



Pipelines 101

Energy Sustainability
University of Texas at Dallas

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The Pipeline & Energy Authority



Course Summary

- Introductions and Key Concepts
- Industry Overview
- PHMSA – What It Is & What It Does
- Federal Pipeline Safety Program – An Overview
- Performance History Drives Regulatory Change
- Current Issues and Initiatives
- New and Expected Rules
- Q&A





Introductions and Key Concepts

Key Concepts: What is “Safety”? What does it take to be “Safe”?

- Public Safety and Environmental Protection?
- Personnel Safety?
- Process Safety?
- Pipeline Safety Regulations?
- Policies and Procedures?
- Best Practices?
- Pipeline Safety Management Systems?



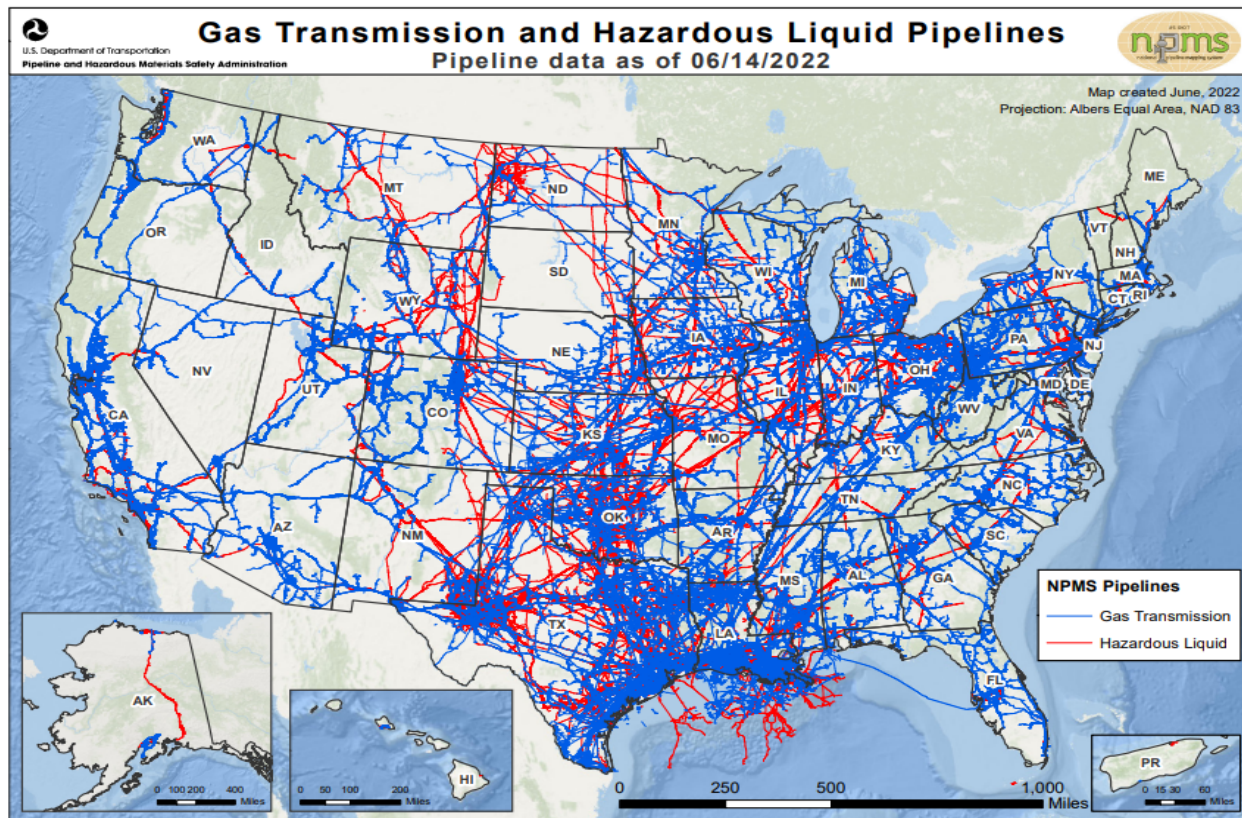


Industry Overview

- 2.9 Million Miles of Pipelines in the United States
 - Hazardous Liquids: 229,996 Miles
 - Natural Gas Transmission: 318,578 Miles
 - Natural Gas Distribution and Gathering: 2,300,610 Miles
 - Crude Oil Gathering: 3,282 + (34,831 rural unregulated reported for the first time in 2021)



Industry Overview





Industry Overview

- Commodities Moved by Pipeline
 - Hazardous Liquids
 - Natural and Other Gas
 - Liquified Natural Gas (Just not that far...)
- Hazardous Liquids?
 - Crude Oil
 - Refined Products – Motor Fuels, Petrochemicals
 - Natural Gas Liquids (Liquified Petroleum Gas)
 - Anhydrous Ammonia
 - CO₂ (supercritical phase)
 - Biofuels





PHMSA – What It Is & What It Does

The Pipeline and Hazardous Materials Safety Administration (PHMSA)

- Part of the US Department of Transportation
- Two “Halves” –
 - Hazardous Materials Transportation Safety
 - Pipeline Transportation Safety
- Let’s Talk Pipelines





PHMSA – What It Is & What It Does

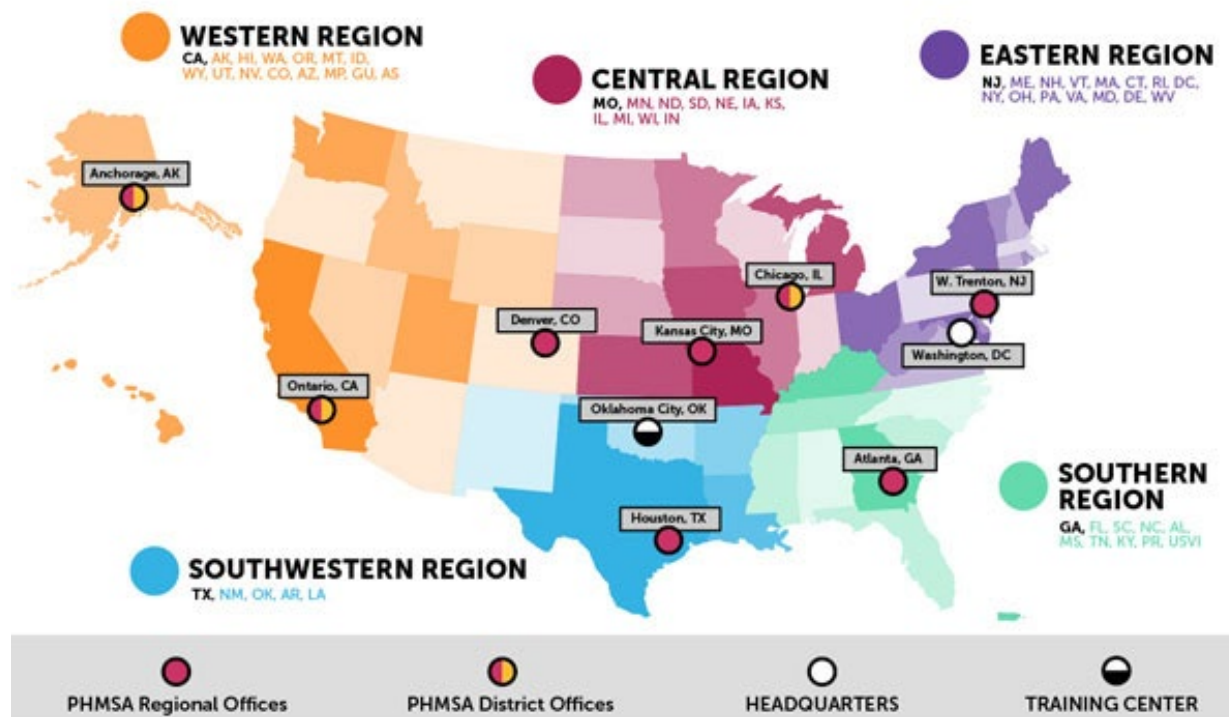
PHMSA Organization

- Organization –
 - HQ in Washington DC – Set Policy, Make Rules, Do Adjudications, Etc
 - Five Regions – Field Operations, Enforcement
- The DC Gang
 - Deputy Administrator Tristan Brown
 - Associate Administrator for Pipeline Safety Alan Mayberry
 - Deputy Associate Administrator Field Operations Linda Daugherty
 - Deputy Associate Administrator Policy & Programs Massoud Tahamtani
 - Rulemaking, Engineering and Legal Staff



PHMSA – What It Is & What It Does

The PHMSA Regions





PHMSA – What It Is & What It Does

The PHMSA Regions

- Region Director
- Operations Supervisors
- Inspectors – General Engineers
- What Do They Do?
 - Inspect Pipeline Systems and Regulated Facilities
 - Investigate Accidents and Incidents (Not All – AID)
 - Initiate Enforcement Actions (most kinds)



Federal Pipeline Safety Program

Pipeline Safety Act

- The PSA grants authority over pipeline safety to the Secretary of the U.S. Department of Transportation (DOT) – 49 USC 60101 et seq.

Among the powers granted by Congress:

- To promulgate safety standards (regulations) for design, installation, inspection, emergency plans and procedures, testing, construction, personnel qualification, operation and maintenance, corrosion control
- To inspect pipeline systems for adherence to the safety standards
- To enforce compliance with the safety standards
- To direct that unsafe, or hazardous, pipeline systems be made safe



Federal Pipeline Safety Program

Among the powers granted by Congress (continued):

- To monitor State pipeline safety programs for oversight of intrastate pipelines
- To encourage State damage prevention programs
- To grant funds for State programs and research activities
- To collect user fees from pipeline operators

But Congress dictated that PHMSA cannot:

- Determine pipeline siting, regulate certain exempt facilities, apply new design, construction, or initial testing standards to existing lines



Federal Pipeline Safety Program

Federal vs. State Jurisdiction – Who's Your Safety Regulator?

Interstate Jurisdiction

The Office of Pipeline Safety (OPS) in PHMSA is delegated the Secretary's powers

PHMSA/OPS is the agency with primary safety jurisdiction over ***interstate*** pipelines.

States also may inspect for PHMSA as ***interstate agent***

Intrastate Jurisdiction

States exercise safety oversight by certifying their programs to PHMSA (15 states for HL)

State regulatory program must be compatible and no less stringent than the federal program (may be more stringent)

States Incorporate Federal Regulations into State Regs



Federal Pipeline Safety Program

Title 49, Code of Federal Regulations, Part 195

- Subpart A: General
- Subpart B: Annual, Accident, and Safety-Related Condition Reporting
- Subpart C: Design Requirements
- Subpart D: Construction
- Subpart E: Pressure Testing
- Subpart F: Operation and Maintenance
- Subpart G: Qualification of Pipeline Personnel
- Subpart H: Corrosion Control
- *See also*, Oil Spill Response Plans (49 CFR Part 194)
- *See also*, Drug and Alcohol testing (49 CFR Part 199)



Federal Pipeline Safety Program

The Regulations – Overarching Subjects

- Performance-Based Regulation (Mostly)
 - Performance vs. Prescriptive
 - Desired safety objectives can be reached
 - Without impeding future industry innovations
- Standards Incorporated by Reference
 - API, ASTM, ASME, NACE, NFPA, Etc.
 - Watch the version
- Best Practices – In Practice, *You Will Be Compared To Others...*



Federal Pipeline Safety Program

The Pipeline Safety Regulations – A Life-Cycle Approach

- Design
- Construction & Testing
- Operation & Maintenance
- Integrity Management
- Corrosion Control
- Reporting

Following are Select Provisions of Part 195
(Many Have Been Omitted From This Presentation)



Federal Pipeline Safety Program

The Pipeline Safety Regulations

Design – Subpart C

- § 195.106 Internal design pressure: $P=(2 St/D)\times E \times F$
- § 195.108 External pressure
- § 195.110 External loads
- § 195.116 Valves
- § 195.120 Passage of internal inspection devices
 - § 195.132 Design and construction of aboveground breakout tanks
- § 195.210 Pipeline location

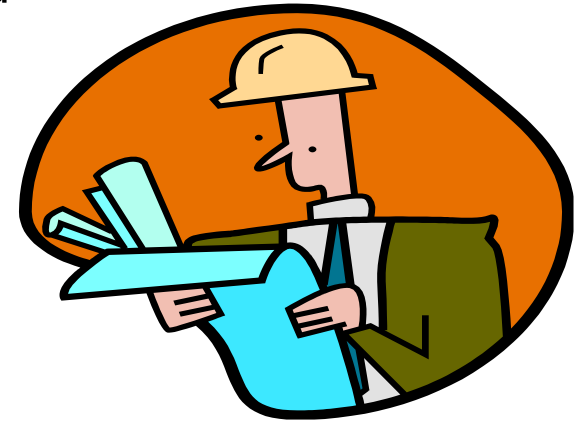


Federal Pipeline Safety Program

The Pipeline Safety Regulations

Construction – Subpart D

- § 195.204 Inspection—Trained and qualified
- § 195.207 Transportation of pipe
- § 195.214 Welding procedures
- § 195.222 Welders: Qualification
- § 195.228 Welds and welding inspection
- § 195.246 Installation of pipe in a ditch
- § 195.248 Cover over buried pipeline
- § 195.260 Valve Locations
- § 195.266 **Construction records**





Federal Pipeline Safety Program

The Pipeline Safety Regulations

Pressure Testing – Subpart E

- § 195.302 General requirements
- § 195.304 Test pressure
 - at least 4 continuous hours at a pressure equal to 125 percent of the maximum operating pressure
- § 195.305 Testing of components
- § 195.307 Pressure testing aboveground breakout tanks
- § 195.310 **Records**



Federal Pipeline Safety Program

The Pipeline Safety Regulations

Operation & Maintenance – Subparts F, G & H

- § 195.401 General requirements
 - No operator may operate or maintain its pipeline systems at a level of safety lower than that required by this subpart
- § 195.402 Procedural manual for operations, maintenance, and emergencies
 - *General*
 - *Maintenance and normal operations*
 - *Abnormal operation*
 - *Emergencies*
 - *Safety-related condition reports (195.55)*



Federal Pipeline Safety Program

The Pipeline Safety Regulations

Operation & Maintenance (continued)

- § 195.403 Emergency response training
- § 195.404 Maps and records
- § 195.406 Maximum operating pressure
- § 195.410 Line markers
- § 195.412 Inspection of ROW and navigable water crossings
- § 195.420 Valve maintenance
- § 195.432 Inspection of in-service breakout tanks
- § 195.436 Security of facilities



Federal Pipeline Safety Program

The Pipeline Safety Regulations

Operation & Maintenance (continued)

- § 195.440 Public awareness
- § 195.442 Damage prevention program
- § 195.444 CPM leak detection
- § 195.446 Control room management
 - *Roles and responsibilities*
 - *Provide adequate information*
 - *Fatigue mitigation*
 - *Alarm management*
 - *Change management*





Federal Pipeline Safety Program

The Pipeline Safety Regulations

Operation & Maintenance (continued)

- Subpart G — Qualification of Pipeline Personnel
- Subpart H — Corrosion Control
- § 195.452 Pipeline integrity management in high consequence areas
 - Applies to every part of a hazardous liquid pipeline and carbon dioxide pipeline that could affect a high consequence area
 - Develop a written integrity management program that addresses the risks on each covered segment of pipeline



Federal Pipeline Safety Program

The Pipeline Safety Regulations – Integrity Management

- § 195.452 Pipeline integrity management in high consequence areas
 - What are the elements of an integrity management program?
 - A process for identifying which pipeline segments ***could affect*** a high consequence area
 - A baseline assessment plan (new system)
 - An analysis that integrates all available information about the integrity of the entire pipeline and the consequences of a failure
 - Criteria for remedial actions to address integrity issues raised by the assessment methods and information analysis
 - **A continual process of assessment and evaluation to maintain a pipeline's integrity**
 - Identification of preventive and mitigative measures to protect the high consequence areas



Federal Pipeline Safety Program

- § 195.452 Pipeline integrity management in high consequence areas (continued)
 - Assess the integrity of the line pipe
 - Internal inspection tool or tools capable of detecting corrosion and deformation anomalies including dents, gouges and grooves (§195.591)
 - Pressure test (per subpart E)
 - External corrosion direct assessment (§195.588)
 - A schedule for completing the integrity assessment
 - An explanation of the assessment methods selected and evaluation of risk factors considered





Federal Pipeline Safety Program

- § 195.452 Pipeline integrity management in high consequence areas (continued)
 - **Risk factors** for establishing an assessment schedule:
 - Results of the previous integrity assessment, defect type and size that the assessment method can detect, and defect growth rate
 - Pipe size, material, manufacturing information, coating type and condition, and seam type
 - Leak history, repair history and cathodic protection history
 - Product transported
 - Operating stress level
 - Existing or projected activities in the area
 - Local environmental factors that could affect the pipeline (e.g., corrosivity of soil, subsidence, climatic)
 - Geo-technical hazards
 - Physical support of the segment (e.g., a cable suspension bridge)



Federal Pipeline Safety Program

Reporting – Subpart B


- § 195.49 Annual Report – Form 7000-1.1 (June 15)
- § 195.55 Safety-Related Conditions
 - Corrosion; Movement or loading; Impaired serviceability; Surge greater than 110% MOP; A leak that constitutes an emergency; Pressure reduction (20%) or shutdown
- § 195.50 Accidents
 - Explosion or fire
 - Release of 5 gallons (company property exception)
 - Death – or Injury requiring hospitalization
 - Damage greater than \$50,000
- § 195.64 National Registry – Construction (60 days)
 - Rehab, replacement, etc. > \$10 million
 - 10+ miles new pipeline or a facility



Federal Pipeline Safety Program

Enforcement – 49 CFR Part 190

- Inspections & Investigations
- Requests for Information
- Notice of Amendment
- Warning Letter
- Notice of Probable Violation
- Compliance Order
- Civil Penalties
- Safety Order
- Corrective Action Order
- Emergency Order


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

901 Locust Street, Suite 480
Kansas City, MO 64106

**NOTICE OF PROBABLE VIOLATION
PROPOSED CIVIL PENALTY
and
PROPOSED COMPLIANCE ORDER**

VIA ELECTRONIC MAIL TO

President & CEO

CPF NOPV



Performance History Drives Regulatory Change

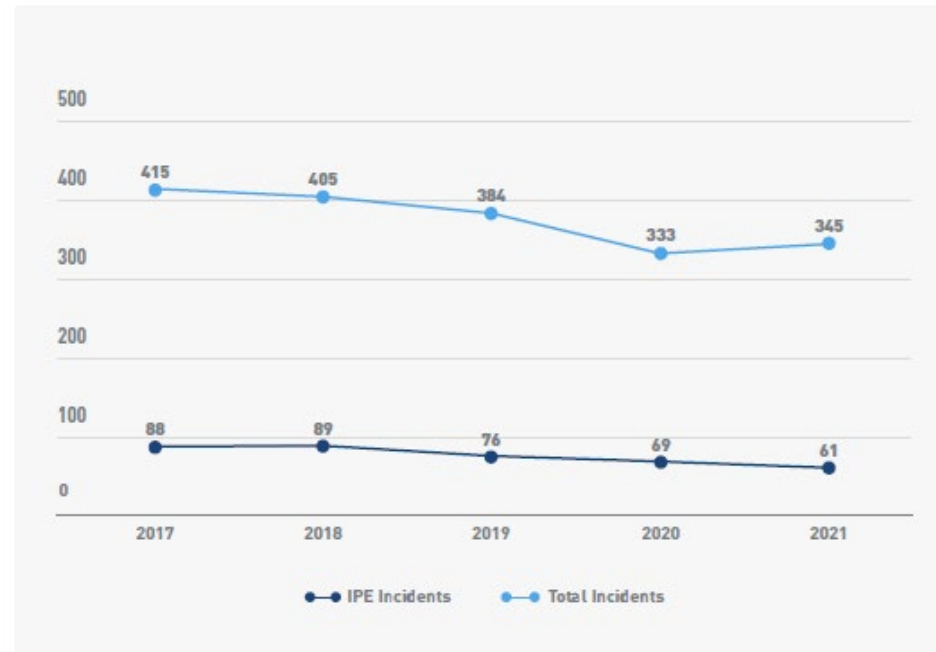
Significant Decline in Hazardous Liquids Spills Last 20 Years

- Driven by Industry Performance Improvement Processes
 - Pipeline Performance Tracking System (1999-~2016)
 - Data Mining Team & Lessons Learned
 - Performance Excellence Team (2002-2022)
 - How can we do better in the future?
 - PIX: Pipeline Information eXchange (2008-2022)
- Integrity Management Regulations
 - Integrity Management Programs benefit non-HCA segments



Performance History and the Effects of Regulatory Change

Total Incidents v. Incidents Impacting People or the Environment (2017-2021)





Performance History and the Effects of Regulatory Change

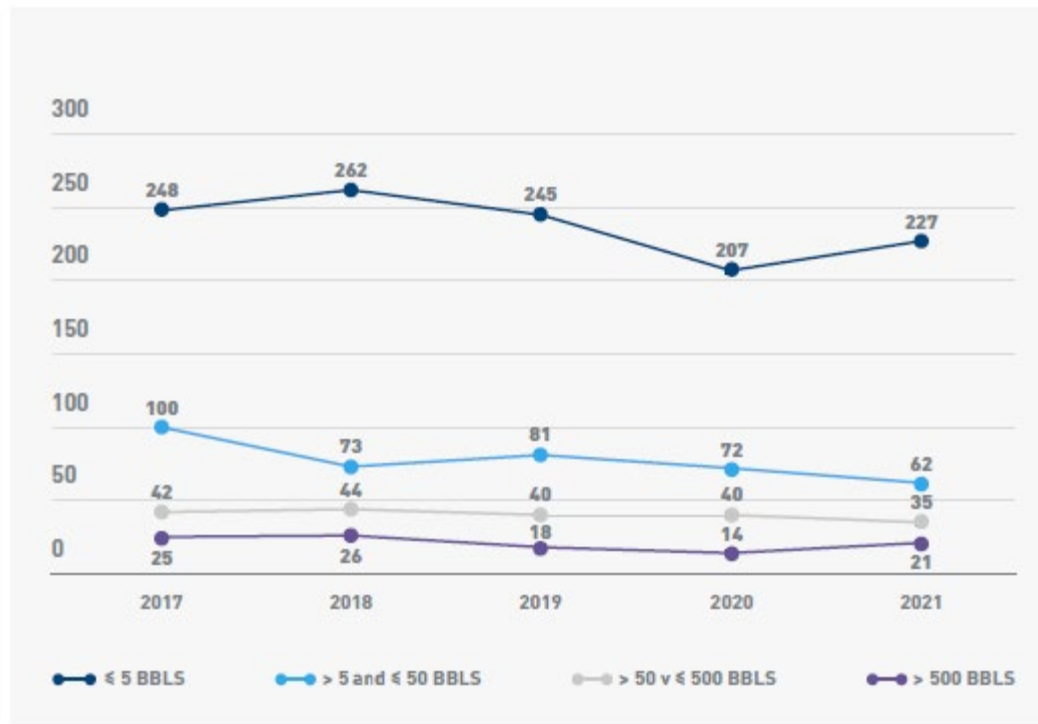
Pipeline Incidents Inside and Outside Operator Property (2017-2021)





Performance History and the Effects of Regulatory Change

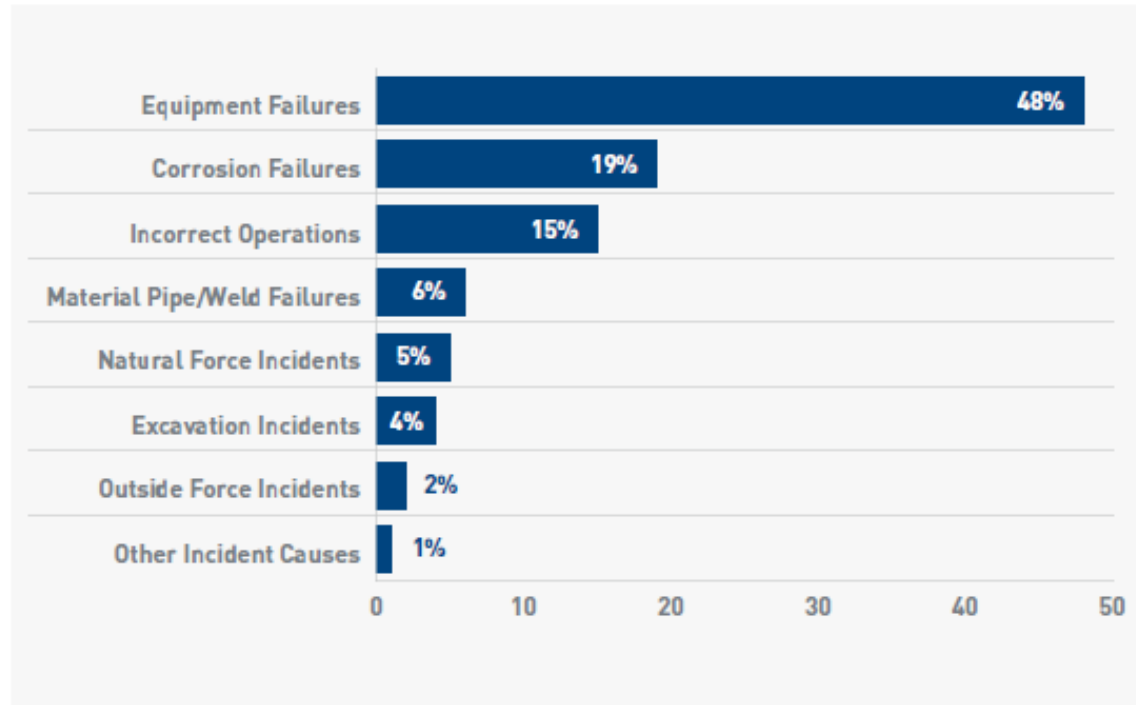
Liquid Pipeline Incidents by Size (2017-2021)





Performance History and the Effects of Regulatory Change

Liquids Pipeline Incidents by Cause (2017-2021)





Current Issues and Initiatives

High-Profile Pipeline Accidents Drive Policy

- Bellingham, WA – Products Release – 1999 – Changed Our World
- Marshall, MI Crude Release – 2010 – NTSB Recommendations
- San Bruno, CA Gas Transmission Release and Fire – 2010
- Merrimac Valley – Natural Gas Distribution – 2018
- Huntersville, NC – Products Release – 2020

Safety Agenda vs. Political Agenda

- As Presidential Administrations Change ...
- So Shift the Political Winds ... and
- So Change the Policies That Drive Regulation....



Current Issues and Initiatives

PIPES Act of 2020 – Key Provisions

- PHMSA Recruitment and Retention of Qualified Workforce
- Advancement of Pipeline Safety Technologies / Innovation
- Enforcement Procedural Changes
 - Settlement / Narrowing of Issues / Consent Agreements
 - Expedited Hearing Possible
 - Agency Records Made Available to Respondent – the “Case File”
 - Civil Penalties: Self-Disclosure
- Certain Coastal Waters and Coastal Beaches – HCA or USA?
- Lots More – Those Political Winds?
 - Methane Leak Detection and Repair – Yes, Affects Liquids Pipelines!
 - Distribution Integrity Management
 - Distribution PSMS?



Current Issues and Initiatives

LEPA-API Pipeline Safety Excellence Strategic Plan

Fundamental Precepts

- Zero Incidents
- Organization-Wide Commitment
- A Culture of Safety
- Continuous Improvement
- Learn from Experience
- Systems for Success
- Employ Technology
- Communicate with Stakeholders



Current Issues and Initiatives

LEPA & API Pipeline Strategic Goals

- Promote Organizational Excellence
- Improved Safety through Technology and Innovation
- Increase Stakeholder Awareness & Involvement
- Enhance Emergency Response Preparedness
- On the Horizon
 - Emergency Response: All Hazards (Cyber too?)?
 - Corrosion Improvement
 - CO₂
 - Technology Pilot – Tanks?



New and Expected Rules

- Rupture Mitigation Valves (Final rule 4.2022, effective 10.5.2022)
- Pipeline Operational Status (proposed rule expected 2023)
- Coastal USAs (Final rule 12.2021, on appeal)
- Liquids Regulatory Reform (proposed rule expected 2023)
- Modernizing Repair Criteria (still a PHMSA priority?)



Questions?

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Credit Where Credit's Due

Roina Baker | OB Harris | L. Shelton...

Chris Paul | John Clayton | Denise

Jim Curry | Van Ness | Catherine & Annie

So Very Many Engineers & Technicians

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Kevin Garrity | Keifner | Beavers | Vieth...

LEPA | API | INGAA | GPA | APGA | AGA...

PHMSA | EPA | USCG | USACE | CEQ...

Office of the Secretary of Transportation

States: TX | LA | ND | OK | MN...