Inspection Reassessment Intervals Guidance for Less than 7 years

October 2016

1. Background

The technical evaluations and assessments conducted to determine the correct reassessment intervals are critical to maintaining an effective integrity management program. These evaluations should include data integration of all assessments (which should include findings from corrosion surveys, excavations, coating assessments, corrosion rates, et cetera), the usage of tool tolerance, and evaluation digs for assessment of tool data quality.

When reassessment intervals are too long, critical time-dependent defects may be missed that could lead to failures before a line is reinspected. Intervals that are too short may result in integrity management resources being spent inefficiently; that money could possibly be better spent on other elements of an integrity program. Federal statutes set the current maximum reassessment interval at 5 years for hazardous liquid pipelines (those under 49 CFR 195) and 7 years for natural gas transmission pipelines (those under 49 CFR 192). It is important to remember that these are the maximum intervals allowed by law and should not be considered "default" reassessment intervals. Integrity reassessment intervals must be calculated using an engineering approach and adequate safety factors. This may lead to intervals that are shorter than the maximum allowed by statute.

Reassessment intervals must also be evaluated for each segment in a pipeline system. Segments may be evaluated and determined to be similar enough to share the same reassessment interval, however some piggable segments may pose risks that may require different intervals. Reassessment intervals also should not be static; data from incidents, pipeline excavations, and other events or new information may require the re-evaluation of reassessment intervals.

2. Purpose

Because of inconsistencies and misunderstandings in determining pipeline integrity reassessment intervals, and considering the data and information that should be reviewed in determining such intervals, the Pipeline and Hazardous Materials Safety Administration (PHMSA) has produced guidelines to assist PHMSA and state inspectors, operating companies, and the public in determining reassessment intervals. This document provides guidelines for operators to consider when evaluating reassessment intervals.

[Important: *PHMSA provides written clarification of the pipeline safety regulations (49 CFR Parts 190-199) in the form of interpretations, frequently asked questions (FAQs), and other guidance materials. These guidelines for reassessment intervals reflect PHMSA's current application of the regulations to the specific implementation scenarios presented. These guidance materials do not create legally enforceable rights or obligations and are provided to help the public understand how to comply with the regulations. Therefore, to the extent the* *terms "shall" and "must" and other mandatory language are used, they signify actions that are necessary for an operator to conform with this guidance, but DO NOT constitute regulations. The term "should" is used to recommend good practices, which operators must consider but are not mandatory for purposes of conforming with this guidance. If the operator chooses to address a consideration differently than recommended, the operator needs to develop and document a technical justification for its course of action. The term "may" is used to state something considered optional.*]

3. Guidelines for Determining Reassessment Intervals

While some differences exist in calculating reassessment intervals for different types of inspection technology, the basic process is the same: (1) Determine the largest remaining defect in a pipeline segment; (2) Apply a growth rate to that defect; (3) Determine when that defect would grow to failure, considering tool/reassessment tolerances and growth safety factors; and (4) Inspect before that defect is predicted to fail. Reasonable conservative assumptions should be made for each of these steps to ensure safety and to determine a realistic reassessment interval. Each of these steps is discussed in further detail below. In all cases an operator must document and justify its decision-making process and how the reassessment interval was determined.

3.1 Determining the Largest Remaining Defect

The method to determine the largest remaining defect after an integrity reassessment has been performed depends on the reassessment method used.

For in-line inspection (ILI) tools, an operator will have a list of the remaining anomalies recorded by the inspection tool after remediation and validation of the ILI data has been performed. When using these values, an operator must integrate the data gathered from validation of the inspection run, as well as take tool tolerances and other possible errors into account. A series of the largest remaining validated defects in the pipeline segment should be chosen for integrity evaluation based on the calculated burst pressure. Both long, shallow defects and defects deep in the pipe wall thickness should be assessed using the maximum operating pressure (hazardous liquid pipelines) or maximum allowable operating pressure (gas pipelines) for the pipeline segment.

For Direct Assessment (DA), it is typically recommended to use the largest defect discovered during the DA inspection. For lines in heavily populated, environmentally sensitive, or areas otherwise more susceptible to risk, an operator may want to consider adding a safety factor to the size of the defect or using a historical defect size if a larger (in depth or length) defect has been found on the line.

For hydrostatic testing, the largest possible remaining defect is calculated by determining the largest possible defects that would have just survived the pressure test. A family of defects should be calculated from long shallow defects to deep short flaws to use the next steps of interval assessment. Higher test pressures will result in smaller possible remaining defects and will provide for longer reassessment intervals.

3.2 Determine Defect Growth Rate

Determining defect growth rates is crucial to evaluating the reassessment interval. This determination can be difficult to make because defect growth rates are not homogeneous and small variations in environment, stress, cathodic protection, corrosion mechanisms such as stray current or AC corrosion, and several other possible factors can cause two similar time-dependent defects to grow at vastly different rates. Using an "average" growth rate can severely underestimate the growth of faster-growing defects and can lead to failures.

If ILI is used as an inspection method, a comparison between the ILI tool runs can be used to estimate the defect growth rate. It is important to compare a large number of features on different parts of the system as the defect growth rates for different areas of the system may vary. Pipeline corrosion coupons or corrosion models based on soil characteristics and other data can be used as well. Default growth rates such as 0.016" a year (for external corrosion) can be found in various technical reports and standards, and may be conservative for each type of corrosion. Operational or environmental changes or other conditions that might impact defect growth rates between ILI tool runs should be considered; growth rates may not remain constant between subsequent tool runs.

3.3 Determine Reassessment Interval

Once the largest remaining defect and the growth rate have been determined, the estimated time to failure can be calculated by growing the feature by the growth rate until the estimated failure pressure (using an engineering reassessment) is less than the maximum allowable operating pressure for gas transmission lines or maximum operating pressure for liquid lines. The reassessment interval is then some percentage (most typically 50 percent) of the time estimated for the worst feature to grow to failure. This reassessment interval should be verified after each inspection to validate that the information going into determining the interval is correct.

It is important to note that not all threats to a pipeline can be considered in this fashion. Threats such as land movement, outside force damage, and other, similar threats will have to be evaluated on a case-by-case basis, and an engineering assessment should be made to determine whether an integrity reassessment should be performed.

3.4 Other Considerations

Several other considerations should be included when determining reassessment intervals. Crack-like defects make determining the reassessment interval much more difficult for several reasons. The remaining life in the area of a crack is highly dependent on the toughness of the pipe, and this toughness will vary much more than the yield strength, particularly in weld seams. Because of this, caution should be taken when determining reassessment intervals for crack-like features, particularly on ILI reports. Conservative approaches should be employed.

Interactive threats such as corrosion, stress corrosion cracking, or external stress interaction with a metal loss feature can lead to a pipeline failure occurring earlier than expected if the individual threats are considered separately. It is important to consider the integrated threats to ensure that the calculated reassessment interval is actually conservative.

Integrity management is designed to be a process of constant improvement, using new data, information, experience and lessons learned to assure pipeline integrity. Integrity reassessment intervals should not be static. They should be re-evaluated on a regular basis, particularly when any of the factors in the process (such as increasing corrosion rates) have changed.

4. Summary

Determining reassessment intervals is a vital part of the pipeline integrity management process that has often not received the level of analysis it should to ensure pipeline safety. Defaulting to the maximum reassessment interval allowed by code and not analyzing each unique inspection segment for each pipeline threat can lead to failures and undermine an effective integrity management program. Operators should have a rigorous, documented process in determining and employing reassessment intervals to ensure pipeline integrity and to ensure that changes to the pipeline system and other new information cause a re-evaluation of the reassessment intervals.