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5. Remediation

5.1. Regulatory Requirement

The fifth item listed in Department of Transportation (DOT) regulation 49 Code of Federal Regulations (CFR) 192.911 as a required element of an integrity management program is provisions for remediating conditions found during an integrity assessment. DOT regulation 49 CFR 192.933 details the requirements of an acceptable program of addressing integrity issues. In addition, DOT regulation 49 CFR 192.933 refers to American Society of Mechanical Engineers (ASME)/American National Standards Institute (ANSI) specifications B31.8S and B31G, as well as to American Gas Association (AGA) Pipeline Research Committee Project PR-3-805. ASME B31.8S refers to Gas Research Institute (GRI)-00/0230 for guidance in making assumptions about the growth rate of time-dependent conditions.

5.2. Description and Objective

This section describes Williams Midstream's (Midstream's) processes for verifying that its integrity management and field teams

- Take prompt action to evaluate all conditions discovered through integrity assessments
- Remediate every condition that could reduce pipeline integrity
- Remediate so that the pipeline integrity is assured until the next assessment
- Follow guidelines to protect workers, the public, and the environment

The objective of this section is to generate documentation that traces these processes as they are being followed.

5.3. Definition of Remediation

Throughout this integrity management plan, the term "*remediation*" is used to describe the addressing of a *defect* through

- Repair, replacement, recoating or operating pressure reduction or
- Operating pressure reduction in combination with repair or replacement or recoating.

5.4. Discovery of a Condition

DOT regulation 49 CFR 192.933 (b) of the rule states that "discovery of a condition" occurs when an operator has adequate information about the condition to determine that the condition presents a potential threat to the integrity of the pipeline. A condition that presents a potential threat includes, but is not limited to, those conditions that require *remediation* or monitoring as discussed in DOT regulation 49 CFR 192.933 (d) and ASME B31.8S, Section 7, Figure 4. Discovery of a condition can happen through a scheduled integrity assessment or through any other means, such as an aerial or ground patrol or a report from the general public. In addition, conditions may include anomalies, which are defined in American Petroleum Institute (API) 1160 as deviation from sound pipe material or weld. System Integrity Plan (SIP) 7.03-ADM-001 further defines discovery, and Midstream documents discovery on Form 0043.

After an integrity assessment, Midstream has a maximum of 180 days to determine which conditions threaten pipeline integrity, including 180 days of post assessment (PA) after direct examination.

Once Midstream discovers an anomalous condition, it documents the date of discovery. Midstream documents the discovery date on the Form 0043 – which outlines the line segment, any dig conditions, *high consequence areas* (*HCAs)*, Inspection dates, Discovery date, timelines, etc. Midstream keeps a Form 0043 on record for every line segment inspected within 180 days. Any condition outside of normal operating conditions is considered anomalous. The Pipeline Integrity Engineer maintains any appropriate documentation.

5.5. Scheduling Remediation

Midstream schedules repairs and emergency reductions in operating pressure according to the types and locations of the condition. Moreover, it prioritizes the schedule based on evaluation and *remediation* of anomalous conditions. Refer to SIP-7.03-ADM-001 In-Line Inspection and Analysis, Form 0043, and Form 0055 for complete details.

DOT regulation 49 CFR 192.933 requires operators to follow the schedule in ASME B31.8S Figure 4 unless a special requirement applies. Special requirements are defined as immediate repair conditions, one-year conditions, and monitored conditions. Midstream uses the definitions from 49 CFR 192.933 and ASME B31.8S as provided in Table 5-1 to describe these conditions:

Table 5-1: Repair Definitions

Severity Group	Definition	Required Actions
Immediate repair	Indication of a *defect* at the failure point as defined in 49 CFR 192.933 and SIP-ADM-7.03-In-Line Inspection and Rehabilitation.	Must follow ASME B31.8S, which calls for evaluating immediate failure indications within five days of identification
One-year response	Indication of a *defect* that is significant but not at the failure point as defined in 49 CFR 192.933 and SIP-ADM-7.03-In-Line Inspection and Rehabilitation.	Must remediate within one year of discovery
Scheduled conditions	Indication of a *defect* that is significant but not at the failure point as defined in ASME B31.8S Figure 4 (reproduced in Figure 5-1 of this procedure) SIP-ADM-7.03-In-Line Inspection and Rehabilitation.	Must remediate within the scheduled response time required by ASME B31.8S Figure 4.
Other conditions	Indication of any other *defect* that could impair the integrity of the pipeline as defined SIP-ADM-7.03-In-Line Inspection and Rehabilitation.	Shall be scheduled, investigated, and remediated, if necessary.

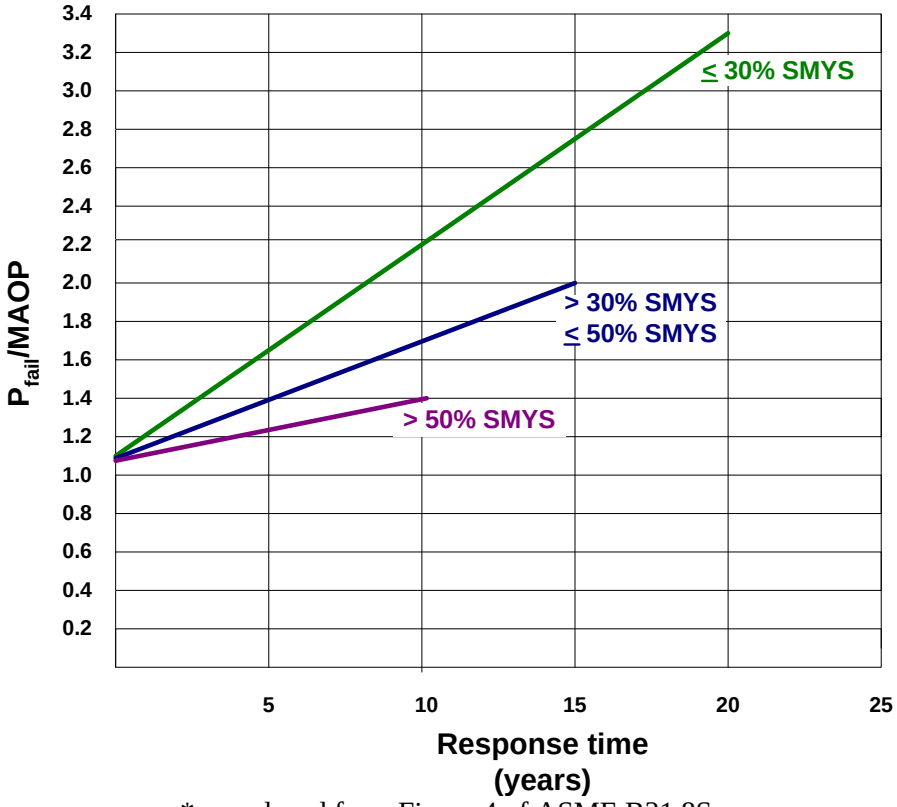
Severity Group	Definition	Required Actions
Monitored	Indication of a *defect* that will not fail before the next inspection as defined in 49 CFR 192.933 and SIP-ADM-7.03-In-Line Inspection and Rehabilitation.	Does not need to be scheduled for *remediation* Must record and monitor during subsequent risk assessments and integrity assessments for any change that might require *remediation*

Midstream follows the schedule in ASME B31.8S for immediate, scheduled, and monitored conditions. The Midstream Integrity Management Team promptly reviews assessment reports for any immediate response indications and reviews for other indications within 180 days of receiving the report. If it cannot meet the *remediation* schedule for immediate or scheduled conditions, and it cannot reduce risk through a pressure reduction, Midstream notifies the Pipeline and Hazardous Materials Safety Administration (PHMSA) with the reasons for the delay and with a revised schedule as described in this section of the standard and Section 14 of this plan.

Midstream maintains Rehab Books for each line segment assessment and associated digs.

Anomalies are prioritized in SIP 7.03-ADM-001 In-line Inspection and Analysis and repair methods outlined in SIP 7.01-ADM-001 Pipeline Defect Evaluation and Repair Procedure.

Figure 5-1: Maximum Allowed Response Times for Scheduled Conditions*



*reproduced from Figure 4 of ASME B31.8S

5.5.1. Response to Pressure Testing

Midstream promptly remediates any *defect* that fails a pressure test by repairing or replacing the *defect*.

5.5.2. Response to Immediate Repair Conditions

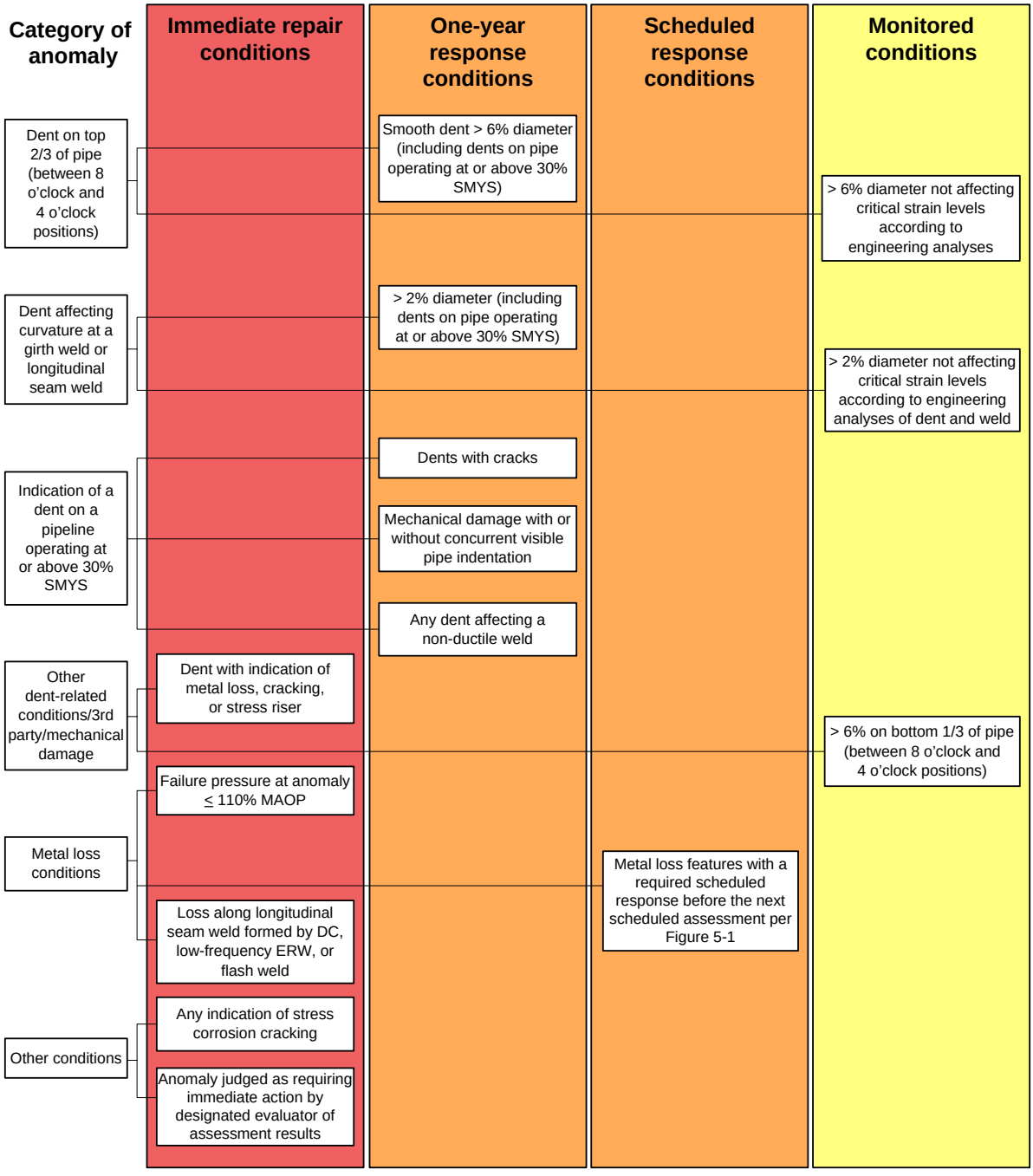
If Midstream discovers an immediate repair condition, it implements a temporary reduction in operating pressure or shuts down the pipeline.

5.6. Special Requirements for Scheduling Remediation

Figure 5-2 shows the conditions listed in DOT regulation 49 CFR 192.933 as requiring immediate repair, one-year scheduled repair, or monitored treatment.

In addition to the conditions shown in Figure 5-2, Midstream also considers conditions under which pipelines operate and gives priority for evaluation and *remediation* to some pipelines (for example, pipelines that are subject to pressure cycling or external loading).

Figure 5-2: Special Conditions for Remediation



5.7. Reducing Operating Pressure

If Midstream reduces operating pressure, it uses the following method(s) to calculate the appropriate pressure reduction: ASME B31G or "*RSTRENG*." Midstream has the option to reduce the pressure to a level not exceeding 80% of the level at the time it discovered the condition or for dents with metal loss >6% to a level not exceeding 60% of maximum allowable operating pressure (MAOP) or maximum operating pressure (MOP) whichever is lower. Midstream uses multiple methods to reduce operating pressure. All methods follow pipeline-specific requirements. Refer to SIP 9.01-ADM-036 Perform Blowdowns for complete details.

5.8. Exceeding Timelines and Notifications

If Midstream cannot complete its evaluation of assessment data and affect the necessary remedial actions within the time limits specified in this procedure and 49 CFR 192.933, it creates a report with the reason for the delay, a revised schedule, and justification for why the changed schedule will not jeopardize public safety. Midstream initiates a pressure reduction or other action that ensures the safety of the covered segment when it is unable to respond within the required timeframes.

If Midstream cannot meet the schedule and cannot provide safety through a temporary reduction in operating pressure or other action, it will notify PHMSA and applicable state agencies as delineated in Sections 13.3.4 and 14.3 of this plan. Moreover, if the covered segment is located within a State where PHMSA has an interstate agent or if the intrastate segment is regulated by a State (Texas Railroad Commission for Texas assets), Midstream also notifies the appropriate State or local pipeline safety authority as delineated in Sections 13.3.4 and 14.4.

If Midstream perceives that a temporary pressure reduction will exceed 365 days, the Integrity Management Team creates a report on how pipeline integrity is not compromised by continued operation in this manner and explaining the reasons for the remediation delay and will notify PHMSA and applicable state agencies as described in Sections 13.3.4 and 14.3. Moreover, if the covered segment is located within a State where PHMSA has an interstate agent or if the intrastate segment is regulated by a State, Midstream also notifies the appropriate State as delineated in Sections 13.3.4 and 14.4.

Midstream has never experienced a pressure reduction that lasted in excess of 365 days without *remediation*. If it did happen, Midstream would document it appropriately and file the extension with PHMSA.

5.9. Calculating the Remaining Strength of Pipe

Section DOT regulation 49 CFR 192.933 specifies the use of ASME B31G, *RSTRENG*, or an equivalent method to find remaining strength of pipe. For small signs of corrosion, B31G uses measurements of length and maximum metal loss depth to assume a bowl-shaped area of metal loss. If the corrosion takes the form of pitting, B31G can estimate a metal loss condition as being more severe than it actually is. The *RSTRENG* software package allows for making individual calculations of the effective area of metal loss in clusters and within sections of each cluster.

5.10. Discovery of a Corrosion Condition

In conformance with item (5) under DOT regulation 49 CFR 192.917, if Midstream finds a corrosion condition that could affect integrity on a segment covered by the rule (which Midstream interprets as

meaning an immediate repair corrosion condition), it evaluates all pipeline segments (both covered and non-covered) with similar material *coating* and environmental characteristics and makes *remediation* as necessary.

For corrosion *defects* that fall into the scheduled response and monitored corrosion severity groups, Midstream follows the guidelines of GRI-00/0230, Determining Periodic Inspection Intervals for *HCAs*, for predicting growth rates of the *defects* so that they do not reach a critical level before the next inspection.

5.11. Prescriptive and Performance-Based Programs

Midstream has a prescriptive integrity management program that does not deviate from the prescriptive requirements of ASME B31.8S and DOT regulation 49 CFR 192 Subpart O.

5.12. Making Repairs

Table 5-2 through Table 5-7 list acceptable *remediation* methods in ASME B31.8S for 20 of the 21 ASME categories of threat (no *remediation* methods are listed under the incorrect operations category). The Midstream integrity management group verifies that all *remediations* employ appropriate materials and processes for the pipeline operating conditions and meet ASME B31.8 requirements. Midstream's repair and emergency response procedures are available on Livelink. Refer to SIP 7.01-ADM-001 Pipeline Defect Evaluation and Repair Procedure for complete details.

In addition, the Pipeline Integrity Engineer can call for a study to determine the effectiveness of implementing a preventive or mitigative measure. A proposed preventive or mitigative measure can also originate from another source. This includes but is not limited to local operations personnel and internal or external engineering analysis. The Pipeline Integrity Engineer analyzes proposed measures and selects the most effective measures for *implementation*. The selection process will follow approved repair practices via SIP 7.01-ADM-001 - Pipeline Defect Evaluation and Repair Procedure.

Once Midstream determines to implement a formally proposed preventive and mitigative (P&M) measure, the Pipeline Integrity Engineer documents the proposal and rationale for not implementing the measure, including alternative measures that Midstream selects on the PA/Risk Analysis Form. The Pipeline Integrity Engineer uses this information documented in the PA/Risk Analysis Form in subsequent P&M evaluations. The Supervisor of Pipeline Integrity is responsible for supervising the overall *remediation* program.

5.12.1. Engineering Critical Assessments

Table 5-2 through Table 5-7 list engineering critical assessments as acceptable *remediation* methods for some threats. ASME B31.8S defines an engineering critical assessment as a rigorous evaluation of the data, which reassesses the criticality of the *anomaly* and adjusts the projected growth rates based on site-specific parameters. In a performance-based program, the results of an engineering critical assessment can extend the interval for repair or re-inspection.

Table 5-2: ASME-Acceptable Remediation Methods for Corrosion-Related Threats

Remediation	External	Internal	Stress Corrosion Cracking (SCC)[1]
Pressure reduction	X	X	X
Replacement	X	X	X
Engineering Critical Assessment, recoat	X	X	
Grind repair/Engineering Critical Assessment			X
Type B, pressurized sleeve	X	X	X
Type A, reinforcing sleeve	X		X
Composite sleeve	X		
Epoxy filled sleeve	X		
Mechanical leak clamp	X		

[1] Section A.3.4 of ASME B31.8S lists *hydrostatic testing* as another acceptable response to discover *SCC*. Refer to SIP-7.07-ADM-001 Pressure Testing.

Table 5-3: ASME-Acceptable Remediation Methods for Manufacturing-Related Threats

Remediation	Defective Pipe Seam	Defective Pipe
Pressure reduction	X	X
Replacement	X	X
Engineering Critical Assessment, recoat		
Grind repair/Engineering Critical Assessment	X	X
Type B, pressurized sleeve	X	X
Type A, reinforcing sleeve	X	X
Composite sleeve		
Epoxy filled steel sleeve	X	X
Mechanical leak clamp		

Table 5-4: ASME-Acceptable Remediation Methods for Welding/Fabrication-Related Threats

Remediation	Defective Girth Weld	Defective Fabrication Weld	Wrinkle Bend or Buckle	Stripped Threads/ Broken Pipe	Coupling Failure
Pressure reduction	X	X			X
Replacement	X	X	X	X	X
Engineering Critical Assessment, recoat	X	X			
Grind repair/ Engineering Critical Assessment	X	X			
Direct deposition weld					
Type B, pressurized sleeve		X			X
Type A, reinforcing sleeve					
Epoxy filled sleeve	X	X	X		X

Table 5-5: ASME-Acceptable Remediation Methods for Equipment-Related Threats

Remediation	Gasket O-Ring Failure	Control/Relief Valve Equipment Malfunction	Seal/Pump Packing Failure
Mechanical leak clamp			
Replacement	X	X	X

Table 5-6: ASME-Acceptable Remediation Methods for Third-Party Damage Threats

Remediation	Inflicted By 1st, 2nd, or 3rd Parties (Instantaneous Failure)	Previously Damaged Pipe (Delayed Failure Mode)	Vandalism
Pressure reduction		X	
Replacement		X	X
Engineering Critical Assessment, recoat			
Grind repair/Engineering Critical Assessment		X	X
Direct deposition weld			X
Type B, pressurized sleeve		X	X
Type A, reinforcing sleeve		X	X
Composite sleeve			
Epoxy filled sleeve		X	X
Mechanical leak clamp			

Table 5-7: ASME-Acceptable Remediation Methods for Weather- and Outside Force-Related Threats

Remediation	Cold Weather	Lightning	Heavy Rain or Floods	Earth Movements
Pressure reduction				
Replacement	X	X	X	X
Engineering Critical Assessment, recoat				
Grind repair/Engineering Critical Assessment				
Direct deposition weld				
Type B, pressurized sleeve				
Type A, reinforcing sleeve				
Composite sleeve				
Epoxy filled sleeve				
Mechanical leak clamp				

5.13. Reassessment of Monitored Conditions

During continual evaluation of pipeline segments, as described in Section 6, Midstream reviews any monitored conditions for change in their status that would require *remediation*. Refer to SIP-ADM-7.12 Operational Reliability Assessment for complete details.

5.14. Flowchart of Remediation Process

Figure 5-3 is a flowchart overview of the remediation process.

Figure 5-3: Remediation Process