic feasibility play a role in determining the use of ASVs/RCVs
- Use of ASVs/RCVs depends on the pipeline system and the needed capabilities

Automatic Shutoff Valve

Automatic Shut-Off Valve (ASV)

- Electric, pneumatic, or gas powered actuators
- Signals are derived from pipeline sensors, typically:
  - Pressure
  - Flow
- Signals cause automatic closure on set pipeline parameters
- Does not require human action for operation

Remote Control Valve

Remote Control Valve (RCV) –

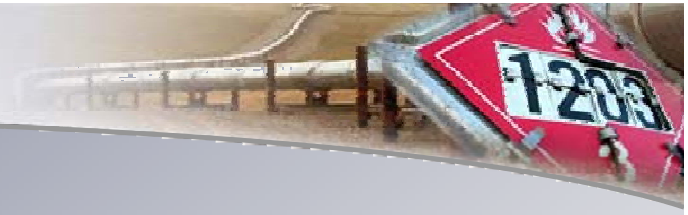
- Electric, pneumatic, or gas powered actuators
- Operated from a remote location
- Communication network required
- Operator review and evaluate data prior to positioning valve
- RCV introduces human intervention, decision making, and evaluation

Preventative and Mitigative Measures within HCAs

- **§192.935(a)**
  - Must take additional measures beyond requirements of Part 192 to address the following:
    - Prevent pipeline failures
    - Mitigate consequences of a pipeline failure in HCAs
    - Additional measures based on identified threats
    - Risk analysis must identify additional measures to protect the HCA and enhance Public Safety
    - **ASVs or RCVs are additional measures**

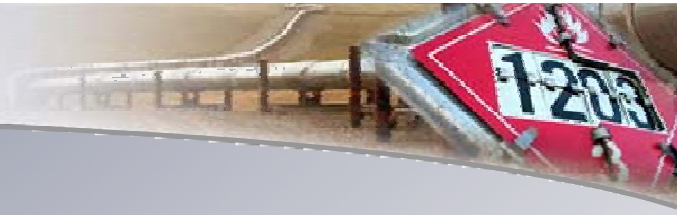
Minimum Considerations for Installation of ASV/RCV in HCAs

- **§192.935(b)**
  - Factors to consider when installing ASVs/RCVs based on risk analysis:
    - Swiftness of leak detection and shutdown capabilities
    - Type of gas being transported
    - Operating pressure
    - Rate of potential leakage and potential for ignition
    - Pipeline profile
    - Location of nearest response personnel



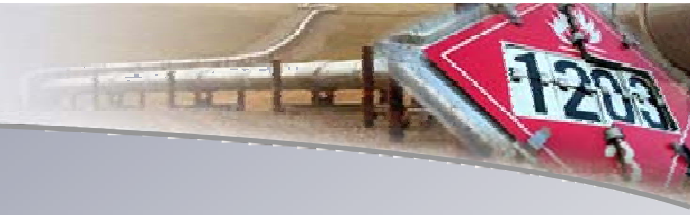
Valve Spacing

- **§192.179(a)**
  - Required distance from valve:
    - Class 4 within 2.5 mile; 5 miles between MLVs
    - Class 3 within 4 miles; 8 miles between MLVs
    - Class 2 within 7.5 miles; 15 miles between MLVs
    - Class 1 within 10 miles; 20 Miles between MLVs
  - Blowdown time is a function of pipeline length

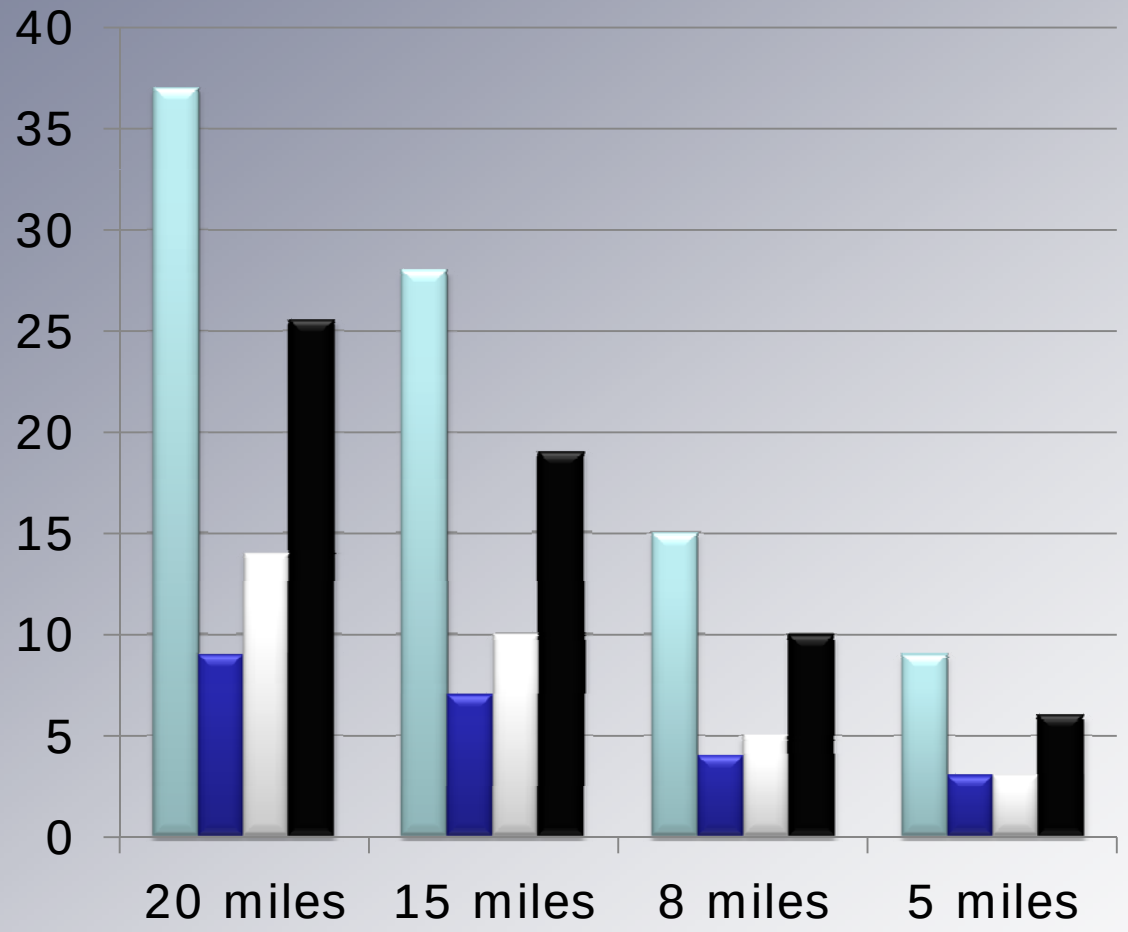


Valve Requirements

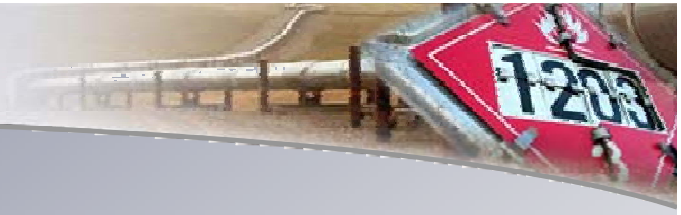
- **§192.179(b)**
  - Valve and actuator must be readily accessible and protected from tampering and damage
- **§192.179(c)**
  - Each section must have a blow down valve between mainline
  - Enough capacity to allow rapid blow down
- Blowdown valves reduce the following:
  - Time gas is venting and susceptible to ignition
  - Duration of a gas fire



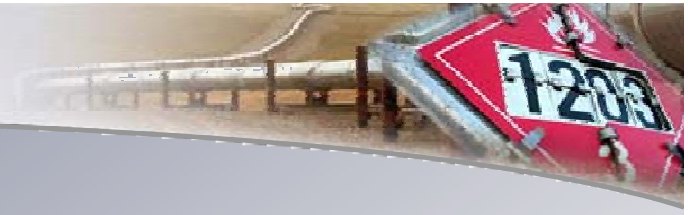
Calculated Time to Depressurize 1000 psi Pipeline After Guillotine Break



- Pipeline Design and Construction Third Edition (2007) Blowdown Analysis Equation
- Pipeline Design and Construction Third Edition (2007) Quick Formula
- SwRI Report 87-2
- Average



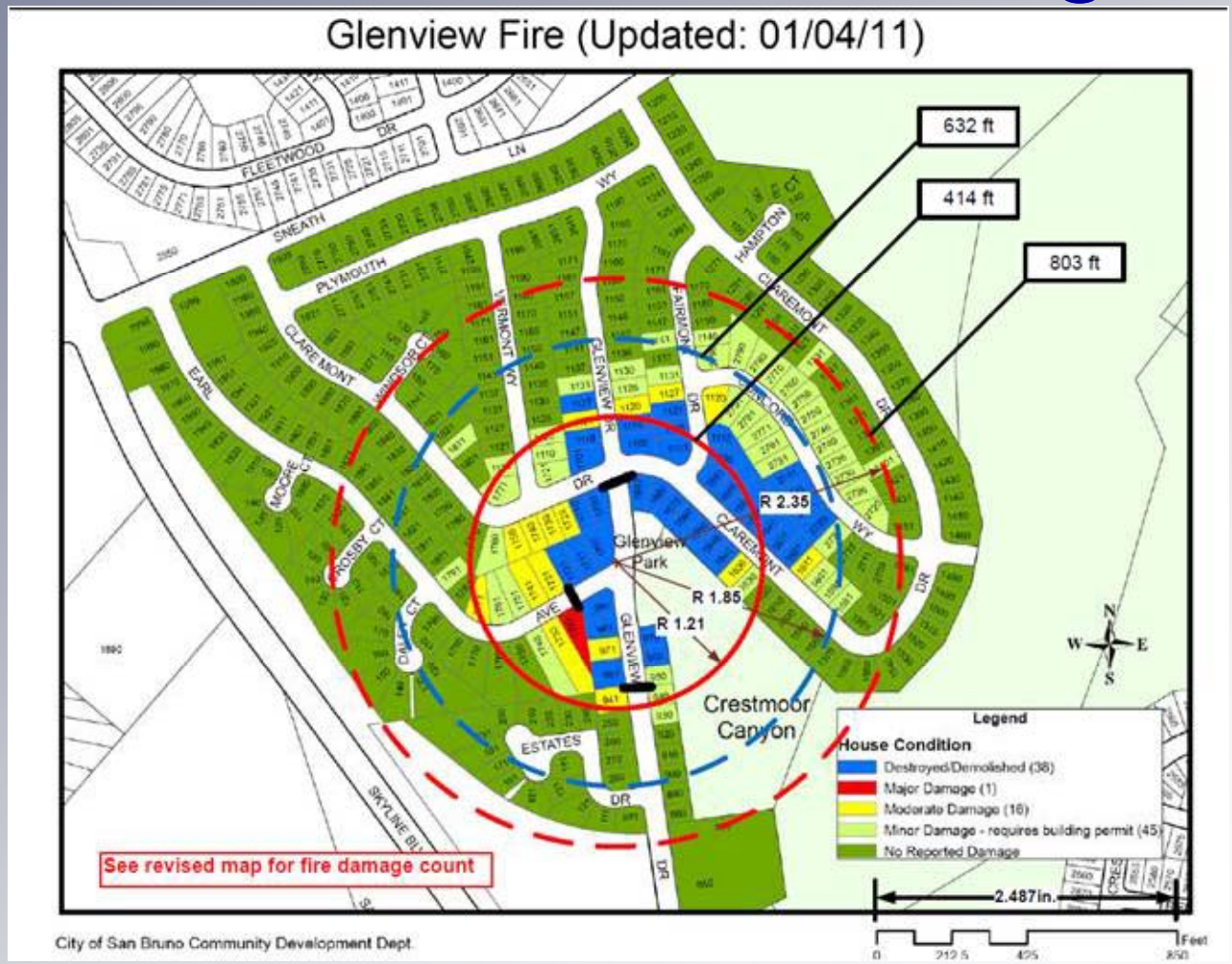
Emergency Response



Emergency Response

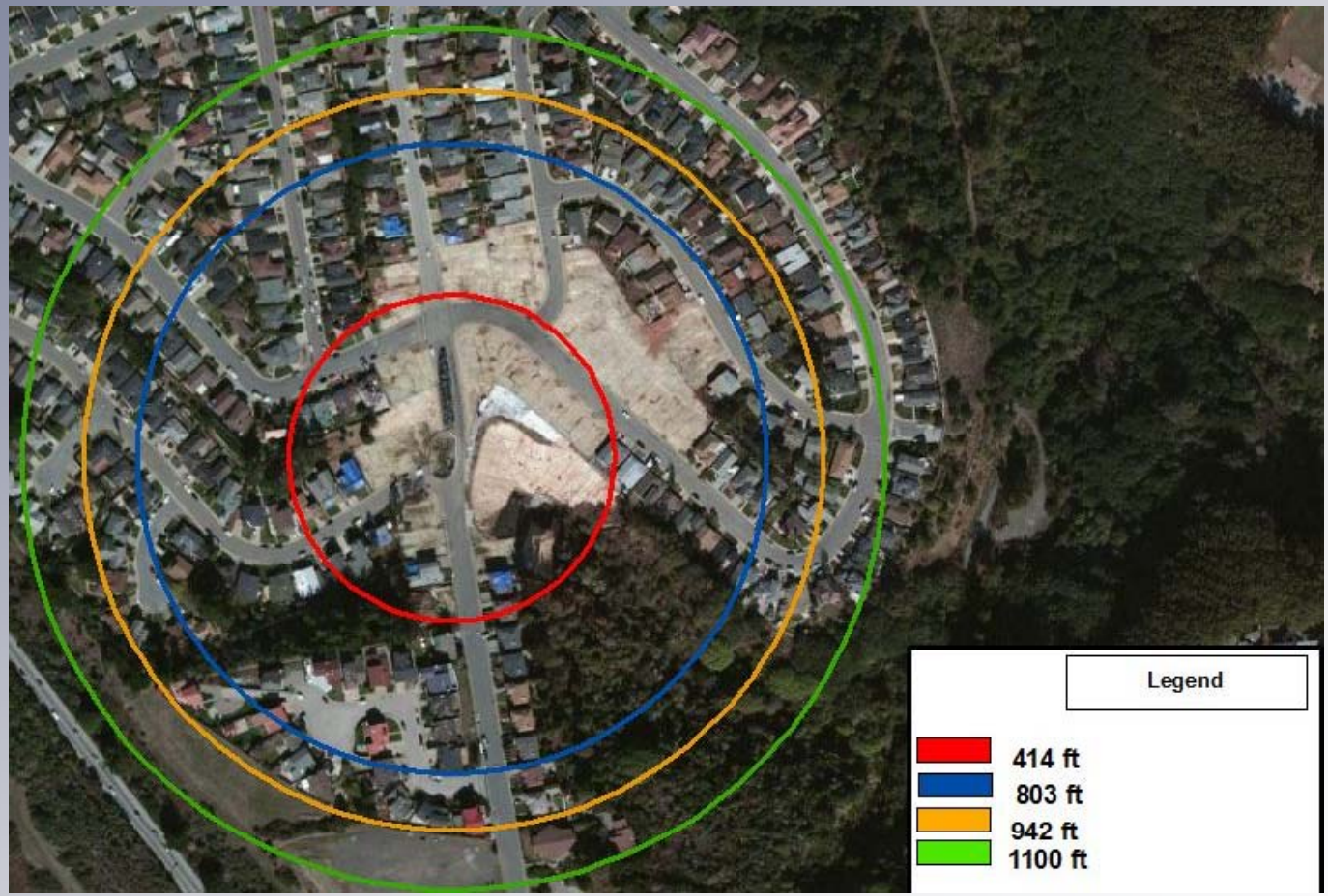
- **Pipeline Emergency Response Forum Washington DC, December 9, 2011**
  - **Key points:**
    - Everyone's goal is public safety
    - Issues specific to valves for emergency response
      - Above or below ground
      - Single, two way feed or looped lines
      - Gas migration
      - Isolation of flow - do first responders shut off gas or wait for operators?

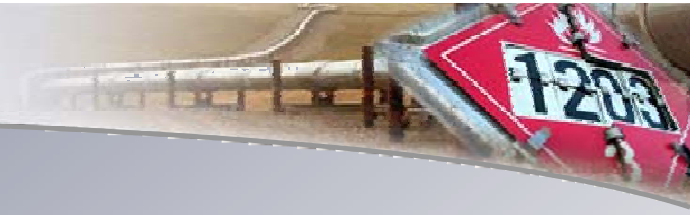
NTSB San Bruno Investigation



- **MAOP Line 32 - 400 psi**
- **PIR - 414 feet**

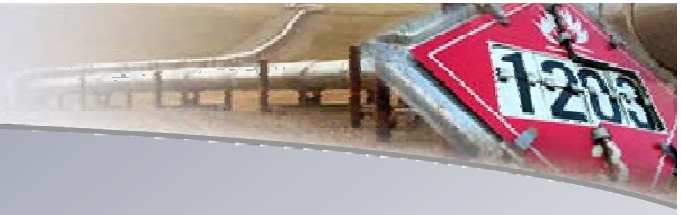
NTSB San Bruno Investigation





NTSB San Bruno Investigation

- **Findings from the investigation:**
  - Heat and radiant energy directly proportional to rupture time
  - Allowed fire to spread which led to an increase in property damage
  - Pressurized flow resulted in an intense flame front
  - Emergency responders were unable to gain access to the area

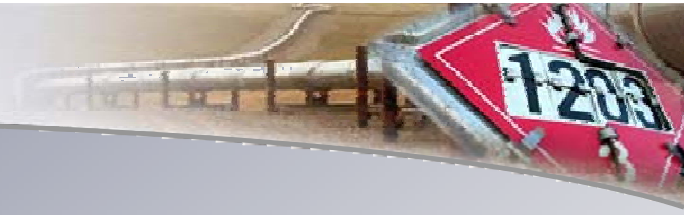


NTSB San Bruno Investigation

- **Findings from the investigation:**
  - Fire would be smaller if the fuel flow was removed
    - This would have limited damage
  - Buildings that would have provided protection to residents in a shorter duration fire were compromised from elevated heat
  - Fire negatively affected emergency responders
    - Increased risk due to be close proximity to fire for a longer time
    - Unavailable to respond to other emergencies

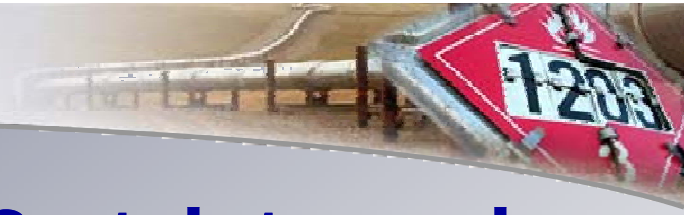
NTSB Recommendation P-11-11

- Recommendations regarding ASVs/ RCVs:
  - *Amend Title 49 Code of Federal Regulations Section 192.935(c) to directly require that automatic shutoff valves (ASV) or remote control valves (RCV) in high consequence areas and in class 3 and 4 locations be installed and spaced at intervals that consider the population factors listed in the regulations*.



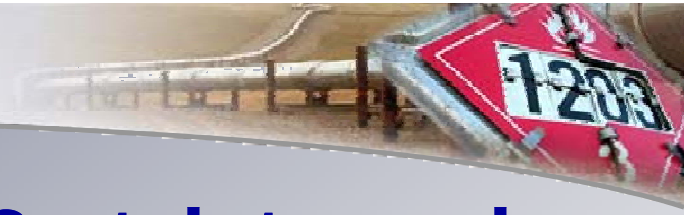
ANPRM August 25, 2011

- Issued to consider whether the following changes to regulations are required:
  - Valve spacing requirements
  - Requiring block valve installation in new class locations
  - Requirements for ASV/RCV
  - PHMSA is asking operators to re-evaluate economic feasibility of ASVs/RCVs installation within HCAs



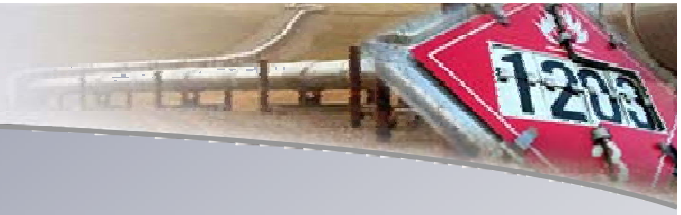
Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011

- By January 2014, if appropriate, requires by regulation the use of Automatic or Remote Controlled Shut-off valves, or equivalent technology, in newly constructed or entirely replaced facilities
- This requirement is based on the following:
  - Economic feasibility
  - Technical feasibility
  - Operational feasibility

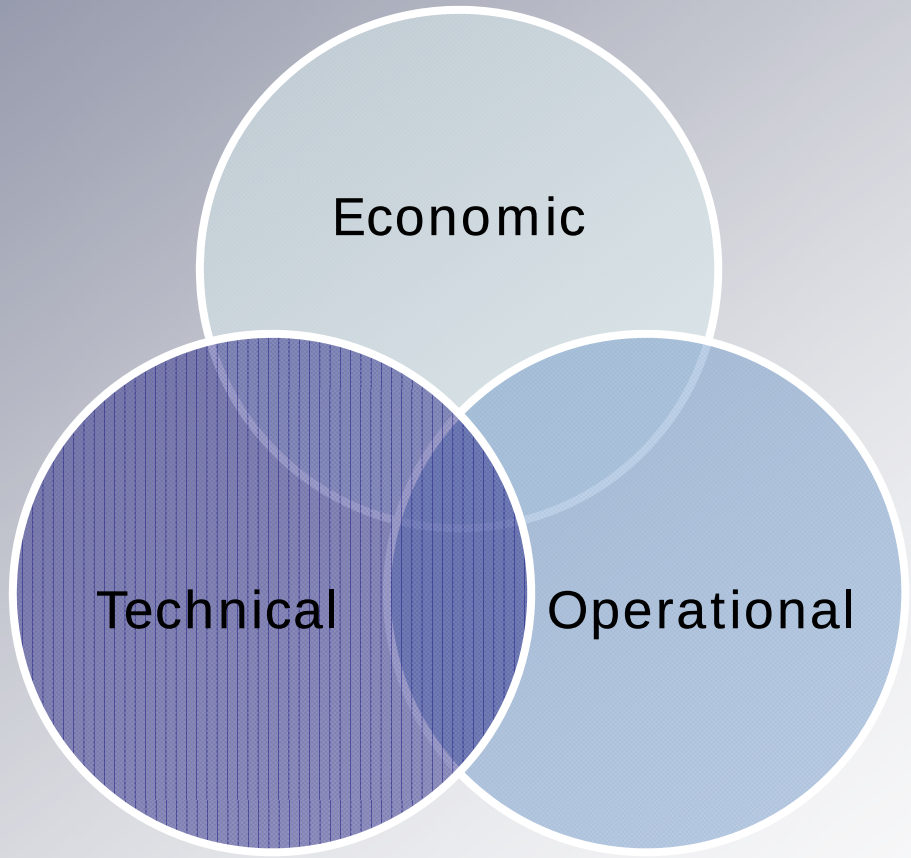


Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011

- By January 2013 required studies conducted by the Comptroller General (GAO) of the United States that addresses product release located within an HCA with the following considerations:
  - Swiftness of leak detection and pipeline shutdown capabilities
  - Location of nearest response personnel
  - Cost, risks, and benefits of installing ASVs and RCVs



ASV / RCV Study



ASV/RCV Study

- PHMSA will conduct a study based on the NTSB recommendation, comments from ANPRM, and the Act's provisions
  - **Scope of the study:**
    - Analyze product release responses and timing
    - Feasibility study on the economic, technical and operational aspects of installing ASVs and RCVs
    - Evaluate requirements for minimum valve spacing
    - Develop models of response times
    - Conduct cost, risk and benefit analysis of installing ASVs or RCVs

Technical Feasibility

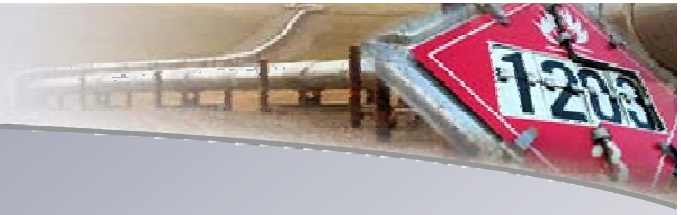
- Compile the operating characteristics for all types of ASVs and RCVs
- Benefits and drawbacks will be identified and assessed
- Effects of detecting and reacting to small (non-guillotine breaks) and intermittent leaks will also be considered
- Technology gaps or system weaknesses will be studied
- Technological shortfalls specific to ASV reliability will be studied
- Alternative technology to ASVs and RCVs

Operational Feasibility

- Summarize operational aspects of current regulations in regards to ASVs and RCVs
- Consideration of system reliability
- Characterize how ASVs and RCVs installation could potentially affect pipeline operations.
- Review fire protection considerations that could affect actions by emergency first responders
- Mitigate fire-related safety issues and the consequences of unplanned releases on the human and natural environments.

Economic Feasibility

- Cost benefit analysis for installing ASVs and RCVs in HCAs and for gas transmission Class 3 and Class 4 areas.
  - The analysis will include the lifetime operational cost of the system and the life cycle benefit
- Characterization of the benefits that may be seen by the public and surrounding environment, and economic impacts of damage to the surrounding environment and the public will be studied



ASV Concerns

- Known issues with ASV
  - Pressure fluctuations
  - False positives / inadvertent closures
  - Partial closures
- Physical and Cyber security threats
- Technology requirements
- Limited to larger leaks due to dead band for smaller transient signatures of small leaks
- Parallel pipelines and Cross over valves

RCV Concerns

- Control Room Management Issues
  - Operator Fatigue
- Operator's ability to recognize a situation that requires response and required permission to do so
- An inadvertent closure due to misjudgment
- Physical and Cyber security threats to technology
- Technology requirement
- Parallel pipelines and Cross over valves

Considerations

- Model opening of blow down valves remotely
  - would this reduce blowdown time?
- Cross over requirements
  - Automation
  - Operational impact if left closed
- Public Comments to this workshop and proposed study

Questions?