Foreword
Introduction

This recommended practice is intended to address the emergence of larger diameter, higher pressure gas gathering lines in shale plays.

The provisions in this recommended practice are intended to work together and should not be considered in isolation. The provisions for the design, construction, testing, operation, and maintenance of rural gas gathering lines are not necessarily appropriate under different definitions.

Background

In August 2011, DOT published an advance notice of proposed rulemaking (ANPRM) asking for public comment on the need to change the federal pipeline safety standards for gas gathering lines in 49 C.F.R. Part 192. (Docket No. PHMSA-2011-0023; 76 Fed. Reg. 53,086). If a pipeline is an onshore gas gathering line, DOT's regulations require operators to determine if the pipeline meets the definition of a “regulated onshore gas gathering line”. Under the March 2006 final rule, regulated onshore gas gathering lines are limited to pipelines in more populated, Class 2, 3, or 4 locations. Onshore gas gathering lines in less populated, Class 1 locations are exempt from regulatory requirements.

In April 2016, DOT issued a notice of proposed rulemaking (NPRM) with potential changes to the regulations for onshore gas gathering lines (Docket No. PHMSA-2011-0023; 81 Fed. Reg. 20,721). The proposed changes included new definitions for onshore production and gathering operations and new safety standards for certain gas gathering lines in Class 1 locations. After submitting comments in response to the NPRM, the American Petroleum Institute (API) formed a working group to consider whether to develop a new recommended practice for the safe operation of large diameter onshore gas gathering lines in rural areas.
1 Scope

1.1 General

This recommended practice contains provisions relating to the design, construction, testing, corrosion control, operation, and maintenance of onshore gas gathering lines as defined in API RP 80. The requirements in the RP are applicable to pipelines > 12.75 inches outside diameter in Class 1 locations (3.1.4) or Class 2 locations (3.1.5) that are not regulated onshore gas gathering lines as defined in 49 CFR 192.8.

NOTE As of the time of publication of this document, RP 80, 1st Edition was incorporated by reference into US federal regulation (49 CFR 192). The 2nd Edition of RP 80 has not been incorporated by reference into US federal regulation (49 CFR 192). Users of this document may also need to reference the 1st Edition of RP 80.

1.2 Applicability

Annex A describes the sections of this RP and their applications.

1.2.1 New Pipelines

Except where otherwise noted, the provisions of this recommended practice apply to new pipelines.

1.2.2 Existing Pipelines

The design, construction, and testing provisions in Section 5 do not apply to existing pipelines. Except where otherwise noted, all other provisions in this RP apply to existing pipelines.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the reference document (including any amendment) applies.

API Recommended Practice 80, Guidelines for the Definition of Onshore Gas Gathering Lines

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1.1 active corrosion

Continuing corrosion, which, unless controlled, could result in a condition that is detrimental to public safety or the environment.

3.1.2 building intended for human occupancy

A residential, commercial, or industrial building that is intended to be regularly occupied by people, such as a house, apartment, store, or office, but not including a building intended to be used intermittently and solely for pipeline operations and maintenance activities.

3.1.3 class location unit

An onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous one-mile (1.6 kilometers) length of pipeline.

3.1.4 class 1 location

A class location unit that has 10 or fewer buildings intended for human occupancy.

3.1.5
class 2 location
Any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

3.1.6 component
Part of a pipeline other than pipe that is subject to system pressure.

3.1.7 existing pipeline
A pipeline placed into service before the adoption of this recommended practice by the pipeline operator.

3.1.8 maximum allowable operating pressure
MAOP
The maximum pressure at which a pipeline or pipeline segment may be operated.

See Section 7 for further details.

3.1.9 new pipeline
A pipeline that is placed into service, or an existing pipeline that is entirely replaced or relocated or at minimum a segment length which is practical to meet this recommended practice as justified by the operator, after adoption of this recommended practice.

3.1.10 pipe
A tube manufactured with metallic or non-metallic material.

3.1.11 pipeline
That which includes physical facilities through which hazardous liquids or gas moves in pipeline transportation, including pipe, valves, fittings, flanges (including bolting and gaskets), regulators, pressure vessels, pulsation dampeners, relief equipment, and other appurtenances attached to pipe, pumps and compressor units, metering stations, regulator stations, and fabricated assemblies.

3.1.12 potential impact circle
A circle of radius equal to the potential impact radius (PIR) as measured from the centerline of a pipeline.

3.1.13 potential impact radius
PIR
The radius of a circle calculated using Equation 1.

See Section 4.3 for further details.

3.1.14 other impacted site
A small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period (the days and weeks need not be consecutive) and freeways, interstates, or other principal 4-lanes or more arterial roadway.

3.1.15 recognized and generally accepted industry practices
Codes, standards, technical reports, or recommended practices that provide established methods for performing pipeline design, construction, testing, operation, or maintenance activities.

4 Risk Categorization

4.1 General
This section contains the provisions for determining whether a pipeline is a Type C or Type D gathering line.

4.2 **Type C and D Gathering Line Attributes**

Table 1 describes attributes for Type C and D gas gathering lines.

<table>
<thead>
<tr>
<th>Type</th>
<th>Diameter</th>
<th>MAOP (Metallic)</th>
<th>MAOP (Non-Metallic)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Any gathering line that is greater than 12.75” outside diameter up to and including 16”.</td>
<td>MAOP produces a hoop stress of 20 % or more of SMYS. If the stress level is unknown, an operator shall determine the stress level according to the applicable provisions in subpart C of 49 CFR 192 or use the MAOP limitation that applies to non-metallic lines (greater than 125 PSIG).</td>
<td>MAOP greater than 125 PSIG.</td>
<td>Operator may treat a pipeline that does not contain any buildings intended for human occupancy or other impacted site within a class location unit or potential impact radius (PIR) as determined in accordance with Section 4.3 as a Type D line</td>
</tr>
<tr>
<td>D</td>
<td>Any gathering line that is greater than 12.75” outside diameter.</td>
<td>MAOP produces a hoop stress of less than 20 % of SMYS. If the stress level is unknown, an operator shall determine the stress level according to the applicable provisions in subpart C of 49 CFR 192 or use the MAOP limitation that applies to non-metallic lines (equal to or less than 125 PSIG).</td>
<td>MAOP equal to or less than 125 PSIG.</td>
<td>A pipeline that is greater than 12.75” outside diameter up to and including 16” that an operator excludes under the potential impact radius (PIR) for Type C lines as determined in accordance with Section 4.3.</td>
</tr>
</tbody>
</table>

4.3 **Potential Impact Radius**
For gathering pipelines with an outside diameter of greater than 12.75” up to 16”, the operator may calculate the potential impact radius using Equation 1. For lines greater than 16” in outside diameter, the PIR is not used to determine whether the line is Type C or Type D.

### 4.3.1 Calculating PIR

The PIR of a gathering pipeline may be determined by Equation 1.

\[
    r = 0.73 \sqrt{pd^2}
\]

Where,

- \( r \) is the radius of a circular area in feet surround the potential point of failure
- \( 0.73 \) is the rich natural gas factor

**NOTE** The lean gas factor of 0.69 may be used when transporting lean gas

- \( p \) is the MAOP of the pipeline segment in pounds per square inch
- \( d \) is the nominal diameter of the pipeline in inches

#### 4.3.1.1 Natural Gas Factor

- **4.3.1.1.1** The rich natural gas factor of 0.73 shall be used in the potential impact radius calculation, unless the operator determines that the use of the lean natural gas factor of 0.69 is justified.
- **4.3.1.1.2** To justify the use of the lean natural gas factor in a potential impact radius calculation, an operator shall demonstrate that the gross heating value of the gas composition is less than or equal to 1100 Btu/cubic foot.
- **4.3.1.1.3** If an operator uses the lean natural gas factor in a potential impact radius calculation, appropriate documentation justifying that determination should be kept for the life of the pipeline.
- **4.3.1.1.4** If the quality of the gas changes from lean to rich gas, requiring a different gas factor, PIR shall be re-calculated for the new composition.

#### 4.3.2 Potential Impact Circle

The operator shall determine whether the potential impact circle contains either of the following:

- One or more buildings intended for human occupancy; or
- One or more other impacted sites.

- **4.3.2.1** In making a determination under Section 4.3, the potential impact circle extends axially along the length of the pipeline from the outermost edge of the first potential impact circle that contains either a building intended for human occupancy or an other impacted site to the outermost edge of the last contiguous potential impact circle that contains either a building intended for human occupancy or another impacted site.

- **4.3.2.2** Operators should consider potential inaccuracies in potential impact circle factors, including:
  - Centerline data
  - Surveying imagery
  - Geospatial information
  - Pipe diameter

#### 4.3.3 Periodic Surveillance

Operators should conduct periodic surveillance at intervals at least once every two calendar years, not to exceed 27 months, to determine if buildings intended for human occupancy or other impacted sites are located within the potential impact circle.

#### 4.3.4 Documentation
Operators shall document the means by which PIR was calculated and the attributes used to classify the pipeline as a Type C or Type D. This documentation shall be retained until the next PIR calculation is performed or the next periodic surveillance is conducted.

### 4.4 Class Location Unit Alternative to PIR

As an alternative to calculating PIR under Section 4.3, an operator of a gathering pipeline with an outside diameter of greater than 12.75" up to 16" may consider whether a class location unit contains either of the following when determining whether is line is Type C or Type D:

- One or more buildings intended for human occupancy; or
- One or more other impacted sites.

### 4.5 Risk Categorization Workflow

Figure 1 details a workflow which can assist the user determine a gathering line’s categorization.

#### Figure 1 – Risk Categorization Workflow

5 Design, Construction, and Testing for New Gathering Pipelines

5.1 General
This section contains design, construction, and testing provisions for new Type C or D gathering pipelines.

5.2 Design, Construction, and Testing for Type C Gathering Line Systems

5.2.1 Type C gathering line systems shall be designed, constructed, and tested in accordance with 49 CFR 192.9(d)(1).

5.2.2 An operator shall keep appropriate records documenting the design, construction, and testing of pipe and components for the life of the pipeline.

5.3 Design, Construction, and Testing for Type D Gathering Line Systems

5.3.1 General
An operator shall follow the requirements given in Sections 5.3.2 to 5.3.7 for Type D Gathering Line systems.

5.3.2 Materials
5.3.2.1 Materials for pipe and components shall:
- be capable of maintaining structural integrity,
- be compatible with product to be transported, and
- satisfy recognized industry standards.

5.3.2.2 An operator should keep appropriate records documenting the materials for pipe and components for the life of the pipeline.

5.3.3 Design
5.3.3.1 Pipe and components shall be designed in accordance with recognized and generally accepted industry practices to withstand internal pressures and external loads.

5.3.3.2 An operator should keep appropriate records documenting the design of pipe and components for the life of the pipeline.

5.3.4 Construction
5.3.4.1 A pipeline shall be constructed in accordance with recognized and generally accepted industry practices.

5.3.4.2 An operator should keep appropriate construction records for the life of the pipeline.

5.3.5 Cover
5.3.5.1 If a pipeline is buried at the time of installation, an operator should consider providing at least 30” of cover in normal soil and 18” of cover in consolidated rock.

5.3.5.2 If a pipeline is buried at the time of installation, an operator should consider providing additional cover or additional protective measures at rail, road, or water crossings.

5.3.5.3 If a pipeline is not buried at the time of installation, or a pipeline is buried with less cover than recommended in Section 5.3.5.1, an operator should consider implementing other measures to protect the pipeline from potential threats.

5.3.6 Location
An operator should keep appropriate records documenting the location of pipe and components for the life of the pipeline.

5.3.7 Testing
5.3.7.1 A pipeline shall be tested in accordance with recognized and generally accepted industry practices to establish MAOP.
5.3.7.2 Testing to establish MAOP for a component shall not be required if a component carries a pressure rating established in accordance with recognized and generally accepted industry practices, including a manufacturer’s certification.

5.3.7.3 Appropriate records documenting the medium, pressure, and duration of a test to substantiate MAOP should be kept for the life of the pipeline.

6 Corrosion Control on New and Existing Type C Gathering Lines

6.1 General

This section contains corrosion control and cathodic protection provisions for metallic Type C gathering lines and metallic piping or components on non-metallic Type C gathering lines.

For additional information on a corrosion control program, see 49 CFR 192 or ASME B31.8.

6.2 Implementation

The operator of a new pipeline shall implement the provisions of Section 6 within 12 months of completion of construction. The operator should implement the provisions of Section 6 within 36 months of determining that an existing pipeline is a Type C gathering line, unless the operator develops an implementation plan which justifies a later date.

6.3 External Corrosion Control for Buried or Submerged Pipelines

6.3.1 Cathodic Protection

6.3.1.1 General

A buried metallic pipeline shall have a cathodic protection system that is consistent with recognized and generally accepted industry practices, unless the operator demonstrates any of the following by tests, investigations, or experience:

- A corrosive environment does not exist,
- The pipe material is suitable for its design life without cathodic protection, or
- The installation of a cathodic protection system is impractical.

6.3.1.2 Test Stations

If a pipeline is under cathodic protection, the operator shall have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection.

6.3.1.3 Unprotected Pipelines

After performing the initial evaluation for a new or existing pipeline (see Section 6.25), an operator shall evaluate for active corrosion, a buried metallic pipeline that does not have a cathodic protection system at least once every 5 years in accordance with recognized and generally accepted practices. In areas where active corrosion is found an operator shall apply appropriate protective measures.

6.3.1.4 Monitoring

6.3.1.4.1 A pipeline under cathodic protection shall be tested for adequate levels of cathodic protection at least once every 2 calendar years not to exceed 27 months.

6.3.1.4.2 A rectifier or other impressed current power source shall be inspected for proper operation at least four times each calendar year at intervals not exceeding three and a half months.

6.3.1.4.3 A reverse current switch, diode, and interference bond whose failure would jeopardize structure protection shall be electrically checked for proper performance at least four times each calendar year at intervals not exceeding three and a half months.

6.3.1.5 Remedial Action
An operator shall take remedial action to correct any deficiencies indicated by the monitoring performed in accordance with Section 6.3.1.4. The remedial actions shall be completed within a timeframe commensurate with the identified threat.

6.3.2 Coating

6.3.2.1 A new metallic pipeline designed for cathodic protection shall have an external protective coating.

6.3.2.2 An operator shall protect the external protective coating from damage in accordance with recognized and generally accepted practices.

6.3.2.3 An operator should take additional precautions when boring or when a pipeline is cased to protect the external protective coating.

6.3.3 Electrical Isolation

6.3.3.1 A buried or submerged metallic pipeline should be electrically isolated where necessary to facilitate the application of corrosion control.

6.3.3.2 A cathodically protected pipeline should be electrically isolated from metallic casings that are part of an underground system where corrosion is a threat, unless other measures are taken to minimize corrosion of the pipeline inside the casing.

6.3.3.3 Inspection and electrical tests should be made to ensure that electrical isolation is adequate.

6.3.3.4 An isolation device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.

6.3.3.5 Where a buried or submerged metallic pipeline is near electrical transmission tower footings, ground cables, or counterpoise, the pipeline should be protected against damage due to fault currents or lightning and protective measures should be taken at isolating devices.

6.3.4 Stray currents

If a pipeline is subjected to stray electrical currents (AC/DC), the operator shall take actions to mitigate any adverse effects on underground metallic structures.

6.4 Internal Corrosion Control

If a corrosive gas stream is transported in a buried metallic pipeline, the operator shall take steps to minimize corrosion or demonstrate that the level of corrosivity is acceptable. An operator should conduct monitoring to determine the effectiveness of the steps taken.

6.5 Atmospheric Corrosion Control

At least once every 3 calendar years, not to exceed 39 months, an operator shall inspect a pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion. If atmospheric corrosion is found that could affect the safe operation of the pipeline, the operator shall take appropriate remedial action.

6.6 Determining the Remaining Strength of Pipe

An operator should determine the strength of pipe based on actual remaining wall thickness in accordance with recognized and generally accepted industry practices. If the actual remaining wall thickness is insufficient to maintain the safe operation of the pipeline, the operator shall take appropriate remedial action.

6.7 Corrosion Control Records

An operator shall keep records documenting the adequacy of corrosion control measures for at least five years.

7 Maximum Allowable Operating Pressure for Type C and D Gathering Lines

7.1 General

This section contains provisions for establishing initial MAOP for Type C and D gathering lines.
7.2 The operating pressure shall not exceed the MAOP of the pipeline as determined in accordance with recognized and generally accepted industry practices.

7.3 For a new pipeline, the MAOP shall not exceed the lowest of the following pressures, as applicable:
- The design pressure of the pipeline.
- The test pressure of the pipeline.

7.4 For an existing pipeline, the MAOP shall not exceed the lowest of the following pressures, as applicable:
- The highest actual operating pressure that the pipeline experienced in the five years prior to implementation of this recommended practice unless the pipeline was or is tested to substantiate the maximum allowable operating pressure or is uprated to increase the previously established MAOP.
- The maximum safe pressure as determined by the operator after considering the history of the pipeline, particularly known corrosion and the actual operating pressure.

7.4.1 An operator should keep appropriate records documenting established MAOP for the life of the pipeline.

7.5 Uprating

7.5.1 The previously established MAOP of a pipeline may be increased if the operator implements a written procedure that meets all the following conditions and is otherwise consistent with recognized and generally accepted industry practices.

7.5.1.1 The design, construction, testing, operation, and maintenance history of the pipeline is reviewed to determine if the higher MAOP is safe.

7.5.1.2 Any defects and other conditions that could reasonably be expected to impair the integrity of the pipeline are repaired or corrected.

7.5.1.3 Records are available to demonstrate that the pipeline previously received an adequate test to a pressure that can substantiate the higher MAOP.

7.5.1.3.1 If records are not available to demonstrate that the pipeline previously received an adequate test, the pressure of the pipeline shall be increased in appropriate increments to establish the higher MAOP, provided that appropriate action is taken after each incremental increase to detect and remediate leaks.

7.5.1.4 The higher MAOP does not exceed the MAOP permitted for a new line of the same design in the same location.

7.5.2 Appropriate records of any inspections, tests, repairs, replacements, and alterations performed in uprating the previously established MAOP of a pipeline should be kept for the life of the pipeline.

7.5.3 For additional information on uprating, refer to 49 CFR 192 or ASME B31.8.

7.6 MAOP Maintenance

The MAOP of a Type C pipeline shall be adjusted considering the history of the pipeline, particularly known corrosion and the actual operating pressure.

8 Operations and Maintenance for Type C and D Gathering Lines

8.1 General

This section contains operations and maintenance provisions for new and existing Type C and D gathering lines as specified.

8.2 Damage Prevention Programs for Type C and D gathering lines
An operator shall participate in an applicable one-call system or damage prevention program.

8.3 Line Markers for Type C and D gathering lines

8.3.1 Location

Buried pipelines shall have a line marker placed at the crossing of a public roadway, an active railway, or any other location deemed appropriate by the operator such as locations where there is a likelihood for damage. Markers or other signs may be placed at above ground piping or facilities.

8.3.2 Warning

A new or replaced line marker shall include an appropriate warning notifying the public about the presence of a gas pipeline, the operator’s name and a telephone number where the operator can always be reached.

8.3.3 Field Observation

An operator should observe line markers during the performance of other field activities. If a line marker is missing, damaged, misplaced, or contains inaccurate information, appropriate remedial action should be taken.

8.4 Emergency Response for Type C and D gathering lines

An operator shall have a means for receiving notifications and responding to a pipeline emergency.

8.5 Repair for Type C and D gathering lines

An operator shall make repairs in a safe manner in accordance with recognized and generally accepted industry practices.

8.6 Patrolling of Type C and D gathering lines

An operator should periodically patrol their pipelines to detect operating conditions that could reasonably be expected to impair the integrity of the pipeline.

8.7 Security for Type C and D gathering lines

An operator should take appropriate steps to protect the security of above-ground installations.

8.8 Public Awareness for Type C gathering lines

An operator of Type C gathering lines shall develop and implement a public awareness program to educate the affected public, emergency responders, public officials, and persons engaged in excavation-related activities, as appropriate, on the essential elements identified in Section 8.8.1 for these assets. Refer to API RP 1162 for further guidance on public awareness programs.

8.8.1 Essential Elements

A public awareness program should include provisions that address the following topics:

- Use of a one-call notification system prior to excavation;
- Possible hazards associated with unintended releases of gas from a pipeline;
- Indications that a release of a gas from a pipeline may have occurred;
- Steps that can be taken to protect the public if gas is released from a pipeline; and
- Procedures for reporting an unintentional release of gas from a pipeline.

8.8.2 Local Knowledge

An operator may use local knowledge to identify the affected stakeholders covered in a public awareness program.

8.8.3 Operator Discretion
An operator may exercise discretion in determining the appropriate means of educating affected stakeholders, given local conditions.

8.9 Leak Surveys & Mitigation for Type C gathering lines

8.9.1 Leak Surveys

A leak survey is a systematic means of detecting leaks on a pipeline. A leak survey shall be conducted on Type C lines at least once every three calendar years, not to exceed 39 months. Acceptable methods of conducting a leak survey can include:

- An aerial survey
- Portable Instrumentation
- Installed instrumentation
- Ground patrols

Other methods may achieve a satisfactory result as determined by the operator.

8.9.2 Leak Mitigation

An operator shall mitigate a leak that presents an immediate hazard to the public.

8.9.3 Leak Survey Documentation

An operator shall maintain records of their leak detection surveys & mitigation efforts for at least 5 years or until the next survey is completed.

9 Conversion to Service

9.1 Conversion

A pipeline previously used to transport a substance other than gas may be converted to use under this RP if the operator implements a written procedure that meets the following conditions and is otherwise consistent with recognized and generally accepted industry practices:

- The design, construction, operation, and maintenance history of the pipeline shall be reviewed and, where sufficient historical records are not available to demonstrate fitness, appropriate tests performed to determine if the pipeline is fit for service.
- The pipeline right-of-way, all aboveground segments of the pipeline, and appropriately selected underground segments should be visually inspected for physical defects and operating conditions which reasonably could be expected to impair the strength or tightness of the pipeline.
- All known unsafe defects and conditions shall be corrected in accordance with this RP.

9.2 An operator shall keep appropriate records of any investigations, tests, repairs, replacements, or alterations performed as part of a conversion to service for the life of the pipeline.

10 Change of Service

If a Type D gathering line becomes a Type C gathering line, the operator should review their procedures with regards to the reclassified pipeline’s Type C requirements.

11 Acquisitions

11.1 Following an acquisition, a review of the asset shall be conducted to determine the applicability of this RP. This review should be completed within 12 months of the acquisition, unless the operator develops an implementation plan which justifies a later date.

11.2 Review items to be considered can include:
• risk categorization (Type C or Type D)
• design, construction, operation, and maintenance history
• corrosion control;
• MAOP determination.

11.3 In conducting the review of an acquired asset, an operator may:
• accept all or part of the prior operator’s risk categorization, or
• temporarily accept all or part of the prior operator’s risk categorization during a transition period pending internal review and risk assessment.
Annex A

Applications

(informative)

Table A.1 describes the sections of this RP and their applications.

Table A.1 – Applications
<table>
<thead>
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<th>Design</th>
<th>New or Replaced</th>
<th>Existing</th>
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