PHMSA Update

Appalachian Underground Corrosion Short Course
Pipeline Integrity Management

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Re-Authorization in 2019

Preparing up to reauthorization

Three themes in the reauthorization:

(1) safety, innovation, and information programs;

(2) encouraging energy infrastructure; and

(3) regulatory improvements/reform

Drivers of PHMSA Regulatory Agenda

Significant Drivers of PHMSA Regulatory Program

- Pipeline Safety Act of 2011 - (Sections 4 (Valves), 8 (Leak Detection), and 23 (MAOP)
- PIPES ACT of 2016 - Signed into law on June 22, 2016
  - Emergency Orders
  - Underground Storage
  - MSDS's for HL incidents
  - LNG –small scale
  - Changes in HL HCA definition
  - 12 month assessments of certain HL lines
  - Reporting requirement for unfinished mandates
- NTSB/GAO/OIG
- Executive Orders on Regulatory Reform

Drivers of OPS Regulatory Agenda

- **Executive Order 13771**
  - 2 for 1 initiative – Significant rules only
- **Executive Order 13777**
  - Establishes Regulatory Reform Officers and Regulatory Reform Task Forces
    - To identify regulations that are outdated, unnecessary, or ineffective and that impose costs that exceed benefits, etc.

Current Rulemakings in Process

Plastic Pipe

- NPRM published May 21, 2015;
  - Comment period ended 7/31/2015
- GPAC meeting June 1-3, 2016
- Final Rule Approved published 11/20/2018
- **Address the following plastic pipe topics:**
  - Authorized use of PA12
  - AGA petition to raise D.F. from 0.32 to 0.40 for PE pipe
  - Tracking and traceability – Not adopted
  - Miscellaneous revisions for PE and PA11 pipelines
  - Additional provisions for fittings used on plastic pipe

Current Rulemakings in Process

- **Underground Storage Facilities for Natural Gas** to comply with minimum safety standards, including compliance with:
  - **API RP 1171**, Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs
  - **API RP 1170**, Design and Operation of Solution-mined Salt Caverns Used for Natural Gas Storage
  - **Annual and Incident reporting** requirements

Current Rulemakings in Process

Underground Storage Facilities for Natural Gas (Final rule stage)

- PHMSA adopted the non-mandatory provisions of the RPs in a manner that would make them all mandatory, except that operators would be permitted to deviate from the RPs, if they provide justification.
- Notice Published (6/20/17)
  - Stay of enforcement for non-mandatory provisions
  - Delay of UGS Annual Report (March 2018)
- Comment period re-opened until 11/20/17

Current Rulemakings in Process

Rupture Detection and Valve Rule (NPRM stage)

- Rulemaking is in response to Section 4 and 8 of the 2011 Act, NTSB Recommendations and studies perform by both PHMSA and GAO.
- Remoted Controlled or Automatic Shutoff Valves on newly constructed or entirely replaced natural gas transmission and hazardous liquid pipelines.
- Rule would establish and define rupture detection and response time metrics.

Current Rulemakings in Process

Standards Update
(NPRM stage)

- **Major Topics:**
  - Addresses the set of IBR standards throughout PHMSA's part 192, and Part 195 code with updated revisions of standards from all standard organization bodies.
  - This NPRM would impact approx. many of the 60+ standards that we currently IBR.
  - Miscellaneous amendments to PSR
    - Stakeholder petitions
    - Agency initiative

Current Rulemakings in Process

Class Location Requirements

- ANPRM examined class locations change due to population increases near pipeline.
- Comment Period ended 10/1/2018
- Current requirements when class locations change:
  - Reduce operating pressure
  - Confirm new MAOP w/pressure test
  - Replace pipe w/thicker wall pipe
  - Note: Operators may also request special permits to operate segments at previous MAOP while performing certain measures to mitigate risk and ensure safety.

Current Rulemakings in Process

Gas Pipeline Regulatory Reform (2137-AF36)
(NPRM stage)

- Aimed at easing regulatory burdens on the construction and operation of gas transmission and gas distribution pipeline systems.
- Regulatory relief actions identified by internal agency review, existing petitions for rulemaking, and public comments on the Department of Transportation regulatory reform and infrastructure notices.
- Number of miscellaneous deregulatory actions applicable to gas transmission and gathering pipelines.
- Implement Executive Order 13,777 to review existing regulations.

Current Rulemakings in Process

Safety of Gas Transmission and Gathering Lines (Final Rule stage)

- Major Topics under consideration:
  - Expansion of assessments beyond HCA's – Moderate Consequence Area's
  - Repair criteria for both HCA and non-HCA areas
  - Assessment methods
  - Corrosion control
  - Assessment methods for GT Lines
  - MAOP Reconfirmation and Records
  - Gas gathering; additional reporting and regulations

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Current Rulemakings in Process

Safety of Gas Transmission and Gathering Lines (Final Rule stage)

- Rule has been broken into three final rules
  - 1) Mandates: MAOP Reconfirmation, Material verification, MCA assessments, records, Seismicity, MAOP Exceedance reporting, 6-month grace period for assessments
  - 2) Non-mandates: Repair criteria (HCA and Non-HCA); Extreme weather; MOC; Corrosion control; IM Clarifications, Strengthening Assessment requirements
  - 3) Gas Gathering: Data, Definitions, regulating large diameter-high pressure lines
- GPAC completed all but Gas Gathering
  - (June 25-26, 2019 meeting, Washington DC)

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Current Rulemakings in Process

LNG - Update to 49 CFR Part 193 (NPRM stage)

- The proposals that will be in the NPRM respond to need for regulatory update
  - Update to current Industry Standards
    - NFPA 59A-2019 and its incorporated standards
  - Address LNG Export Facilities
  - Address Small Scale LNG Facilities as commercialization of LNG increases

Risk Modeling Work Group (RMWG)

- Concluded a series of five topic-specific in-person meetings
- Meeting summaries & technical presentations posted on RMWG portion of Pipeline Technical Resources web site
- PHMSA report prepared summarizing technical information and best practices
- Federal Register comment period in 2018
- Currently in final PHMSA approval process

Summarization of RMWG Activities

RMWG web page contains work group meeting summaries and all technical presentations:

https://www.phmsa.dot.gov/pipeline/risk-modeling-work-group/risk-modeling-work-group-overview

Natural Force Damage

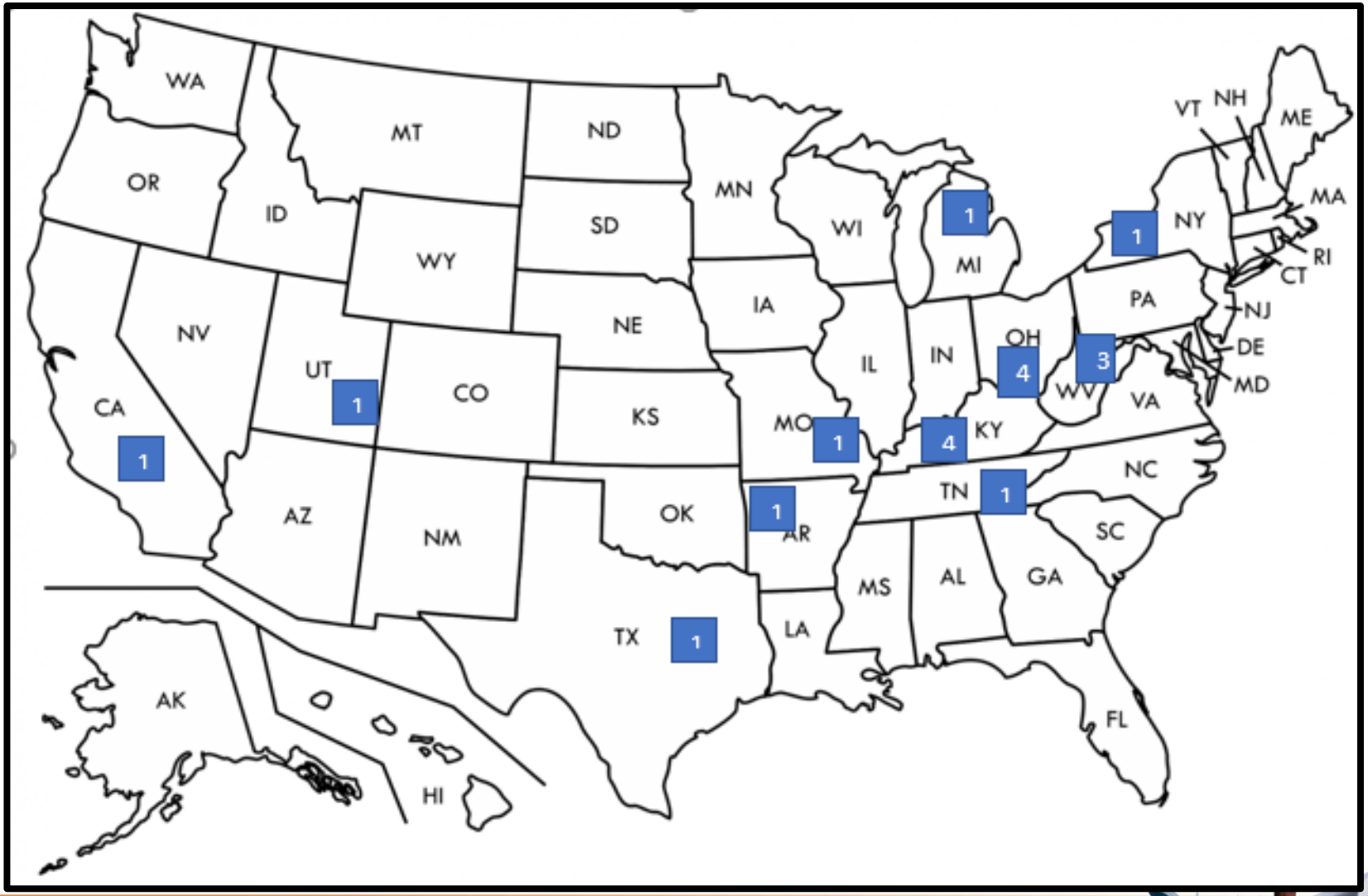
1. Earth Movement
2. Heavy Rains/Floods
3. High Winds
4. Lighting
5. Other Natural Force Damage
6. Temperature

Gas Transmission and Hazardous Liquid Incidents 2009-2018

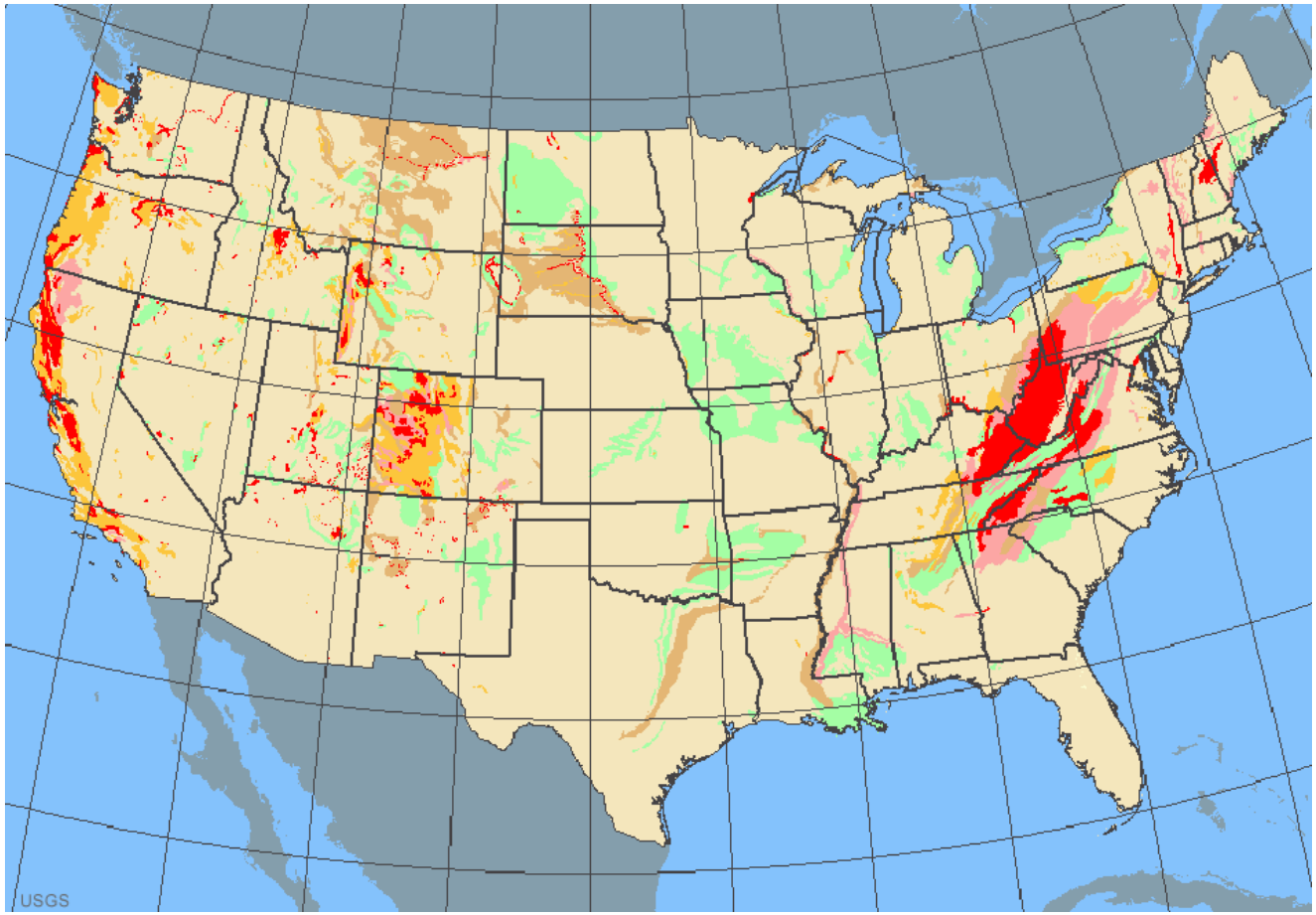
Calendar Year: 2009 - 2018	Hazardous Liquid	Gas Transmission
Incident Cause Type	**ALL REPORTED**	**ALL REPORTED**
ALL OTHER CAUSES	118	64
CORROSION	806	201
EXCAVATION DAMAGE	153	150
INCORRECT OPERATION	555	61
MATERIAL/WELD/EQUIP FAILURE	2068	482
NATURAL FORCE DAMAGE	176	97
OTHER OUTSIDE FORCE DAMAGE	79	77
Grand Total	**3956**	**1132**

Natural Force Damage – All Reported: HL – 4.4% and GT – 8.6%

Hazardous Liquid, Gas Gathering and Gas Transmission Natural Force Damages - Land Movement – 2010 - 2019



Map of relative landslide incidence and susceptibility
Red and pink areas have the highest incidence and susceptibility



U.S. Regulatory Requirements to Prevent Natural Outside Force Damage

- **§192.103** "Pipe must be designed with sufficient wall thickness, or must be installed with adequate protection, to withstand anticipated external pressures and loads that will be imposed on the pipe after installation."
  - To comply-must consider loads imposed by geological forces
- **§192.317 Protection from hazards**
  - "The operator [a person who engages in the transportation of gas] must take all practicable steps to protect each transmission line or main from washouts, floods, unstable soil, landslides, or other hazards that may cause the pipeline to move or to sustain abnormal loads. In addition, the operator must take all practicable steps to protect offshore pipelines from damage by mud slides, water currents, hurricanes, ship anchors, and fishing operations."

U.S. Regulatory Requirements to Prevent Natural Outside Force Damage

- **§192.613 Continuing surveillance.**
- "(a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions."
- **§192.705 Transmission lines: Patrolling.**
- "(a) Each operator shall have a patrol program to observe surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity, and other factors affecting safety and operation."

U.S. Regulatory Requirements to Prevent Natural Outside Force Damage

- **§192.935** requires an operator to take additional preventative and mitigative measures to prevent a pipeline failure and to mitigate the consequences of a pipeline failure that could affect a high consequence area. An operator must base the additional measures on the threats the operator has identified for each pipeline segment. If an operator determines there is a threat to the pipeline, such as outside force damage (e.g., earth movement, floods), the operator must take steps to prevent a failure and to minimize the consequences of a failure under these regulations.

Recent Geological-Related Incidents

- On October 21, 2016, a pipeline release of over 1,238 barrels of gasoline spilled into the Loyalsock Creek in Lycoming County, Pennsylvania. The release was caused by extreme localized flooding and soil erosion.
- On December 5, 2016, approximately 12, 615 barrels of crude oil was released into Ash Coulee Creek in Billings County, North Dakota. The metallurgical and root cause failure analysis indicated the failure was caused by compressive and bending forces due to a landslide impacting the pipeline. The landslide was the result of excessive moisture within the hillside creating unstable soil conditions.

Recent Geological-Related Incidents

- On April 30, 2018, a pipeline failure occurred in a remote mountainous region of Marshall County, West Virginia resulting in the release of 2,658 barrels of propane. The failure and subsequent release was caused by lateral movement of the 8-inch intrastate pipeline due to earth movement along the right-of-way.
- On June 7, 2018, a rupture occurred on a 36-inch pipeline located in a rural, mountainous area near Moundsville, West Virginia, resulting in the release of approximately 165,000 MCF of natural gas. The failed sections of the pipeline were sent to a metallurgical laboratory to determine the probable cause behind the failure of the pipeline. According to the analysis, the cause of the rupture was due to earth movement on the right-of-way due to a single overload event. Overloading of the pipeline likely resulted from a series of lateral displacements with accompanying bending.

Recent Geological-Related Incidents

- On January 9, 2018, a failure occurred on a 22-inch transmission pipeline in Montecito California. The incident resulted in a fire and explosion and the release of an estimated 12,000 MFC of natural gas within a Class 3 location. It is believed that heavy rains and localized flooding contributed to the incident. Automated safety equipment designed to stop the flow of gas to the effected segment activated to shut off gas flow to the damaged segment of pipeline.
- On January 31, 2018, a portion of a pipeline experienced an in-service rupture near the city of Summerfield, Ohio. The rupture of the 24-inch interstate pipeline resulted in the release of approximately 23,500 MCF of natural gas in a rural forested area. A root cause analysis concluded that the girth weld failure was caused by axial stress due to movement of the pipe that exceeded the cross-sectional tensile strength of the net section weld zone surrounding the crack initiation location. This determination is supported by metallurgical analysis, strain capacity evaluation and geotechnical findings.

Recent Geological-Related Incidents

- On January 29, 2019, a pipeline ruptured near the town of Lumberport in Harrison County, West Virginia. The rupture was located at a girth weld of an elbow on the 12-inch interstate pipeline. The root cause investigation concluded that a landslide about 150 yards from the rupture moved the pipeline approximately 10 feet from its original location causing excessive stress on the pipe resulting in the rupture.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

Advisory: All owners and operators of gas and hazardous liquid pipelines are reminded that earth movement, particularly in variable, steep, and rugged terrain and with varied geological subsurface conditions, can pose a threat to the integrity of a pipeline if those threats are not mitigated. Pipeline operators should consider taking the following actions to ensure pipeline safety:

- Identify areas surrounding the pipeline that may be prone to large earth movement, including but not limited to slope instability, subsidence, frost heave, soil settlement, erosion, earthquakes, and other dynamic geologic conditions that may pose a safety risk. …..
- Utilize geotechnical engineers during the design, construction, and ongoing operations of a pipeline system to ensure that sufficient information is available to avoid or minimize the impact of earth movement on the integrity of the pipeline system. At a minimum, this should include soil strength characteristics, ground and surface water conditions, propensity for erosion or scour of underlying soils, and the propensity of earthquakes or frost heave.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Develop design, construction, and monitoring plans and procedures for each identified location, based on the site-specific hazards identified. When constructing new pipelines, develop and implement procedures for pipe and girth weld designs to increase their effectiveness for taking loads, either stresses or strains, exerted from pipe movement in areas where geological subsurface conditions and movement are a hazard to the pipeline integrity.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Monitoring plans may include:
  - Ensuring during construction of new pipelines that excavators do not steepen, load (including changing the groundwater levels) or undercut slopes …..
  - Conducting periodic visits and site inspections; increased patrolling may be necessary due to potential hazards identified and existing/pending weather conditions……
  - Identifying geodetic monitoring points (i.e. survey bench marks) to track potential ground movement;
  - Installing slope inclinometers to track ground movement at depth which may otherwise not be detectable during ROW patrols;
  - Installing standpipe piezometers to track changes in groundwater conditions that may affect slope stability;

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Evaluating the accumulation of strain in the pipeline by installing strain gauges on the pipeline.
- Conducting stress/strain analysis utilizing in-line inspection tools equipped with Inertia Mapping Unit technology and High Resolution Deformation in-line inspection for pipe bending and denting from movement.
- Utilizing aerial mapping light detection and ranging or other technology to track changes in ground conditions.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Develop mitigation measures to remediate the identified locations.
- Mitigation measures should be based on site-specific conditions and may include:
  - Re-routing the pipeline to avoid areas prone to large ground movement such as unstable slope areas, right-of-way prior to construction earthquake fault zones, permafrost movement, or scour.
  - Utilize properly designed horizontal directional drilling (HDD) to go below areas of potential land movement.
  - Installation of drainage measures in the trench to mitigate subsurface flows….
  - Reducing the steepness of potentially unstable slopes, including installing retaining walls, soldier piles, sheet piles, wire mesh systems, mechanically stabilized earth systems and other mechanical structures.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Installing trench breakers and slope breakers….
- Building retaining walls and/or installing steel piling or concrete caissons to stabilize steep slope areas as long as the corrosion control systems are not compromised.
- Reducing the loading on the site by removing and/or reducing the excess backfill materials to off-site locations….
- Compacting backfill materials at the site….
- Drying the soil using special additives such as lime-kiln dust or cement-kiln….
- Regrading the pipeline right-of-way to minimize scour and erosion.

Advisory Bulletin (ADB-2019-02) Issued May 2, 2019

- Bringing the pipeline above ground and placing them on supports that can accommodate large ground movements, (e.g. transitions across earthquake fault zones or unstable slopes, without putting excessive stress or strain on the pipeline).
- Reducing the operating pressure temporarily or shutting-in the affected pipeline segment completely.
- Re-routing the pipeline when other appropriate mitigation measures cannot be effectively implemented to maintain safety.

Questions?

Thank you for your participation in Pipeline safety!