Managing System Integrity of Gas Pipelines

TENTATIVE
SUBJECT TO REVISION OR WITHDRAWAL
Specific Authorization Required for Reproduction or Quotation
ASME Standards and Certification
Change the sixth paragraph of 2.1 General to reference equipment where PCC-3 may be applicable:

**Existing**
There is no single “best” approach that is applicable to all pipeline systems for all situations. This Code recognizes the importance of flexibility in designing integrity management programs and provides alternatives commensurate with this need. Operators may choose either a prescriptive-based or a performance-based approach for their entire system, individual lines, segments, or individual threats. The program elements shown in Fig. 2.1-1 are required for all integrity management programs.

**Proposed**
There is no single “best” approach that is applicable to all pipeline systems or equipment for all situations. This Code recognizes the importance of flexibility in designing integrity management programs and provides alternatives commensurate with this need. ASME PCC-3 provides guidance and information applicable to equipment or components that for practical reasons may be excluded from inspection activities normally conducted for the transportation piping and/or that may be subject to damage mechanisms that differ from those of the main pipeline. Operators may choose either a prescriptive-based or a performance-based approach for their entire system, individual lines, segments, or individual threats. The program elements shown in Fig. 2.1-1 are required for all integrity management programs.

Change the second paragraph of 5.6.2 Risk Analysis for Performance-Based Integrity Management Programs:

**Existing**
Risk analyses for performance-based integrity management programs may also be used as a basis for establishing inspection intervals. Such risk analyses will require more data elements than required in Nonmandatory Appendix A and more detailed analyses. The results of these analyses may also be used to evaluate alternative mitigation and prevention methods and their timing.

**Proposed**
Risk analyses for performance-based integrity management programs may also be used as a basis for establishing inspection intervals. Such risk analyses will require more data elements than required in Nonmandatory Appendix A and more detailed analyses. The results of these analyses may also be used to evaluate alternative mitigation and prevention methods and their timing. If permitted by the jurisdiction, ASME PCC-3 may be used for guidance concerning the use of risk-based inspection methods to establish inspection intervals for equipment that may not be included in inspection activities for the transportation piping or may be subject to damage mechanisms that differ from those of the main pipeline.
Add a sentence near the end of the first paragraph of 6.1 General:

**Existing**

6.1 General

Based on the priorities determined by risk assessment, the operator shall conduct integrity assessments using the appropriate integrity assessment methods. The integrity assessments methods that can be used are inline inspection, pressure testing, direct assessment, or other methodologies provided in para. 6.5. The integrity assessment method is based on the threats to which the segment is susceptible. More than one method and/or tool may be required to address all the threats in a pipeline segment. Conversely, inspection using any of the integrity methods may not be the appropriate action for the operator to take for certain threats. Other actions, such as prevention may provide better integrity management results.

**Proposed**

6.1 General

Based on the priorities determined by risk assessment, the operator shall conduct integrity assessments using the appropriate integrity assessment methods. The integrity assessments methods that can be used are inline inspection, pressure testing, direct assessment, or other methodologies provided in para. 6.5. The integrity assessment method is based on the threats to which the segment is susceptible. More than one method and/or tool may be required to address all the threats in a pipeline segment. Conversely, inspection using any of the integrity methods may not be the appropriate action for the operator to take for certain threats. If permitted by the jurisdiction, ASME PCC-3 may be used for guidance concerning the use of inspection methods appropriate for threats to equipment that may not be included in inspection activities for the transportation piping or may be subject to damage mechanisms that differ from those of the main pipeline. Other actions, such as prevention may provide better integrity management results.

Add ASME PCC-3 2007 to the list of references, in the location as shown below:

**Existing**


**Proposed**


## Item 16-1616

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### FOREWORD

This Code is a process code that describes the process an operator may use to develop an integrity management program. It also provides two approaches for developing an integrity management program: a prescriptive approach and a performance- or risk-based approach. Pipeline operators in a number of countries are currently utilizing risk-based or risk-management principles to improve the safety of their systems. Some of the international standards issued on this subject were utilized as resources for writing this Code. Particular recognition is given to API and their liquids integrity management standard, API Std 1160, which was used as a model for the format of this Code.

### 14 REFERENCES AND STANDARDS

The following is a list of publications that support or are referenced in this Standard. The references shall be to the specific editions cited below, except the user may use the latest published edition of ANSI approved standards unless specifically prohibited by this Standard, and providing the user has reviewed the latest edition of the standard to ensure that the integrity of the pipeline system is not compromised. If a newer or amended edition of a standard is not ANSI approved, then the user shall use the specific edition reference date shown herein. An asterisk (*) is used to indicate that the specific edition of the standard has been accepted as an American National Standard by the American National Standards Institute (ANSI).

- **ANSI/GPTC-Z380-TR-1** (November 2001), Review of Integrity Management for Natural Gas Transmission Pipelines
  - Publisher: Gas Piping Technology Committee (GPTC) of the American Gas Association (AGA), 400 North Capitol Street, NW, Washington, DC 20001 (www.agawg.org)

  - Publisher: American Society for Quality (ASQ), P.O. Box 3005, Milwaukee, WI 53201 (www.asq.org)

  - Publisher: Gas Piping Technology Committee (GPTC) of the American Gas Association (AGA), 400 North Capitol Street, NW, Washington, DC 20001 (www.agawg.org)

  - Juran’s Quality Handbook (sixthseventh edition, 20102016)
  - Publisher: American Society for Quality (ASQ), P.O. Box 3005, Milwaukee, WI 53201 (www.asq.org)
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<tr>
<td>*API RP 1110, (sixth edition, February 2013), Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide</td>
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<td>*API Std 1160 (first edition, November 2001; reaffirmed November 2008), Managing System Integrity for Hazardous Liquid Pipelines</td>
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<td>*API Std 1163 (second edition, April 2013), In-Line Inspection Systems Qualifications</td>
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<td>AWS A3.0:2001 (including 2001 Errata), Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying</td>
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**NOTES:**
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GRI-00/0076 (2000), Evaluation of Pipeline Design Factors
GRI-00/0077 (2000), Safety Performance of Natural Gas Transmission and Gathering Systems Regulated by Office of Pipeline Safety
GRI-00/0189 (2000), Model for Sizing High Consequence Areas Associated With Natural Gas Pipelines
GRI-00/0192 (2000), GRI Guide for Locating and Using Pipeline Industry Research
GRI-00/0193 (2000), Natural Gas Transmission Pipelines: Pipeline Integrity — Prevention, Detection & Mitigation Practices
GRI-00/0228 (2000), Cost of Periodically Assuring Pipeline Integrity in High Consequence Areas by In-Line Inspection, Pressure Testing and Direct Assessment
GRI-00/0230 (2000), Periodic Re-Verification Intervals for High-Consequence Areas
GRI-00/0231 (2000), Direct Assessment and Validation
GRI-00/0232 (2000), Leak Versus Rupture Considerations for Steel Low-Stress Pipelines
GRI-00/0233 (2000), Quantifying Pipeline Design at 72% SMYS as a Precursor to Increasing the Design Stress Level
GRI-00/0246 (2000), Implementation Plan for Periodic Re-Verification Intervals for High-Consequence Areas
GRI-00/0247 (2000), Introduction to Smart Pigging in Natural Gas Pipelines
GRI-01/0027 (2001), Pipeline Open Data Standard (PODS)
GRI-01/0083 (2001), Review of Pressure Retesting for Gas Transmission Pipelines
GRI-01/0084 (2001), Proposed New Guidelines for ASME B31.8 on Assessment of Dents and Mechanical Damage
GRI-01/0085 (2001), Schedule of Responses to Corrosion-Caused Metal Loss Revealed by Integrity-Assessment Results
GRI-01/0111 (2001), Determining the Full Cost of a Pipeline Incident
GRI-01/0154 (2001), Natural Gas Pipeline Integrity Management Committee Process Overview Report
GRI-04/0178 (2004), Effect of Pressure Cycles on Gas Pipelines
Publisher: Gas Technology Institute (GTI), 1700 South Mount Prospect Road, Des Plaines, IL 60018 (www.gastechology.org)

Integrity Characteristics of Vintage Pipelines (2005)
Publisher: The INGAA Foundation, Inc. (INGAA), 20 F Street, NW, Washington, DC 20001 (www.ingaa.org)
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<tr>
<td>NACE SP0106-2006</td>
<td>Control of Internal Corrosion in Steel Pipelines and Piping Systems</td>
<td>National Association of Corrosion Engineers (NACE International), 1440 South Creek Drive, Houston, TX 77084-4906 (<a href="http://www.nace.org">www.nace.org</a>)</td>
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<td>NACE SP0169-2007</td>
<td>Control of External Corrosion on Underground or Submerged Metallic Piping Systems</td>
<td>National Association of Corrosion Engineers (NACE International), 1440 South Creek Drive, Houston, TX 77084-4906 (<a href="http://www.nace.org">www.nace.org</a>)</td>
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<td>NACE SP0204-2008</td>
<td>Stress Corrosion Cracking (SCC) Direct Assessment Methodology</td>
<td>National Association of Corrosion Engineers (NACE International), 1440 South Creek Drive, Houston, TX 77084-4906 (<a href="http://www.nace.org">www.nace.org</a>)</td>
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<td>NACE SP0226-2006</td>
<td>Internal Corrosion Direct Assessment Methodology for Pipelines Carrying Normally Dry Natural Gas (DG-ICDA)</td>
<td>National Association of Corrosion Engineers (NACE International), 1440 South Creek Drive, Houston, TX 77084-4906 (<a href="http://www.nace.org">www.nace.org</a>)</td>
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<td>*NACE SP0502-2010</td>
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<td>National Association of Corrosion Engineers (NACE International), 1440 South Creek Drive, Houston, TX 77084-4906 (<a href="http://www.nace.org">www.nace.org</a>)</td>
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<td>NACE SP0502-2010</td>
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<td>PR-218-08350</td>
<td>(2008), Pipeline Facility Incident Data Review and Statistical Analysis</td>
<td>Gulf Publishing Company, P.O. Box 2608, Houston, TX 77252 (<a href="http://www.globepub.com">www.globepub.com</a>)</td>
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<td>PR-268-9823</td>
<td>(2004), Guidelines for the Seismic Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines</td>
<td>Pipeline Research Council International, Inc. (PRCI), 3141 Fairview Park Drive, Suite 525, Falls Church, VA 22042 (<a href="http://www.prci.org">www.prci.org</a>)</td>
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6.3.2 Manufacturing and Related Defect Threats.
Pressure testing is appropriate for use when addressing the pipe seam aspect of the manufacturing threat. Pressure testing shall comply with the requirements of ASME B31.8. This will define whether air or water shall be used. Seam issues have been known to exist for pipe with a joint factor of less than 1.0 (e.g., lap-welded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency-welded electric-resistance-welded (ERW) pipe or flash-welded pipe. References for determining if a specific pipe is susceptible to seam issues are Integrity Characteristics of Vintage Pipelines (The INGAA Foundation, Inc.) and History of Line Pipe Manufacturing in North America (ASME research report).

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(3) Green indicates changes from the previous revision of this item
### Table 8.3.4-2 Example of Integrity Management Plan for Hypothetical Pipeline Segment (Integrity Assessment Plan: Line 1, Segment 3)

**threat** | **Criteria/Risk Assessment**  
--- | ---  
External corrosion | Some external corrosion history, no in-line inspection  
Internal corrosion | No history of IC issues, no in-line inspection  
SCC | Have found SCC of near critical dimension  
Manufacturing | ERW pipe, joint factor <1.0, no hydrostatic test

**Proposed Changes**

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**threat** | **Criteria/Risk Assessment**  
--- | ---  
External corrosion | Some external corrosion history, no in-line inspection  
Internal corrosion | No history of IC issues, no in-line inspection  
SCC | Have found SCC of near critical dimension  
Manufacturing | ERW pipe, **longitudinal weld** joint **quality** factor <1.0, no hydrostatic test

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**Notes:**

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2. Strikethrough and red indicates deleted text.  
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### 13 TERMS, DEFINITIONS, AND ACRONYMS

**liquefied petroleum gas(es) (LPG):** liquid petroleum gases composed predominantly of the following hydrocarbons, either by themselves or as mixtures: butane (normal butane or isobutane), butylene (including isomers), propane, propylene, and ethane. LPG can be stored as liquids under moderate pressures [approximately 80 psig to 250 psig (550 kPa to 1 720 kPa)] at ambient temperatures.

**seam weld:** longitudinal or helical seam in pipe that is made in the pipe mill for the purpose of making a complete circular cross section.

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**PROPOSED CHANGES**

**liquefied petroleum gas(es) (LPG):** liquid petroleum gases composed predominantly of the following hydrocarbons, either by themselves or as mixtures: butane (normal butane or isobutane), butylene (including isomers), propane, propylene, and ethane. LPG can be stored as liquids under moderate pressures [approximately 80 psig to 250 psig (550 kPa to 1 720 kPa)] at ambient temperatures.  

**longitudinal weld joint quality factor:** a value of one (1.00) or less applicable to a straight or helical pipe seam weld, based on the type of welding process and applicable supplementary NDE requirements. This weld joint quality factor does not apply to girth welds.

**seam weld:** longitudinal (straight or helical) seam in pipe that is made in the pipe mill for the purpose of making a complete circular cross section.

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### A-5.2 Gathering, Reviewing, and Integrating Data

The following minimal data sets should be collected for each segment and reviewed before a risk assessment can be conducted. These data are collected for performing risk assessment and for special considerations such as identifying severe situations requiring more or additional activities.

- (a) pipe material
- (b) year of installation
- (c) manufacturing process (age of manufacture as alternative; see note below)
- (d) seam type
- (e) joint factor
- (f) operating pressure history

### A-5.3 Criteria and Risk Assessment

For cast iron pipe, steel pipe manufactured prior to 1952, mechanically coupled pipelines, or pipelines joined by means of acetylene girth welds, where low temperatures are experienced or where the pipe is exposed to movement such as land movement or removal of supporting backfill, examination of the terrain is required. If land movement is observed or can reasonably be anticipated, a pipeline movement monitoring program should be established and appropriate intervention activities undertaken.

If the pipe has a joint factor of less than 1.0 (such as lap-welded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency-welded ERW pipe or flash-welded pipe, a manufacturing threat is considered to exist.

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- (a) pipe material
- (b) year of installation
- (c) manufacturing process (age of manufacture as alternative; see note below)
- (d) seam type
- (e) **longitudinal weld** joint quality factor
- (f) operating pressure history

### A-5.3 Criteria and Risk Assessment

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**2.3 The Integrity Management Process**

**2.3.4 Integrity Assessment.**

Data and information from integrity assessments for a specific threat may be of value when considering the presence of other threats and performing risk assessment for those threats. For example, a dent may be identified when running a magnetic flux leakage (MFL) tool while checking for corrosion. This data element should be integrated with other data elements for other threats, such as third-party or construction damage.

**3.2 Potential Impact Area**

**3.2.1 Typical Natural Gas.**

EXAMPLES:

1. A 30-in. diameter pipe with a maximum allowable operating pressure of 1,000 psig has a radius of impact of approximately 660 ft.

2. A 762-mm diameter pipe with a maximum allowable operating pressure of 6 900 kPa has a radius of impact of approximately 200 m.

**Figure 3.2.4-1 Potential Impact Area**

GENERAL NOTE: This diagram represents the results for a 30-in. (762-mm) pipe with an MAOP of 1,000 psig (6 900 kPa).

**NOTES:** (1) Underline and blue indicates revised and new text.
(2) Strikethrough and red indicates deleted text.

(6/6/20)
### 4.5 Data Integration

**EXAMPLES:**

(2) An operator suspects that a possible corrosion problem exists on a large-diameter pipeline located in a populated area. However, a CIS indicates good cathodic protection coverage in the area. A direct current voltage gradient (DCVG) coating condition inspection is performed and reveals that the welds were tape-coated and are in poor condition. The CIS results did not indicate a potential integrity issue, but data integration prevented possibly incorrect conclusions.

### 5.7 Characteristics of an Effective Risk Assessment Approach

Another requirement of the model involves the ability to update the risk model to account for mitigation or other action that changes the risk in a particular length. This can be illustrated by assuming that two adjacent 1-mi-long (1.6-km-long) segments have been identified. Suppose a pipe replacement is completed from the midpoint of one segment to some point within the other. In order to account for the risk reduction, the pipeline length comprising these two segments now becomes four risk analysis segments. This is called dynamic segmentation.

### Table 5.6.1-1 Integrity Assessment Intervals: Time-Dependent Threats, Internal and External Corrosion, Prescriptive Integrity Management Plan

**NOTES:**

(4) For the direct assessment process, indications for inspection are classified and prioritized using NACE SP0204, Stress Corrosion Cracking (SCC) Direct Assessment Methodology; NACE SP0206, Internal Corrosion Direct Assessment Methodology for Pipelines Carrying Normally Dry Natural Gas (DG-ICDA); or NACE SP0502, Pipeline External Corrosion Direct Assessment Methodology. The indications are process-based and may not align with each other. For example, the External Corrosion DA indications may not be at the same location as the Internal Corrosion DA indications.
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<td><strong>5.10 Prioritization for Prescriptive-Based and Performance-Based Integrity Management Programs</strong>&lt;br&gt;...&lt;br&gt;When considering threat exclusion, a cautionary note applies to threats classified as time-dependent. Although such an event may not have occurred in any given pipeline segment, system, or facility, the fact that the threat is considered time-dependent should require very strong justification for its exclusion. Some threats, such as internal corrosion and SCC, may not be immediately evident and can become a significant threat even after extended operating periods.&lt;br&gt;<strong>6.1 General</strong>&lt;br&gt;...&lt;br&gt;Section 2 provides a listing of threats by three groups: time-dependent, resident, and time-independent. Time-dependent threats can typically be addressed by utilizing any one of the integrity assessment methods discussed in this section. Resident threats, such as defects that occurred during manufacturing, can typically be addressed by pressure testing, while construction and equipment threats can typically be addressed by examination and evaluation of the specific piece of equipment, component, or pipe joint. Random threats typically cannot be addressed through use of any of the integrity assessment methods discussed in this section but are subject to the prevention measures discussed in section 7.</td>
<td><strong>5.10 Prioritization for Prescriptive-Based and Performance-Based Integrity Management Programs</strong>&lt;br&gt;...&lt;br&gt;When considering threat exclusion, a cautionary note applies to threats classified as <strong>time-dependent</strong>. Although such an event may not have occurred in any given pipeline segment, system, or facility, the fact that the threat is considered <strong>time-dependent</strong> should require very strong justification for its exclusion. Some threats, such as internal corrosion and SCC, may not be immediately evident and can become a significant threat even after extended operating periods.&lt;br&gt;<strong>6.1 General</strong>&lt;br&gt;...&lt;br&gt;Section 2 provides a listing of threats by three groups: <strong>time-dependent</strong>, resident, and <strong>time-independent</strong>. Time-dependent threats can typically be addressed by utilizing any one of the integrity assessment methods discussed in this section. Resident threats, such as defects that occurred during manufacturing, can typically be addressed by pressure testing, while construction and equipment threats can typically be addressed by examination and evaluation of the specific piece of equipment, component, or pipe joint. Random threats typically cannot be addressed through use of any of the integrity assessment methods discussed in this section but are subject to the prevention measures discussed in section 7.</td>
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### ASME B31.8S-2018 EDITION

#### 6.2.1 Metal Loss Tools for the Internal and External Corrosion Threat

For these threats, the following tools can be used. Their effectiveness is limited by the technology the tool employs.

- **Magnetic Flux Leakage, Standard Resolution Tool.** This is better suited for detection of metal loss than for sizing. Sizing accuracy is limited by sensor size. It is sensitive to certain metallurgical defects such as scabs and slivers. It is not reliable for detection or sizing of most defects other than metal loss and not reliable for detection or sizing of axially aligned metal-loss defects. High inspection speeds degrade sizing accuracy.

- **Magnetic Flux Leakage, High-Resolution Tool.** This provides better sizing accuracy than standard resolution tools. Sizing accuracy is best for geometrically simple defect shapes. Sizing accuracy degrades where pits are present or defect geometry becomes complex. There is some ability to detect defects other than metal loss, but ability varies with defect geometries and characteristics. It is not generally reliable for axially aligned defects. High inspection speeds degrade sizing accuracy.

#### 6.2.5 Special Considerations for the Use of In-Line Inspection Tools

- **(4) Type of Fluid.** The type of phase — gas or liquid — affects the possible choice of technologies.

#### 6.3.2 Manufacturing and Related Defect Threats

Pressure testing is appropriate for use when addressing the pipe seam aspect of the manufacturing threat. Pressure testing shall comply with the requirements of ASME B31.8. This will define whether air or water shall be used. Seam issues have been known to exist for pipe with a joint factor of less than 1.0 (e.g., lap-welded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency-welded electric-resistance-welded (ERW) pipe or flash-welded pipe. References for determining if a specific pipe is susceptible to seam issues are Integrity Characteristics of Vintage Pipelines (The INGAA Foundation, Inc.) and History of Line Pipe Manufacturing in North America (ASME research report).

### Correct Hyphenation in the B31.8S Standard

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#### 6.2.5 Special Considerations for the Use of In-Line Inspection Tools

- **(4) Type of Fluid.** The type of phase — gas or liquid — affects the possible choice of technologies.

#### 6.3.2 Manufacturing and Related Defect Threats

Pressure testing is appropriate for use when addressing the pipe seam aspect of the manufacturing threat. Pressure testing shall comply with the requirements of ASME B31.8. This will define whether air or water shall be used. Seam issues have been known to exist for pipe with a joint factor of less than 1.0 (e.g., lap-welded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency-welded electric-resistance-welded (ERW) pipe. References for determining if a specific pipe is susceptible to seam issues are Integrity Characteristics of Vintage Pipelines (The INGAA Foundation, Inc.) and History of Line Pipe Manufacturing in North America (ASME research report).
<table>
<thead>
<tr>
<th>PRESENT TEXT</th>
<th>PROPOSED CHANGES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.2.1 Metal Loss Tools for Internal and External Corrosion.</strong> Indications requiring immediate response are those that might be expected to cause immediate or near-term leaks or ruptures based on their known or perceived effects on the strength of the pipeline. This would include any corroded areas that have a predicted failure pressure level less than 1.1 times the MAOP as determined by ASME B31G or equivalent. Also in this group would be any metal-loss indication affecting a detected longitudinal seam, if that seam was formed by direct current or low-frequency electric resistance welding or by electric flash welding.</td>
<td><strong>7.2.1 Metal Loss Tools for Internal and External Corrosion.</strong> Indications requiring immediate response are those that might be expected to cause immediate or near-term leaks or ruptures based on their known or perceived effects on the strength of the pipeline. This would include any corroded areas that have a predicted failure pressure level less than 1.1 times the MAOP as determined by ASME B31G or equivalent. Also in this group would be any metal-loss indication affecting a detected longitudinal seam, if that seam was formed by direct current or low-frequency electric resistancem or electric-flash welding.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>7.7 Prevention Strategy/Methods</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Prevention is an important proactive element of an integrity management program. Integrity management program prevention strategies should be based on data gathering, threat identification, and risk assessments conducted per the requirements of sections 2, 3, 4, and 5. Prevention measures shown to be effective in the past should be continued in the integrity management program. Prevention strategies (including intervals) should also consider the classification of identified threats as time-dependent, resident, or time-independent in order to ensure that effective prevention methods are utilized.</td>
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<thead>
<tr>
<th><strong>8.1 General</strong></th>
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<td>...</td>
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All threats cannot be dealt with through inspection and repair; therefore, prevention for these threats is a key element in the plan. These activities may include, for example, prevention of third-party damage and monitoring for outside force damage. | All threats cannot be dealt with through inspection and repair; therefore, prevention for these threats is a key element in the plan. These activities may include, for example, prevention of third-party damage and monitoring for outside force damage. |
## Table 8.3.4-1 Example of Integrity Management Plan for Hypothetical Pipeline Segment
(Segment Data: Line 1, Segment 3)

<table>
<thead>
<tr>
<th>Segment Data</th>
<th>Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe attributes</td>
<td>Pipe grade</td>
<td>API 5L-X42 (290 MPa)</td>
</tr>
<tr>
<td>Size</td>
<td>NPS 24 (DN 600)</td>
<td></td>
</tr>
<tr>
<td>Wall thickness</td>
<td>0.250 in. (6.35 mm)</td>
<td></td>
</tr>
<tr>
<td>Manufacturer</td>
<td>A. O. Smith</td>
<td></td>
</tr>
<tr>
<td>Manufacturer process</td>
<td>Low frequency</td>
<td></td>
</tr>
<tr>
<td>Manufacturing date</td>
<td>1965</td>
<td></td>
</tr>
<tr>
<td>Seam type</td>
<td>Electric resistance weld</td>
<td></td>
</tr>
<tr>
<td>Design/construction</td>
<td>Operating pressure</td>
<td>630/550 psig (4 340/3 790 kPa)</td>
</tr>
<tr>
<td></td>
<td>Operating stress</td>
<td>72% SMYS</td>
</tr>
<tr>
<td></td>
<td>Coating type</td>
<td>Coal tar</td>
</tr>
<tr>
<td></td>
<td>Coating condition</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Pipe install date</td>
<td>1966</td>
</tr>
<tr>
<td></td>
<td>Joining method</td>
<td>Submerged arc weld</td>
</tr>
<tr>
<td></td>
<td>Soil type</td>
<td>Clay</td>
</tr>
<tr>
<td></td>
<td>Soil stability</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Hydrostatic test</td>
<td>None</td>
</tr>
<tr>
<td>Operational</td>
<td>Compressor discharge temperature</td>
<td>120°F (49°C)</td>
</tr>
<tr>
<td></td>
<td>Pipe wall temperature</td>
<td>65°F (18°C)</td>
</tr>
<tr>
<td></td>
<td>Gas quality</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Flow rate</td>
<td>50 MMSCFD (1.42 MSm³/d)</td>
</tr>
<tr>
<td></td>
<td>Repair methods</td>
<td>Replacement</td>
</tr>
<tr>
<td></td>
<td>Leak/rupture history</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Pressure cycling</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>CP effectiveness</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>SCC indications</td>
<td>Minor cracking</td>
</tr>
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<td></td>
</tr>
<tr>
<td><strong>13 TERMS, DEFINITIONS, AND ACRONYMS</strong></td>
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</tr>
<tr>
<td>direct current voltage gradient (DCVG): inspection technique that includes aboveground electrical measurements taken at predetermined increments along the pipeline and is used to provide information on the effectiveness of the coating system.</td>
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<td>electric-resistance-welded pipe (ERW pipe): pipe that has a straight longitudinal seam produced without the addition of filler metal by the application of pressure and heat obtained from electrical resistance. ERW pipe forming is distinct from flash welded pipe and furnace butt welded pipe as a result of being produced in a continuous forming process from coils of flat plate.</td>
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<td>magnetic flux leakage (MFL): an in-line inspection technique that induces a magnetic field in a pipe wall between two poles of a magnet. Sensors record status in leakage in this magnetic flux (flow) outside the pipe wall, which can be correlated to metal loss.</td>
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<td>magnetic particle inspection (MPI): a nondestructive test method utilizing magnetic leakage fields and suitable indicating materials to disclose surface and near-surface discontinuity indications.</td>
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<td>nondestructive examination (NDE) or nondestructive testing (NDT): testing method, such as radiography, ultrasonic, magnetic testing, liquid penetrant, visual, leak testing, eddy current, and acoustic emission, or a testing technique, such as magnetic flux leakage, magnetic particle inspection, shear-wave ultrasonic, and contact compression-wave ultrasonic.</td>
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<tr>
<td>submerged arc welding: arc welding process that uses an arc or arcs between a bare metal electrode or electrodes and the weld pool. The arc and molten metal are shielded by a blanket of granular flux on the workpieces. The process is used without pressure and with filler metal from the electrode and sometimes from a supplemental source (welding rod, flux, or metal granules).</td>
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<td>Tracking # 17-2555</td>
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</tr>
<tr>
<td><strong>ASME B31.8S-2018 EDITION</strong></td>
<td><strong>Correct Hyphenation in the B31.8S Standard</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PRESENT TEXT</strong></td>
<td><strong>PROPOSED CHANGES</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A-4.3.1 Possible Threat of Near-Neutral pH SCC.</strong> Each segment should be assessed for the possible threat of near-neutral pH SCC if all of the following criteria are present:</td>
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<td></td>
</tr>
<tr>
<td>(c) all corrosion coating systems other than plant-applied or field-applied fusion bonded epoxy (FBE) or liquid epoxy (when abrasive surface preparation was used during field coating application). Field joint coating systems should also be considered for their susceptibility using the criteria in this section.</td>
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<td></td>
</tr>
<tr>
<td><strong>A-4.4.1 Bell Hole Examination and Evaluation Method.</strong> Magnetic particle inspection methods (MPI), or other equivalent nondestructive evaluation methods, shall be used when disbonded coating or bare pipe is encountered during integrity-related excavation of pipeline segments susceptible to SCC.</td>
<td><strong>A-4.4.1 Bell Hole Examination and Evaluation Method.</strong> Magnetic particle inspection methods (MPI), or other equivalent nondestructive evaluation methods, shall be used when disbonded coating or bare pipe is encountered during integrity-related excavation of pipeline segments susceptible to SCC.</td>
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<tr>
<td><strong>A-5.3 Criteria and Risk Assessment</strong></td>
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<td></td>
</tr>
<tr>
<td>If the pipe has a joint factor of less than 1.0 (such as lapwelded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency-welded ERW pipe or flash-welded pipe, a manufacturing threat is considered to exist.</td>
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<td>The existence of these construction-related threats alone does not pose an integrity issue. The presence of these threats in conjunction with the potential for outside forces significantly increases the likelihood of an event. The data must be integrated and evaluated to determine where these construction characteristics coexist with external or outside force potential.</td>
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<td><strong>A-7.3 Criteria and Risk Assessment</strong></td>
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<td></td>
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<tr>
<td>Certain relief and regulator valves are known to have their set points drift. These equipment types may require extra scrutiny. Certain gasket types are prone to premature degradation. These equipment types may require more-frequent leak checks.</td>
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<td></td>
</tr>
</tbody>
</table>

**NOTES:**
1. Underline and blue indicates revised and new text.
2. Strikethrough and red indicates deleted text.
<table>
<thead>
<tr>
<th><strong>PRESENT TEXT</strong></th>
<th><strong>PROPOSED CHANGES</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>A-7.6 Other Data</strong></td>
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</tr>
<tr>
<td>During the inspection activities, the operator may discover other data that should be used when performing risk assessments for other threats. For example, when inspecting gaskets at aboveground facilities, it is discovered that there has been a lightning strike. It is appropriate to use this information when conducting risk assessments for the weather-related and outside force threat.</td>
<td>During the inspection activities, the operator may discover other data that should be used when performing risk assessments for other threats. For example, when inspecting gaskets at aboveground facilities, it is discovered that there has been a lightning strike. It is appropriate to use this information when conducting risk assessments for the weather-related and outside-force threat.</td>
</tr>
<tr>
<td><strong>A-10 WEATHER-RELATED AND OUTSIDE FORCE THREAT (EARTH MOVEMENT, HEAVY RAINS OR FLOODS, COLD WEATHER, LIGHTNING)</strong></td>
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</tr>
<tr>
<td><strong>A-10.1 Scope</strong></td>
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</tr>
<tr>
<td>Section A-10 provides an integrity management plan to address the threat, and methods of integrity assessment and mitigation, for weather-related and outside force concerns. Weather-related and outside force is defined in this context as earth movement, heavy rains or floods, cold weather, and lightning (see Figure A-10.1-1). This section outlines the integrity management process for weather-related and outside force threats in general, and also covers some specific issues. For seismic threats, PR 268-9823, Guidelines for the Seismic Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, or similar methodologies may be used. Pipeline incident analysis has identified weather-related and outside force damage among the causes of past incidents.</td>
<td>Section A-10 provides an integrity management plan to address the threat, and methods of integrity assessment and mitigation, for weather-related and outside-force concerns. Weather-related and outside force is defined in this context as earth movement, heavy rains or floods, cold weather, and lightning (see Figure A-10.1-1). This section outlines the integrity management process for weather-related and outside-force threats in general, and also covers some specific issues. For seismic threats, PR 268-9823, Guidelines for the Seismic Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, or similar methodologies may be used. Pipeline incident analysis has identified weather-related and outside-force damage among the causes of past incidents.</td>
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<td><strong>Figure A-10.1-1 Integrity Management Plan, Weather-Related and Outside Force Threat (Earth Movement, Heavy Rains or Floods, Cold Weather, Lightning; Simplified Process: Prescriptive)</strong></td>
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</tr>
<tr>
<td><strong>A-10.4 Integrity Assessment</strong></td>
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</tr>
<tr>
<td>For weather-related and outside force threats, integrity assessments, including inspections, examinations, and evaluations, are normally conducted per the requirements of the O&amp;M procedures. Additional or more-frequent inspections may be necessary, depending on leak and failure information.</td>
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### A-10.8 Performance Measures

The following performance measures shall be documented for the weather-related and outside force threat, in order to establish the effectiveness of the program and for confirmation of the inspection interval:

(a) number of leaks that are weather-related or due to outside force

(b) number of repair, replacement, or relocation actions due to weather-related or outside force threats

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This Proposal

**Proposed Text change to B31.8S**

1.1 **Scope**

This Code applies to onshore pipeline systems constructed with ferrous materials and that transport gas. The principles and processes embodied in integrity management are applicable to all pipeline systems.

This Code is specifically designed to provide the operator (as defined in section 13) with the information necessary to develop and implement an effective integrity management program utilizing proven industry practices and processes. The processes and approaches described within this Code are applicable to the entire pipeline.

1.2 **Purpose and Objectives**…

1.3 **Integrity Management Principles**…

1.4 **Units of Measure**

This Code states values in both U.S. Customary (USC) and International System (SI, also known as metric) units. Either set of units may be used. Local customary units may also be used to demonstrate compliance with this Standard. Within the text, the SI units are shown in parentheses, or in separate tables. The values stated in each system are not exact equivalents; therefore, each system of units should be used independently of the other. The equations in this Code may be used with any consistent system of units. It is the responsibility of the organization performing calculations to ensure that a consistent system of units is used.

When necessary to convert from one system of units to another, conversion should be made by rounding the values to the number of significant digits of implied precision in the starting value.
(4) The personnel involved in the integrity management program shall be competent, aware of the program and all of its activities, and be qualified to execute the activities within the program. Documentation of such competence, awareness, and qualification, and the processes for their achievement shall be part of the quality control plan.

(5) The operator shall determine how to monitor the integrity management program to show that it is being implemented according to plan and document these steps. These control points, criteria, and/or performance metrics shall be defined.

(6) Periodic internal audits or independent third-party reviews of the integrity management program and its quality plan are required.

(7) Corrective actions to improve the integrity management program or quality plan shall be documented and the effectiveness of their implementation monitored.

(c) When an operator chooses to use outside resources to conduct any process (for example, pigging) that affects the quality of the integrity management program, the operator shall ensure control of such processes and document them within the quality program.

13 TERMS, DEFINITIONS, AND ACRONYMS

See Figure 13-1 for the hierarchy of terminology for integrity assessment.

actionable anomalies: anomalies that may exceed acceptable limits based on the operator’s anomaly and pipeline data analysis.

active corrosion: corrosion that is continuing or not arrested.

annular filled saddle: an external steel fabrication similar to a sleeve except one half is pierced and forged to provide a close fit around a hot tap “T.” The other half away from the “T” is joined with seam welds like a type A sleeve. The annular space between the pressure-containing pipes and the saddle is filled with an incompressible material to provide mechanical support to the welded “T.”

anomaly: an unexamined deviation from the norm in pipe material, coatings, or welds.
anomaly and pipeline data analysis: the process through which anomaly and pipeline data are integrated and analyzed to further classify and characterize anomalies.

arc welding or arc weld: group of welding processes that produces coalescence by heating them with an arc. The processes are used with or without the application of pressure and with or without filler metal.

backfill: material placed in a hole or trench to fill excavated space around a pipeline or other appurtenances.

baffle: a device or mechanism that is placed in a process stream to change its flow path or to redirect it.

bell hole: excavation that minimizes surface disturbance yet provides sufficient room for examination or repair of buried facilities.

buckle: condition in which the pipeline has undergone sufficient plastic deformation to cause permanent wrinkling in the pipe wall or excessive cross-sectional deformation caused by bending, axial, impact, and/or torsional loads acting alone or in combination with hydrostatic pressure.

butt joint: a joint between two members aligned approximately in the same plane. See Figs. 1(A), 2(A), 3, 51(A), and 51(B) in AWS A3.0.

butt weld: a nonstandard term for a weld in a butt joint.

calibration dig: exploratory excavation to validate findings of an in-line inspection tool with the purpose of improving data interpretation.

caliper tool or geometry tool: an instrumented in-line inspection tool designed to record conditions, such as dents, wrinkles, ovality, bend radius, and angle, by sensing the shape of the internal surface of the pipe.

carbon dioxide: a heavy, colorless gas that does not support combustion, dissolves in water to form carbonic acid, and is found in some natural gas streams.

cast iron: unqualified term “cast iron” shall apply to gray cast iron, which is a cast ferrous material in which a major part of the carbon content occurs as free carbon in the form of flakes interspersed throughout the metal.

cathodic protection (CP): technique to reduce the corrosion of a metal surface by making that surface the cathode of an electromechanical cell.

certification: written testimony of qualification.

characterize: to qualify the type, size, shape, orientation, and location of an anomaly.

close interval survey (CIS): inspection technique that includes a series of aboveground pipe-to-soil potential measurements taken at predetermined increments of a few to several feet (meters) along the pipeline and used to provide information on the effectiveness of the cathodic protection system.

coating: liquid, liquefiable, or mastic composition that, after application to a surface, is converted into a solid protective, decorative, or functional adherent film. Coating also includes tape wrap.

coating system: complete number and types of coats applied to a substrate in a predetermined order. (When used in a broader sense, surface preparation, pretreatments, dry film thickness, and manner of application are included.)

component or pipeline component: an individual item or element fitted in line with pipe in a pipeline system, such as, but not limited to, valves, elbows, tees, flanges, and closures.

composite repair sleeve: permanent repair method using composite sleeve material, which is applied with an adhesive.

consequence: impact that a pipeline failure could have on the public, employees, property, and the environment.

corrosion: deterioration of a material, usually a metal, that results from an electrochemical reaction with its environment.

corrosion inhibitor: chemical substance or combination of substances that, when present in the environment or on a surface, prevents or reduces corrosion.

corrosion rate: rate at which corrosion proceeds.

crack: very narrow, elongated defect caused by mechanical splitting into two parts.

current: flow of electric charge.

data analysis: the evaluation process through which inspection indications are classified and characterized.

defect: a physically examined anomaly with dimensions or characteristics that exceed acceptable limits.

dent: permanent deformation of the circular cross section of the pipe that produces a decrease in the diameter and is concave inward.

detect: to sense or obtain measurable wall loss indications from an anomaly in a steel pipeline using in-line inspection or other technologies.

diameter or nominal outside diameter: as-produced or as-specified outside diameter of the pipe, not to be confused with the dimensionless NPS (DN). For example, NPS 12 (DN 300) pipe has a specified outside diameter of 12.750 in. (323.85 mm), NPS 8 (DN 200) pipe has a specified outside diameter of 8.625 in. (219.08 mm), and NPS 24 (DN 600) pipe has a specified outside diameter of 24.000 in. (609.90 mm).

direct current voltage gradient (DCVG): inspection technique that includes aboveground electrical measurements taken at predetermined increments along the pipeline and
is used to provide information on the effectiveness of the coating system.

discontinuity: an interruption of the typical structure of a material, such as a lack of homogeneity in its mechanical, metallurgical, or physical characteristics. A discontinuity is not necessarily a defect.
documented: condition of being in written form.
double submerged-arc welded pipe (DSAW pipe): pipe that has a straight longitudinal or helical seam containing filler metal deposited on both sides of the joint by the submerged-arc welded process.
ductility: measure of the capability of a material to be deformed plastically before fracturing.
electric-resistance-welded pipe (ERW pipe): pipe that has a straight longitudinal seam produced without the addition of filler metal by the application of pressure and heat obtained from electrical resistance. ERW pipe forming is distinct from flash welded pipe and furnace butt-welded pipe as a result of being produced in a continuous forming process from coils of flat plate.
electrolyte: medium containing ions that migrate in an electric field.
engineering assessment: a documented assessment, using engineering principles, of the effect of relevant variables upon service or integrity of a pipeline system, using engineering principles, and conducted by, or under the supervision of, a competent person with demonstrated understanding and experience in the application of the engineering and risk management principles related to the issue being assessed.
engineering critical assessment: an analytical procedure, based upon fracture mechanics, that allows determination of the maximum tolerable sizes for imperfections, and conducted by, or under the supervision of, a competent person with demonstrated understanding and experience in the application of the engineering principles related to the issue being assessed.
environment: surroundings or conditions (physical, chemical, mechanical) in which a material exists.
epoxy: type of resin formed by the reaction of aliphatic or aromatic polyols (like bisphenol) with epichlorohydrin and characterized by the presence of reactive oxirane end groups.
evaluation: a review following the characterization of an actionable anomaly to determine whether the anomaly meets specified acceptance criteria.
examination: direct physical inspection of a pipeline that may include the use of nondestructive examination (NDE) techniques or methods.
experience: work activities accomplished in a specific NDT method under the direction of qualified supervision including the performance of the NDT method and related activities but not including time spent in organized training programs.
failure: general term used to imply that a part in service has become completely inoperable; is still operable but is incapable of satisfactorily performing its intended function; or has deteriorated seriously to the point that it has become unreliable or unsafe for continued use.
fatigue: process of development of or enlargement of a crack as a result of repeated cycles of stress.
feature: any physical object detected by an in-line inspection system. Features may be anomalies, components, nearby metallic objects, welds, or some other item.
film: thin, not necessarily visible layer of material.
galvanic corrosion: accelerated corrosion of a metal because of an electrical contact with a more noble metal and/or a more noble localized section of the metal or nonmetallic conductor in a corrosive electrolyte.
gas: as used in this Code, any gas or mixture of gases suitable for domestic or industrial fuel and transmitted or distributed to the user through a piping system. The common types are natural gas, manufactured gas, and liquefied petroleum gas distributed as a vapor, with or without the admixture of air.
gas processing plant: facility used for extracting commercial products from gas.
gathering system: one or more segments of pipeline, usually interconnected to form a network, that transports gas from one or more production facilities to the inlet of a gas processing plant. If no gas processing plant exists, the gas is transported to the most downstream of either of the following:
(a) the point of custody transfer of gas suitable for delivery to a distribution system
(b) the point where accumulation and preparation of gas from separate geographic production fields in reasonable proximity has been completed
geographic information system (GIS): system of computer software, hardware, data, and personnel to help manipulate, analyze, and present information that is tied to a geographic location.
butt weld: complete circumferential butt weld joining pipe or components.
global positioning system (GPS): system used to identify the latitude and longitude of locations using GPS satellites.
gouge: mechanically induced metal loss that causes localized elongated grooves or cavities in a metal pipeline.
high-pressure distribution system: gas distribution piping system that operates at a pressure higher than the standard service pressure delivered to the customer. In such a system, a service regulator is required on each service line to control the pressure delivered to the customer.
**hydrotest**: see hydrostatic test.

**hydrostatic test or hydrotest**: a pressure test using water as the test medium.

**imperfection**: an anomaly with characteristics that do not exceed acceptable limits.

**incident**: unintentional release of gas due to the failure of a pipeline.

**Hydrotest**: see hydrostatic test.

**Hydrogen sulfide** ($H_2S$): toxic gaseous impurity found in some well gas streams. It also can be generated in situ as a result of microbiologic activity.

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**In-service pipeline**: defined herein as a pipeline that contains natural gas to be transported. The gas may or may not be flowing.

**Inspection**: use of a nondestructive testing technique or method.

**Integrity**: defined herein as the capability of the pipeline to withstand all anticipated loads (including hoop stress due to operating pressure) plus the margin of safety established by this section.

**Integrity assessment**: process that includes inspection of pipeline facilities, evaluating the indications resulting from the inspections, examining the pipe using a variety of techniques, evaluating the results of the examinations, characterizing the evaluation by defect type and severity, and determining the resulting integrity of the pipeline through analysis.

**Launcher**: pipeline facility used to insert a pig into a pressurized pipeline, sometimes referred to as a "pig trap.

**Leak**: unintentional escape of gas from the pipeline. The source of the leak may be holes, cracks (include propagating and nonpropagating, longitudinal, and circumferential), separation or pullout, and loose connections.

**Length**: a piece of pipe of the length delivered from the mill. Each piece is called a length, regardless of its actual dimension. This is sometimes called a "joint," but "length" is preferred.

**Liquefied petroleum gas(es)** (LPG): liquid petroleum gases composed predominantly of the following hydrocarbons, either by themselves or as mixtures: butane (normal butane or isobutane), butylene (including isomers), propane, propylene, and ethane. LPG can be stored as liquids under moderate pressures [approximately 80 psig to 250 psig (550 kPa to 1720 kPa)] at ambient temperatures.

**Low-pressure distribution system**: gas distribution piping system in which the gas pressure in the mains and service lines is substantially the same as that delivered to the customer's appliances. In such a system, a service regulator is not required on the individual service lines.

**Low-stress pipeline**: pipeline that is operated in its entirety at a hoop stress level of 20% or less of the specified minimum yield strength of the line pipe.

**Magnetic flux leakage (MFL)**: an in-line inspection technique that induces a magnetic field in a pipe wall between two poles of a magnet. Sensors record status in leakage in this magnetic flux (flow) outside the pipe wall, which can be correlated to metal loss.

**Magnetic particle inspection (MPI)**: a nondestructive test method utilizing magnetic leakage fields and suitable indicating materials to disclose surface and near-surface discontinuity indications.

**Management of change**: process that systematically recognizes and communicates to the necessary parties changes of a technical, physical, procedural, or organizational nature that can impact system integrity.

**Maximum allowable operating pressure (MAOP)**: maximum pressure at which a pipeline system may be operated in accordance with the provisions of the ASME B31.8 Code.

**Mechanical damage**: type of metal damage in a pipe or pipe coating caused by the application of an external force. Mechanical damage can include denting, coating removal, metal removal, metal movement, cold working of the underlying metal, puncturing, and residual stresses.

**Metal loss**: types of anomalies in pipe in which metal has been removed from the pipe surface, usually due to corrosion or gouging.
nominal outside diameter: see diameter.

microbiologically influenced corrosion (MIC): corrosion or deterioration of metals resulting from the metabolic activity of microorganisms. Such corrosion may be initiated or accelerated by microbial activity.

mitigation: limitation or reduction of the probability of occurrence or expected consequence for a particular event.

municipality: city, county, or any other political subdivision of a state.

nondestructive examination (NDE) or nondestructive testing (NDT): testing method, such as radiography, ultrasonic, magnetic testing, liquid penetrant, visual, leak testing, eddy current, and acoustic emission, or a testing technique, such as magnetic flux leakage, magnetic particle inspection, shear-wave ultrasonic, and contact compression-wave ultrasonic.

operating stress: stress in a pipe or structural member under normal operating conditions.

operator or operating company: individual, partnership, corporation, public agency, owner, agent, or other entity currently responsible for the design, construction, inspection, testing, operation, and maintenance of the pipeline facilities.

performance-based integrity management program: integrity management process that utilizes risk management principles and risk assessments to determine detection, and mitigation actions and their timing.

pipeline: new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

pipeline section: continuous run of pipe between adjacent compressor stations, between a compressor station and a block valve, or between adjacent block valves.

pipe-to-soil potential: electric potential difference between the surface of a buried or submerged metallic structure and the electrolyte that is measured with reference to an electrode in contact with the electrolyte.

piping and instrumentation diagram (P&ID): drawing showing the piping and instrumentation for a pipeline or pipeline facility.

pitting: localized corrosion of a metal surface that is confined to a small area and takes the form of cavities called pits.

predicted failure pressure, \( P_f \): an internal pressure that is used to prioritize a defect as immediate, scheduled, or monitored. See the detail explanation with Figure 7.2.1-1. The failure pressure is calculated utilizing ASME B31G or similar method when the design factor, \( F \), is set to unity.

prescriptive integrity management program: integrity management process that follows preset conditions and timelines.

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resistivity:
(a) resistance per unit length of a substance with uniform cross section
(b) measure of the ability of an electrolyte (e.g., soil) to resist the flow of electric charge (e.g., cathodic protection current)

Resistivity data are used to design a groundbed for a cathodic protection system.

rich gas: gas that contains significant amounts of hydrocarbons or components that are heavier than methane and ethane. Rich gases decompress in a different fashion than pure methane or ethane.

right-of-way (ROW): strip of land on which pipelines, railroads, power lines, roads, highways, and other similar facilities are constructed. The ROW agreement secures the right to pass through property owned by others. ROW agreements generally allow the right of ingress and egress for the operation and maintenance of the facility, and the installation of the facility. The ROW width can vary with the construction and maintenance requirements of the facility’s operator and is usually determined based on negotiation with the affected landowner, by legal action, or by permitting authority.

risk: measure of potential loss in terms of both the incident probability (likelihood) of occurrence and the magnitude of the consequences.

risk assessment: systematic process in which potential hazards from facility operation are identified, and the likelihood and consequences of potential adverse events are estimated. Risk assessments can have varying scopes, and can be performed at varying levels of detail depending on the operator’s objectives (see section 5).

risk management: overall program consisting of identifying potential threats to an area or equipment; assessing the risk associated with those threats in terms of incident likelihood and consequences; mitigating risk by reducing the likelihood, the consequences, or both; and measuring the risk reduction results achieved.

root cause analysis: family of processes implemented to determine the primary cause of an event. These processes all seek to examine a cause-and-effect relationship through the organization and analysis of data. Such processes are often used in failure analyses.

rupture: complete failure of any portion of the pipeline that allows the product to escape to the environment.

rust: corrosion product consisting of various iron oxides and hydrated iron oxides (this term properly applies only to iron and ferrous alloys).

seam weld: longitudinal or helical seam in pipe that is made in the pipe mill for the purpose of making a complete circular cross section.

segment: length of pipeline or part of the system that has unique characteristics in a specific geographic location.

sensors: devices that receive a response to a stimulus (e.g., an ultrasonic sensor detects ultrasound).

shall: “shall” and “shall not” are used to indicate that a provision is mandatory.

shielding: preventing or diverting the flow of cathodic protection current from its natural path.

should: “should,” “should not,” and “it is recommended” are used to indicate that a provision is not mandatory but recommended as good practice.

sizing accuracy: given by the interval within which a fixed percentage of all metal-loss features will be sized. The fixed percentage is stated as the confidence level.

smart pig: see in-line inspection tools.

soil liquefaction: soil condition, typically caused by dynamic cyclic loading (e.g., earthquake, waves) where the effective shear strength of the soil is reduced such that the soil exhibits the properties of a liquid.

specified minimum yield strength (SMYS): expressed in pounds per square inch (MPa), minimum yield strength prescribed by the specification under which pipe is purchased from the manufacturer.

storage field: geographic field containing a well or wells that are completed for and dedicated to subsurface storage of large quantities of gas for later recovery, transmission, and end use.

strain: change in length of a material in response to an applied force, expressed on a unit length basis (e.g., inches per inch or millimeters per millimeter).

stress: internal resistance of a body to an external applied force, expressed in units of force per unit area (psi or MPa). It may also be termed “unit stress.”

stress corrosion cracking (SCC): form of environmental attack of the metal involving an interaction of a local corrosive environment and tensile stresses in the metal, resulting in formation and growth of cracks.

stress level: level of tangential or hoop stress, usually expressed as a percentage of specified minimum yield strength.

subject matter experts: individuals that have expertise in a specific area of operation or engineering.

submerged arc welding: arc welding process that uses an arc or arcs between a bare metal electrode or electrodes and the weld pool. The arc and molten metal are shielded by a blanket of granular flux on the workpieces. The process is used without pressure and with filler metal from the electrode and sometimes from a supplemental source (welding rod, flux, or metal granules).

survey: measurements, inspections, or observations intended to discover and identify events or conditions that indicate a departure from normal operation or undamaged condition of the pipeline.
system or pipeline system: either the operator’s entire pipeline infrastructure or large portions of that infrastructure that have definable starting and stopping points.

temperature: expressed in degrees Fahrenheit (°F) [degrees Celsius (°C)].

tensile stress: applied pulling force divided by the original system: see pipeline system.

third-party damage: damage to a gas pipeline facility by an outside party other than those performing work for the operator. For the purposes of this Code, this also includes damage caused by the operator’s personnel or the operator’s contractors.

tool: generic term signifying any type of instrumented tool or pig.

training: organized program developed to impart the knowledge and skills necessary for qualification.

transmission line: segment of pipeline installed in a transmission system or between storage fields.

transmission system: one or more segments of pipeline, usually interconnected to form a network, that transports gas from a gathering system, the outlet of a gas processing plant, or a storage field to a high- or low-pressure distribution system, a large-volume customer, or another storage field.

transportation of gas: gathering, transmission, or distribution of gas by pipeline or the storage of gas.

ultrasonic: high-frequency sound. Ultrasonic examination is used to determine wall thickness and to detect the presence of defects.

uprating: qualifying of an existing pipeline or main for a higher maximum allowable operating pressure.

weld: localized coalescence of metals or nonmetals produced by heating the materials to the welding temperature, with or without the application of pressure, or by the application of pressure alone and with or without the use of filler material.

welding procedures: detailed methods and practices involved in the production of a weldment.

wrinkle bend: pipe bend produced by field machine or controlled process that may result in prominent contour discontinuities on the inner radius. The wrinkle is deliberately introduced as a means of shortening the inside meridian of the bend. Note that this definition does not apply to a pipeline bend in which incidental minor, smooth ripples are present.

(18) REFERENCES AND STANDARDS

The following is a list of publications that support or are referenced in this Standard. The references shall be to the specific editions cited below, except the user may use the latest published edition of ANSI-approved standards unless specifically prohibited by this Standard, and provided the user has reviewed the latest edition of the standard to ensure that the integrity of the pipeline system is not compromised. If a newer or amended edition of a standard is not ANSI approved, then the user shall use the specific edition reference date shown herein. An asterisk (*) is used to indicate that the specific edition of the standard has been accepted as an American National Standard by the American National Standards Institute (ANSI).

*ANSI/GPTC-Z380-TR-1 (November 2001), Review of Integrity Management for Natural Gas Transmission Pipelines
Publisher: Gas Piping Technology Committee (GPTC) of the American Gas Association (AGA), 400 North Capitol Street, NW, Washington, DC 20001 (www.agaga.org)

Publisher: American Society for Quality (ASQ), P.O. Box 3005, Milwaukee, WI 53201 (www.asq.org)

*API RP 1110 (sixth edition, February 2013), Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide

*API Std 1160 (first edition, November 2001; reaffirmed November 2008), Managing System Integrity for Hazardous Liquid Pipelines

*API Std 1163 (second edition, April 2013), In-Line Inspection Systems Qualification
Publisher: American Petroleum Institute (API), 1220 L Street, NW, Washington, DC 20005 (www.api.org)

*ASME B31.8-2018, Gas Transmission and Distribution Piping Systems

*ASME B31G-2012, Manual for Determining the Remaining Strength of Corroded Pipelines: Supplement to ASME B31 Code for Pressure Piping


ASME STP-PT-011, Integrity Management of Stress Corrosion Cracking in Gas Pipeline High Consequence Areas, October 31, 2008

### Item 19-1979

<table>
<thead>
<tr>
<th>ASME B31.8S-2018 EDITION</th>
<th>Revise Definition of Arc Weld in B31.8S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESENT TEXT</strong></td>
<td><strong>PROPOSED CHANGES</strong></td>
</tr>
<tr>
<td><strong>13 TERMS, DEFINITIONS, AND ACRONYMS</strong></td>
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</tr>
<tr>
<td><em>arc weld:</em> group of welding processes that produces coalescence of metals by heating them with an arc. The processes are used with or without the application of pressure and with or without filler metal.</td>
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</tr>
</tbody>
</table>
6.3.2 Manufacturing and Related Defect Threats.
Pressure testing is appropriate for use when addressing the pipe seam aspect of the manufacturing threat. Pressure testing shall comply with the requirements of ASME B31.8. This will define whether air or water shall be used. Seam issues have been known to exist for pipe with a joint factor of less than 1.0 (e.g., lapwelded pipe, hammer-welded pipe, and buttwelded pipe) or if the pipeline is composed of low-frequency welded electric-resistance welded (ERW) pipe or flash-welded pipe. References for determining if a specific pipe is susceptible to seam issues are Integrity Characteristics of Vintage Pipelines (The INGAA Foundation, Inc.) and History of Line Pipe Manufacturing in North America (ASME research report).

<table>
<thead>
<tr>
<th>Threat</th>
<th>Criteria/Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>ERW pipe, joint factor &lt;1.0, no hydrostatic test</td>
</tr>
</tbody>
</table>

Table 8.3.4-2 Example of Integrity Management Plan for Hypothetical Pipeline Segment (Integrity Assessment Plan: Line 1, Segment 3)

13 TERMS, DEFINITIONS, AND ACRONYMS

Note to Editor: In Section 13 below, the definitions will be inserted into the document so that they are in alphabetical order with the other definitions in Section 13.
<table>
<thead>
<tr>
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<td><strong>double submerged arc welded pipe (DSAW pipe):</strong> pipe that has a straight longitudinal or helical seam containing filler metal deposited on both sides of the joint by the submerged-arc welded process. <strong>submerged-arc welded (SAW) pipe:</strong> pipe having one or two straight seams, or one helical seam, produced by the submerged-arc welding process. At least one submerged-arc welding pass is made on the outside of the pipe. In addition, there is at least one additional SAW pass on the inside of the pipe which sometimes results in pipe described as double submerged-arc welded (DSAW) pipe. The SAW process produces melting and coalescence of metals by heating them with an arc or arcs between a bare metal consumable electrode or electrodes and the work, wherein the arc and molten metal are shielded by a blanket of granular flux. Pressure is not used and part or all of the filler metal is obtained from the electrodes. Typical specifications are ASTM A381 and API 5L. API 5L also allows two straight seams for pipe diameters greater than or equal to 36 in. (914 mm).</td>
</tr>
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<td><strong>electric-resistance welded pipe (ERW pipe):</strong> pipe that has a straight longitudinal seam produced without the addition of filler metal by the application of pressure and heat obtained from electrical resistance. ERW pipe forming is distinct from flash-welded pipe and furnace-buttwelded pipe as a result of being produced in a continuous forming process from coils of flat plate.</td>
<td><strong>electric-resistance welded pipe (ERW pipe):</strong> pipe that has a straight longitudinal seam produced without the addition of filler metal by the application of pressure and heat obtained from electrical resistance. ERW pipe forming is distinct from flash-welded pipe and furnace-buttwelded pipe as a result of being produced in a continuous forming process from coils of flat plate. <strong>electric-induction welded pipe (EW):</strong> pipe having one longitudinal (straight or helical) seam produced by low- or high-frequency electric welding. The process of forming a seam is done by electric-resistance welding, wherein the edges to be welded are mechanically pressed together and the heat for welding is generated by the resistance to flow of electric current applied by induction (no electric contact) or conduction. Typical specifications are ASTM A53, ASTM A135, ASTM A333 and API 5L. <strong>(1) high-frequency welded (HFW) pipe:</strong> EW pipe produced with a welding current frequency equal to or greater than 70 kHz as stated in API 5L. <strong>(2) low-frequency welded (LFW) pipe:</strong> EW pipe produced with a welding current frequency less than 70 kHz as stated in API 5L. Note: 360 Hz had been a common upper limit for LFW pipe manufactured prior to 1980.</td>
</tr>
</tbody>
</table>

**NOTES:**
(1) Underline and blue indicates revised and new text.
(2) Strikethrough and red indicates deleted text.
### A-5.3 Criteria and Risk Assessment

If the pipe has a joint factor of less than 1.0 (such as lapwelded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency welded ERW pipe or flash-welded pipe, a manufacturing threat is considered to exist.

### PROPOSED CHANGES

If the pipe has a joint factor of less than 1.0 (such as lapwelded pipe, hammer-welded pipe, and butt-welded pipe) or if the pipeline is composed of low-frequency welded ERW LFW pipe or flash-welded pipe, a manufacturing threat is considered to exist.
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<td>NOTE: When pipe data is unknown, the operator may refer to History of Line Pipe Manufacturing in North America by J. F. Kiefner and E. B. Clark, 1996, ASME. In addition, this report provides information on historic pipe manufacturing processes, including legacy seams such as lap welded, electric-flash welded and single submerged-arc welded.</td>
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</tbody>
</table>