NATIONAL ACADEMIES
Sciences Engineering Medicine
Transportation Research Board

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

Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

PHMSA: Integrity Management Programs

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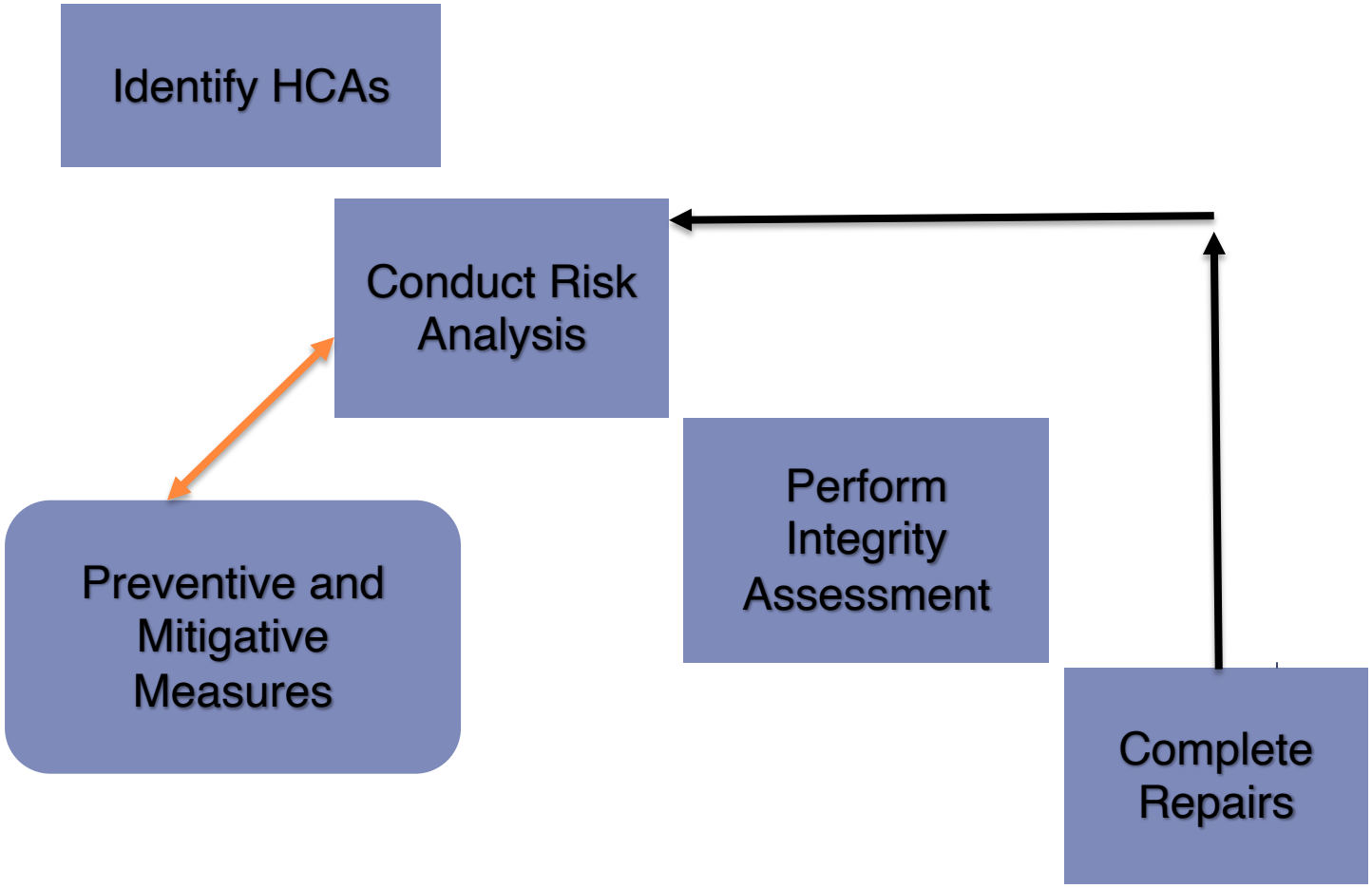
Overview

- Integrity Management Plan (IMP) components
- IMP regulatory requirements
  - Hazardous Liquids
  - Natural Gas
  - Differences between HL and NG
- Valve Installation Considerations
- PHMSA Inspection and Enforcement Efforts
- Committee Questions

Components of IMP

- Written Integrity Management Program;
- Identify covered segments;
- Perform Baseline Assessment;
- Create a Framework to include all required elements of IMP;
- Ensure continual improvement to the program;
- Implement and follow the program;
- Incorporate by reference industry standards; and
- Document (and notify OPS as required) any changes.

Integrity Management



IMP Regulatory Requirements

Hazardous Liquids IMP issued December 2000

- All requirements under a single code Section 195.452
- Defines High Consequence Area (HCA) and could affect areas
- A failure could impact a larger area as the product flows from the pipeline.

Natural Gas IMP issued in December 2003

- Subpart O - starting with 192.901
- Defines High Consequence Areas (HCA)
- A failure directly impacts population surrounding a pipeline.

Valve Installation Considerations

Risk of Failure = Likelihood X Consequence

- For HCA areas operators MUST:
  - Develop and implement a risk-based process to identify additional preventative and mitigative measures (P&MMs) to:
    - Preventive - Reduce the likelihood of failure; and
    - Mitigative - Reduce the Consequences

Considerations for Installation

- PHMSA FAQ-86
- NTSB Recommendation P-11-11
- ASV/EFRD for new construction pipeline
- Reaction response time
- AGA White Paper – 3/25/2011
- Gas Research Institute Study – 1998

Operator Considerations for Installation

FAQ-86. What criteria must an operator use in determining whether automatic shut-off valves or remote control valves are required to protect HCAs? [04/06/2004]

- Operators must make these determinations based on their risk analysis and using criteria that they define, considering the circumstances of each. The rule includes specified factors that must be considered in these evaluations. They include:
- The swiftness of leak detection and pipeline shutdown capabilities,
- The type of gas being transported,
- Operating pressure,
- The rate of potential release,
- Pipeline profile,
- The potential for ignition,
- Location of nearest response personnel.

An operator is required to install an ASV or RCV if the operator determines that it would be an efficient means to protect an HCA in the event of a gas release. OPS inspectors will review operator determinations.

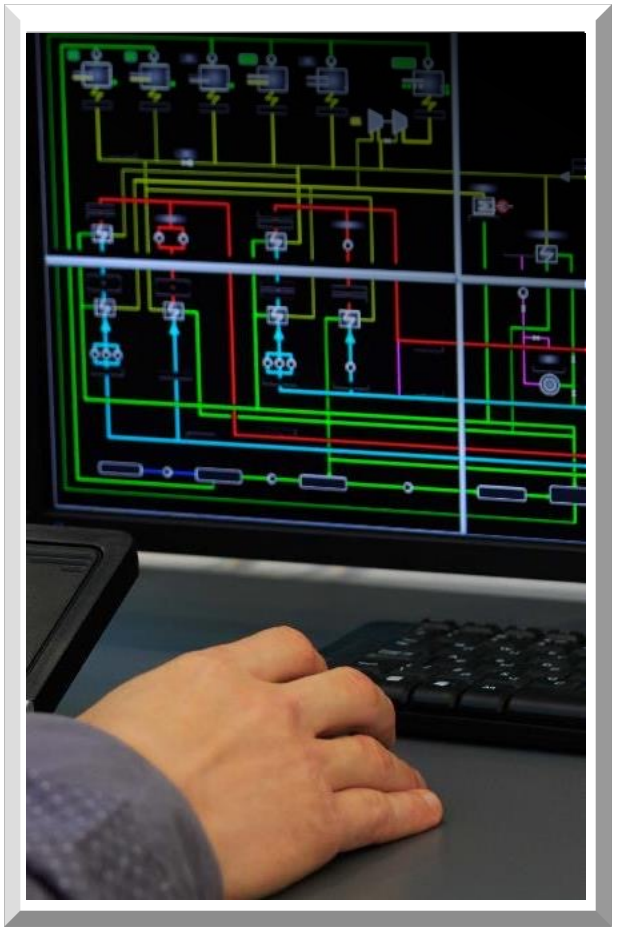
Installation Considerations

NTSB Recommendation P-11-11

- Issued following the San Bruno incident
- Last updated 5/2/2022 NTSB reported as OPEN – ACCEPTABLE ALTERNATE RESPONSE.
  - Update PHMSA's special permit conditions to require ASVs or RCVs on all new special permits for class location changes and renewal of old special permits.
  - Issue an ADB addressing existing pipelines in HCAs by highlighting installation of ASVs and RSVs as a compliance strategy under the preventative and mitigative measures in 49 CFR Part 192 Subpart O.
  - Create a new IA directive on valves that links relevant questions on class location, valve spacing, and Subpart O requirements to emphasize requirements for operators to consider the addition of rupture mitigation valves in HCAs.
  - Add a question to Form F7100.2-1, Gas Transmission and Gathering Annual Report Form, requiring operators to inform PHMSA of the number of valves installed on their systems to protect HCAs and class 3 and 4 segments and how they are monitored and operated for emergency closure.

Installation Considerations

RIN: 2137-AF06



- **Final Rule Published 4/8/2022**
  - Effective Date: 10/5/22; 4/20/23
- **NPRM Published 2/26/20**
- **PAC Meetings Held 7/22/20 to 7/23/20**
- **Major Topics**
  - Rupture mitigation valves (RMVs)
    - Installation, operation, spacing, and alternatives
  - Emergency plans
  - Notifications of potential ruptures
  - Leak detection
  - Post failure and incident procedures

Installation Considerations

Highlights of New Requirements

- RMVs required for newly constructed HL and Gas transmission(GT) / Type A gas gathering pipelines that are ≥ 6” in diameter
  - Exception for Class 1 and 2 lines with 150ft PIR
- Pipelines that are newly constructed or “entirely replaced” must be equipped with “rupture-mitigation valves” or alternative equivalent technology
- New valve spacing provisions HL and GT pipelines
- If an operator observes or is notified of a release of gas or HL that may be representative of a “notification of potential rupture,” the operator must, as soon as practicable but within 30 minutes:
  - Identify the rupture.
  - Fully close any rupture-mitigation valves necessary to mitigate the rupture – mainline valves, cross-over valves and laterals

Hazardous Liquids

§195.452(i) contains four major sub-paragraphs. **§195.452(i)(1)** deals with the general requirement to identify and implement additional preventive and mitigative measures. **§195.452(i)(2)** addresses the risk analysis that must be performed to identify these additional preventive and mitigative measures. **§195.452(i)(3) and §195.452(i)(4)** provide specific guidance for enhancing leak detection capability and for installing EFRDs, respectively.

§195.452(i)(4) requires that an operator must install an EFRD if one is necessary to protect an HCA. This paragraph goes on to describe specific factors that must be considered in the determination of whether or not an EFRD is needed.

Natural Gas

§ 192.935(c) *Automatic shut-off valves (ASV) or Remote control valves (RCV)*

- If an operator determines, based on a risk analysis, that an ASV or RCV would be an efficient means of adding protection to a high consequence area in the event of a gas release, an operator must install the ASV or RCV.
- In making that determination, an operator must, at least, consider the following factors—swiftness of leak detection and pipe shutdown capabilities, the type of gas being transported, operating pressure, the rate of potential release, pipeline profile, the potential for ignition, and **location of nearest response personnel.**

PHMSA Inspection and Enforcement

- If an operator performs no evaluation of the need for additional ASVs, RCVs, or EFRDs, or the evaluation has some inadequacies or deficiencies, is compliance with §192.935 or §195.452(i)(4) being achieved?
- Does the evaluation include the required factors?
- If an operator determines that ASVs, RCVs, or EFRDs are not needed, documentation justifying this decision must be provided.

PHMSA Inspection

- Pipeline operators must determine the necessity of additional valves (*RCVs, ASVs, and EFRDs)* through integrity management.
- For natural gas pipelines, initial population impacts are unchanged regardless of valve closure time or location (distance between valves).
- Risk benefit of installation or automation of new or existing valves is shown to be more beneficial to hazardous liquids pipelines.
- Pipeline operators should continue use of advanced geospatial consequence and valve analysis tools.
- Pipeline operators should continue to implement mitigative measures to reduce the consequence of failure through risk reduction activities (e.g., improved leak detection).
- Installation or automation of valves reduce consequence of a failure under certain scenarios, however, the safety gained may not warrant the additional safety risks.

Regulatory Considerations

- Identify where a pipeline release could potentially affect **HCAs**
- Meet prescriptive requirements for periodic **Inspection and Repair**
- Conduct a Risk Analysis to evaluate the need for additional **PMM**, to prevent and/or mitigate the impact of a release to HCAs
- An **ASV, RCV, EFRD** is a part of PMM identified in the regulation

PHMSA Inspection (Operator Input)

- Considered ASV/EFRD for new construction pipeline only but not existing pipeline
- Response time
- AGA White Paper – 3/25/2011
- Gas Research Institute Study – 1998
- RCV is not cost effective
- RCV may not response quickly enough etc.

PHMSA Enforcement

CPF: 4-2016-1004

- Operator conducted a study in 2007 with the finding that installation of ASVs or RCVs would not significantly reduce the damage impact of a pipeline rupture or provide an efficient means of additional safety.
- HCAs were added and boundaries were adjusted and operator did not conduct an updated study in accordance with 192.937(b) (requiring "periodic evaluation.")

CPF: 4-2017-1011

- Operator failed to conduct an adequate risk analysis to identify and take additional P&M measures by failing to include all of the considerations of 192.935(c).
- Operator completed an ASV Hazard Modeling Study and confirmed the adequacy of measures implemented.

PHMSA Case Studies

CPF: 4-2019-1004

- Operator did not identify and take additional preventative and mitigative (P&M) measures to mitigate the consequences of a pipeline failure in a High Consequence Area (HCA).
- Operator was required to revise its procedures conduct an evaluation/risk analysis of its pipelines to determine if ASV or RCV would be needed.

CPF: 4-2017-5032

- Operator delayed its process to determine if EFRDs were needed on certain pipeline segments to protect high consequence areas in the event of a hazardous liquid pipeline release.
- Operator replaced 5 manual valves with actuated valves.

CPF: 4-2017-5028

- Operator did not complete its process to determine if EFRDs were needed to protect high consequence areas in the event of a hazardous liquid pipeline release. Operator concluded no valves were needed.

Questions?

Thank You

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