

- The basis on which two complementary tools are selected for assessing each ECDA Region. Further information is in Appendix E.
- Criteria for identifying and documenting indications that must later be characterized for severity and considered for direct examination. These criteria must consider, as a minimum, the known sensitivities of assessment tools, the procedures for the use of each tool, and the approach to be used for decreasing the physical spacing at which indirect assessment tool readings are to be taken when presence of a defect is suspected.
- Criteria for characterizing indications identified in the ECDA process. These criteria must define how an indication will be characterized as severe, moderate or minor.
- Criteria for defining the urgency of excavation and direct examination of each indication. These criteria must define the urgency of excavating the indication as immediate, scheduled or monitored.
- Criteria for scheduling excavation of each urgency level of indication. These criteria are discussed at greater length below.
- Criteria for data gathering associated with each excavation.
- Criteria for the qualification of people who carry out and interpret the results from the direct assessment process.
- Criteria and measures for long-term process effectiveness evaluation.

#### *Completion of the Following Four Steps*

**Step 1: Pre-Assessment**—As part of the Pre-Assessment step, the pipeline operator must analyze and integrate the risk factor data to determine whether conditions exist that would preclude the effective use of ECDA. The following conditions may rule out ECDA application or make it difficult to apply. Should any of these conditions exist, the operator must document in the ECDA Plan why ECDA is considered to be valid and the special provisions it will implement to ensure ECDA effectiveness.

- The presence of coatings that cause electrical shielding;
- Backfill around the pipe with significant rock content or the presence of rock ledges;
- Situations impeding timely above-ground data gathering;
- Locations with adjacent buried metallic structures; and
- Inaccessible areas.

As part of the Pre-Assessment step, the operator must select at least two different indirect examination methods for each location where ECDA is to be

applied along the pipeline. These methods must be selected based on their ability to detect external corrosion activity and deficiencies in the pipe coating under the conditions expected to be encountered. The tools selected must be complementary, such that the strengths of one tool overlap the limitations of the other. Appendix E presents information to support selection of the two complementary tools. A few examples of indirect examination tools are Close Interval Surveys (CIS), Direct (or Alternate) Current Voltage Gradient (DCVG or ACVG), and electromagnetic techniques (e.g., Pipeline Current Mapper (PCM) and C-Scan).

Direct assessment with only one inspection tool will be permitted to assess for external corrosion only if the operator develops and documents a plan specifying and justifying the special tool or tools being used. The conditions where this deviation is permitted are as follows:

- Pipe in frozen ground;
- Pipe under paved roadways; and
- Pipe in cased crossings (either road or river).

**ECDA Region:** As part of the Pre-Assessment step, the operator must define ECDA regions. An "ECDA Region" is a portion of a pipeline, not necessarily contiguous, that has similar physical characteristics, operating and corrosion history, expected future corrosion conditions, and in which the same indirect assessment tools are used. Due to their similarity, these regions will be used in each of the remaining three steps in the ECDA process. In these subsequent steps, ECDA regions are used to support aggregation and evaluation of indirect and direct examination data. Additionally, ECDA regions may be redefined, or the ECDA process may be determined to be inapplicable for an entire region.

**Step 2: Indirect Examination**—The operator must carry out the indirect examination step using the tools selected for each ECDA Region. In defining the boundaries for use of each pair of ECDA tools, the operator must ensure completeness of coverage by providing for some overlap between adjacent regions. The following additional provisions must be incorporated when the ECDA process is applied to a segment of pipe:

- Repeat indirect inspections on a sample basis to ensure consistent data are obtained.
- Select intervals for capturing tool readings that are closely spaced enough to ensure consistent data are obtained. Data sampling intervals (locations of test points) for indirect examination tools

should typically be no greater than the local depth of coverage of the pipeline.

- Indirect inspections using the two complementary tools in an ECDA Region should be carried out as close together in time as practical.
- Above ground measurements should be geo-referenced and documented so inspection results can be compared and excavation locations accurately identified.

After indirect examination measurements are completed for an ECDA Region, the operator must align the measures taken with the complementary tools and evaluate the consistency of the observations using the following guidance:

- If the results from the two complementary tools are not consistent and cannot be explained by differences in the capabilities of the tools, then either direct examination or additional indirect inspections must be used to evaluate the reasons for the differences.
- If additional indirect inspections or direct examinations are not carried out or if they do not resolve the inconsistencies, then the feasibility of ECDA must be reevaluated.
- Indications must be identified and located following indirect inspection, and the severity of each indication must be classified as severe, moderate or minor using the criteria in the ECDA Plan.
- These classifications should be conservatively developed the first time the process is applied. Results from the Pre-Assessment step (Step 1) must next be compared with prior history for each ECDA Region.

- If assessment results are not consistent with operating history, then the operator must reassess the feasibility of ECDA.

**Step 3: Direct Examination (Excavation and Data Gathering)**—The operator must next use the results from the indirect examination step to develop and carry out a direct examination plan. The activities to be included in this step are listed below:

- The order and timing of excavations in the direct examination step must be determined from results of the indirect examination step. Both order and timing are derived from a classification of the indications. Criteria developed in the ECDA Plan must be used to determine whether each indication is classified as requiring immediate action, scheduled action or monitoring.
- All indications that are categorized as "immediate action" require direct examination (excavation). Should any of these indications be associated with defects that require immediate mitigation, the operator must reduce