Distribution Integrity Management: Guidance for Master Meter and Small Liquefied Petroleum Gas Pipeline Operators

Pipeline Safety: Integrity Management Program for Gas Distribution Pipelines

Company Name:
Property Name:

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Office of Pipeline Safety
Pipeline and Hazardous Materials Safety Administration (PHMSA)
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Distribution Integrity Management: Guidance for Master Meter and Small Liquefied Petroleum Gas Pipeline Operators

This document provides guidance to help master meter operators and small LPG operators (i.e., those serving fewer than 100 customers from a single source) implement the requirements of subpart P of Part 192. Operators of larger distribution pipelines should refer to the Gas Piping Technology Committee (GPTC) guidelines.

PHMSA has developed guidance documents for operators of small gas and LPG systems to provide an overview of pipeline compliance responsibilities under the Federal pipeline safety regulations. The "Small Natural Gas Systems Manual" and "Small LP Gas Systems Manual" are designed for the non-technically trained person who operates a master meter system, a small municipal system, or small independent system, and these documents are available in the PHMSA electronic library at http://phmsa.dot.gov/pipeline/guidance . The PHMSA DIMP Enforcement Guidance is also a good source of guidance for all operators, and it is available at http://www.phmsa.dot.gov/foia/e-reading-room .

Distribution Integrity Management Plan
Master meter distribution operators and small LPG distribution operators (serving fewer than 100 customers from a single source) should complete the actions described in the following paragraphs. Retain this completed document and any documentation and records generated through actions suggested in this document. This collection of documents will become your integrity management plan.

Note: If the Company owns multiple properties and chooses to use this plan, an integrity management plan shall be completed for each property.

(1) Knowledge of system infrastructure

(a) Identify the approximate date the system was placed in service and/or the date the system was acquired.

(b) Identify the number of units with gas services.

(c) Identify the people responsible for the plan, to include the plan administrator, subject matter experts, those responsible for carrying out maintenance activities, and those responsible for carrying out the requirements in this plan.

(d) Identify the approximate location of system piping and equipment on maps, drawings, or sketches using best-available information.

- Update the maps, drawings, or sketches to show the type of pipe and equipment (i.e., bare steel, galvanized steel, coated steel, copper, plastic, cast iron, line valves)
- Record the location, size and type of pipe (i.e., material of construction), and type of equipment (if applicable) from any new installations of pipe or equipment.
- Plan to update the maps, drawings, or sketches as better information about the location of the system becomes available through other work (e.g., repairing leaks, excavations to install other utilities).

(e) Identify dates of installation, pressures of the pipelines, and odorant levels of the pipelines. (Keep copies of the required odorant testing records from your supplier).

(f) Describe the operation of the system.

(g) Identify any missing information there may be or any additional information needed.

(h) Describe the method(s) to be used to gain the missing or additional information.

(i) Include a list of all documents, along with location of the documents that were used to gain the knowledge of the system and the threats to the system. Also have a list of the documents and records to be used to keep the plan up to date.

(2) Identify threats

Consider the following questions for each threat category and check all that apply. Each threat category including at least one check will be considered a threat of concern to be addressed under the distribution integrity management program. PHMSA Advisory Bulletins may also be reviewed to identify threats, and listing of those applicable to distribution systems are listed at http://primis.phmsa.dot.gov/dimp/resources.htm .

(a) Corrosion

- ☐ Does the system include metallic pipe that is not protected from corrosion (i.e., coated or uncoated metallic pipe that lacks appropriate corrosion protection)
- ☐ Does the system include non-metallic pipe but includes metallic fittings or connectors that are not protected from corrosion?
- ☐ Does the system include cast iron or ductile iron pipe?
- ☐ Does the system include above ground piping?
- ☐ Has there been leakage due to the corrosion of facilities? If so, is the pipe still in service?

(b) Natural Forces

- ☐ Are other utilities using your above ground pipeline as a grounding point? Note that above ground gas services should NOT be grounded.
- ☐ Are portions of the system susceptible to snow or ice slide impacting above ground piping, meter and regulator sets, or meter header piping?
- ☐ Are exterior above-ground portions of the system potentially subject to other forces of nature (e.g., earthquakes, floods or waterway scouring, severe flooding leading to uprooting of near-by trees) due to unique local weather or geologic conditions?
- ☐ Are buried portions of the system located in areas where soil movement or subsidence is likely (e.g., earthquakes, landslide, flood-induced erosion)?
- ☐ Are there large trees near the pipeline that could be uprooted by high winds and whose roots could be entangled with and damage the pipeline if that happens?
- ☐ Could frost heave impact buried piping (cast iron or ductile iron piping)?
- ☐ Is the system located in an area with greater than usual exposure to the possibility of wildfires?
- ☐ Has there been leakage due to natural forces?

(c) Excavation Damage

- ☐ Are portions of the system buried in areas where digging might occur without your knowledge or control?
- ☐ Has there been damage to underground facilities caused by excavation?
- ☐ Are you a member of the local one-call notification center?

(d) Other outside force damage

- ☐ Are, above-ground portions of the system located in areas where they could be subject to damage from vehicles or other expected activities?
- ☐ Is there a history of vandalism to the pipeline system, or is the local area subject to vandalism of a kind that could damage the pipeline system?
- ☐ Has there been leakage due to vehicular damage, vandalism, fire, or explosion?

(e) Material or welds

- ☐ Has the manufacturer of your piping or fittings (appurtenances) contacted you regarding material defects?
- ☐ Have you contacted the gas supplier for information on the quality of gas supplied to your property and the effect of any contaminants to your property?
- ☐ Has there been leakage due to material or weld defects such as pipe cracking or breaking on the body of the pipe or at the joints?

(f) Equipment

- ☐ Does the system include any equipment other than valves, meters, and service regulators?
- ☐ Has there been leakage due to dried pipe dope or caulk on couplings or packing in valves?
- ☐ Has there been leakage due to valve, meter, or regulator failures?
- ☐ Have failures been experienced due to leakage in seals or gaskets?

(g) Operations

- ☐ Are operator personnel required to adjust any equipment other than valves that are a permanent part of the system?
- ☐ Have failures been experienced due to workmanship defects?
- ☐ Are personnel performing operation, maintenance, and inspection tasks on the system qualified to perform the respective tasks per 49 CFR Part 192, Subpart N?

(h) Other Concerns

- ☐ Has there been leakage due to any issues not noted above?

(3) Evaluate and prioritize risk

Risk considers both the relative likelihood of an accident occurring and the consequences that would result if it did.

(a) Consider likelihood. Leak and incident data from gas distribution systems has been used to determine the following relative likelihood that threats might cause a leak or accident on distribution pipelines (from most-likely to cause a problem to least-likely):

1. Excavation damage
2. Corrosion
3. Natural forces
4. Material or welds
5. Other outside force damage
6. Operations
7. Equipment
8. Other Issues

Arrange this list based on the number of leaks in each category first, then by the order above. If the system has not experienced any leaks attributable to a particular cause, keep the above ranking. Any category where there has been no leakage is a potential threat. This is your ranked list of threats. This ranking should be recalculated when significant changes occur to include all new leaks found and any new information that was gathered.

(b) Consider consequences. Are the areas in which the pipeline is located generally similar in terms of the number of people who would be present at most times (e.g., residences of similar size, no schools)? If so, your ranked list of threats becomes your ranked list of risks. Divide your list into 3 groups of roughly equal size, group 1 consisting of the lower-numbered (higher-ranked) threats on your list, group 2 consisting of those in the middle, and group 3 consisting of the higher-numbered. Continue to section (4).

If there are areas in which more people would be near the pipeline at most times, or areas that are difficult to evacuate (e.g., commercial buildings, retirement centers, assisted living, schools, etc.), divide the pipeline into two regions, one including areas where more people would be present (call this the higher consequence region), and the other areas where there would be fewer people (call this the lower consequence region). Identify these areas on the maps, drawings, or sketches prepared under paragraph 1 above.

Reconsider your list of threats to determine whether they exist in both regions. For example, there may be equipment other than valves, meters, and service regulators in the higher consequences region, but not in the lower. In this case, the equipment threat would not exist in the lower consequences region. Another example would be if there is steel piping in the higher consequence region, but not in the lower. In this case, the corrosion threat would exist in the higher consequence region and not in the lower consequence region. Rank the threats specific to each region using the same information from (a) in this section.

Finally, group the risks together based on data available and the groupings below. This becomes the risk ranking. As a reminder, any threat where there has been no leakage should be considered a potential threat and therefore should remain in the risk ranking. (These groups have been developed from distribution pipeline leak and accident data to represent those combinations of highest to lowest importance for implementing mitigating actions).

Group 1:

Excavation damage – high and low consequence regions
Corrosion – high consequence region
Natural forces – high consequence region
Material or welds – high consequence region

Group 2:

Corrosion – low consequence region
Other outside force – high consequence region
Natural forces – low consequence region
Equipment – high consequence region
Operations – high consequence region

Group 3:

Material or welds – low consequence region
Other outside force – low consequence region
Equipment – low consequence region
Operations – low consequence region

(4) Identify and implement measures to mitigate risks

For all risks in your ranked list, verify that actions are being taken or requirements are in place intended to protect against the threat. This should include, at a minimum, the actions required by Part 192, the additional general monitoring actions listed below, and for each identified threat (or threat-region combination) of concern, the actions listed for that threat. Additional monitoring and threat-specific actions should be focused first on threats (or threat-region combinations) in group 1, then on group 2, and finally on group 3. Be sure to keep records of the dates each measure is conducted along with any notes or findings from performing the measure.

(a) General Monitoring, additional patrols:

(i) Periodically walk the course of pipelines that have experienced problems in the past, to look for signs of damage and to smell for gas.

(ii) Periodically walk the lines to check for active excavation or signs of excavation of which you were unaware.

(iii) Monitor more frequently any portions of the system experiencing frequent leakage.

(b) Corrosion

(i) Replace or cathodically protect steel pipe installed after August 1, 1971.

(ii) Coat and cathodically protect all areas of metallic pipe experiencing active corrosion (as indicated by a history of corrosion-caused leaks or current inspection records – see (vi) below).

(iii) If a section of the pipeline is leaking at a high rate, or found to be deteriorating due to corrosion, replace the section of pipe.

(iv) Consider increasing frequency of inspections, including the following:

- Monitoring and testing of cathodic protection.
- Inspection of rectifiers
- Inspection of above-ground steel pipe
- Leak surveys

(c) Natural Forces

(i) Conduct more frequent patrols to identify conditions that may adversely affect pipe or components, especially following - lightning storms, tornadoes, earthquakes, landslides, flood-induced erosion, or high winds leading to uprooting of near-by trees.

(ii) Take actions to eliminate the hazard or reduce the threat.

(d) Excavation Damage

(i) Physically control access to the pipeline, or

(ii) Implement a damage prevention program including the following elements:

(1) A means of receiving and recording notification of planned excavation activities.

(2) Requirements to locate and mark the pipe in areas where buried piping exists and excavation is planned.
(3) Provision for actual notification of persons who give notice of their intent to excavate in areas where buried pipe is located, of the type of temporary markings and how to identify them.
(4) Provision for inspection of pipelines during and after excavation if you have reason to believe they could be damaged.

(e) Other outside force damage

(i) Identify using signs and/or distinctive colors those portions of the system potentially subject to damage.
(ii) Install vehicle barriers as appropriate.
(iii) Conduct patrols to identify at-risk pipe and components and mitigate the risk to the pipe using means such as in (i) and (ii) above.
(iv) Implement measures to reduce the opportunities for vandalism to affect the safe operation of the system

(f) Material or welds

(i) Replace small diameter cast iron or ductile iron pipe not adequately supported.
(ii) Replace brittle plastic pipe or other materials unsuitable for gas service based on your leak history.
(iii) Implement the recommended actions in any notice received from a pipe/fitting manufacturer regarding material defects.
(iv) Where the system has a history of problems with pipe or fittings, replace the pipe or fittings when practical (e.g., when excavations for other reasons expose the pipe).

(g) Equipment

(i) Replace any component in the system that has experienced a number of failures or is failing.
(ii) Dope/caulk/pack components needing maintenance.

(h) Operations

(i) Implement a program to qualify personnel who perform covered tasks under 49 CFR Part 192, Subpart N.
(ii) Ensure personnel are aware of the precautions to take to prevent over-pressuring a low pressure system, when stopping the flow of gas, and to prevent unsafe gas-air mixtures.

In addition, the operator should implement any actions recommended by the appropriate regulatory agency in advisory bulletins or other communication tool.

(5) Measure performance, monitor results, and evaluate effectiveness

(a) Keep a record of the number of leaks either eliminated or repaired including the date, the apparent cause of the leak, the repair method, and the person or persons performing the repair.

(b) Keep a record of any instances in which the system is damaged by excavation.

(c) Keep an accurate record of replacing any materials and components from the gas system. Record the type of pipe/component that was removed and the type/component that replaced it. Update the maps with the new information.

(6) Periodic Evaluation and Improvement

(a) Re-answer the questions in the threat identification and perform a new evaluation and ranking of risks whenever changes are made to the pipeline or significant changes occur in the local environment to determine if threats of concern have been eliminated or if new risks have been introduced.

(b) Modify the mitigative measures in Section (4) as appropriate.

(c) Review this document at a minimum of every 5 years.

(d) Keep all documents and records, including superseded IM plans for a minimum of 10 years.

(7) Records

(a) A written DIMP plan in accordance with 49 CFR Part 192, Subpart P, including superseded IM plans, must be maintained for a period of at least 10 years

(b) Documents supporting threat identification must be maintained for a period of at least 10 years

(c) Documents showing the location and material of all piping and appurtenances that are installed after the effective date of the operator's IM program and, to the extent known, the location and material of all pipe and appurtenances that were existing on the effective date of the operator's program must be maintained for a period of at least 10 years.

(8) Report results

Master Meter distribution system reporting requirements

(a) Consistent with the exclusions in 49 CFR §191.9 (incident reports) and §191.11 (annual reports), operators of master meter distribution systems need not submit incidents or annual reports that contain DIMP related performance measures. However, a performance measure (the number of leaks eliminated or repaired on its pipeline and their causes) is required to be maintained by the operator and available to Regulators upon request.

Small LPG distribution system reporting requirements

(a) Consistent with the exclusions in 49 CFR §191.11 (annual reports), operators of small LPG distribution systems need not submit annual reports that contain DIMP related performance measures. However, a performance measure (the number of leaks eliminated or repaired on its pipeline and their causes) is required to be maintained by the operator and available to Regulators upon request. Operators of small LPG distribution systems are required in 49 CFR §191.9 (incident reports) to submit incident reports when criteria in 49 CFR §191.3 (definitions) are met.