

operating pressure by at least 20% in the associated ECDA Region and not exceed this pressure until 100% of such indications are excavated, evaluated and mitigated as necessary.

- All excavations of "immediate action" indications must be carried out promptly after indirect examination step is complete. An operator must take prompt action to address all anomalous conditions found.

- A minimum of one direct examination (excavation) is required for each ECDA Region. This examination must be made at the most severe indication, based on risk evaluation of the indications. If no indications are shown in the ECDA Region, then the excavation must be made at a location that the operator considers to be the most suspect.

- At least two indications found in each ECDA Region categorized as "scheduled action," require direct examination. Excavation of "scheduled action" indications must continue, in priority order, until at least two indications are excavated having corrosion of depth no greater than 20% of the wall thickness.

- The operator must collect all data specified in its ECDA Plan for each excavation completed. These data are to be used in determining the nature and timing of remediation as well as in the fourth step of the ECDA process, the Post Assessment step.

- Except for conditions specified in the body of the rule Section (h)(4), the operator must carry out remediation on a time frame and in a manner specified by ASME B31.8S. Remedial action must be consistent with a determination of remaining strength using ASME B31G, RSTRENG, or equivalent.

- If any exposed segment has significant coating degradation or corrosion, then the operator must increase the size of that excavation until coating and pipe are determined to be adequate.

- The operator must identify the root cause of all significant corrosion activity revealed by excavation.

- When ECDA identifies any defect in an ECDA Region that requires immediate mitigation, or when the root cause of any defect is a condition that ECDA is ineffective at assessing (e.g., MIC or shielded corrosion), then an alternate assessment technology must be used for that ECDA Region.

**Step 4: Post-Assessment**—The operator must carry out a Post Assessment step to determine the reassessment interval and to evaluate the overall effectiveness of the ECDA process. In carrying out this step, the following requirements apply:

- The reassessment interval must be determined based on the largest defect remaining in the pipe segment and on the corrosion rate appropriate for the pipe, soil and protection conditions. The largest remaining defect must be taken to be the size of the largest defect discovered in the ECDA segment. The corrosion growth rate must be conservatively estimated based on data taken during the direct examination. The reassessment interval must be estimated as half the time required for the largest defect to grow to a critical size.

- An operator that directly examines and appropriately remediates defects consistent with the sampling provisions presented in this rule must reassess each segment at an interval not to exceed every five years.

- An operator that examines all anomalies by excavation and remediates these anomalies may be allowed to extend the reassessment interval from 5 years, as specified in the main body of the rule, paragraph (g)(4) of the proposed rule, to as much as 10 years.

- The operator must define and monitor measures to determine the effectiveness of the ECDA process. Measures should be developed to track: (a) The effectiveness of the overall process (e.g., the change in the calculated reassessment interval); (b) the extent and severity of corrosion found; (c) the number of indications in each classification located on successive applications of ECDA; and (d) the time from discovery of an indication categorized as immediate action or scheduled action to its excavation.

**Additional Documentation Requirements:** In addition to the ECDA Plan, the operator must document all data on Pre-Assessment, Indirect Examination, verification of indirect examination by excavation, Direct Examination and Post-Assessment, and performance measures. The operator must also have procedures documenting communications requirements among various organizations conducting each step of the direct assessment process.

#### *Internal Corrosion Direct Assessment*

Internal corrosion direct assessment (ICDA) is a process that identifies areas along the pipeline where water or other electrolyte introduced by an upset condition may reside, then focuses direct examination on the locations in each area where internal corrosion is most likely to exist. If no evidence of internal corrosion exists in these most likely locations, then the entire section can be considered to be free of internal corrosion. An operator using direct assessment as a method to address

internal corrosion in a pipeline segment must follow the requirements in ASME/ANSI B31.8S, Appendix SP-B2, and in this section.

For internal corrosion direct assessment, in addition to requirements in ASME/ANSI B31.8S, Appendix SP-B2, an operator must carry out the process described below. This process consists of four steps: pre-assessment, identification of ICDA regions and excavation locations, direct examination, and post assessment and continuing evaluation. The process is designed to evaluate potential for internal corrosion caused by water, CO<sub>2</sub>, O<sub>2</sub>, chlorides, hydrogen sulfide and other contaminants present in the gas, as well as MIC.

**Step 1: Pre-assessment**—The first step in the ICDA process is pre-assessment. In this step the operator gathers information needed to support identification of areas where internal corrosion is most likely to exist. This step requires the operator to:

- Gather all data elements listed in Appendix SP-A2 of ASME/ANSI B31.8S.

- Assemble information needed to determine where internal corrosion is most likely to occur including: (a) Location of all gas input and withdrawal points on the line; (b) location of all low points on the line such as sags, drips, inclines, valves, manifolds, dead-legs, and traps; (c) the elevation profile of the pipeline in sufficient detail that angles of inclination can be calculated for all pipe segments; (d) the diameter of the pipeline, and the range of expected gas velocities in the pipeline.

- Assemble and evaluate operating experience data that would provide an indication of historic upsets in gas conditions, locations where these upsets have occurred, and any indications of damage resulting from these upset conditions.

**Step 2: Identification of ICDA Regions and Excavation Locations**—The principal innovation of the gas pipeline industry in its development of the ICDA Process is the capability to evaluate the critical slope of a pipeline beyond which moisture in the gas is unlikely to be carried over. The primary assumptions in this analysis include: (a) For internal corrosion to occur an electrolyte such as water must be present in the pipeline; (b) the gas being transported is nominally clean and dry but may potentially be subject to upset conditions; (c) any entrained moisture carried in the gas stream will either evaporate or accumulate in a film along the wall of the pipe and be carried downstream by the shear force of the gas movement; (d) there is a critical pipe