

Valve Installation and Minimum Rupture Detection Standards

Pre-PAC Briefing on 7/14/2020 to the Gas/HL Pipeline Advisory Committees

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Docket: PHMSA - 2013 – 0255

For the Meetings Scheduled
July 22/23, 2020

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Rupture Mitigation Valves



Gas/Hydraulic Actuator (GT)



Electric Motor Actuator (HL)



Valve Site Footprint



Manual Valve - No Actuator



Rupture Mitigation Valves

Actuator added here for Remote Control



Manual Valve

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Gas/Hydraulic Actuator (GT)

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Drivers for Valve Rule

- **Statutory Mandates (2011 Pipeline Safety Act)**
 - § 4 –require by regulation the use of ASVs or RCVs, or equivalent technology.
 - § 8 –establish standards for the capability of leak detection systems to detect leaks on HL pipelines.
- **NTSB Recommendations**
 - **P-11-9** – Require control room operators to immediately and directly notify 911 of a possible rupture.
 - **P-11-10** –Require all gas transmission and distribution operators to upgrade SCADA, install real-time leak detection system, and/or appropriately spaced flow and pressure transmitters.
 - **P-11-11** – Amend gas IMP rule to directly require installation of ASVs or RCVs in HCAs and class 3 and 4 locations.
- **GAO Recommendation**
 - **GAO-13-168** – Improve operators' incident response times using a performance-based framework.

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High Level Summary of NPRM Proposed Rule Changes

PHMSA proposed rule changes in the following areas for gas transmission and HL pipelines:

1. Define “rupture” for use in leak detection and mitigation requirements.
2. Include public safety answering point (9-1-1 emergency call center) in emergency response and liaison efforts.
3. Establish timeframes for rupture identification (10 min.) and response (as soon as practical not to exceed 40 min.).
4. Strengthen incident investigation requirements.
5. Require installation of Rupture Mitigation valves for newly constructed or 2+ mile replacement pipelines greater than 6” diameter.



High Level Summary of NPRM Proposed Rule Changes

PHMSA proposed rule changes in the following areas for gas transmission and HL pipelines:

6. Define gas pipeline valves spacing based on the ‘one class bump’ rule for Class Location changes.
7. Define mainline block valve spacing for HL pipelines.
8. Specify Rupture Mitigation valve shut-off capability and methods.
9. Require Rupture Mitigation valve operational monitoring.
10. Require Rupture Mitigation valve maintenance and verification.
11. Establish and validate 40-minute response time through drills.
12. Strengthen IM requirements to include Rupture Mitigation valve provisions in ASV/RCV annual risk analysis.

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Gas Rupture Mitigation Valve Spacing for Pipeline Replacements

Rupture Mitigation Valve Spacing for Pipeline Replacements

Class 4	8 miles
Class 3	15 miles
Class 2	20 miles
Class 1	20 miles

HL Mainline Block Valve Spacing

Non-HCA	20 miles
HCA	15 miles
HVL Lines (‘High Pop’ or ‘Other Pop’ HCAs)	7 1/2 miles.
Water Crossing >100 ft.	1 mile & located outside of the flood plain or actuators unaffected by flood



PHMSA Construction Inspections 2018 – early 2020

Facility	Miles	RCVs	ASVs	EFRDs	MOV	Total Valves
Gas Transmission	2,431	200 (86%)	23 (10%)	N/A	9 (4%)	232
Hazardous Liquid	5,797	478 (51%)	136 (14%)	64 (7%)	268 (28%)	946

- RCV=Remote Control Valve
- ASV=Automatic Shutoff Valve
- EFRD=Emergency Flow Restricting Device
(see § 195.450, typically an RCV on new construction)
- MOV=Manually Operated Valve

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PHMSA Baseline Estimate of Valve Installation in New and Replaced Gas Pipelines 6 inches or Greater

Class Location	Miles \geq 6 inches	Valves Installed
Class 1	1,407	71
Class 2	180	12
Class 3	202	25
Class 4	6	1
Total	1,795	109

- 1,795 new and replaced miles w/diameter \geq 6 inches (out of 1,941 total)
- 109 valves installed per year
 - 44 valves already RCVs
 - 65 valves need modification for rule compliance



Baseline Estimate of Annual Valve Installation in New and Replaced HL Pipelines \geq 6 inch

Hazardous Liquid Pipeline	
Estimated Total New and Replaced Pipeline (miles)	5,640
Estimated Total New and Replaced Pipeline \geq 6 inches (miles)	5,432
Valves Installed	794
Rule Impact	
Valve Upgrades for Rule Compliance	290



Selected Summary of Significant Comments Posted to Docket and Draft PHMSA Response



Scope and Applicability

Public Comments:

- NTSB reminds PHMSA that recommendation **P-11-11 addresses valves for both new construction and existing pipelines.**
- PST and the Clean Air Council also ask that PHMSA consider application to existing pipelines based on NTSB Recommendation and Statute.

PHMSA Initial Response

- Application to existing pipelines is prevented by **statute (49 U.S.C. 60104(b)) prohibiting retroactive design and construction regulations.**
- PHMSA proposed to apply the requirements to new and entirely replaced pipelines (2 miles) based on risk as mandated by 49 U.S.C. 60102(n).



Scope and Applicability

Public Comments:

- NTSB and PST commented that leak detection (P-11-10) is not addressed and requirements for installing rupture-mitigation valves exclude most existing systems, including distribution lines. NTSB and PST commented that requirements for installing rupture-mitigation valves exclude most existing systems, including existing transmission and distribution lines.
- *[P-11-10] Require that all operators of **natural gas transmission and distribution pipelines** equip their supervisory control and data acquisition systems with tools to assist in recognizing and **pinpointing the location of leaks**, including line breaks; such tools could include a real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines.*



Scope and Applicability

PHMSA Initial Response – Gas Pipelines

- By requiring pressure monitoring upstream and downstream of rupture-mitigation valves, ruptures can be better detected and isolated. **However, mandatory installation of leakage detection sensing technology on either transmission or distribution pipelines is outside the scope of the NPRM.**
- The pressure monitoring equipment required by this rule can also be integrated into a future leak detection system.
- PHMSA will continue to advance remote leak detection technology through its R&D program with a view toward future rulemaking.
- For distribution pipelines, PHMSA will review existing leakage survey requirements in § 192.723 to strengthen leak survey requirements (e.g, more frequent surveys and account for advancement in technology) and repair criteria.
- For gas transmission pipelines, section 192.706 already requires leak surveys twice per year for Class 3 locations and quarterly for Class 4 locations.
- PHMSA will review this matter to identify any code sections for gas leakage monitoring that should be strengthened.

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[cont.]



Scope and Applicability

PHMSA Initial Response – HL Pipelines

- Since 2002, HL pipeline operators must evaluate and install leak detection systems for high consequence areas.
- In addition, new requirements in § 195.444 were promulgated in October 2019 to require that all HL pipelines have an effective system for detecting leaks in accordance with §§195.134 or 195.452, as appropriate.
- Also, HL pipelines must patrol for leaks every 3 weeks in accordance with § 195.412.
- PHMSA will monitor these requirements and leakage technology improvements to assure that current requirements adequately address the risk of leaks on HL lines.



Scope and Applicability

Public Comments:

- Clarify applicability of Rupture Mitigation valve requirements to gas distribution lines.

PHMSA Response:

- Rupture Mitigation valve requirements in § 192.179 and § 192.634 specifically apply to gas transmission lines and not gas distribution lines.
- The only new (amended) requirements in this rule that would apply to gas distribution systems are contacting 9-1-1 call centers [§ 192.615(a)(2), & (a)(8) and (a)(6), as applicable] and post-incident lessons learned [§ 192.617(a) & (b)].



- **Specific NPRM comments are addressed as follows:**
 - Rupture Mitigation
 - Definition of Rupture
 - 10-minute rupture identification
 - 40-minute valve closure timeframe (rupture isolation)
 - Rupture Mitigation Valves
 - Valve technology
 - Valve spacing
 - Valve location
 - Valve status monitoring
 - Class Location requirements
 - Maintenance Requirements
 - Failure Investigations
 - Communications with 9-1-1



Rupture Definition

Rupture Definition - Public Comments:

- Do not define ‘rupture’ using quantitative release criteria (i.e., 10 % pressure drop in 15 minutes) that are impractical and do not account for differences in system operation and monitoring capabilities.
- Consider allowing operators to establish specific rupture notification criteria suitable for the specific aspects of each pipeline rather than establishing universal criteria.
- Clarify and distinguish between the meanings of the terms ‘rupture identification’ and ‘notification of potential rupture.’
- Rupture definition in § 192.3 should be limited to transmission pipelines.
- Align definition of rupture with incident report definition.
- Adjust definition of rupture to account for technically infeasible detection sensitivities.



Rupture Definition

PHMSA Response:

- The intent of the definition is to provide a standard for operators to consistently and promptly initiate rupture mitigation measures and notify emergency responders.
- The proposed rule already allows operators to adopt a standard that differs from a 10% pressure drop in 15 minutes by documenting a higher flow rate change or higher pressure-change threshold for rupture identification to account for pipeline-specific parameters.
- Operators may implement this change **without** advance notification to PHMSA. PHMSA will consider committee recommendations for editing the definition as shown on the next slide.
- PHMSA will consider the comments to clarify terminology and improve understanding and readability of the final rule.
- PHMSA will adjust incident reporting forms to align with the final rule.

[cont.]



Rupture Definition

PHMSA Response: (suggested definition for Committee consideration)

Notification of Potential Rupture means any of the following events that involve an unintentional and uncontrolled release of a large volume of gas transmission/HL from a pipeline:

- (1) A release of gas/HL observed or reported to the operator by its field personnel, nearby pipeline or utility personnel, the public, local responders, or public authorities, and that may be representative of an unintentional and uncontrolled release event meeting paragraphs (2) or (3) of this definition is observed or reported to the operator;
- (2) The operator observes an unanticipated or unplanned pressure loss outside of the pipeline' normal operating parameters, as defined in the operator's procedures. If the operator establishes a threshold that is greater than a 10 percent pressure loss, occurring within a time interval of 15 minutes or less, the operator must document the need for a higher pressure-change threshold due to pipeline flow dynamics caused by fluctuations in gas/HL demand; or
- (3) The operator observes an unexplained flow rate change, pressure change, instrumentation indication, or equipment function that may be representative of an event meeting paragraph (2) of this definition.

Note: Notification occurs when a rupture, as defined in this section, is first observed by or reported to pipeline operating personnel or a controller.

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10-Min. Rupture Identification Timeframe

Timeframe - Public Comments:

- The decision to shut down a pipeline has serious implications and should not be rushed to meet a 10-minute threshold.
- Feasibility of a 10-minute deadline is dependent on location. For pipelines in remote areas, a 10-minute deadline could require operators to treat some operational events as ruptures.
- Remove the 10-minute rupture identification requirement while retaining the overall 40-minute shut-off timeframe.



40-Min. Valve Closure Timeframe

Timeframe - Public Comments:

- NTSB and PST expressed concern that a 40-minute timeframe may be too long for ASV and RCV and would not provide sufficient mitigation capability.
- PST further requests that PHMSA provide technical justification for the maximum shutdown time limit.
- PST commented that a 30-minute shutdown timeframe might also be reasonable and that some spill response plans for hazardous liquid lines claim that failures isolated within 15 minutes constitute an operator's worst-case discharge.
- Industry Associations commented that the 40-minute performance standard is not appropriate or practical for existing pipelines, especially in rural and remote locations and recommended that the 40-minute standard be applied only to HCAs and Class 3 and 4 locations. [cont.]



40-Min. Valve Closure Timeframe

Timeframe - Public Comments:

- Extend the 40-minute shut-off period to 60 minutes.
- Remove 40-minute closure timeframe for manual valves.
- Require documentation of the response activities occurring within the 40-minute timeframe.
- Allow operators to specify maximum detection and shut-off timeframes individually for each pipeline within O&M procedures.
- Provide for “other technology” type notification for operators to establish valve closure timeframes longer than 40 minutes.



Rupture Mitigation

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Changing the definition of ‘rupture’ as recommended by PHMSA staff during this meeting and as presented in the slides.
- Eliminating the prescriptive 10-minute rupture identification requirement.
- **Reducing the mandatory rupture mitigation valve maximum closure time from 40 minutes to 30 minutes (while maintaining the requirements for operators to close valves as soon as practical).**
- Allowing manual valves, in non-HCA remote Class 1 locations only, to exceed the 30-minute closure time requirement if the operator submits a notification and demonstrates that installing an ASV or RCV is economically, technically, or operationally infeasible.
- Revising applicable sections to eliminate duplication and improve readability.



Rupture Mitigation Valves

General - Public Comments:

- Commenters requested that PHMSA consider whether it is appropriate to include gas/HL gathering lines and, if so, in the case of gas gathering whether it should apply to Type A, Type B, or both.
- Industry trade organization commented that § 4 of the Act is limited to transmission pipelines only and gathering lines should be exempted.
- Commenters requested the following broad exceptions:
 - Low stress pipelines (MAOP below 30% SMYS)
 - Pipelines with PIR less than 150 feet
 - Outside HCAs
 - Class 1 and 2



Rupture Mitigation Valves

Replaced Segment – Public Comments:

- PHMSA should clarify that operators are not required to install new valves when replacing less than two miles of pipe, with the exception of replacements covered by § 192.610.
- Clarify the term “entirely replaced.” Does a 2-mile replacement segment mean valves are required for the entire pipeline or just the 2-mile replaced segment?
- Clarify in § 192.179 that maintenance and integrity management replacements less than two miles (not due to class change under § 192.610) do not require new or upgraded rupture mitigation valves.
- Multiple public commenters request to reduce length to include pipe replacement > 1-mile sections.
- PST request to reduce length to include pipe replacement from 2 miles to 600 feet of pipe being replaced within 1,000 continuous feet.



Rupture Mitigation Valves

Valve Technology – Public Comments:

- Modify § 192.634(b) to allow the use of additional technologies and practices.
- Expand list of approved technology to include:
 - Manual valves (normally closed/locked) at crossovers
 - Check valves on the downstream end of shut-off segment
 - Check valves at laterals
 - Locally actuated automatic shut-off valves
- NTSB requests additional restrictions on the use of manual valves, including PHMSA notification with technical, safety, and feasibility evaluation.
- PST requests to clarify what criteria would be needed to justify use of manual valves based on economically, technically, or operationally infeasible, with emphasis on economically infeasible.



Rupture Mitigation Valves

Implementation Period – Public Comments:

- Change implementation period for new construction to 24 months (from 12 months).
- Change the timeframe to activate Rupture Mitigation valve following completion of construction from 7 days to 14 days; some commenters asked that this requirement be completely deleted.



Rupture Mitigation Valves

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Incorporating notification requirements of § 192.18 into the final rule.
- Specifying that the **proposed rule would not apply to Type B gas gathering pipelines.**
- Revising the final rule to designate a valve on crossover piping that is locked and tagged closed in accordance with operating procedures as a rupture mitigation valve.
- Revising the final rule to address applicability to multiple replacements that, in the aggregate, **exceed 2 miles in 5 contiguous miles.**
- Adding specificity on standards for PHMSA review of ‘other technology’ and manual valve notifications.

[cont.]



Rupture Mitigation Valves

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Changing the timeframe to activate Rupture Mitigation valve after completion of construction from 7 days to 14 days.
- The rule applies to: **[not voting items]**
 - Type A Gas Gathering or Rural Regulated Gathering (HL)
 - Non-HCA
 - <30% SMYS
 - PIR < 150 ft.



Valve Spacing & Location

Valve Spacing – Public Comments:

- Clarify that locations outside of HCA's do not require rupture mitigation valves unless the replacement project involves a valve.

PHMSA Response:

- The rupture mitigation valving requirements in non-HCA locations (HL) and non-HCA Class 1 & 2 locations (gas) were intended to only apply to new construction and those replacement projects, two miles or greater in length, involving a valve. This is unlike the requirements affecting HCA's which require upstream and downstream automated valves for new construction and two-plus-mile replacements, regardless of whether the project involves a valve installation.
- Therefore, PHMSA will clarify in the final rule that non-HCA locations do not require rupture mitigation valves unless the replacement project involves a valve (i.e., an “opportunistic” approach).



Valve Spacing & Location

Valve Spacing – Public Comments:

- NTSB requests that PHMSA justify the technical basis for valve spacing intervals.
- PST expressed concern for 15- and 20-mile spacing as too far, especially for large diameter pipelines.
- PST requests clarification that new valve spacing requirements would be equal to or more stringent than currently required valves.
- Revise § 192.179 to clarify that Class 1 and Class 2 locations outside of HCAs do not require rupture mitigation valves unless the replacement project involves a valve (i.e., “opportunistic” approach).
- HL industry did not support the use of prescriptive valve spacing standards for HCAs (15 miles) and non-HCAs (20 miles).

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[cont.]



Valve Spacing & Location

Valve Spacing – Public Comments:

- API commented to align spacing for HVL segments with Canadian standards, using approximately 10-mile spacing with allowance for up to a 25% tolerance from the specified valve spacing to account for operational, access, and maintenance restrictions.
- Clarify ‘flood plain.’ Use of 100-yr flood plain was suggested.
- Clarify the 1-mile limitation on water crossings if the location is still within the flood plain.



Valve Status Monitoring

Valve Status Monitoring – Public Comments:

- Clarify remote monitoring of ASV status is not required.
- Where valve status is not available, allow either pressure OR flow monitoring in lieu of valve status.
- Clarify if remote flow/pressure monitoring is required for manual Rupture Mitigation valves following closure.
- Remove the requirement for continuous monitoring at the site of a manual Rupture Mitigation valve for best use of operator personnel.



Valve Spacing, Location, Status Monitoring

- **In light of comments received from the NPRM, PHMSA recommends the Committee consider:**
- Revising the rule to clarify that replacement projects in Class 1 and Class 2 locations outside of HCAs (gas) and in segments that could not affect an HCA (HL) do not require rupture mitigation valves unless the replacement project involves a valve (i.e., “opportunistic” approach).
- Specifying that §192.634(b) does not apply to Class 1 and Class 2 pipelines outside HCAs and that spacing requirements in § 192.634 apply to replacement projects covered by § 192.179.
- Specifying in §§ 192.634(b) & 195.418(b) that the shut-off segment must contain the new or replaced Class 3, 4, or HCA segment.
- Specifying that rupture mitigation valves would not be required at the downstream termination of the pipeline.

[cont.]



Valve Spacing, Location, Status Monitoring

- **In light of comments received from the NPRM, PHMSA recommends the Committee consider:**
- Specifying that ASV status need not be monitored if the operator can monitor pressures or flows to be able to identify and locate a rupture (similar to manual valves).
- Specifying that operational block valves would be permitted within a shut-off segment and rupture mitigation valves need not be the nearest valve to the shutoff segment.
- Specifying 100-year flood plain at HL water crossings.
- Adding the 25% tolerance to the spacing for HVL lines and other HL lines in HCAs.
- PHMSA believes a 20-mile maximum spacing for non-HCA lines is appropriate. **[not a voting item.]**
- Add a notification requirement to allow HL operators to obtain valve spacing relief on a case-by-case basis.



Class Location Changes

Public Comments:

- Industry commented that proposed § 192.610 would shift resources towards a minimal amount of pipeline mileage and would inhibit higher-value, system-wide safety enhancements and recommended:
 - Allow operators to automate existing valves instead of installing new valves for pipe replacements between 2,000 ft and 2 miles (distance between valves not to exceed 20 miles, i.e., Class 1 spacing).
 - For pipe replacements ≥ 2 miles, valve spacing required by § 192.179 and § 192.634, as appropriate, would apply.
 - Exclude short pipe replacements less than 2,000 feet.



Class Location Changes

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Valve spacing proposed in § 192.634 would be applicable to class location changes under § 192.610.
- Excluding pipeline replacements less than 1,000 ft. within one contiguous mile.
- For pipe replacements due to Class Location between 1,000 ft and 2 miles, allow operators to automate existing valves with RCVs/ASVs and pressure sensors (with maximum spacing of 20 miles) consistent with the operational capability specified in § 192.634.



Maintenance Requirements

Maintenance – Public Comments:

- Clarify that valves do not need to be fully closed during drills.
- Tabletop drills may be used to satisfy response time drills.
- Operators request the following changes/clarifications regarding maintenance/repair timeframes:
 - When a drill indicates that a rupture-mitigation valve does not meet the performance requirements, operators requested extension of timeframe revise response effort to achieve compliance from 6 to 12 months.
 - Multiple operators requested extension of timeframe to repair or replace inoperable valves from 6 to 12 months.

[cont.]



Maintenance Requirements

Maintenance – Public Comments:

- Multiple operators requested extension of the 7-day timeframe to identify appropriate alternative compliant valves (when response time cannot be validated or valves are inoperable), suggesting 10, 14, or 30 days.
- Allow a notification process to inform PHMSA when timeframes are not practicable.
- Clarify that alternate compliance valves (i.e., valves that comply with shut-off time requirement) would not be required to comply with the spacing requirement.



Failure Investigation

Failure Investigation - Public Comments:

- Use defined terms (remove “failure” in favor of “incident”).
- Specify that implementation of lessons learned and additional P&M measures after accidents are required only where reasonable and practicable.
- Remove requirement to investigate failures because it is duplicative with incident reporting requirements.
- Specify that implementation of lessons learned and additional P&M measures after incidents are required only where reasonable and practicable.

[cont.]



Failure Investigation

Failure Investigation – Public Comments:

- Clarify which incident investigation requirements apply to gas distribution lines.
- Associations support lessons learned for gas distribution pipelines.
- Only require senior executive official certification of the final report.
- Remove requirements for senior executive official certification of report.
- Remove risk analysis certification by senior executive officer based on lack of hands-on involvement with risk assessment (subjective decision vs. fact-based assertion).



Maintenance & Failure Investigation

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Removing the duplicate requirement for point-to-point testing (duplicates current requirements in § 192.631 and § 195.446).
- Clarifying that implementation of lessons learned and additional P&M measures after incidents are required only where reasonable and practicable.
- Clarifying that annual drills apply to manually-operated valves only (either by manual operation of a local actuator or by hand), not to ASVs or RCVs.
- Specifying that 25% valve closure is sufficient to demonstrate successful completion of the response time validation drill.

[cont.]



Maintenance & Failure Investigation

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Allowing notification by operators that justify a need to extend the timeframes for repair and establishing alternate rupture mitigation valves.
- Specifying that alternate compliant valves would not be required to comply with spacing requirements.
- Specifying that general failure investigations would apply to distribution lines but that failure investigations specific to rupture mitigation valves would not apply to distribution lines.



Communications with 9-1-1

Public Comments:

- NTSB and PST reminded PHMSA that NTSB Rec. P-11-9 calls for all gas transmission and distribution pipelines to be required to contact 9-1-1 to report a pipeline rupture. Specifically, the NPRM's clarifications could possibly exclude some ruptures, such as systems or portions of systems which do not contain "Rupture Mitigation" valves, from the notification requirement.
- Industry associations support PHMSA requiring distribution pipeline operators to liaise with and notify public safety answering points.
- Include provisions for pipelines not located within 9-1-1 areas or that have no public safety answering points.
- Allow operators to liaise with appropriate local emergency coordinating entities as a means to communicate with first responders.
- Revise liaison audience to more specific, actionable criteria (i.e. agencies with primary jurisdiction for a pipeline incident).
- Allow emergency planning and response coordination with lead agency if recognized by state and local law.

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Communications with 9-1-1

In light of comments received from the NPRM, PHMSA recommends the Committee consider:

- Stating that communication with 9-1-1 applies to all ruptures, without exception.
- Limiting § 192.615(a)(2) & § 195.402(c)(12) to emergency preparedness activities and § 192.615(a)(8) & § 195.402(e)(7) to emergency response activities.
- Including provisions for pipelines not located within 9-1-1 areas or that have no public safety answering points.
- Stating that operators may establish liaison with the appropriate local emergency response coordinating agencies, such as 9-1-1 emergency call centers or county emergency managers, in lieu of communicating individually with each fire, police, or other public entity.



Any Clarifying Questions

