

angle above which gas that is swept along the wall will not progress downstream because the gravitational force will exceed the shear force of the gas on the liquid film.

The purpose of this step is to define ICDA Regions, and to use these regions to identify areas where excavation and direct physical examination of the pipeline is needed to look for internal corrosion. ICDA Regions are regions along the pipeline where internal corrosion may occur and further evaluation is needed. An ICDA Region is bounded by a location where a new gas stream enters the pipe and the nearest location downstream of that point where the pipe slope exceeds the critical angle, given local gas velocity. The operator identifies these ICDA Regions by applying the results of the mathematical flow model as represented in Graph E.III.1 in Appendix E of this document. Flow modeling must include explicit consideration of changes in pipe diameter as well as locations where gas enters a line (providing potential to introduce moisture) and locations downstream of gas draw-offs (where gas velocity is reduced).

Once the ICDA Regions are identified, the most likely locations for internal corrosion in each region can be identified. A minimum of two locations must be identified for excavation in each ICDA Region. One location is the low point (e.g., sags, drips, valves, manifolds, dead-legs, traps) nearest to the beginning of the ICDA Region. The second location is at the upstream end of the pipe incline nearest the end of the ICDA Region. The first point represents the most likely locations for accumulation of electrolyte in the ICDA Region, and the second point represents the location furthest from the beginning of the ICDA Region where internal corrosion may occur.

Step 3: Direct Examination—At a minimum the operator must excavate the two locations described above, in each ICDA Region where the potential for moisture accumulation exists, and must perform direct examination for internal corrosion by inspecting both locations. Acceptable direct examination technologies are described in ASME/ANSI B31.8S, Appendix SP-B2, and include ultrasonic examination and x-ray.

If no internal corrosion exists at either of these locations, then the remainder of the ICDA Region is likely to be corrosion free. However, if corrosion exists at either of these locations, then either much more extensive excavation is required or an alternative assessment technology (e.g., in-line-inspection) will

be required to characterize the pipe for internal corrosion. At any location where indications of metal loss exist, mitigation must be undertaken.

Step 4: Post Assessment and Continuing Evaluation—After completing excavation and needed mitigation of the two suspect locations in each ICDA Region, the operator must document and implement a program of continuing monitoring for segments where internal corrosion has been identified. This program may include use of coupons located in suspected areas, but must include periodic reassessment at the prescribed interval. In addition, fluids drawn off of the pipeline at low points must be retained and chemically analyzed for the presence of corrosion products. Evidence of corrosion products must be interpreted as requiring further excavations of locations downstream where moisture might accumulate, or use of an alternative assessment technology such as in-line-inspection.

Stress Corrosion Cracking (SCC)

As described in ASME/ANSI B31.8S, Appendix SP-B3, direct assessment techniques represent the single most significant historic approach to evaluate for the presence of stress corrosion cracking (SCC). Only recently ILI tools have become available to reliably identify SCC in pipelines, and the use of these tools must be guided by a pre-assessment review that identifies where to look for the possibility of SCC.

For SCC direct assessment, in addition to text in ASME B31.8S standard, an operator must consider the following condition:

- Systematic SCC data collection, evaluation and accumulation process must be instituted for all segments that satisfy the criteria in the ASME B31.8S standard. This process must include gathering and evaluating data related to SCC at all excavation sites where the criteria indicate the potential for SCC.
- If any evidence of SCC is discovered, then the operator must select and implement a suitable assessment approach.

Confirmatory Direct Assessment is a more focused application of the principles and techniques of direct assessment. It utilizes process steps similar to direct assessment to evaluate for the presence of suspected corrosion and third party damage, but it is not as involved as direct assessment. The rule proposes that an operator use confirmatory direct assessment to reassess a pipeline segment within the required seven-year interval if the operator has established a longer reassessment interval for that segment.

For example, in the proposed rule, if an operator is using pressure testing or internal inspection, it could establish a ten-year reassessment interval for a covered segment. By the seventh year, the operator would have to conduct a confirmatory direct assessment on that segment to identify corrosion or third party damage. The operator would then have to conduct the follow up reassessment in the tenth year. If the operator has established a seven-year or shorter interval for the segment, the operator would not have to conduct the confirmatory direct assessment.

The rule proposes that the confirmatory direct assessment method be used to identify internal and external corrosion and third party damage. For external corrosion, an operator's plan to use this method would have to include steps for pre-assessment, indirect examination, direct examination, and remediation.

- The pre-assessment would be the same as that proposed for direct assessment;

- The indirect examination would be the same as that proposed for direct assessment except the examination can be conducted using only one indirect examination tool most suitable for the application.

- The direct examination would follow that for the direct assessment, except that all immediate action indications must be excavated in each ICDA region, and at least one high risk indication that meets the criteria of scheduled action must be excavated in each ICDA region. No excavation is required for indications categorized as monitored indications.

- The remediation requirements follow those proposed for direct assessment.

For internal corrosion, an operator's plan to use this method would have to include steps for pre-assessment, identification of ICDA Regions, identification of excavation locations, direct examination and remediation.

- The pre-assessment would follow that proposed for direct assessment.
- The identification of ICDA Regions would follow that proposed for direct assessment.
- The identification of excavation locations and excavation would follow that proposed for direct assessment, except that the operator must identify for excavation at least one high risk location in each ICDA Region.
- The direct examination (excavation) and remediation would follow that for direct assessment, except one high risk location in each ICDA Region is to be chosen for excavation.