MAOP

Maximum Allowable Operating Pressure means the maximum pressure at which a pipeline or segment of a pipeline may be operated under this part.

(§192.3 – Definitions)
MAOP

• MAOP is Calculated by using:
  § 192.619 - Maximum allowable operating pressure - Steel or plastic pipelines
  § 192.621 - Maximum allowable operating pressure: High-Pressure distribution systems.
  § 192.623 - Maximum and minimum allowable operating pressure: Low-pressure distribution systems.
  § 192.620 - Alternative maximum allowable operating pressure for certain steel pipelines

Factors Affecting MAOP

• Class location (Steel pipelines)
• Design of pipe and components
• System pressure test
• Operating history
• Overpressure protection
§192.619 (a)

No person may operate a segment of steel or plastic pipeline at a pressure that exceeds a maximum allowable operating pressure determined under paragraph (c) or (d) of this section, or the lowest of the following:

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

**Design Pressure**

The pressure for which a pipeline or segment of a pipeline is designed using appropriate engineering parameters, formulas, and component pressure ratings
Design

• Pipe Design Formulas
  – Steel - §192.105
  – Plastic - §192.121
  – Limitations for Plastic - §192.123

• Components
  – Manufacturer’s rating

MAOP based on Design

• Based on the weakest link
  – Pipe
  – Component
  – Fabricated fitting
Double Stamped Pipe

• Meets requirements of both grades
• Operator must specify which grade is being used, and consistently use that grade

MAOP based on Design

• Design also includes:
  – Pipe replacements
  – Repairs such as leak clamps, sleeves
  – Component replacements such as valves, fittings, or other appurtenances
  – Hot taps
§192.619

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element
- Test Pressure (steel de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

Test Pressure

- Tested according to the requirements of Subpart J and operators procedures
Test Pressure

• Steel
  – Test pressure de-rated by class location factor

• Plastic
  – Test Pressure divided by 1.5 for all locations
  – §192.513 requires TP
    150% of MAOP or 50 psi, whichever is greater

MAOP based on Test Pressure

• Test Pressures also includes:
  – Pipe replacements
    • Ensure pretested pipe to appropriate pressures
  – Fabricated components
  – ASME Vessels
    • ASME only to 1.3 times, must consider Part 192 requirements
§192.619

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

---

**5 Year MOP**

- The highest operating pressure in the 5 years preceding
  - Onshore pipelines – 7/1/1970
  - Gathering pipelines – 3/15/2006 or date line becomes subject to this part, whichever is later
- **Unless**
  - Tested in accordance with §192.619(a)(2) after July 1, 1965 or
  - Uprated in accordance with Part 192 Subpart K
5 Year MOP

Except for newly regulated gathering lines, using the 5-year pressure to establish MAOP is not an option!

§192.619

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator
Maximum Safe Pressure

The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

Used for derating pressure only!

§192.619 (a)

MAOP cannot exceed the LOWEST of:

• Design pressure of weakest element
• Test Pressure (de-rated by class location factor)
• MOP during the 5 years preceding applicable date
• Maximum safe pressure determined by the operator
§192.619 (b)

- If MAOP established by a maximum safe pressure (§192.619(a)(4)), must have overpressure protective devices installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with §192.195.

§192.619 (c)

The requirements on pressure restrictions in this section do not apply in the following instance.
§192.619 (c) (Grandfather Clause)

An operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the 5 years preceding the applicable date in the second column of the table in paragraph (a)(3) of this section.

§192.619 (c) (Grandfather Clause)

• The highest operating pressure in the 5 years preceding
  – Onshore pipelines – 7/1/1970
  – Newly regulated gathering lines - The five years prior to the date the line becomes regulated
OTHER

Instances where MAOP must be revised for a class change as required by §192.611

Steel MAOP Calculation

Steel transmission line constructed in 1995
6”, Grade B pipe, 0.280 wall thickness
Installed in a Class 2 location
Valves, fittings ANSI 300 (740 psig)
Tested to 650 psig for 8 hours

What is the MAOP?
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

**MAOP Steel Pipe - §192.619(a)(1)**

- §192.105 – Design of Steel Pipe

\[
P = (2St/D) \times F \times E \times T
\]

S=Grade of pipe

\( t \) = thickness

D=diameter

\( F \)=Design Factor §192.111

\( E \)=Longitudinal Joint Factor §192.113

\( T \)=Temperature Derating Factor §192.115
MAOP Steel Pipe - §192.619(a)

• §192.105 – Design of Steel Pipe

\[ P = (2St/D)xFxExT \]

- \( S = \text{Grade of pipe} \quad \text{Grade B or 35,000} \)
- \( t = \text{thickness} \quad 0.280" \)
- \( D = \text{diameter} \quad 6.625" \)
- \( F = \text{Design Factor} \quad \text{§192.111} \quad 0.6 \)
- \( E = \text{Longitudinal Joint Factor} \quad \text{§192.113} \quad 1.0 \)
- \( T = \text{Temperature Derating Factor} \quad \text{§192.115} \quad 1.0 \)

\[ P = \left(2 \times 35,000 \times 0.280\right) / 6.625 \times 0.6 \times 1 \times 1 \]

\[ P = 1775 \text{ psig} \]

Fittings – ANSI 300 = 740 psig

MAOP by Design – 740 psig
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = 740 psig
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

MAOP Steel Pipe – §192.619 (a)(2)

- Test Pressure (de-rated by class location factor)

\[
\text{MAOP} = \frac{\text{Test Pressure}}{\text{Class Location Factor}}
\]

Test Pressure = 650 psig
Class Location Factor for class 2 = 1.25

\[
\text{MAOP} = \frac{650}{1.25}
\]

**MAOP by test pressure = 520 psig**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = 740 psig
- Test Pressure = 520 psig
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

MAOP Steel Pipe – §192.619 (a)(3)

- The highest operating pressure in the 5 years preceding applicable date
  - Onshore pipelines – 7/1/1970
  - Gathering pipelines – 3/15/2006 or date line becomes subject to this part, whichever is later

**Not applicable, built in 1995**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = **740 psig**
- Test Pressure = **520 psig**
- MOP during the 5 years preceding applicable date = **NA**
- Maximum safe pressure determined by the operator

MAOP Steel Pipe – §192.619 (a)(4)

- Maximum safe pressure determined by the operator

**Not applicable**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element = **740 psig**
- Test Pressure = **520 psig**
- MOP during the 5 years preceding applicable date = **NA**
- Maximum safe pressure determined by the operator = **NA**

MAOP of steel pipeline = 520 psig as determined by §192.619 (a)(2)

Steel MAOP Calculation

Steel transmission line constructed in 1964
- 6”, Grade B pipe, 0.280 wall thickness
- Installed in a Class 1 location
- Valves, fittings ANSI 300 (740 psig)
- Tested to 900 psig for 12 hours
- Operated at 900 psi in 1968

**What is the MAOP?**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

MAOP Steel Pipe - §192.619(a)(1)

- §192.105 – Design of Steel Pipe

\[ P = (2St/D) \times F \times E \times T \]

S=Grade of pipe  
\( t = \text{thickness} \)
\( D = \text{diameter} \)
F=Design Factor §192.111  
E=Longitudinal Joint Factor §192.113  
T=Temperature Derating Factor §192.115
MAOP Steel Pipe - §192.619(a)

- §192.105 – Design of Steel Pipe
  \[ P = \frac{(2St)}{D} \times F \times E \times T \]
  
  - \( S = \text{Grade of pipe} \) Grade B or 35,000
  - \( t = \text{thickness} \) 0.280"
  - \( D = \text{diameter} \) 6.625"
  - \( F = \text{Design Factor} \) §192.111 0.72
  - \( E = \text{Longitudinal Joint Factor} \) §192.113 1.0
  - \( T = \text{Temperature Derating Factor} \) §192.115 1.0

\[ P = \left(\frac{(2 \times 35,000 \times 0.280)}{6.625}\right) \times 0.72 \times 1 \times 1 \]

\[ P = 2130 \text{ psig (6.625")} \]

\[ P = 2352 \text{ psig (6")} \]

Fittings – ANSI 300 = 740 psig

MAOP by Design = 740 psig
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element = 740 psig
- Test Pressure (de-rated by class location factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

**MAOP Steel Pipe – §192.619 (a)(2)**

- Test Pressure (de-rated by class location factor)

MAOP = Test Pressure / Class Location Factor

Test Pressure = 900 psig
Class Location Factor for class 1 = 1.1

MAOP = 900 / 1.1

**MAOP by test pressure = 818 psig**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = **740 psig**
- Test Pressure = **818 psig**
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

MAOP Steel Pipe – §192.619 (a)(3)

- The highest operating pressure in the 5 years preceding applicable date
  - Onshore pipelines – 7/1/1970
  - Gathering pipelines – 3/15/2006 or date line becomes subject to this part, whichever is later
  - Operated at 900 psi in 1968

**MAOP by 5 year is 900 psig**
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element = 740 psig
- Test Pressure = 818 psig
- MOP during the 5 years preceding applicable date = 900 psig
- Maximum safe pressure determined by the operator

MAOP Steel Pipe – §192.619 (a)(4)

- Maximum safe pressure determined by the operator

**Not applicable**
§192.619 (a)
MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element = **740 psig**
- Test Pressure = **818 psig**
- MOP during the 5 years preceding applicable date = **900 psig**
- Maximum safe pressure determined by the operator = **NA**

MAOP of steel pipeline = 740 psig as determined by §192.619 (a)(1)

§192.619 (c)
(Grandfather Clause)
- The highest operating pressure in the 5 years preceding
  - Onshore pipelines – 7/1/1970
  - Newly regulated gathering lines - The five years prior to the date the line becomes regulated

**Operated at 900 psig in 1968**
§192.619
(a) MAOP cannot exceed the **LOWEST** of:
- Design pressure of weakest element = **740 psig**
- Test Pressure = **818 psig**
- MOP during the 5 years preceding applicable date = **900 psig**
- Maximum safe pressure determined by the operator = **NA**
(c) MAOP by grandfather = **900 psig**

MAOP of steel pipeline = 900 psig as determined by §192.619 (c)

---

**Plastic MAOP Calculation**

Plastic line constructed in 2005
- 2", PE 3408, SDR =11
- Installed in a Class 2 location
- Tested to 150 psig

What is the MAOP?
§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element
- Test Pressure (de-rating factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator

MAOP Plastic Pipe - §192.619(a)(1)

- §192.121 – Design of Plastic Pipe

\[
P = \left(\frac{2S}{SDR} - 1\right) \times DF
\]

- \(S = \text{HDB (Hydrostatic Design Basis) in accordance with listed specification at given temperature}\)
- \(SDR = \text{Standard dimension ratio}\)
- \(DF = \text{Design Factor 0.32 or 0.40 for PA-11}\)
Hydrostatic Design Basis
Thermoplastic Pipe

<table>
<thead>
<tr>
<th>Piping Material</th>
<th>73°F</th>
<th>100°F</th>
<th>120°F</th>
<th>140°F</th>
</tr>
</thead>
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<tr>
<td>2406</td>
<td>1250</td>
<td>1250</td>
<td>1000</td>
<td>800</td>
</tr>
<tr>
<td>3408</td>
<td>1600</td>
<td>1250</td>
<td>1000</td>
<td>800</td>
</tr>
</tbody>
</table>

MAOP Plastic Pipe - §192.619(a)(1)

- §192.121 – Design of Plastic Pipe
  \[ P = (2S/SDR - 1) \times DF \]

  \[ S = \text{HDB (Hydrostatic Design Basis) in accordance with listed specification at given temperature} = 1600 \]
  \[ SDR = \text{Standard dimension ratio} = 11 \]
  \[ DF = \text{Design Factor} \ 0.32 \]
MAOP Plastic Pipe - §192.619(a)(1)

- §192.121 – Design of Plastic Pipe
  \[ P = \left( \frac{2S}{SDR - 1} \right) \times DF \]

\[ P = \left( \frac{2\times1600}{11-1} \right) \times 0.32 \]
\[ P = \frac{3200}{10} \times 0.32 \]
\[ P = 320 \times 0.32 = 102 \]

MAOP by Design = 102 psig

§192.619 (a)

MAOP cannot exceed the LOWEST of:
- Design pressure of weakest element = 102 psig
- Test Pressure (de-rating factor)
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator
MAOP Plastic Pipe – §192.619 (a)(2)

- Test Pressure (de-rating factor)

MAOP = Test Pressure/1.5
MAOP = 150/1.5

MAOP by test pressure = 100 psig

§192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = 102 psig
- Test Pressure = 100 psig
- MOP during the 5 years preceding applicable date
- Maximum safe pressure determined by the operator
MAOP Plastic Pipe – §192.619 (a)(3)

- The highest operating pressure in the 5 years preceding applicable date
  - Onshore pipelines – 7/1/1970
  - Gathering pipelines – 3/15/2006 or date line becomes subject to this part, whichever is later

Not applicable, built in 2005

§192.619 (a)

MAOP cannot exceed the LOWEST of:
- Design pressure of weakest element = 102 psig
- Test Pressure = 100 psig
- MOP during the 5 years preceding applicable date = NA
- Maximum safe pressure determined by the operator
### MAOP Plastic Pipe – §192.619 (a)(4)

- Maximum safe pressure determined by the operator

**Not applicable**

### §192.619 (a)

MAOP cannot exceed the **LOWEST** of:

- Design pressure of weakest element = **102 psig**
- Test Pressure = **100 psig**
- MOP during the 5 years preceding applicable date = **NA**
- Maximum safe pressure determined by the operator = **NA**

**MAOP of plastic pipeline = 100 psig as determined by §192.619 (a)(2)**
For Distribution

Not done calculating MAOP yet!

From §192.619, must move to:
High pressure distribution - §192.621
Low pressure distribution - §192.623

High Pressure Distribution System

A distribution system in which the gas pressure in the main is higher than the pressure provided to the customer. (Service Regulators)
§192.621 MAOP High Pressure Distribution Systems

Lowest of the following:

Design (redundant from §192.619)

60# - unless service lines equipped with pressure limiting devices meeting §192.197(c)

§192.621 MAOP High Pressure Distribution Systems

- 25# - Cast Iron Pipe if there are Unreinforced Bell and Spigot Joints

- "The Pressure Limits to which a Joint could be Subjected without the Possibility of its Parting."

- Maximum Safe Pressure determined by the Operator ~Must provide Overpressure Protection per §192.195 (Redundant from §192.619)
**Low Pressure Distribution**

A distribution system in which the gas pressure in the main is substantially the same as the pressure provided to the customer.  
*(No Service Regulators)*

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**§192.623 – Low Pressure Distribution Systems**

- *Maximum* and Minimum Allowable Operating Pressure

  Cannot operate at a pressure high enough to make unsafe the operation of properly adjusted low-pressure gas burning equipment.
§192.623 – Low Pressure Distribution Systems

• *Maximum* and Minimum Allowable Operating Pressure

• Cannot operate at a pressure lower than the minimum pressure at which the safe and continuing operation of any properly adjusted low-pressure gas burning equipment can be assured.

Conversion of Service
§192.14

• Steel pipeline previously used in service not subject to this part qualifies for use under this part if:
  – Pipeline must be tested according to Subpart J
  – MAOP established by Subpart L (§192.619)
Established MAOP

Do not have to operate at MAOP

Established MAOP

• Once established, MAOP not lost unless:
  – Down rate pipe according to maximum safe pressure §192.619(a)(4)
  – Install pipe or component that does not comply with design formula or pressure requirements
  – Install untested or low tested pipe
  – Class location change §192.611
Temporary Pressure Reductions

• May have temporary pressure reductions due to:
  – Operations and maintenance issues
  – Safety related conditions
  – IM requirements
  – Pressure reductions due to PHMSA orders

What should an operator do to raise operating pressure if the pipeline has been operating for a significant time at a pressure lower than established MAOP?
Re-establish MOP

Technically......

NOTHING

Re-establish MOP

• Realistically.............

Determine fitness for service (FFS)
Fitness for Service

Fitness for service is the ability of a system or component to provide continued service, within established regulations and margins for safety, until the end of some desired period of operations or scheduled inspection or reassessment.

Fitness for Service

Fitness for service assessment is multi-disciplinary engineering analysis of equipment to determine if it is safe and fit for continued service until the end of some desired period of operation (for example, until the next shutdown, until some specific future date, or until the end of its useful life).
Fitness for Service

Based on a review of historical performance to:

• identify threats,
• technical analyses
• evaluate threats

API RP 579-1/ASME FFS 1 (2007)

Fitness for Service

Fitness for service is the pipelines ability to operate in a manner that ensures the safety of the people that live and work near pipelines, protects the environment, while dependably transporting natural gas from sources to markets. (INGAA)
Fitness for Service

Based on a review of historical performance to:
  • identify threats
  • technical analyses
  • risk assessments

Challenge for pipelines is environment spanning tens to thousands of miles

FFS for pipelines

ADB 11-01 – Establishing MAOP/MOP using records

INGAA defined for MAOP/MOP
  • process diagram for looking at MAOP/MOP records
Verify MAOP

• Recommend follow requirements similar to §192.555 or §192.557
  – Review the design, operating, and maintenance history of the segment of pipeline to determine whether the proposed increase is safe and consistent with the requirements of this part; and
  – Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure.
  – Written plan for procedure, maintain records

Verify MAOP

• Check for
  – Any component changes since installation
  – Class changes
  – Regulation and overpressure protection
  – Leak history and repairs

Pipeline really suitable to be operated at higher pressure?
Re-establish MAOP

- Modified §192.555(e) or §192.557(c)
- Where a segment of pipeline has a pressure increase to established MAOP, the increase in pressure should be made in increments that are equal to:
  - (1) 10 percent of the operating pressure before the increase; or
  - (2) 25 percent of the total pressure increase, whichever produces the fewer number of increments.

Re-establish MAOP

- Modified requirements of §192.553
  - At the end, the pressure should be held constant while the entire segment of the pipeline that is leak surveyed
  - Each leak detected must be repaired before a further pressure increase is made, except that:
  - a leak determined not to be potentially hazardous need not be repaired if it is monitored during the pressure increase and it does not become potentially hazardous.
Summary

• Consider fitness for service prior to re-establishing MAOP
  – Design, repairs, operating and maintenance history
  – Written procedure
  – Incremental pressure increases
  – Leak surveys
UPRATING

• Subpart J
  – Minimum requirements for increasing maximum allowable operating pressure (uprating) for pipelines.

§192.553 General requirements

• The pressure must be increased gradually, at a rate that can be controlled
  – At the end of each incremental increase, the pressure must be held constant while the entire segment of the pipeline that is affected is checked for leaks.
  – Each leak detected must be repaired before a further pressure increase is made, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous.
§192.553 General

• Written plan. Each operator who uprates a segment of pipeline shall establish a written procedure that will ensure that each applicable requirement of this subpart is complied with.

§192.553 General

• Records - retain for the life of the segment a record of each investigation required by this subpart, of all work performed, and of each pressure test conducted, in connection with the uprating.
§192.553 General

• The new maximum allowable operating pressure established under this subpart may not exceed the maximum that would be allowed under §§ 192.619 and 192.621 for a new segment of pipeline constructed of the same materials in the same location.

§192.555 Steel Pipe operating at or over 30% SMYS

• Review the design, operating, and maintenance history and previous testing of the segment of pipeline and determine whether the proposed increase is safe and consistent with the requirements of this part; and
• Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure.
§192.555 Steel Pipe operating at or over 30% SMYS

• May increase the maximum allowable operating pressure of a segment of pipeline constructed before September 12, 1970, to the highest pressure that is permitted under §192.619, using as test pressure the highest pressure to which the segment of pipeline was previously subjected (either in a strength test or in actual operation).

§192.555 Steel Pipe operating at or over 30% SMYS

• If existing pressure test, according to §192.619 (a)(2), either:
  – Steel – apply appropriate class location factor to determine new MAOP
  – Plastic - the test pressure is divided by a factor of 1.5.
§192.555 Steel Pipe operating at or over 30% SMYS

• If no prior pressure test, to determine MAOP, the highest uprate pressure must have:
  – Steel – apply appropriate class location factor to uprate pressure to determine new MAOP
  – Plastic - the uprate pressure is divided by a factor of 1.5

• The new maximum operating pressure does not exceed 80 percent of that allowed for a new line of the same design in the same location;

§192.555 Steel Pipe operating at or over 30% SMYS

• Where a segment of pipeline is uprated in accordance with paragraph (c) or (d)(2) of this section, the increase in pressure must be made in increments that are equal to:

(1) 10 percent of the pressure before the uprating; or
(2) 25 percent of the total pressure increase, whichever produces the fewer number of increments.
§192.557 Uprating Steel pipelines to a hoop stress less than 30 percent of SMYS

• Before increasing operating pressure above the previously established maximum allowable operating pressure, the operator shall:

(1) Review the design, operating, and maintenance history of the segment of pipeline;

(2) Make a leakage survey (if it has been more than 1 year since the last survey) and repair any leaks that are found, except that a leak determined not to be potentially hazardous need not be repaired, if it is monitored during the pressure increase and it does not become potentially hazardous;

(3) Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure;

(4) Reinforce or anchor offsets, bends and dead ends in pipe joined by compression couplings or bell spigot joints to prevent failure of the pipe joint, if the offset, bend, or dead end is exposed in an excavation;
§192.557 Uprating to hoop stress <30 percent of SMYS

(5) Isolate the segment of pipeline in which the pressure is to be increased from any adjacent segment that will continue to be operated at a lower pressure; and,

(6) If the pressure in main or service lines, or both, is to be higher than the pressure delivered to the customer, install a service regulator on each service line and test each regulator to determine that it is functioning. Pressure may be increased as necessary to test each regulator, after a regulator has been installed on each pipeline subject to the increased pressure.

§192.557 Uprating to hoop stress <30 percent of SMYS

- The increase in maximum allowable operating pressure must be made in increments that are equal to 10 p.s.i. (69 kPa) gage or 25 percent of the total pressure increase, whichever produces the fewer number of increments. Whenever the requirements of paragraph (b)(6) of this section apply, there must be at least two approximately equal incremental increases.
§192.557 Uprating to hoop stress <30 percent of SMYS

(d) If records for cast iron or ductile iron pipeline facilities are not complete enough to determine stresses produced by internal pressure, trench loading, rolling loads, beam stresses, and other bending loads, in evaluating the level of safety of the pipeline when operating at the proposed increased pressure, operator must make certain assumptions and calculations.

Interpretation
July 17, 2009

We agree that § 192.557 allows the uprating of PE pipelines.

However, § 192.619 (a)(2)(i) requires the operator to increase the uprating test pressure to 1.5 times the new MAOP in order to meet the lowest limiting factor for the new MAOP. Therefore, in order for the operator to increase the MAOP from 50 psig to 60 psig, a pressure test to 1.5 times the new MAOP (90 psig) must be conducted to comply with the § 192.619 (a)(2)(i) requirements.

- Following procedures prior to uprating (§ 192.557(b)(1));
- Checking rating of applicable appurtenances for the test pressure; and
- Meeting and maintaining operating conditions to ensure pressure increments as required by the uprating (§ 192.553(a)).
Summary

• Consider fitness for service prior to MAOP verification
  – Design, operating and maintenance history
  – Written procedure
  – Incremental pressure increases
  – Leak surveys

Mary Friend
405-686-2332
mary.friend@dot.gov