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

Pipeline Safety: Integrity Management Program for Gas Distribution Pipelines

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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.

Distribution Integrity Management Plan
Master meter and small LPG distribution operators should complete the actions described in the following paragraphs. Retain this document and any records generated through actions suggested in this document. This collection of documents will become your integrity management plan.

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

- 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).
- Arrange to update the maps, drawings, or sketches to show the kind of pipe and equipment (i.e., bare steel, galvanized steel, coated steel, copper, plastic, cast iron, line valves) and
- 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.

(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.

(a) Corrosion

- Does the system include of steel pipe that is not protected from corrosion (e.g., pipe that lacks coating, wrapping or galvanic protection?)
- Does the system include of non-steel pipe but include steel fittings or connectors that are not protected from corrosion?
- Has the system experienced leaks from corroded pipe
- Does the system include cast iron pipe?

(b) Natural Forces

- Are exterior above-ground steel pipe/equipment not grounded (i.e., protected from lightning)?
- 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 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?

(c) Excavation Damage

- Are portions of the system buried in areas where digging might occur without your knowledge or control?

(d) Other outside force damage

- Are exterior, above-ground portions of the system located in areas where they could be subject to damage from vehicles or other expected activities?
- Is the system located in an area with greater than usual exposure to the possibility of wildfires?
- 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?

(e) Material or welds

- Has any of your piping experienced frequent leakage?

- Has the manufacturer of your piping or fittings (appurtenances) contacted you regarding material defects?

(f) Equipment

- Does the system include any equipment other than valves, meters, and service regulators?

(g) Operations

- Does system operation require the manipulation of any equipment other than valves that are permanently installed as part of the system?

(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

Delete from this list any threat that does not have at least one box checked in section 2 above. This is your ranked list of threats.

(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 being the lower-numbered (higher-ranked) threats on your list, number 2 those in the middle, and number 3 the higher-numbered. Continue to section (4).

If there are areas in which more people would be near the pipeline at most times (e.g., commercial buildings or schools), 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.

Consider your remaining threat-region combinations in the following groupings. (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.

(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.

(b) Corrosion

(i) Coat and cathodically protect steel pipe installed after August 1, 1971.
(ii) Coat and cathodically protect all areas of steel pipe experiencing active corrosion (as indicated by a history of corrosion-caused leaks or current inspection records – see (vi) below).
(iii) Annually monitor and test cathodic protection.
(iv) Inspect rectifiers six times per year.
(v) Inspect above-ground steel pipe every three years. Inspect annually for pipe with a history of corrosion-caused leaks.
(vi) Inspect buried steel pipe exposed by any digging for evidence of corrosion.

(c) Natural Forces

(i) Conduct more frequent patrols to identify conditions that may adversely affect pipe or components, especially following lightning storms, earthquakes, landslide, 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.

(f) Material or welds

(i) Replace small diameter cast iron pipe not adequately supported.
(ii) Replace brittle plastic pipe or other materials unsuitable for gas service.
(iii) Implement the recommended actions in any notice received from a pipe/fitting manufacturer regarding material defects.
(iv) Monitor more frequently any portions of the system experiencing frequent leakage.
(v) 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) Implement a program to qualify personnel who operate equipment under 49 CFR Part 192, Subpart N.

(h) Operations

(i) Implement a program to qualify personnel who operate equipment 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.

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

(a) Keep a record of the number of hazardous leaks either eliminated or repaired including the date and the apparent cause of the leak.

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

(c) Keep a 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.

(6) Periodic Evaluation and Improvement

Revise this checklist 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. Modify the mitigative measures in paragraph (4) as appropriate.

(7) Report results

Consistent with the exclusions in 49 CFR §191.9 (incident reports) and §191.11 (annual reports), operators of master meter and small LPG distribution systems need not report performance measures.