Section 192.485

1 EVALUATION

1.1 Introduction.

(a) The evaluation of ~~the pressure~~ remaining strength of a corroded region in a transmission pipeline or regulated gathering line to determine its suitability for continued service can be made by an analytical method including ASME B31G and RSTRENG, by pressure testing (ASME B31G), or by an alternate equally conservative method. See §192.712(b) for corrosion metal loss. The operator should consider prompt evaluation to ensure ~~assure~~ safety and asset integrity, and ~~to~~ accommodate potential PHMSA reporting, such as Safety Related Condition or other PHMSA reporting (see §§ 191.23(a)(1), (2) or (9), 192.933(a)(2), and 192.933(b)).

(b) ASME B31G lists predicting rupture failure as a limitation and presents P' as the safe maximum pressure, except that P' cannot exceed MAOP or the Alternate Method equation shown in 1.3 below using t, the nominal wall thickness. RSTRENG software calculates and presents multiple methodologies and multiple maximum safe pressures, burst pressures, and safety factors. The safety factor (Sf) is the ratio of burst pressure/MAOP. Sections 192.714 and 192.933 use 1.1, 1.39, and 1.5 as Sf criteria for determination of immediate repairs, one-year conditions, and monitoring conditions for transmission pipelines. For making repairs and evaluation of anomalies or alternate MAOP of transmission pipelines, see §192.620(d).

(c) If the method chosen results in an operator temporarily lowering operating pressure, additional activities ~~remediation, actions, or analysis~~ should be performed to address the integrity conditions ~~and~~ to restore normal operating pressures. A temporary operating pressure reduction for covered segments in accordance with §192.933(a)(1), or per operator engineering judgment if not on a covered segment; the duration observed; and the magnitude of the reduction might influence an operator's decision to lower MAOP. See §192.933 for requirements applicable to corroded region analysis and response criteria for segments subject to Integrity Management (IM).

(d) Refer to guide material for Subpart O regarding safety factors, pressure reductions, and subsequent remediation timing or scheduling for either of the following.

(1) The corroded region is discovered through integrity assessment.

(2) Pressure testing is within or affects a~~n HCA or other IM program subject assets~~ covered segment.

(e) Like transmission lines, metallic gathering lines are subject to the requirements of §192.485(a) and (b) ~~like transmission lines~~ in accordance with §192.9. However, operators of metallic gathering lines may use §192.712(b) to analyze corrosion metal loss.

(f) If the analysis and operator decision results in a lowering of ~~change to~~ MAOP, it may be subject to §§ 192.619(a)(4) or 192.620.

(g) The Management of Change process (see §192.13(d), excluding gathering) must be used to initiate, communicate, and document actions.

1.2 Pressure testing.

The pipe containing the corroded region may be pressure tested to confirm the established MAOP, or to determine a lower MAOP. The pressure test should be in accordance with the general requirements of Subpart J (in particular §192.503), and the pressure should be held for at least 8 hours. The established MAOP may be confirmed by testing to a pressure at least equal to the MAOP times the appropriate factor in Table 192.485i or Table 192.485ii below. A lower MAOP may be established by dividing the successful test pressure by the appropriate factor.

(a) For pipeline segments that have not been confirmed for operation in the next higher class location, see §192.611:

CLASS LOCATION	FACTOR
Class 1 locations • No buildings for human occupancy within 300 feet	1.10
• With buildings for human occupancy within 300 feet	1.25
Class 2 locations	1.25
Class 3 & 4 locations and Meter & Compressor Station piping in Class 1 & 2 locations	1.5

TABLE 192.485i

(b) For pipeline segments that are required to be qualified for an existing class location, see §192.611:

[Publication notes: Reference is made above in 1.2 to "Table 192.485i or Table 192.485ii". Change "Table 192.485i" to "Table 192.485ii" in the following table graphic.]

CLASS LOCATION	FACTOR
Class 2	1.25
Class 3	1.50
Class 4	1.80

TABLE 192.485i

[2nd LB note: TR 21-40 is approved to Public Review with below proposed changes shown in green font. This TR is over riding those proposed changes with below proposed changes shown in red font. See TR 21-40.]

1.3 Alternate Method

~~For transmission and gathering lines operating under low stress conditions of low stress level, the following method may be used with the actual remaining wall thickness. An MAOP, not to exceed the established MAOP (§§ 192.619 or 192.620), may be determined by the following formula:~~
The following modified design formula (§192.105) may be used, substituting the measured remaining wall thickness t_r, to estimate or calculate a safe operating pressure not to exceed the MAOP established under §§ 192.619 or 192.620.

$$P = (2S_{\sout{h}}t_r/D)\,FET$$

Where:

P = Calculated operating pressure ~~MAOP (not to exceed established MAOP)~~, psig.
$S_{\sout{h}}$ = Yield strength (§192.107), psi. ~~Hoop stress, psi psig.~~
t_r = Actual remaining wall thickness at point of deepest corrosion, inches.
F = Design factor determined in accordance with §192.111(a) corresponding to the class location.
E = Longitudinal joint factor, see §192.113.
T = Temperature derating factor, see §192.115 if the wall temperature is above 250°F.
D = Nominal outside diameter (see Table 192.105i for 12" and under), inches.

Note: Corrosion impacting ~~the girth or longitudinal~~ welds (e.g., girth, longitudinal), ~~or~~ corrosion with rough profiles, and stress concentrations cannot be analyzed with this method. The population of corrosion defects used to derive ASME B31G did not include any welds.

~~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

If a pipeline has an area of external corrosion that disqualifies it for service at the established MAOP, or if the MAOP cannot be reduced to the indicated safe level, it should be repaired or replaced. For acceptable methods of repair, see 3 below and §§192.703, 192.711(b), 192.713, and 192.717.

3 RELIABLE ENGINEERING TESTS AND ANALYSES (§192.485(a))

Reliable engineering tests and analyses demonstrate compliance with a performance standard. Operators may conduct their own tests and analyses; or, they may choose to accept testing and analyses done by manufacturers, trade associations, consultants, or other operators. The engineering tests and analyses should:

(a) Include the following items, as needed, to achieve satisfactory precision.
  (1) Concise and orderly procedures for conducting tests and analyses.
  (2) Listing of equipment needed.
  (3) Descriptions of test specimens.
  (4) Required calculations.

(b) Exhibit sound engineering practices, which may include the following.
  (1) Knowledge and experience relating to the subject area.
  (2) Certifications, professional qualifications, or operator qualifications
  (~~2~~ 3) Data evaluation and statistical analysis.
  (~~3~~ 4) Assessment of test results to verify an analytical model.
  (~~4~~ 5) Application of scientific principles.