2025 – July 9 – Editorial Section
Approved revisions to guide material under §§192.3, 192.8, 192.53, 192.105, 192.153, 192.169, 192.471, 192.485, 192.505, 192.515, 192.517, 192.605, 192.609, 192.611, 192.613, 192.619, 192.620, 192.624, 192.706, 192.711, 192.903, 192.905, 192.911, 192.917, 192.919, 192.927, 192.929, 192.933, 192.935, 192.941, Appendix E, G-191-3, G-192-9, G-192-9A, G-192-11, G-192-11A. After approval in LB2-2025 (2 comments); Design TG approved to Editorial Section & Public Review with 2 edits. Editorial concurs. **Ready for Publication** after GPTC Secretary processes through ANSI Public Review.

TR Number	**21-40**
Primary	§192.105
Secondary	Any areas where calculation of % SMYS is necessary to determine if the regulation is applicable (e.g., §§ 192.609, 192.3 – Transmission Line, 192.713, 192.624, 192.941).
Purpose	To provide the instructions to calculate %SMYS of a pipeline.
Origin/Rationale	There has been a lot of confusion through the years of the correct method to calculate % SMYS. The main question is if an operator uses the derating factors in the design formula in 192.105?
Notes	Some possible input to the Guide Material: *Question:* When calculating % SMYS when it is referenced in Part 192, which formula is used to calculate % SMYS; Barlow's formula for hoop stress or the pipeline design formula in §192.105? *Regulatory Background:* Several areas of the regulations distinguish different requirements an operator to follow based upon the operating pressure of a pipeline. This operating pressure differential is usually expressed in a calculation of the percentage of hoop stress (% SMYS) based upon the specifications of the pipeline. An example from §192.609: Whenever an increase in population density indicates a change in class location for a segment of an existing steel ***pipeline operating at a hoop stress that is more than 40 percent of SMYS***, or indicates that the hoop stress corresponding to the established maximum allowable operating pressure for a segment of existing pipeline is not commensurate with the present class location, the operator shall immediately make a study to determine; * * * * "Hoop Stress" is not defined in Part 192 and when a term is not defined in Part 192, operators are to look to industry standards or the dictionary to define those terms. Most of the current regulatory language in Part 192 was adopted from the 1968 version of the American Society of Mechanical Engineers (ASME) standard B31.8. The original version of the ASME code, defined "hoop stress" in section 805.32 as: *"The stress in a pipe wall, acting circumferentially in a plane perpendicular to the longitudinal axis of the pipe and produced by the pressure of the fluid in the pipe."* "Hoop Stress" is calculated using Barlow's formula: The calculation is: $P=2St/D$ Where: P = Pressure at 100% SMYS S = Specified Minimum Yield Strength t = wall thickness D = Nominal outside diameter The design pressure formula in §192.105 was adopted from section 841.1 of B31.8 and introduces derating factors to Barlow's formula. These derating factors are for Class Location, the type of longitudinal seam, and for temperature. The calculation is: $P=2St/D \times F \times E \times T$ Where: F = Class Location Factor from §192.111 E = Longitudinal Joint Factor from §192.113 T = Temperature Derating Factor from §192.115 These derating factors limit the pressure which a pipeline can operate based upon its proximity to people, how the pipe was manufactured, and the temperature of the gas being transported. *Answer:* Where %SMYS is expressed in the regulations, the determination of % SMYS is requested of the "hoop stress" and not of the "design pressure" of the pipeline. This means the calculation is the percentage fraction of Barlow's formula, not the design formula in §192.105. Example: If the criteria is 40% of SMYS, the calculation is the resulting pressure of: P = 2St/D (.40)
Assigned to	Design

Note: *Revisions are shown in yellow highlight and red font.*

§192.3
Definitions.

[Effective Date: 05/24/23]

As used in this part:

***Abandoned* means permanently removed from service.**

...

***SMYS* means specified minimum yield strength is:**

(1) For steel pipe manufactured in accordance with a listed specification, the yield strength specified as a minimum in that specification; or

(2) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with §192.107(b).

...

GUIDE MATERIAL

[Editorial note: SMYS is a definition in §192.3 as shown above, so GM that was originally proposed under Table 192.3i has been moved to this location.]

Regarding *SMYS* as defined in §192.3, specified minimum yield strength is a material property stated in the material specification for the pipe. It is an indication of the stress a pipe may experience that will not cause permanent deformation.

Glossary of Commonly Used Terms

(For Glossary of Commonly Used Abbreviations, see Table 192.3i below.)

...

Hoop stress is the stress in a pipe wall, acting circumferentially ~~in a plane~~ perpendicular to the longitudinal axis of the pipe, produced by the pressure of the fluid in the pipe. In this Guide, hoop stress ~~in steel pipe~~ is calculated by Barlow's ~~the~~ formula:

$$S_h = \frac{P * D}{2 * t}$$

Where:

S_h = Pipe h~~H~~oop stress, psi

P = Pipe i~~I~~nternal pressure, psig

D = Nominal outside diameter of pipe, inches

t = Nominal wall thickness of pipe, inches

Note: P in this case is not the design pressure.

See also *Maximum allowable hoop stress*.

...

Maximum allowable hoop stress is the maximum hoop stress permitted for the design of a piping system. For steel pipe, it ~~It~~ depends upon the material ~~used~~ properties, the class location of the pipe, and the operating conditions. See also *Hoop stress*.

[Publication note: Remove italics for words after "Maximum allowable test pressure" as shown below.]

Maximum allowable test pressure is the maximum internal fluid pressure permitted for testing, for the materials and class location involved.

...

Percent of SMYS (% SMYS) is the ratio of hoop stress divided by SMYS expressed in percent. In this Guide, % SMYS is calculated by the formula:

$$\% SMYS = \frac{Hoop\ Stress, S_h}{SMYS} * 100 = \frac{P * D}{2 * t} * \frac{100}{SMYS}$$

Where:

P = Pipe internal pressure, psig

D = Nominal outside diameter of pipe, inches

t = Nominal wall thickness of pipe, inches

In Part 192, hoop stress levels are referred to by percentages of SMYS corresponding to the grade of steel used in the pipe. A steel pipeline operating above 20% SMYS has an internal pressure which produces a hoop stress greater than 20% of the pipe SMYS corresponding to its grade of steel (e.g., Grade B SMYS = 35,000 psi; Grade X52 SMYS = 52,000 psi).

See guide material under §§ 192.105 and 192.3.

...

Stress (in pipes) is the resultant of internal or external forces acting on the pipe that resists change in the size or shape of a body acted on by external forces. See also *Hoop stress*, *Maximum allowable hoop stress*, *Operating stress*, *Secondary stress*, *Tensile strength*, and *Yield strength*.

...

[Editorial Section comments about revisions to Table 192.3i as proposed below: Existing entries in this Table give the abbreviation and then the words for the abbreviation. This table is not intended to give meanings like in the glossary above, so Editorial Section proposes to revise the column heading of "Meaning" as shown below and address the original GM proposals for this Table in different ways. Review of code definitions and Glossary resulted in more additions below, plus table footnotes.]

GLOSSARY OF COMMONLY USED ABBREVIATIONS

Note: For added organizational abbreviations, see Guide Material Appendix G-192-1, Sections 4 and 5.

Abbreviation	Meaning Abbreviation Words
...	
AOC [1]	abnormal operating condition
ASV [2]	automatic shut-off valve
...	
CDA [3]	confirmatory direct assessment
CFR [4]	Code of Federal Regulations
...	
CIS [5]	close interval close-interval survey
...	
CTS [6]	copper tube size
DA [3]	direct assessment
...	
ECA [5]	engineering critical assessment
ECDA	external corrosion direct assessment
EFV [6]	excess flow valve
EFVB [6]	excess flow valve – bypass (automatic reset)
EFVNB [6]	excess flow valve – non-bypass (manual reset)
ERW [6]	electric-resistance-welded
...	
HCA [3]	high consequence area
...	
IBR [7]	I incorporated by reference (see §192.7)
ILI [5]	in-line inspection
IMP	integrity management program
IPS [6]	iron pipe size
IR drop [8]	voltage drop
LEL [6]	lower explosive limit

LNG	liquefied natural gas
LPG [6]	liquid or liquefied petroleum gas
LTHS [6]	long-term hydrostatic strength
MAOP [5]	maximum allowable operating pressure
...	
NPS [6]	nominal pipe size
...	
OCS [4, 5]	outer continental shelf
...	
PHMSA [4]	Pipeline and Hazardous Materials Safety Administration
PIC [3]	potential impact circle
PIR [3]	potential impact radius
...	
RCV [1]	remote-control valve
RMV [2]	rupture-mitigation valve
SCADA [5]	supervisory control and data acquisition
...	
SME [6]	subject matter expert
SMYS [5, 9]	specified minimum yield strength
% SMYS [6]	percent of specified minimum yield strength
TVC	traceable, verifiable, and complete
UNGSF [5]	underground natural gas storage facility
U.S.C. [4]	United States Code
~~USGS~~	~~United States Geological Survey~~
USCG	United States Coast Guard
USGS	United States Geological Survey

[1] See definition in §192.803.
[2] Used in definition of *Rupture-mitigation valve* in §192.3.
[3] See definition in §192.903.
[4] Used in §192.1.
[5] See definition in §192.3.
[6] See definition in Glossary above.
[7] See §192.7.
[8] Used in definition of *Close interval survey* in §192.3.
[9] See guide material above.

TABLE 192.3i

Section 192.8

2 TYPE OF GATHERING LINE

...

2.1 Type A gathering line.

(a) A Type A gathering line is one located in a Class 2, 3, or 4 location to which either of the following conditions apply.

(1) A non-metallic line (e.g., plastic or fiberglass) where the MAOP is greater than 125 psig.

(2) A steel line where the MAOP produces a hoop stress that is equal to or greater than 20% SMYS.

(i) The ~~stress determination~~ internal pipe pressure for a steel line operating with a hoop stress at 20% SMYS is determined ~~made~~ by using Barlow's formula for hoop stress, solving for P, and multiplying by 0.20. ~~Barlow's formula for hoop stress is:~~

$$P_{100} = \frac{2St}{D}$$

$$P_{20} = P_{100} * 0.20$$

Where:

P_{100} = Pipe internal p~~P~~ressure at a hoop stress of 100% SMYS, psig
P_{20} = Pipe internal pressure at a hoop stress of 20% SMYS, psig
S = Specified Minimum Yield Strength (SMYS) of the pipe, psi
T = Nominal w~~W~~all thickness of pipe, inches
D = Nominal outside diameter of pipe, inches (see 2 of the guide material under §192.105)

(ii) If the gathering line MAOP is equal to or greater than P_{20} ~~P_{100} multiplied by 0.20~~, the gathering line is Type A.

(iii) If the pipe yield strength is unknown, or if the pipe was manufactured in accordance with a specification not listed in Section I of Appendix B to Part 192, see the guide material under §192.107.

(b) ...

2.2 *Type B gathering line.*

(a) A Type B gathering line is one that meets both of the following conditions.

(1) Condition 1 - Material and MAOP.

(i) A steel pipeline where the MAOP produces a hoop stress that is less than 20% SMYS (i.e., MAOP < P_{20}), or

...

Section 192.53

1 FRACTURE TOUGHNESS REQUIREMENTS

(a) Seam-welded steel pipe, 20 inches and larger in diameter and with SMYS of 52,000 psi or higher to be installed in transmission lines and Type A gathering lines ~~to~~ that operate at a hoop stress of 40% or more of SMYS and at operating pipe temperature less than 60 °F, should exhibit sufficient notch ductility at the operating pipe temperature. Compliance with either the Charpy impact or drop weight test criteria specified in SR5 or SR6 of API Spec 5L (see listing in §192.7, not IBR for §192.53) is sufficient evidence of such ductility when impact tests are made at or below the design pipe temperature.

(b) ...

...

Section 192.105

1 WALL THICKNESS ...

2 NOMINAL OUTSIDE DIAMETER ...

3 DESIGN PRESSURE OF PIPE WITH UNKNOWN VARIABLES ...

4 CALCULATION OF PRESSURE BASED ON % SMYS

Several sections of Part 192 are applicable to certain pipeline types or classifications based upon the % SMYS at which they operate or to which they are or could be exposed. ~~A more conservative design factor other than found in §192.111 may be considered.~~

An example is one part of the definition of "transmission line" in §192.3. If a pipeline MAOP produces ~~operates at~~ a hoop stress equal to or greater than 20% SMYS, it is considered a "transmission line" by definition and regulations pertaining to transmission lines must be followed for that pipeline. Also, if a gathering line operates at a hoop stress greater than 20% SMYS, the regulations pertaining to gathering lines must be followed for that pipeline.

Equivalent pressure at a hoop stress of 100% SMYS is determined by Barlow's formula for hoop stress after solving for P:

$$P_{100} = \frac{2St}{D}$$

Where:

P_{100} = Pipe internal pressure at a hoop stress of 100% SMYS, psig
S = Specified Minimum Yield Strength (SMYS) of the pipe, psi
t = Nominal wall thickness of pipe, inches
D = Nominal outside diameter of pipe, inches (see 2 above)

Using the qualifier of 20% SMYS for a transmission line, the calculation is:

$$P_{20} = P_{100} * 0.20$$

Where:

P_{20} = Pipe internal pressure at a hoop stress of 20% SMYS, psig

If the pipeline operates at or above the pressure calculated at 20% SMYS, it is a transmission line.

Note: The design factors F (Class location – see §192.111), E (Longitudinal joint factor - see §192.113 and T (Temperature derating factor - see §192.115) are not used to calculate % SMYS.

Section 192.153

This guide material is under review following Amendment 192-128.

Section 192.153(e) requires that certain components, subject to the strength testing requirements of §192.505(b), be tested to at least 1.5 times the MAOP. It is the operator's responsibility to ensure that a component is tested in accordance with §192.153(e) by communicating design, specification, and testing requirements to the manufacturer or fabricator of the component. For pipelines operating at a hoop stress below 30% SMYS, the operator might consider adopting specifications requiring strength testing of all components to at least 1.5 times the MAOP.

Section 192.169

Overpressure protection devices or automatic compressor shutdown devices (e.g., transducers, software) should be installed to protect the discharge line of each compressor between the gas compressor and the first discharge block valve. The total capacity of relief devices should be equal to or greater than the capacity of that compressor.

If using overpressure protection devices on the discharge side of a compressor to protect station piping or downstream pipelines, the allowable overpressure limit is governed by the following.

(a) A pressure of 10% above the MAOP (§192.169(a)).
(b) A pressure that produces a hoop stress of 75% of the SMYS of the pipe (see §192.201(a)(2)(i)).
(c) 4% above the MAOP for a steel pipeline where the MAOP is determined under §192.620 (see §192.620(e)(1)).
(d) For a steel pipeline with an MAOP of 60 psig or higher and covered under §192.619(c) (see §192.739(b)):
    (1) 4% above an MAOP that produces a hoop stress over 72% SMYS.
    (2) If the percentage of SMYS is unknown, a safe pipeline pressure considering operating and maintenance history.

[Letter Ballot Note: Based on an LB comment for this TR, TR 24-34 approved to public review the revision shown in green font below. See TR 24-34.]

Section 192.471

1.3 *Brazing*.

Attachment of electrical leads to steel pipe by brazing, provided that the pipeline operates at a hoop stress less than ~~29~~ 20% SMYS.

[3rd LB note: TR 19-13 is approved to this same Letter Ballot with proposed changes to the GM under §192.485 that are over riding the proposed changes shown below in red font. See TR 19-13.]

Section 192.485

...

1.3 *Alternate Method*

For conditions of low stress level, the following method may be used. An MAOP, not to exceed the established MAOP, may be determined by the following formula:

$$P = \frac{2 * S_h * t_r * T}{D}$$

Where:

P = MAOP (not to exceed established MAOP), psig

S_h = Hoop stress, psi~~g~~

t_r = Actual remaining wall thickness at point of deepest corrosion, inches

T = Temperature derating factor, see §192.115

D = Nominal outside diameter (see Table 192.105i), inches

S_h must not exceed 72% SMYS in Class 1 locations, 60% SMYS in Class 2 locations, 50% SMYS in Class 3 locations, and 40% SMYS in Class 4 locations.

2 REPAIR OR REPLACEMENT

...

Section 192.505

1 GENERAL

The following preliminary considerations should be noted.

(a) Because of the requirements of §192.611 and the possibility of a change in class location, especially in Class 1 and Class 2 locations, a strength test ~~to~~ which produces a hoop stress of at least 90% SMYS is recommended.

3 HYDROSTATIC TEST

...

3.2 *Test evaluation.*

(a) General.

In order that intelligent interpretation of pressure variations can be made, it is important that accurate thermometers, deadweight pressure gauges, meters, etc., be used and that the readings be taken at properly located points and at proper intervals of time. The use of a pressure-volume plot is recommended for tests that are planned to approach a hoop stress of 100% SMYS.

...

Section 192.515

2.2 Tests producing a hoop stress greater than ~~in excess of~~ 50 percent SMYS.

When the test will result in hoop stresses greater than ~~in excess of~~ 50% SMYS, particularly in uprating facilities, each operator should consider the following precautionary measures to ensure that the test area is kept clear of persons not directly engaged in the testing operation.

(a) ...

...

2.3 Tests producing a hoop stress greater than ~~in excess of~~ 90 percent SMYS.

When the test pressure will produce a hoop stress greater than ~~in excess of~~ 90% of SMYS, the following additional precautions may be considered to minimize the risk to occupants of buildings in close proximity to the pipeline.

(a) ...

...

Section 192.517

(a) ...

...

(d) In addition to the requirements of §192.517(a), records of a spike hydrostatic test conducted under §192.506(a) should include the following.

- (1) Start and end times of the spike portion of the pressure test.
- (2) The spike pressure throughout the duration of this portion of the pressure test.
- (3) Whether the spike pressure produced a hoop stress equal to or greater than 100% SMYS or was 1.5 times the MAOP.
- (4) Pressure versus volume plot, if performed, to confirm that the test did not reveal any leaks or yield the pipe.

(e) ...

(f) For segments of steel service line stressed to 20% or more of SMYS (§192.511(c)), records are required to document testing in accordance with §192.507.

(g) ...

Section 192.605

4.1 Potential safety-related conditions.

Personnel who perform O&M activities should recognize the following anomalies as potential safety-related conditions that may be subject to the reporting requirements of §191.23.

Note: Reporting requirements for (a), (b), and (d) below apply to a pipeline that operates at a hoop stress of 20% or more of SMYS.

(a) ...

...

...

4.4 Actions in response to potential safety-related conditions.

(a) ...

...

(f) When there are indications that the pressure of a pipeline has risen above its MAOP plus the buildup allowed for the operation of pressure limiting or control devices, consider the following actions which may vary depending upon the situation.

- (1) ...
- (2) Additional actions.
  - (i) Perform an instrumented leak survey of the overpressured pipe.
    - (A) ...
    - (B) ...

(ii) Determine the duration of the overpressurization.
(iii) Address transmission lines as follows.
  (A) Comply with the notification requirements ...
  (B) Determine the highest stress level as a percentage of SMYS attributed to the overpressure event.
  (C) For segments subject to integrity management under §192.917(e), determine whether the overpressured pipe needs to be prioritized as a high risk segment for the baseline assessment or a subsequent reassessment.
  (D) For additional information about transmission lines, see 3 above.

...

Section 192.609

(a) When an analysis of population density indicates an increase in class location, studies are required for transmission lines and Type A gathering lines operating at a hoop stress above 40 percent of SMYS (§192.609). When a class location change occurs, the pipeline MAOP might be affected.
(b) Pipeline maximum allowable operating pressures (MAOPs) are limited by class location design factors as defined in §192.111(a), by class location test pressure safety factors as defined in §192.619(a)(2), or by alternative MAOP class location design and test factors as outlined in §192.620(a)(1) and (2). Class 4 locations have the highest safety factors. The design factor allowed for Class 4 locations yields a design pressure with a hoop stress no greater than 40 percent of SMYS. Therefore, pipelines operating at a hoop stress equal to or under 40 percent of SMYS do not require a confirmation of MAOP under §192.611, and no study is required.
(c) Changes in class location might require a modification of the MAOP as required by §192.611. Pipelines with an established MAOP that produces a hoop stress at or below 40 percent of SMYS do not require confirmation or changes in MAOP because the operating hoop stress of these pipelines is already commensurate with any of the class location hoop stress levels.
(d) Transmission lines and Type A gathering lines with an established MAOP that produces a hoop stress at or below 40 percent of SMYS, or Type B gathering lines, do not require studies.
(e) In cases where the reduction in class location (e.g., Class 2 to Class 1, Class 3 to Class 2) could allow operation of the pipeline at a higher operating hoop stress, the MAOP cannot be increased unless the pipeline is uprated in accordance with Subpart K.
(f) Changes in class location might change inspection frequencies, such as those found in §§ 192.705 and 192.706.

Section 192.611

This section applies to transmission lines and Type A gathering lines operating at a hoop stress above 40 percent SMYS.

...

Section 192.613

4 STEEL TRANSMISSION LINES - STRESS CORROSION CRACKING (SCC)

4.1 SCC.

...

(a) Types of SCC.
Two types of SCC may be found on underground steel pipe.
(1) ...
(2) ...
...
Table 192.613i below summarizes the characteristics of near-neutral pH SCC and high pH SCC.

TYPICAL CHARACTERISTICS OF SCC IN PIPELINES		
Factor	**Near-neutral pH SCC**	**High pH SCC**
...		

...		
~~Operating Pressure~~ Hoop Stress	~~In excess of~~ > 60% SMYS	~~In excess of~~ > 60% SMYS
...		

TABLE 192.613i

(b) ...

...

...

Section 192.619

(a) ...

(b) ...

(c) When pipe segments with the following characteristics are considered for flow reversal or service conversion, caution should be exercised if pressure testing is planned.

(1) ...

...

(4) Pipelines that operate above Part 192 design factors (~~i.~~e.g., a pressure that produces a hoop stress above 72% SMYS per §192.619(c)).

(d) ...

Section 192.620

6 HIGH YIELD PIPELINES (GENERALLY GRADE X-70 OR ABOVE)

(a) Operators should perform ILI that will identify threats to the pipeline.

...

(b) The results of the initial ILI must be integrated ...

(c) The operator must evaluate and remediate anomalies (e.g., expanded pipe, dents) prior to increasing the pressure to a hoop stress above 72 percent SMYS for Class 1 locations (see §192.620(c)(2)(ii) and (c)(5)).

Section 192.624

1 GENERAL

This section applies to onshore steel transmission pipeline segments. MAOP reconfirmation is also applicable to transmission line pipe and non-line pipe components within appurtenant facilities including compressor, meter, and pressure limiting stations. MAOP reconfirmation is required (§192.624(a)) for pipeline segments with non-TVC MAOP records located within the following areas.

Applicability	Pipeline Location
MAOP Records (§~~-~~192.619(a)(2)) not Traceable, Verifiable, and Complete (TVC)	High Consequence Area
	Class 3 Location
	Class 4 Location
Pipelines with MAOP Grandfathered by §192.619(c) and operating at a hoop stress ≥ 30% SMYS	High Consequence Area
	Class 3 Location
	Class 4 Location
	Moderate Consequence Area and ILI-capable

(a) ...

Section 192.706

The minimum frequency for leakage surveys of transmission lines and gathering lines is established by §192.706. See 4 and Table 192.935i of the guide material under §192.935 for transmission pipelines operating at a hoop stress below 30% of SMYS located in Class 3 or Class 4 location, but not in a high consequence area. See 1.3, 1.4, and 1.5 of the guide material under §192.723 and the applicable sections of Guide Material Appendix G-192-11.

...

Section 192.711

(a) Prior to permanent mechanical or welded repair of a steel pipeline operating at a hoop stress greater than 20% SMYS, the operator should determine the thickness and integrity of the pipe wall by ultrasonic or other means. Where deterioration or lamination is found, steps should be taken to ensure a safe repair.

(b) ...

Section 192.903

Glossary of Commonly Used Terms and Abbreviations Used in Subpart O

...

Low-stress transmission line is a steel transmission line that operates at a hoop stress below 30% SMYS.

...

Section 192.905

4 NEW OR CHANGED HCAs

4.1 Reasons why HCAs might be created, changed, or eliminated.

...

(k) For some pipelines downstream of a distribution center, the operator may be able to reclassify a pipeline from a transmission line to a distribution line. Some actions, which may be involved in the reclassification, include the following.

(1) Substantiating pipeline characteristics (e.g., SMYS, ~~or~~ wall thickness) by observation or testing.

(2) Lowering the MAOP to a pressure that results in ~~operating at~~ a hoop stress of less than 20% SMYS.

...

Section 192.911

3.5 Effects of IMP and pipeline system changes.

... Table 192.911i shows some additional examples that initiate the use of the formal MOC process.

	IMP CHANGE THAT AFFECTS PIPELINE	PIPELINE CHANGE THAT AFFECTS THE IMP	
Technical	An assessment of a pipeline may drive a reduction in MAOP.	Lowering the MAOP on a pipeline may cause a reduction or elimination of an HCA within the BAP and a change in assessment intervals. (Note: Lowering hoop stress below 20% SMYS may remove the IMP requirements.)	
...			

TABLE 192.911i

Section 192.917

5 STRESS CORROSION CRACKING

(a) ...

(b) ...
(c) In accordance with ASME B31.8S, Appendix A3.3, the operator must consider the threat of high pH SCC if all of the following operating conditions apply to the pipeline.
(1) Segment is less than 20 miles downstream of a compressor.
(2) Operates above a hoop stress of 60% SMYS.
...
...

...
5.2 Operating stress level (percent SMYS).
A pipeline operating at a hoop stress above 60% SMYS might be susceptible to high pH SCC. Increases in steel toughness, which have generally occurred in parallel with increasing SMYS, have significantly increased the size of cracks that a pipeline can tolerate without failing. ...

...
7.7 Hydrostatic test information.
Operators should have procedures in place to ensure that ~~high~~ test pressures creating a hoop stress ~~(~~above 100% SMYS~~)~~ do not result in excessively expanded pipe. If excessive test pressures cannot be avoided due to pipeline profile, the operator should have a method of evaluating the condition of the pipeline (e.g., caliper pig) after the hydrostatic test. Expanded pipe may result in cracked coating.

...

Section 192.919

1 GENERAL

(a) ...
(b) When developing a BAP, the operator should consider the following.
(1) HCA information.
(i) ...
...
(v) Covered segment information (e.g., length, diameter, MAOP, hoop stress as percent of SMYS, maximum actual operating pressure, piggable).
...

Section 192.927

6.2 Determining reassessment intervals.
...
(d) Reassessment interval calculation.
...
(2) For pipelines operating at a hoop stress of 30% or more of SMYS and the ICDA reassessment interval exceeds 7 years according to ASME B31.8S, then Confirmatory Direct Assessment (CDA) or other assessments such as ILI, ICDA, or pressure testing is required to be performed at intervals not exceeding 7 years (§192.939).
(3) For pipelines operating at a hoop stress of less than 30% SMYS, a low stress reassessment may be conducted (see guide material under §192.941). Example: A pipeline operates at a hoop stress of 25% SMYS and the half-life analysis calculates to be 23 years. In accordance with §192.939(b)(6), the maximum reassessment interval is 20 years. Therefore, the required reassessment interval for a full integrity assessment is 20 years. Note that either CDA is required every 7 years or the operator is required to follow the requirements of a low stress reassessment in accordance with §192.941.

...

Section 192.929

3.2 Minimal data.

In accordance with ASME B31.8S, Appendix A3.2, minimal data sets are to be collected as outlined in Table 192.929i below.

MINIMAL DATA SETS		
Data Element	**SCC Influence**	**Key Decision Points & Comments**
...	...	...
Operating stress Level	A factor in SCC initiation and growth of cracks.	Impacts SCC initiation, critical flaw size, and remaining life predictions. A pipeline operating at a hoop stress above 60% SMYS is considered susceptible to high pH SCC. Increases in toughness, which have generally occurred in parallel with increasing SMYS, have significantly increased the size of cracks that can result in failure or leak. See 4 of the guide material under §192.613.
...	...	...

TABLE 192.929i

3.3 *Other data considerations.*

...

(d) Pipe attributes. There is no known correlation between SCC and the grade, diameter, or wall thickness of the pipe. However, this data is needed to determine hoop stress as a percent of SMYS.

...

Section 192.933

2.3 *Scheduled conditions.*

Corrosion indications are required to be analyzed for predicted failure pressure in accordance with ASME B31G, PRCI PR-3-805 (RSTRENG) (see §192.7 for IBR for both), or equivalent method. The failure pressure (P_f) is divided by the MAOP to determine a safety factor. The safety factor and operating hoop stress as a percent of SMYS determine the maximum time interval for evaluation and remediation. The maximum time interval for responding to scheduled defects may be obtained from ASME B31.8S-2004, Section 7, Figure 4 (see §192.7 for IBR).

...

Section 192.935

4 PIPELINES OPERATING AT A HOOP STRESS BELOW 30 PERCENT SMYS (§192.935(d))

Pipelines operating at a hoop stress below 30% SMYS have additional requirements as addressed below. For guidance related to these additional requirements, see Appendix E to Part 192.

...

...

ADDITIONAL P&M MEASURES FOR TRANSMISSION PIPELINES OPERATING AT A HOOP STRESS BELOW 30 PERCENT SMYS AND PLASTIC TRANSMISSION LINES					
Location	**General Requirements**	**Use Qualified Personnel**	**Participate in one-call**	**Monitor Excavations or Additional Patrol**	**Additional Leak Survey**
...	...	...	...	...	...

TABLE 192.935i

Section 192.941

This guide material is under review following Amendment 192-132.

1 GENERAL

Low stress reassessment is an integrity assessment method that may be used by an operator to address the threats of external corrosion and internal corrosion. This method can only be used for transmission lines operating at a hoop stress below 30% SMYS. Prior to applying this method, ...

...

Appendix E to Part 192

(a) ...

(b) Subpart O references Appendix E to Part 192, "Guidance on Determining High Consequence Areas and on Carrying Out Requirements in the Integrity Management Rule." This appendix describes the process an operator must use to determine whether a pipeline segment is in a high consequence area. This appendix also provides guidance on alternative assessment methods, and preventative and mitigative measures for transmission pipelines operating at a hoop stress below 30% SMYS. Similar to GPTC guide material for Subpart O sections, Appendix E to Part 192 is PHMSA "Guidance" for Subpart O and does not contain added requirements.

GUIDE MATERIAL APPENDIX G-191-3

(See guide material under §191.23)

...

TABLE 1 NOTES
Notes: [1] An event which ... ... [4] Does not pertain to pipelines operating at a hoop stress less than 20% SMYS.

GUIDE MATERIAL APPENDIX G-192-9

...

	Other Than Plastic				
	Hoop Stress Under 30 Percent SMYS			Hoop Stress 30 Percent SMYS and Over	Plastic
Maximum Operating Pressure	...	...	...	...	...
...	...	...	...	...	...

Notes:

(1) Determining whether a new segment of pipeline should be tested per §192.505 (hoop stress 30% SMYS and over) or per §192.507 (hoop stress under 30% SMYS and operating at or above 100 psig) is dictated by the percent of SMYS for the hoop stress produced at MAOP. Some pipelines, generally tested per §192.505, may contain segments or have connections that are tested per §192.507. For examples, see the following.

(a) If a new lateral is to be installed on a pipeline that operates at a hoop stress over 30% SMYS, and the new lateral will operate with an MAOP that produces a hoop stress ~~is~~ less than 30% SMYS and operates at or above 100 psig, the new lateral is covered by §192.507, even though the header pipe might have been tested per §192.505.

(b) If a segment of transmission line is replaced with different-wall-thickness or stronger pipe that will operate with an MAOP producing a hoop stress below 30% SMYS, the replacement pipe segment is covered by §192.507, even if the majority of the pipeline has been tested per

§192.505. However, in this situation the operator might consider testing in accordance with §192.505 to avoid possible issues with the following.

(i) Section 192.555(b)(1) and (b)(2), if the pipeline segment is uprated in the future to operate at a hoop stress of 30% SMYS or more.

(ii) Section 192.611(a)(1), if there is a confirmation or revision of the MAOP in the future due to a change in class location.

(2) Plastic pipe must be designed in accordance with §192.121.

(3) Whenever test pressure creates a hoop stress of ~~is~~ 20% SMYS or greater and air, natural gas, or inert gas is the test medium, the line must be checked for leaks either by a leak test at a pressure greater than 100 psig but less than 20% SMYS or by walking the line while the pressure is held at 20% SMYS (§192.507(b)).

...

GUIDE MATERIAL APPENDIX G-192-9A

3 PRESSURE TESTING OF STEEL TRANSMISSION PIPELINES

3.1 Pressure testing new steel transmission pipelines.

(a) The test pressure may produce a hoop stress ~~be~~ above 100% SMYS at the lowest elevation to provide an adequate test pressure at the highest elevation to ensure fitness for service.

(b) When any portion is tested at a hoop stress above 100% SMYS, a pressure-volume plot should be used to identify yielding. The test should be stopped if yielding occurs. For additional information on testing to yield, see ASME B31.8, Appendix N (see listing in §192.7, not IBR for Subpart J).

...

3.3 General pressure testing considerations for steel transmission pipelines.

...

INTEGRITY ASSESSMENT INTERVALS (Reference ASME B31.8S-2004, Table 3 - see §192.7 for IBR)			
Interval Years	Hoop Stress <30 Percent SMYS	Hoop Stress 30 Percent to 50 Percent SMYS	Hoop Stress >50 Percent SMYS
...	...	...	...

TABLE 3.3

...

3.4 Spike hydrostatic test.

(a) ...

(b) A spike hydrostatic test must be designed to hold pressure at the lower of the following pressures for a minimum of 15 minutes (§192.506).

(1) 1.5 times MAOP.

(2) Pressure that produces hoop stress of 100% SMYS.

(c) For example, to determine the minimum spike hydrostatic test pressure for a 24'' O.D., 0.312 w.t., X52, EFW, class 1 location segment, the following will apply.

(1) Design pressure = 1,352 psi.

(2) MAOP = 973 psi (72% SMYS hoop stress).

(3) Minimum hydrostatic test pressure: 1.25 x 973 psi = 1,216 psi (90% SMYS hoop stress).

(4) Hydrostatic spike test pressure is lesser of the following:

(i) 1.5 x 973 psi = 1,460 psi (108% SMYS hoop stress).

(ii) 100% SMYS hoop stress = 1,352 psi.

...

GUIDE MATERIAL APPENDIX G-192-11

...

TABLE 3b - LEAK CLASSIFICATION AND ACTION CRITERIA - GRADE 2			
Grade	Definition	Action Criteria	Examples
2	...	...	*A. ...* *B. Leaks Requiring Action Within Six Months* ... 5. Any reading on a pipeline operating at a hoop stress of 30% SMYS, or greater, in a class 3 or 4 location, which does not qualify as a Grade 1 leak. ...

...

GUIDE MATERIAL APPENDIX G-192-11A

...

TABLE 3b - LEAK CLASSIFICATION AND ACTION CRITERIA - GRADE 2			
Grade	Definition	Action Criteria	Examples
2	...	...	*A. ...* *B. Leaks Requiring Action Within Six Months* ... 5. Any reading on a pipeline operating at a hoop stress of 30% SMYS, or greater, in a class 3 or 4 location, which does not qualify as a Grade 1 leak. ...

...