

External Corrosion Direct Assessment Training



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AGENDA

- ◆ Introductions
- ◆ Purpose for Training
 - ◆ Training vs Operator Qualifications
- ◆ Procedure revision to incorporate enterprise-wide applicability
- ◆ Regulatory requirements
- ◆ ECDA for line piping
- ◆ ECDA for cased piping

Training

- ◆ No specific code requires training for engineers overseeing ECDA process; however RP-0502 must be understood.
- ◆ “ The provisions of this standard should be applied under the direction of competent persons who by reason of knowledge of the physical sciences and the principles of engineering and mathematics, acquired by education and related practical experience, are qualified to engage in the practice of corrosion control and risk assessment on buried ferrous piping systems.”
- ◆ C&S requires training for the implementation of this standard. Integrity Engineering recommends training for engineering staff.
- ◆ There are other components of Integrity Management that also have training components, such as Repair of Transmission Pipelines and Sanding Repair Guidelines. Most of our training is field-related.

Operator Qualifications

- ◆ Field Crews, such as Corrosion Control, have various “Operator Qualification” type training, which is mandated.
 - ◆ Task No. 1: Inspecting for Shorted Casings
 - ◆ Task No. 2: Measuring Pipe-to-Soil Potential
 - ◆ Task No. 3: Conduct a Soil Resistivity Survey
 - ◆ Task No. 4: Conducting Interference Testing
 - ◆ Task No. 6: Inspection for Atmospheric Corrosion
 - ◆ Task No. 7: Ensure Operation of a Rectifier
 - ◆ Task No. 11: Applying Pipe Coating in the Field
 - ◆ Task No. 17: Repair Coating on Steel Pipelines
 - ◆ Task No. 21: Line Locating and Mark Out
 - ◆ Task No. 23: Inspecting the Coating of Exposed Metallic Pipe or Pipe Coating
 - ◆ Task No. 24: Inspect Pipe for Damages
 - ◆ Task No. 30: Repair a non-leaking pipe
 - ◆ Task No. 70: Properties of Gas – Abnormal Operating Conditions

Responsibilities:

- ◆ Integrity Engineering shall be responsible for the following:
 - ◆ Initiate and complete ECDAs in accordance with this procedure.
 - ◆ Perform the pre-assessment, issue indirect testing instructions, review indirect testing data, issue retest instructions when required, select excavation sites for direct examination, perform required oversight of excavations, provide engineering for direct examinations and complete required post assessment.
 - ◆ Coordinate and schedule all required direct examinations.
 - ◆ Evaluate all indirect testing data anomalies and indications and evaluate pipeline coating or metal anomalies, imperfection and defects. This includes notifications and taking corrective steps to safeguard the crews, public and the gas system when repairs are required.
 - ◆ Ensure all forms and required documentation is completed and accurate.
 - ◆ Provide completed assessment information required for the applicable IMP Performance Measures Report.

Responsibilities (Cont'd)

- ◆ Corrosion Control Division of System Integrity or their designee shall perform the following:
 - ◆ Perform required indirect testing as requested in the test instruction and any subsequent retest instructions.
 - ◆ Document all required indirect testing results and provide the information to the Integrity Engineering Division.
 - ◆ Inspections of the pipe coating and pipeline metal for direct examination phase of the ECDA process.
 - ◆ Ensure coating or pipeline repairs are made in accordance with the assigned Integrity engineer's direction.

Regulatory Requirements for External Corrosion Direct Assessment

- ◆ Regulations driven by 49 CFR 192, which references NACE RP-0502 and ASME B31.8S in conducting External Corrosion Direct Assessments.
 - ◆ § 192.921 describes the assessment methods that may be used for each covered segment.
 - ◆ § 192.925 describes the requirements for using ECDA: “ An operator that uses direct assessment to assess the threat of external corrosion must follow the requirements in this section, in ASME/ANSI B31.8S section 6.4, and in NACE RP 0502. An operator must develop and implement a direct assessment plan that has procedures addressing preassessment, indirect assessment, direct examination and post-assessment...”

Integrity Assessment Methods

- ◆ Approved assessment include:
- ◆ Pressure testing per Subpart J of Part 192
- ◆ In line inspection (ILI)
 - ◆ The data from ILI assessments of cased pipe is so important because it can give insight to apply to other pipeline segments.
 - ◆ This information could be a gage for the industry and regulators to look at what we can assess and what we've learned and know about cased pipe from ILI inspections.
- ◆ Direct Assessment (ECDA, ICDA, SCCDA, and CDA)
- ◆ Other Technology, provided:
 - ◆ It can provide an understanding of the condition of the line pipe that is equivalent to the other methods, and
 - ◆ The operator notifies PHMSA, or the state agency exercising jurisdiction in advance of its intent to use the technology.
 - ◆ Requires 180 day notification to PHMSA and their prior approval in order to use.

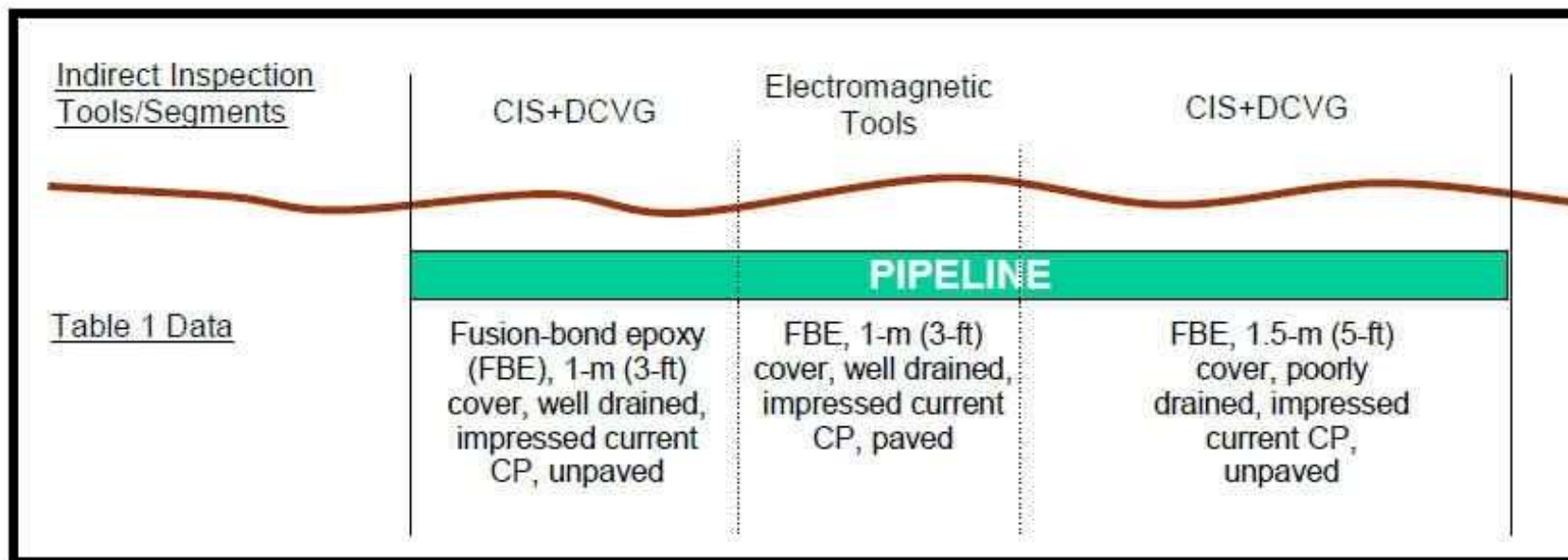
Four-Step ECDA Process

- ◆ **Pre-assessment:** the purpose of the Pre-Assessment step is to determine whether ECDA is feasible for the segment, to select indirect inspection tools, and to identify ECDA regions.
- ◆ **Indirect Inspections:** The purpose of the Indirect Inspection Step is to identify the most severe coating faults, other anomalies, and areas at which corrosion activity may have occurred or may be occurring.
- ◆ **Direct Examinations:** Direct Examination – Includes analyses of indirect inspection data to permit the selection of sites for excavations and pipe surface evaluations. The data from the direct examinations are combined with prior data to identify and assess the impact of external corrosion on the pipeline.
- ◆ **Post Assessment** – Analyses of data collected from the previous three steps to assess the effectiveness of the ECDA and determine reassessment intervals.

Definitions:

- ◆ Anomaly – Any deviation from normal conditions in the external wall of a pipe, its coating, or the electromagnetic conditions around the pipe.
- ◆ Defect – An anomaly in the pipe wall that may reduce the pressure-carrying capacity of the pipe.
- ◆ ECDA Region – A section or sections of a pipeline that have similar physical characteristics and operating history and in which the same indirect inspection tools are used.
- ◆ Holiday – A discontinuity (hole) in a protective coating that exposes the pipe surface to the environment.
- ◆ Segment – A contiguous portion of a pipeline to be assessed using ECDA.

Tool Selection



Example Selection of Indirect Inspection Tools

Region Selection

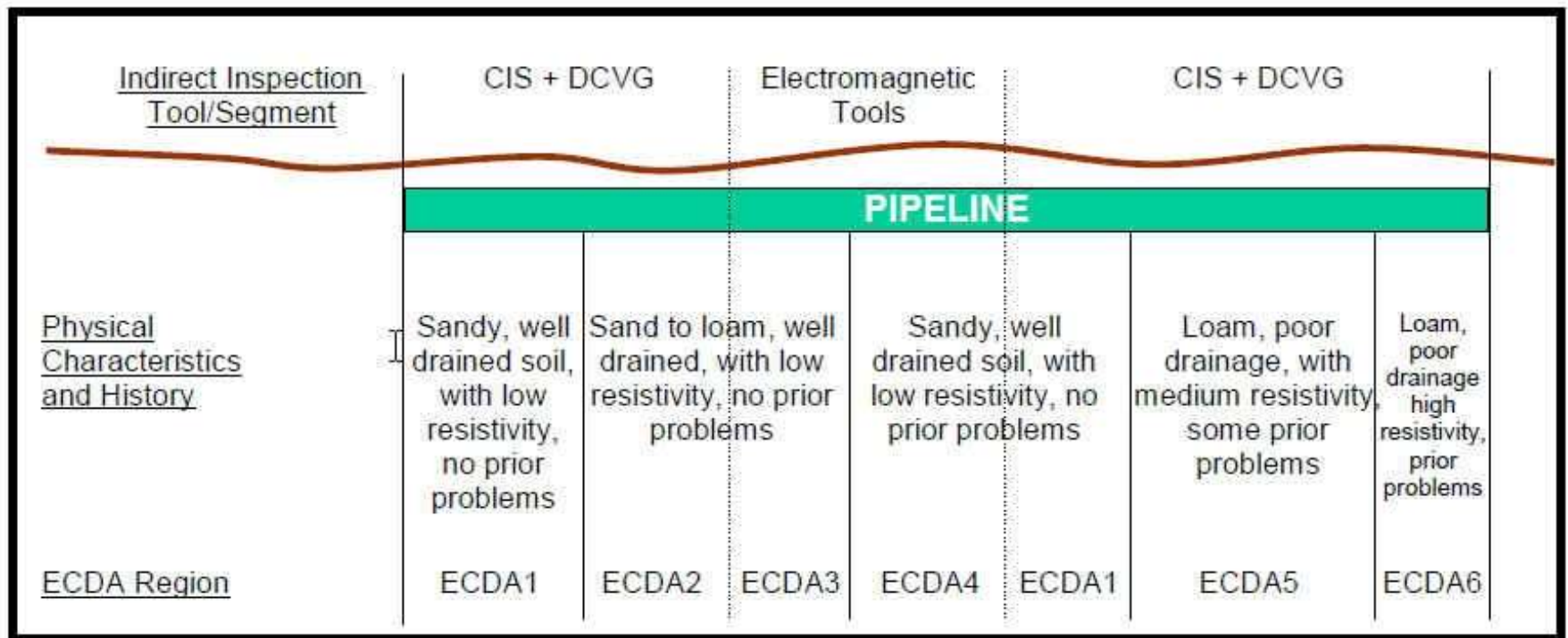


Illustration of ECDA Region Definitions

ECDA Step 1: Pre-Assessment

- ◆ Purpose: Determine whether ECDA is feasible, select indirect inspection tools, and identify ECDA regions
 - ◆ Perform historical data collection and review.
 - ◆ Determine ECDA feasibility and selection of indirect inspection methods. Consider issues such as stray current, pavement, inassessable areas, electrical interference, and known disbonded coating.
- ◆ Some general recommendations:
 - ◆ Review operating history (CP records, construction records, survey information as applicable).
 - ◆ Evaluate cased portions of pipeline for appropriate indirect inspection tools
 - ◆ Prepare tool selection/region justification
 - ◆ Define your cased pipe region(s)
- ◆ Complete “ECDA Data Elements Form” and ECDA Region Analysis Form” (See Attachments 1 and 2 of procedure)

ECDA Step 2: Indirect Inspections

- ◆ The purpose of the Indirect Inspection Step is to identify the most severe coating faults, other anomalies, and areas at which corrosion activity may have occurred or may be occurring.
- ◆ At least two aboveground indirect inspection methods are required over the entire length of each ECDA region and include the following activities:
 - ◆ Conducting indirect inspections in each ECDA region selected in the Pre-Assessment Step.
 - ◆ Alignment and comparison of the data.
- ◆ Prepare instructions (called a Test Plan) with detailed ECDA requirements for field application. (See Attachment 4, Example of Test Plan) Corrosion Control should conduct and complete each selected Indirect Inspection as close together in time as practical.

ECDA Step 2: Indirect Inspections (Cont'd)

- ◆ Corrosion Control performs the following steps:
 - ◆ The boundaries of the ECDA segment should be identified and the gas pipeline shall be clearly marked out in the field by Corrosion Control Division or their designee.
 - ◆ Field data shall be compiled and aligned by Corrosion staff.
- ◆ Integrity Engineering evaluation:
 - ◆ Multiple test results data shall be further aligned, compiled and analyzed by Integrity Engineering.
 - ◆ Engineering may enhance its Test Plan to perform additional testing if desired. (Called a “Retest Plan”)
- ◆ Proper scheduling is crucial to ensure we stay on track with our assessments. There is a short window for conducting direct examinations. Furthermore, data integrity can be comprised if there are significant gaps between the indirect inspection and direct examination steps. We also have an obligation to react in a timely basis to significant indications.
- ◆ Engineering reviews the indirect data, and then proceeds into the direct examination phase

Indirect Inspection Tools & Surveys for Use with ECDA:

- ◆ NACE Standard RP0502-2002, section 4.1.2 states that the indirect inspection step requires the use of **at least** two inspections over the **entire length** of each ECDA region.
- ◆ **Per RP/SP0502 Tool selections and ECDA regions shall be documented and justified.**
- ◆ Indirect Inspections results when combined provide a more complete understanding of the carrier pipe condition.
- ◆ Based on ECDA Pre-Assessment, choose **at least 2 of the** standard tools for indirect inspection surveys over the entire length of the pipe to be assessed.
- ◆ Additionally for cased pipe, additional steps must be taken to properly evaluate and assess the cased pipe. [Refer to the Casings ECDA Process Check List, Attachment 3](#), which includes additional considerations for each phase of the process. Note that each cased location must be assessed.

Tool Selection - Standard Indirect Tools Used in ECDA

Select 2 indirect inspection surveys that are best suited to cover the entire length of the (cased) pipe to be assessed.

- ◆ Document your additional considerations for casing indirect testing.
- ◆ Know your tools and justify decisions.
- ◆ Choose at least 2:
 - ◆ **Close interval survey (CIS)** to determine CP levels along the pipeline (paying attention to the profile as it approaches and reaches the casing ends);
 - ◆ **Electromagnetic technique (PCM)** to determine coating condition on a macro-scale (AC Coating Attenuation);
 - ◆ **PCM/A-frame (AC Voltage Gradient)** to locate and classify coating anomaly indications,
 - ◆ **Direct current voltage gradient (DCVG)** to pinpoint and size defects;
 - ◆ **Soil and/or electrolyte resistivity survey** to help determine corrosion growth rates
 - ◆ You'll need pipeline location and depth (depth of cover)

Additional Considerations for Cased Pipe

- 1) Each cased crossing must be indirectly assessed.
- 2) Take and Compare pipe-to-soil potential vs. casing-to-soil potential level. (a potential difference between the two measured potentials below “criteria” is indicative of a metallic short)
 - ◆ A generally accepted criteria is to compare the mV difference between the 2 readings. This test is used to identify pipe-to-casing metallic shorts.
 - ◆ Review historical records to see if casing itself is cathodically protected.
 - ◆ Should no test station be available a metallic casing vent line connection that is continuous to the casing can also be used for this purpose.
- 3) These additional surveys and testing techniques **may also be used** to provide additional information relevant to the integrity of the cased pipe:
 - Pipe-to-casing resistance measurements
 - ◆ Panhandle Eastern test method as found in PRCI L51587
 - ◆ [These tests indicate the resistance between the pipe and its casing over the length of the carrier within the casing pipe.]

Exceptions/Data Gaps

Where no casing test lead is available, an electrically continuous casing vent may be used for testing the casing potential and for resistance measurement tests. If neither exists, isolation testing cannot be performed then A-framing is recommended going over the length of the casing to provide a full indirect assessment of such casings.

RP0502 Objective of Direct Examinations

Section 5: Direct Examinations

5.1 Introduction

5.1.1 The objectives of the *Direct Examination Step* are to determine which indications from the indirect inspections are most severe and collect data to assess corrosion activity.

5.1.2 The *Direct Examination Step* requires excavations to expose the pipe surface so that measurements can be made on the pipeline and in the immediate surrounding environment.

5.1.3 A minimum of one dig is required regardless of the results of the indirect inspections and pre-assessment steps. Guidelines for determining the location and minimum number of excavations and direct examinations are given in Paragraph 5.10.

5.1.4 The order in which excavations and direct examinations are made is at the discretion of the pipeline operator but should take into account safety and related considerations.

5.1.5 During the *Direct Examination Step*, defects other than external corrosion may be found. While

defects such as mechanical damage and stress corrosion cracking may be found, alternative methods must be considered for assessing the impact of such defect types. Alternative methods are given in ASME B31.4,¹ ASME B31.8,^{2,3} and API 1160.⁴

5.1.6 The *Direct Examination Step* includes the following activities, as shown in Figure 6:

5.1.6.1 Prioritization of indications found during the indirect inspections;

5.1.6.2 Excavations and data collection at areas where corrosion activity is most likely;

5.1.6.3 Measurements of coating damage and corrosion defects;

5.1.6.4 Evaluations of remaining strength (severity);

5.1.6.5 Root cause analyses; and

5.1.6.6 A process evaluation.

Step 3: Direct Examinations

- ◆ The purpose of the formal ECDA Direct Examination Step as outlined in the NACE standard RP0502 is to determine which indications from the indirect inspections are most severe and collect data to assess for corrosion activity. The Direct Examination site locations require excavations to expose the pipe coating surface so that a detailed inspection can be performed.
- ◆ The following guidelines shall be used for direct examinations:
 - ◆ Upon completion of Indirect Inspection testing, Engineering shall identify and prioritize anomalies.
 - ◆ Classify all indications found from the Indirect Inspection data as 'minor', 'moderate', or 'severe' as defined in [Attachment 5, Severity Classification and Prioritization Tables](#).
 - ◆ Prioritize all classified indications as 'immediate', 'scheduled', or 'monitored' as defined in Attachment 5, Severity Classification and Prioritization Tables. The information should be recorded on Attachment 6: Severity Classification/Dig Prioritization Data Form (This form is used for classifying anomalies throughout the ECDA process).

Step 3: Direct Examinations (Cont'd)

- ◆ Guidelines (Continued)
 - ◆ Determine the required number of direct examinations necessary in accordance with [Attachment 7, Guidelines for Determining the Required Number of Direct Examinations](#).
 - ◆ During the excavation National Grid personnel shall be present to witness excavation. Excavation around pipeline should be hand dug in order not to damage pipeline, coating and any corrosion or protective product in accordance with approved procedures.
 - ◆ The condition of the coating shall be evaluated utilizing jeep testing. Other inspections such as X-cuts, adhesion, surface profile, etc. and visual inspection per applicable approved procedures can be used at the engineer's discretion.
 - ◆ Photographic documentation and soil samples shall be taken.
 - ◆ If there is a breach in the coating, coating shall be removed in order to perform pipe wall inspection. Coating repair shall be in accordance with approved procedures.

Step 3: Direct Examinations (Cont'd)

- ◆ Guidelines (Continued)
 - ◆ Corrosion and/or protective products should be analyzed for pH and specific ions to determine if the corrosion is active.
 - ◆ Document inspection data on Attachment 8, D.A. Facility Mains – Corrosion Control Report sheet 1 – Example, and Attachment 9, Direct Examination - UT Wall Thickness Measurement Form.
 - ◆ If metal anomaly exists, Integrity Engineering must evaluate and determine classification and need for repair in accordance with approved National Grid procedures.

Step 3: Direct Examinations (Cont'd)

- ◆ The following guidelines shall be used for repairs if necessary:
 - ◆ Pipeline coating damage shall be repaired per National Grid approved procedures and specifications.
 - ◆ Pipe wall loss or damage shall be evaluated and repaired by qualified personnel in accordance with company procedures and specifications.
 - ◆ Documentation shall be completed in accordance with approved company procedures.
 - ◆ The following supplemental forms should be completed only when there are metal defect repairs:
 - ◆ Defect Analysis Form (Example shown as Attachment 10).
 - ◆ Remaining Life Calculation form (Example shown as Attachment 11).

Prioritize Indications for Direct Examinations

- ◆ Operators must define how they classify the indirect indications and prioritize the direct exams.
 - Per RP/SP0502 Indirect Indications Classifications:
 - ◆ 4.6.1.1. *Severe - highest likelihood of corrosion activity.*
 - ◆ 4.6.1.2. *Moderate - possible corrosion activity.*
 - ◆ 4.6.1.3. *Minor - lowest likelihood of corrosion activity.*
- ◆ How do they combine the results of multiple indirect examinations?
- ◆ Criteria?
 - ◆ Each operator establishes their own criteria based on RP0502 and engineering judgment, corrosion history and knowledge of their system.
 - ◆ The results of the indirect inspections are aligned and compared to then prioritize need for direct examinations.
 - ◆ Locations are selected for direct examinations and a schedule prepared.
- ◆ Greatest Threat? Metallically Shorted Casing are 4x's more likely to corrode than un-shortened pipe. Finding shorts should be the priority.

Severity Classification Table

Tool & Test	MEASUREMENT AMPLITUDE/ CHANGE IN INDICATION		
	See additional details in notes below table		
	MINOR	MODERATE	SEVERE
CIS	At or more negative than -0.850 v (1)	more negative than -0.800 v not more negative than -0.850 v (2)	Not more negative than -0.800 v (2)
DCVG	1-35% cathodic both on & off	35-50% cathodic on, anodic or neutral off	50-100% anodic both on & off
PCM	1-30% (3)	30-50% (3)	50-100% (3)
PCM/A-Frame (ACVG)	30-59 dB (4)	60-80 dB (4)	Greater Than 80 dB (2 Ft Intervals Around Defect) (4)
4-Pin Resistivity	>10,000 ohm-cm	1000-10,000 ohm-cm	<1000 ohm-cm
MIC Areas	more negative than -1.0 v	more negative than -0.850v not more than -1.0v	Not more negative than -0.850 v
Cased Pipe (5)	Additional Considerations for Casings		
	MINOR	MODERATE	SEVERE
Pipe to Electrolyte Potential (Industry Standard)	Pipe to Electrolyte (1) Potentials are slightly depressed near casing structure and are at or above -850 mV criterion	Pipe to Electrolyte (2) Potentials significantly drop near casing and are: -0.800 v ≤ to < -0.850 v	Pipe to Electrolyte (2) Potentials are severely depressed near casing and below -800 mV
Casing-to- Electrolyte Potential (6, 7) (Industry Standard)	Casing to Electrolyte ON Potentials partially track Pipe Potentials and the difference in the P/S & C/S "ON" potentials is greater than 100 mV	Casing to Electrolyte ON Potentials partially track Pipe Potentials and the difference in the P/S & C/S "ON" potentials is greater than or equal to 10 mV and less than or equal to 100 mV	Casing to Electrolyte Potentials track Pipe Potentials and the difference in the Pipe and Casing "ON" Potentials < than 10 mV
Open Circuit Potential (OCP) between Pipe and Casing (7) (Industry Standard)	Difference between the P/S & C/S "ON" Potential is greater than 100 mV.	Difference between the P/S & C/S "ON" Potential 10 mV ≤ and ≤ 100 mV.	Difference between Pipe and Casing Structure Potential < 10 mV
Internal Resistance (7) (Industry Standard)	P/C resistance greater than 0.1 Ω	P/C resistance greater than 0.01 Ω and less than or equal to 0.1 Ω	Pipe-to-Casing (P/C) resistance less than or equal to 0.01 Ω

Notes for Severity Classification Table:

General Notes:

- A. When the word "**OFF**" is used, it is the instant "**OFF**" readings to be used as applicable to rectifier protected sections.
- B. Some sacrificial anodes are connected directly to the pipeline and not linked to test points. These can be easily located as they cause large PCM current loss.
- C. If an anode is heavily depleted it will be high resistance, and the PCM transmitter signal lights will indicate higher voltage.
- D. If MIC (microbiologically induced corrosion), Suspect Third Party Damage **OR** Stray Current, the Integrity Engineer will evaluate and determine the severity indication.

Notes for Specific Parts of Table:

- (1) For impressed current cathodic protection systems, "OFF" potential is below (less negative than) -0.850v but **MEETS** the 100mv criteria [Minor].
- (2) For impressed current cathodic protection systems, "OFF" potential is below -0.850v but does **NOT MEET** 100mv criteria. Severity classification as "Moderate" or "Severe" depends on the "OFF" potential level range in table.
- (3) Consider percentage drop in signal **OVER THE DISTANCE** measured, i.e. large % drop over miles is **MINOR** vs. a large % drop over 100 feet (**SEVERE**). See Pipeline Current Mapper User's Guide under section for "**Pipelines and Pipeline defects: Interpretation of Readings and Graphs**" for additional guidance.
- (4) When ACVG tools (A-frame) detect both Convergences with Rotations, it is **ONLY** the decibel ranges of the **ROTATION INDICATIONS** that are to be used to compare and classify the severity between such indications. (Just use dB range at "**ROTATIONS**" to classify the severity).
- (5) Cased pipe indirect testing will generally follow the line pipe indirect testing. Use the information from the line pipe indirect testing trends (graphs if available) and pre-assessment information. Performing additional tests on the cased pipe and its casing may be required to complete the assessment and to determine severity classification level and priority for cased pipe direct examinations.
- (6) Casing Note: A well-oxidized, bare-steel casing is expected to have a static (i.e., not polarized) potential between approximately -200 mV and -500 mV (Cu/CuSO_4). Elevated casing potentials need to be investigated further to determine how to prioritize severity. Coated casings can shield cathodic protection from reaching the carrier pipe within. While unusual, some casings may actually have cathodic protection applied to the casing (not just the carrier). Look for such details in pipeline records. Internal resistance tests together with the other casing tests will help give more complete information to determine if a pipe-to-casing short exists.
- (7) Where no casing test lead is available, an electrically continuous casing vent may be used for testing the casing potential and for resistance measurement tests. If neither exists, isolation testing cannot be performed then A-framing is recommended going over the length of the casing to provide a full indirect assessment of such casings.

Example of Prioritization for Direct Examination

- ◆ All indirect results are aligned and compared
- ◆ Criteria is reviewed to prioritize indications

Prioritization Table

IMMEDIATE ACTION	SCHEDULED ACTION	MONITORING
CIS severe indication with any other Severe or Moderate classified indication.	CIS moderate indication with any one other severe indication.	All remaining indications.
CIS moderate with MIC severe indication.	CIS minor indication with any two other severe indications.	
Any Severe or Moderate indication with suspected Third Party Damage.		

Additional Considerations for Casings



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Casings ECDA Process (check list)

Phase	Steps	Description	Completed
Pre- Assessment	1	Review & understand history of casings on this line	
Pre- Assessment	2	Review files for any completed or missing Supplemental Testing Data for each casing	
Pre- Assessment	3	Review cathodic protection history of pipeline & casings	
Pre- Assessment	4	Review trends in CP readings and the line pipe ECDA data at each casing	
Pre- Assessment	5	Review for threats of atmospheric or underground corrosion	
Pre- Assessment	6	Determine relative risk of each casing	
Pre- Assessment	7	Consult with casing asset owner & consider additional testing requirements	
Pre- Assessment	8	Determine if ECDA is feasible for cased location(s)	
Pre- Assessment	9	Issue Test Instruction with any additional indirect testing	
Indirect Testing	10	Perform Indirect testing in accordance with test instruction	
Indirect Testing	11	Review indirect testing data and consider Pre-assessment work	
Indirect Testing	12	Identify any retesting requirements & issue retest order	
Indirect Testing	13	Perform Retesting as required	
Indirect Testing	14	Review indirect retesting data	
Direct Examination	15	Classify & Prioritize ECDA excavations	
Direct Examination	16	Consider including casing digs or using as validation excavations	
Direct Examination	17	Issue Direct examination instructions, consider available technologies & potential remediation or repairs including wax filling	
Direct Examination	18	Perform direct examinations, collect & document findings	
Direct Examination	19	Perform any additional remediation or repairs as necessary	
Post Assessment	20	Review all excavations and data to determine if assessment process was successful	
Post Assessment	21	Determine if any findings need to be applied to other areas of the pipeline or gas system	
Post Assessment	22	Issue Final Close Out Report	
Post Assessment	23	Communicate findings to process owners and file records	

Example of 4
Step ECDA
Process for
cased pipe

Criteria Examples – Metallic Short

- ◆ **The first step before analyzing if there is a corrosive condition at a cased crossing is to establish criteria for a metallically shorted condition.**
- ◆ In accordance to NACE RP0200:
- ◆ **“A shorted casing may exist if there is a small differential or there is no differential between the pipe to electrolyte and casing electrolyte potential.”**
- ◆ Based on this definition, the following potential criterion can be derived.
- ◆ **Severe Indication** - Pipe to Electrolyte "ON" Potentials are less than -850 mV and the difference in the Pipe and Casing Potential is less than 10 mV.
- ◆ **Moderate Indication** - Pipe to Electrolyte "ON" Potentials are borderline -850 mV and the difference in the P/S & C/S potentials is greater than 10 mV and less than or equal to 100 mV .
- ◆ **Minor Indication** - Pipe to Electrolyte "ON" Potentials are greater than -850 mV and the difference in the P/S & C/S potentials is greater than 10 mV and less than or equal to 100 mV .
- ◆ **Electrically Clear** – Pipe to Electrolyte "ON" Potentials are greater than 1000 mV and the difference P/S & C/S potentials is greater than 150 mV.
- ◆ Taking the potential criterion one more level, the following classification table can be used to assess a carrier pipe in an HCA. This table will help prioritize in the selection of tools to indirect assess the level of severity of a casing condition.

Step 4: Post-Assessment

- ◆ The purpose of the Post-Assessment Step is to define reassessment intervals and assess the overall effectiveness of the ECDA process.
- ◆ Review the Integrity Management Plan and perform Post-Assessment to evaluate the overall effectiveness of the ECDA process as in section 6.4 of the NACE Standard RP0502. As stated in this section of the NACE standard, at least one additional direct examination at a randomly selected location shall be conducted to provide additional confirmation that the ECDA process has been successful. In addition, reassessment intervals are to be determined and shall follow ASME B31.8S. The information should be recorded on [Attachment 6: Severity Classification/Dig Prioritization Data Form](#).
- ◆ Determine if any findings need to be applied to other areas of the pipeline or gas system.
- ◆ [Upon completion of the assessment, a “Closeout” Report is required by the Integrity Engineer. A sample “Closeout” Report is provided as Attachment 12.](#)
 - ◆ The post assessment should include wording describing the overall condition of the remaining steel pipe. It should also indicate the effectiveness of the ECDA process on that pipeline.
- ◆ A list of casings on the ECDA should be included in the pipeline assessment job file.