TR 24-01 – P&M Measures

TR Number	**24-01**
Primary Reference	192.613
Secondary Reference	192.935, 192.1007
Purpose	Review existing GM and revise as appropriate/necessary per Origin/Rationale
Origin/Rationale	TR 22-40 was approved with the following comment: Although the addition of 6(b)(11) addresses IM, my original comment was that many of these items listed in 6(b) are P&M measures, I think the better way to address my original disapproval vote is to phrase (b)(11) as Some of the actions listed above may be used as preventative and mitigative measures. For information regarding P&M measures, see GM under 192.935 or 192.1007(d). I would also suggest that language be added to GM 192.935 referring back to this section for these additional P&M measures. This could be done under a new TR. From AHTG for TR 22-66: Recommend moving GM 192.917, Section 11.2, 11.3 and 12.8 to 192.613 to consolidate information into one location.
Assigned to	O&M/OQ Task Group

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

Section 192.613

...

1 GENERAL ...

2 EXTREME WEATHER OR NATURAL DISASTER ...

3 CAST IRON PIPELINES ...

4 PE PIPELINES ...

5 STEEL TRANSMISSION LINES - STRESS CORROSION CRACKING (SCC) ...

6 THREADED JOINTS ...

7 SEVERE FLOODING AND GROUND MOVEMENT

Severe flooding and ground movement can adversely affect the safe operation of a pipeline. Operators should consider the following actions in areas prone to, or previously affected by, flooding and ground movement.

(a) Identify pipeline facilities that are in the flood plain, such as overlaying 100-year flood elevations on GIS pipeline maps.

(b) For buried pipelines, consider the following.

(1) Engaging hydrologists, geomorphologists, or other experts in river flow to evaluate the potential for scour or channel migration that might affect the identified pipeline facilities.

(2) Evaluating terrain and vegetation conditions that can cause severe scouring of the watercourse. Such conditions could include burned areas subject to sediment erosion and long-term buildup of debris and vegetation.

(3) Evaluating river or water crossings to determine if the pipeline installation method is sufficient to withstand the risks posed by areas prone to flooding, scour, or channel migration.

(4) Determining the maximum flow or flooding conditions at river or water crossings where pipeline integrity is at risk due to flooding or scouring and having contingency plans to shut down and isolate those pipelines when such conditions occur. Where appropriate, provide copies of the contingency plan and review with the pipeline controllers.

(5) Installing drainage measures in the trench to mitigate subsurface flows and enhance surface water draining at the site.

(6) Installing trench breakers and slope breakers to mitigate trench seepage and divert trench flows along ground surface to a safe discharge point off the site or right-of-way.

(7) Evaluating geological and environmental conditions, changing weather patterns and soil stability near facilities and consider using available data and information resources to assess vulnerabilities related to landslides and earth movement (i.e., cascading hazards). Cascading hazards are chains of adverse events like floods leading to slope failures or denuded slopes, causing slope failures during the next storm, which cause more extreme flooding.

(8) Looking for indications of ground movement (e.g., tension cracks along the surfaces of slopes, scarping, leaning posts or poles, curving tree trunks (gravitropism)). Tension cracks and scarps indicate possible failure is underway (downslope movement such as slips or landslides), while leaning posts or poles and curving tree trunks are indicators of slope creep. Both processes are types of slope failures.

(9) Examining infrastructure at ground level for cracks or indications that the infrastructure has shifted position. Ground movement can be caused by subsidence processes. For example, cracks in foundations are a good indication that ground level may be sinking over time.

(10) Monitoring for ground movement, if suspected. Equipment such as strain gauges, inclinometers, piezometers, or geodetic monitoring points could be considered to monitor movement.

(11) Some of the items listed above could be considered preventive and mitigative measures. For information regarding preventative and mitigative measures, see guide material under §§ 192.935 or 192.1007(d).

(c) ...

...

8 SERVICE LINES UNDER BUILDINGS ...

9 INTEGRITY MANAGEMENT CONSIDERATIONS ...

[2nd Letter Ballot Note: The 1st LB proposed to create the below new GM section using GM from under §192.917. This 2nd LB proposes to not add a new GM section here.]

~~**9 WEATHER AND OUTSIDE FORCES**~~

~~*9.1 Topography, soil conditions, and frost depth.*~~

~~The following topographical areas should be examined to determine if they contribute to this threat by exerting extreme loading conditions (e.g., bending, tension, compression).~~

~~(a) Slopes prone to movement or other unstable areas that would induce additional stress in a pipeline due to the movement of soil.~~

(b) Extremely saturated soils that produce buoyant forces on pipelines.
(1) River and stream crossings.
(2) Lowlands, floodplains, and swamps.
(3) Coastal areas prone to tidal surges from hurricanes or tropical storms.

(c) Areas susceptible to frost heave.

(d) Highly expansive or unstable soils (e.g., some clays, manmade soils).

(e) Locations with known geologic conditions that contribute to instability (e.g., karst topography, sinkholes, underground mining, other subsidence areas).

9.2 Fault zones.

The following should be considered in evaluating an active or known fault zone.

(a) Location of earthquake fault lines.

(b) Previous earthquake activity.

(c) Probability of future earthquake activity along fault.

(d) Analyses of leaks or damage attributable to earthquake activity.

9.3 Weather-related and outside forces.

Weather-related and outside force threats can create extreme loading conditions on plastic pipelines (see guide material under §§ 192.317 and 192.615).

(a) Potential weather-related and outside forces threats include the following.
(1) Flooding (see 6 of the guide material under §192.613).
(2) Frost heave.
(3) Earthquakes.
(4) Landslides.
(5) Subsidence.
(6) Extreme loads (e.g., equipment crossings).

(b) Data collection.

ASME B31.8S, Appendix A9 generally relates to metallic pipelines but might be useful as a format for data that should be collected to evaluate a plastic pipeline for weather and outside force damage. The following might apply to plastic pipelines and should be considered by the operator.

(1) Pipe joining method.
Pipelines that include the following joint types might be more susceptible to leakage or failure from the threat of weather-related and outside forces than pipelines constructed using modern joining methods.
(i) Mechanical fittings that do not have restraints to prevent pipe pull-out.
(ii) Solvent cement.
(iii) Adhesive.
(iv) Heat fusions with a history of poor or cold fusions.
(2) Topography and soil conditions.
The following topographical areas should be examined to determine if the threat associated with extreme loading conditions exists.
(i) Slopes prone to movement or other unstable areas that would induce additional stresses in a pipeline due to the movement of soil.
(ii) Extremely saturated soils that produce buoyant forces on pipelines.
(A) River and stream crossings.
(B) Lowlands, floodplains, and swamps.
(C) Coastal areas prone to tidal surges from hurricanes or tropical storms.
(iii) Areas with deep frost line depths.
(iv) Highly expansive or unstable soils (e.g., some clays).

(v) Locations with known geologic conditions that contribute to instability (e.g., karst topography, sinkholes, underground mining, and other subsidence areas).

(3) Fault zones.

The following should be considered in evaluating an earthquake fault zone condition.

(i) Proximity of earthquake fault zones to pipeline location.

(ii) Previous earthquake activity.

(iii) Probability of future earthquake activity along the fault.

(iv) Analyses of leaks or other damage attributable to earthquake activity.

(4) Weather-related conditions.

Excessive loading from weather-related conditions that are likely to occur should be considered.

(i) Tidal surges from hurricanes or tropical storms in coastal areas.

(ii) Flooding or erosion.

(iii) Tornado activity or high winds.

(iv) Heavy snow or ice loading, or frost heave.

(v) Significant lightning.

(5) Year of installation.

Some older pipeline facilities were constructed with materials and techniques that are generally not equivalent to modern facilities in terms of strength and integrity. The risk attributable to weather-related and outside forces threat may be commensurate with the age of the pipeline facilities.

(6) Pipe parameters.

The following pipe parameters indicate capacity to resist weather-related and outside forces.

(i) Pipe material and density classification (e.g., high-density, medium-density).

(ii) Specified wall thickness.

(iii) Specified outside diameter.

(iv) Standard Dimension Ratio (SDR).

(7) Operations and maintenance records.

Operators should also review operations and maintenance records (e.g., leak data, patrol data) to determine whether extreme loading conditions are present on their pipelines.

Section 192.917

...

11 WEATHER AND OUTSIDE FORCES

Weather-related and outside force threats have the capability to create extreme loading conditions on pipelines. In assessing this type of threat, ASME B31.8S, Appendix A9 provides a list of data that the operator is required to gather and evaluate to determine whether pipelines are being subjected to extreme loading conditions caused by weather or outside forces. Aboveground facilities are also prone to weather-related events.

11.1 Pipe joining method.

Pipelines with the following joint types are more susceptible to leakage or failure from the threat of weather-related and outside forces than pipelines constructed using modern joining methods.

(a) Mechanical fittings that do not have restraints to prevent pipe pull-out.
(b) Oxyacetylene welds, due to their brittleness.
(c) Miter joints.

[2nd Letter Ballot Note: The 1st LB proposed to move GM 11.2 & 11.3 to new GM under §192.613. This 2nd LB proposes keep GM 11.2 & 11.3 below.]

11.2 Topography, soil conditions, and frost depth.

The following topographical areas should be examined to determine if they contribute to this threat by exerting extreme loading conditions (e.g., bending, tension, compression).

(a) Slopes prone to movement or other unstable areas that would induce additional stress in a pipeline due to the movement of soil.
(b) Extremely saturated soils that produce buoyant forces on pipelines.
    (1) River and stream crossings.
    (2) Lowlands, floodplains, and swamps.
    (3) Coastal areas prone to tidal surges from hurricanes or tropical storms.
(c) Areas susceptible to frost heave.
(d) Highly expansive or unstable soils (e.g., some clays or manmade soils).
(e) Locations with known geologic conditions that contribute to instability (e.g., karst topography, sinkholes, underground mining, other subsidence areas).

11.3 Fault zones.

The following should be considered in evaluating an active or known fault zone.

(a) Location of earthquake fault lines.
(b) Previous earthquake activity.
(c) Probability of future earthquake activity along fault.
(d) Analyses of leaks or damage attributable to earthquake activity.

11.4 Year of installation.

Older pipeline facilities were constructed with materials and techniques that are generally not equivalent to modern facilities in terms of strength and integrity. The risk attributable to weather-related and outside force threats may be commensurate with the age of the pipeline facilities. If the installation data is not known, conservative estimates of the installation year can be used.

11.5 Pipe parameters.

The following pipe parameters are factors in determining operating hoop stress

(a) Pipe grade.
(b) Wall thickness.
(c) Outside pipe diameter.

ASME B31.8S, Appendix A9.2(g) states that the sum of all pipe stresses (e.g., longitudinal, hoop stress, bending, overburden) is not to exceed 100% SMYS. If any of the pipe parameters are not known, conservative estimates of the missing data should be used.

11.6 Other considerations.

(a) Weather-related conditions.
    Excessive loading from weather-related conditions that are likely to occur (see guide material under §§192.317 and 192.615).
    (1) Tornadic activity or high winds.
    (2) Heavy snow or ice loading.
    (3) Lightning strikes.
    (4) Wild (or other) fires.
    (5) Flooding (see 7 of guide material under §192.613).
(b) Operations and maintenance records.
    Operators should review operations and maintenance records (e.g., patrolling data) to determine whether extreme loading conditions are present on their pipelines. Information may also be found in incident reports, safety-related condition reports, leakage information, abnormal operations, and other failure investigations required by §192.617.
(c) Fatigue cracking from improper loading of pipe on railcars.
(d) See 16.3.2 below.

12 PLASTIC TRANSMISSION PIPELINES

12.1 General.

...

12.7 Incorrect operations (includes human error).

...

[2nd Letter Ballot Note: The 1st LB proposed to move GM 12.8 to new GM under §192.613. This 2nd LB proposes keep GM 12.8 below.]

12.8 Weather-related and outside forces.

Weather-related and outside force threats have the capability to create extreme loading conditions on plastic pipelines (see guide material under §§192.317 and 192.615).

(a) Potential weather-related and outside forces threats include the following.
- (1) Flooding (see 7 of the guide material under §192.613).
- (2) Frost heave.
- (3) Earthquakes.
- (4) Landslides.
- (5) Subsidence.
- (6) Extreme loads (e.g., equipment crossings).

(b) Data collection.

ASME B31.8S, Appendix A9 generally relates to metallic pipelines, but may be useful as a format for data that should be collected to evaluate a plastic pipeline for weather and outside force damage. The following may be applicable to plastic pipelines and should be considered by the operator.

(1) Pipe joining method.

Pipelines that include the following joint types may be more susceptible to leakage or failure from the threat of weather-related and outside forces than pipelines constructed using modern joining methods.

.

- (i) Mechanical fittings that do not have restraints to prevent pipe pull-out.
- (ii) Solvent cement.
- (iii) Adhesive Heat fusions with a history of poor or cold fusions.

(2) Topography and soil conditions.

The following topographical areas should be examined to determine if the threat associated with extreme loading conditions exists.

- (i) Slopes prone to movement or other unstable areas that would induce additional stresses in a pipeline due to the movement of soil.
- (ii) Extremely saturated soils that produce buoyant forces on pipelines.
  - (A) River and stream crossings.
  - (B) Low lands, floodplains, and swamps.
  - (C) Coastal areas prone to tidal surges from hurricanes or tropical storms.
- (iii) Areas with deep frost line depths.
- (iv) Highly expansive or unstable soils (e.g., some clays).
- (v) Locations with known geologic conditions that contribute to instability (e.g., karst topography, sinkholes, underground mining, other subsidence areas).

(3) Fault zones.

The following should be considered in evaluating an earthquake fault zone condition.

- (i) Proximity of earthquake fault zones to pipeline location.
- (ii) Previous earthquake activity.
- (iii) Probability of future earthquake activity along fault.
- (iv) Analyses of leaks or other damage attributable to earthquake activity.

(4) Weather-related conditions.
Excessive loading from weather-related conditions that are likely to occur should be considered.
(i) Tidal surges from hurricanes or tropical storms in coastal areas.
(ii) Flooding or erosion.
(iii) Tornado activity or high winds.
(iv) Heavy snow or ice loading, or frost heave.
(v) Significant lightning.

(5) Year of installation.
Some older pipeline facilities were constructed with materials and techniques that are generally not equivalent to modern facilities in terms of strength and integrity. The risk attributable to weather-related and outside forces threat may be commensurate with the age of the pipeline facilities.

(6) Pipe parameters.
The following pipe parameters indicate capacity to resist weather-related and outside forces.
(i) Pipe material and density classification (e.g., high-density, medium-density).
(ii) Specified wall thickness.
(iii) Specified outside diameter.
(iv) Standard dimension ratio (SDR).

(7) Operations and maintenance records.
Operators should also review operations and maintenance records (e.g., leak data, patrol data) to determine whether extreme loading conditions are present on their pipelines.

12.9 *Other threats unique to plastic pipelines.*

...

13 DATA INTEGRATION

...

Section 192.935

This guide material is under review following Amendment 192-130.

1 ADDITIONAL PREVENTIVE AND MITIGATIVE (P&M) MEASURES (§192.935(a) and (c)) ...
2 THIRD-PARTY DAMAGE (§192.935(b)(1)) ...
3 OUTSIDE FORCE DAMAGE (§192.935(b)(2)) ...
4 PIPELINES OPERATING BELOW 30 PERCENT SMYS (§192.935(d)) ...
5 PLASTIC TRANSMISSION LINES (§192.935(e)) ...

{Table 192.935i – not displayed in this TR}

TABLE 192.935i

6 OTHER

For additional suggestions regarding preventive and mitigative measures for flooding and ground movement, see 7(b) of the guide material under §192.613.

Section 192.1007

(a) See Guide Material Appendices G-192-3 and G-192-8.

(b) For additional suggestions regarding preventive and mitigative measures for flooding and ground movement, see 7(b) of the guide material under §192.613.