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Materials Safety Administration

PHMSA Guidelines for Integrity Assessment of Cased Pipe

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Guidance Overview

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Guidance Overview

- **ECDA – only practical assessment method for certain transmission pipelines**
 - Impractical to ILI, hydrotest or other tech.
- **Guidance**
 - **Uses ECDA – 4-Step Process**
 - **Regions**



The Approach

- ECDA for cased pipe, NACE RP0502 requires implementation of:
 - “**other assessment activities**” (RP0502 3.3.2, & Table 1)
 - “**other considerations**” (RP0502, Table 2, footnote 3)
- NACE did not address these “other” areas



The Approach

- **PHMSA has identified “other assessment activities” and “other considerations” which it finds acceptable to compensate for the limited effectiveness of indirect inspection tools**
- **Guidance for “other activities” address:**
 - **Quality casing construction and fill**
 - **Monitoring the effectiveness of casing performance**
 - **Both filled and unfilled**



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- **“Other assessment activities” and “other considerations” (Section 3 and Appendix D)**
 - **Assist in the analysis of indirect assessment results**
 - **Aid the selection the highest risk casings for direct examination**



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What the guidance DOES NOT allow?



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- **DOES NOT allow for skipping casing assessments**
 - **All pipe in HCA must be periodically reassessed in accordance with 49 CFR 192.939 or 195.452**
 - **For time dependent threats, 7 year reassessment per Gas IMP (5 year for HL IMP)**



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- **DOES NOT allow operator to declare that cased pipe has no corrosion threat**
 - **Effectively managing a threat is not a valid basis for declaring that you do not have the threat**
 - **Purpose of integrity assessment is to verify that threat management/mitigation continues to be effective**



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- **DOES NOT** mandate the use of GWUT or any other specific indirect inspection tools
 - **Guidance provided to help select tools appropriate for circumstances unique to cased pipe**
 - **Guidance provided to help interpret tool results appropriate for cased pipe**



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- **DOES NOT take additional state regulations into account, if any**
 - **Guidelines address federal requirements only**



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What DOES the guidance address?



- **What DOES the Guidance address?**
 - How to review ECDA integrity management procedures for cased pipelines;
 - ECDA Regions for cased pipe (allows multiple casings in one ECDA region);
 - How procedures should be set up to effectively monitor casings (both filled and unfilled);



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- **The guidance, when followed, should result in casings being in a low risk category if :**
 - **Previous direct examination was performed**
 - **Casing properly assessed and monitored**



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- **Guidance follows 4-step ECDA process NACE RP 0502**
 - **Required for all casings**
 - Step 1 (Pre-assessment)
 - Step 2 (Indirect Inspection)
 - Step 4 (Post Assessment)
 - **Required for SELECTED casings**
 - Step 3 (Direct Examination)
- **When all 4- ECDA-steps are accomplished for each region, all casings in the region are “assessed” (even though all did not have a direct examination in Step 3)**



Guidance 3.1 (Pre-assessment)

- **Identifies additional issues for pre-assessment**
 - **Data Collection (3.1.1)**
 - **Feasibility reviews (3.1.2)**
 - **Indirect inspection tool selection (3.1.3 & Exhibit A)**
 - **Region setting (3.1.4)**
 - **Provides 17 points analogous to Table 1 in NACE RP0502 on how/which casings are to be in separate regions (Guidance Exhibit B)**



Guidance 3.1.1 (Data Collection)

- **Minimum data set PHMSA considers critical to effective ECDA on cased pipe**
 - Data for indirect tool selection (Exhibit A)
 - Data for region identification (see Exhibit B)
 - Data on casing construction (see Exhibit D)
 - Type of fill material (see Exhibit D)
 - Casing monitoring data
 - Operating conditions
 - Coating type and condition (note: these guidelines may not be used if the carrier pipe is bare, i.e., uncoated)
 - History of metallic shorts and/or electrolytic contact



Guidance 3.1.2 (Feasibility)

- **PHMSA position on feasibility of ECDA on cased pipe**
 - **Guidelines address “other assessment activities” and “other considerations” for successfully tailoring the ECDA methodology**
 - **Whenever guidelines cannot be effectively implemented, PHMSA considers the ECDA process not feasible.**



Guidance 3.1.3 (Indirect Tools)

- **Guidance on indirect inspection tool selection (3.1.3 & Exhibit A)**
 - **Per NACE, select tools based on their ability to detect corrosion activity and/or coating holidays reliably under the specific pipeline conditions to be encountered**
 - **Inspection tools have limited ability to detect corrosion activity and/or coating holidays reliably for pipe inside casings**



Guidance 3.1.4 (ECDA Regions)

- **Guidance on region setting (3.1.4 & Exh B)**
 - **NACE RP 0502-2002, Table 1, requires that casings be treated as separate ECDA regions (i.e., cannot include cased pipe in same region as direct buried pipe)**
 - **Exhibit B: 17 points analogous to Table 1 in NACE RP0502 that address ECDA Regions for cased pipe**



Guidance 3.1.4 (ECDA Regions)

- **Guidance on region setting (3.1.4 & Exh B)**
 - **The following factors require separate regions**
 - **Carrier Pipe Coating**
 - **Casing Material and Design**
 - **Corrosion History on Adjacent Pipe**
 - **CP Maintenance History**
 - **Past metallic shorts or electrolytic contacts**
 - **Risk of MIC**
 - **A number of other considerations are recommended**



Guidance 3.2.1 (Indirect Inspections)

- **Guidance on performing the indirect inspections**
 - **What to expect from various inspection tools**
 - **Limited capability (identify short/contact only)**
 - **Exhibit C: Supplementary guidance on special considerations, cautions, engineering considerations, and limitations that should be taken into account when interpreting tool results**



Guidance 3.2.2 (Other Considerations)

- **Other Considerations: How to fill casings (Exhibit D1)**
 - **Preparation Procedure**
 - **Casing data from installation**
 - **Spacers and supports**
 - **Flushing the casing**
 - **Inspecting the end seals**
 - **Vents and fill pipes**
 - **Test leads**
 - **Isolation testing**



Guidance 3.2.2 (Other Considerations)

- **How to fill casings (cont.)**
 - **Filler and Filling Procedure**
 - **Use of non electrolyte**
 - **Annulus free of debris and electrolytes**
 - **Use of inhibitors**
 - **Measured volume of fill material**



Guidance 3.2.2 (Other Considerations)

- **How to monitor FILLED casings (Exhibit D1.2)**
 - **Material remains in place**
 - **Carrier pipe remains isolated**
 - **Filler completely engulfs carrier pipe and fills annulus**
 - **End seals remain intact**



Guidance 3.2.2 (Other Considerations)

- **How to monitor UNFILLED casings (Exh. D2)**
 - **Carrier pipe remains isolated**
 - **End seals remain intact**
 - **No debris or electrolyte in annulus**



Guidance 3.2.3 (Other Considerations)

- **Classifying Severity of Indirect Inspection Tool Indications**
 - **Criteria should take into account the capabilities of the tool used and the unique conditions within an ECDA region (pipe inside casings)**
 - **Tools only capable of detecting short/contact**
 - **Indications classified as “severe”**



Guidance 3.3 (Direct Examination)

- **Setting priorities for direct examination**
 - **Immediate**
 - **Metallic Short**
 - **GWUT indication > 5% of X-section area**
 - **Change in casing integrity or fill level/quality (Appendix D)**
 - **Scheduled**
 - **Electrolytic Contact**



Guidance 3.3 (Direct Examination)

- **For reassessments, previous direct examination is key factor in determining if an individual casing must undergo a direct examination**
 - **Cased pipe that has been previously directly examined may not need to be directly examined during the reassessment (unless other data or indications suggest there is a likelihood of ongoing corrosion) if all of the following are true:**
-
-



Direct Exam MAY Not Be Required If:

- **All corrosion metal loss and other defects identified during the prior direct examinations were repaired to restore the carrier pipe's original design safety factor for the class location in which it is located,**
- **Carrier pipe and casing were re-installed in accordance with the guidelines in Exhibit D**



Direct Exam MAY Not Be Required If:

- **Casing effectively monitored in accordance with Exhibit D**
- **Indirect inspection tools and other assessment activities did not identify any “immediate” indications**
- **Excavation not otherwise required in order to comply with NACE RP 0502 (e.g., to comply with the additional direct examinations to evaluate ECDA effectiveness)**



Guidance 3.3 (Direct Examination)

- **Direct exam may not be required:**
 - **If you did it right the first time**
 - **If you can demonstrate that no changes have occurred**
- **ECDA Regions contain few cased crossings might still require additional excavations to comply with the minimum required direct excavations required by NACE RP0502**



Guidance 3.3 (Direct Examination)

- **Regions can be combined** if all casings in multiple regions do not contain any immediate or scheduled indications
 - Direct examination is not required in each region.
 - Instead, one excavation is required in one of the ECDA regions identified as most likely to have external corrosion during the pre-assessment, as specified in NACE RP 0502 §5.10.2.3



Guidance 3.4 (Post Assessment)

- **Post assessment same as NACE RP0502,**
 - **No additional guidance provided**
 - **Emphasizes importance of good post assessment**
 - **Important to continually improve process**



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Thank you

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Frequently Asked Questions

(FAQs)



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Casing FAQs are located at:

http://primis.phmsa.dot.gov/ga_simp/ccfaqs.htm



Casing FAQs

- **Frequently Asked Questions (FAQs) are intended to clarify, explain, and promote better understanding of integrity management rules and the guidelines we have introduced today**



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Casing FAQ

- You are encouraged to submit additional questions

Gas IMP Feedback:

<http://primis.phmsa.dot.gov/gasimp/Feedback.gim>



FAQ-248

What are the basic regulatory requirements for cased pipe monitoring and inspection?

- Cased pipe in HCA:
 - baseline & periodic assessments
- Each cased pipe must have an assessment but may not need to have direct examination depending on several factors
- Cased pipe having shorts/couples/contacts must be corrected since they are considered detrimental to the long term integrity of the pipeline



FAQ-249

Incorrect Pre-Assessment Data, if an operator creates regions based on pre-assessment data and during the direct examination determines that construction documentation was incorrect and the cased pipe should have been in a different region...

- Must follow NACE RP 0502 and 49 CFR 192.925 using the “Feedback and Continuous Improvement” provision
- May need to re-run the indirect inspection, change the region, or perform additional direct examinations



FAQ-250

No previous monitoring data but construction data and current indirect inspection data shows no contact/couple/short ... is this cased pipe considered a high risk?

- If it can be demonstrated that the cased pipe never had a contact/couple/short then this cased pipe may have a lower priority for direct examination
- If this is not the situation, then the priority for a direct examination must be raised
- Lack of data result in conservative actions



FAQ-251

Filled, Shorted, and an Incomplete Inspection due to less than 100% coverage by GWUT ... is this an acceptable assessment?

- This cased pipe not considered assessed
- Minimum requirements of NACE and Part 192 have not been met
- If there is a short and it has not been cleared, then this cased pipe is considered high risk



FAQ-252

Filled, Isolated, and Not Following Go-No Go Target Items, is this an acceptable assessment?

- If an operator does not follow the Go-No Go checklist items for GWUT then the assessment can not be considered successful without additional technical analysis and justification



FAQ-253

Fifty Casings in One Region ... if an operator places all of their cased crossings in one region, is this always wrong?

- Under some circumstances this may be acceptable but a rigorous engineering justification is needed
- The 17 guidance points for selecting regions would have to be followed and any deviation justified
- Without justification, additional regions would need to be selected and additional direct examinations performed



FAQ-254

Each Casing in Their Own Region, is it permissible for an operator to place each of its cased crossings in separate region regardless of similarities with other cased crossings?

- Yes, an operator can place each cased pipe in a separate region
- This could require that each one be directly examined for the baseline and subsequent assessments to comply with RP0502



FAQ-255

Reassessment on Filled Casings that have not Experienced a Major Change in Status ... why are reassessments necessary?

- DOT Regulations, all pipelines located in an HCA must have a reassessment every seven years
- Just because a cased pipe has not changed since the last assessment does not mean an assessment is not required
- If priority is low based on the previous assessment, direct examination may be unnecessary



FAQ-256

All Casing Low Risk ... do small operators with very few cased crossings still have to do a direct examination even if all of their cased crossings are low risk and filled?

- Part 192 requires reassessment every seven years
- If ECDA is assessment method, some direct examinations required
 - At cased pipe most likely to have corrosion, and
 - At a location to validate the process
- Having few casings does not alleviate requirement



FAQ-257

Do small operators with very few cased crossings still have to do effectiveness digs on cased crossings?

- Effectiveness excavations are required per the NACE RP 0502 assessment process
- Not performing them would mean that the process was not being followed entirely and would thus not be considered a completed assessment



FAQ-258

What is the proper method for determining corrosion growth rate that should be used on cased crossings when calculating reassessment intervals?

- When conducting ECDA, operators must comply with NACE RP 0502-2002 §6.2.3 as referenced by 49 CFR § 192.925 to determine the corrosion growth rate used to calculate the reassessment interval



FAQ-259

Do I have to cathodically protect a casing?

- It is not the intent of the casing guidance material to require operators to provide cathodic protection (CP) for casings
- Providing CP for casing may make it more difficult to determine if there are metallic shorts or electrolytic contacts



FAQ-260

How are operators expected to monitor structural integrity of the casing and end seals?

- PHMSA has not established prescriptive requirements for how an operator should monitor the structural integrity of the casing
- PHMSA expects operators to develop their own technically sound processes
- Each operator must determine which method(s) are applicable to their situations



FAQ-261

Are leak surveys conducted in accordance with 49 CFR § 192.706 sufficient to assess carrier pipe integrity in a shorted casing?

- Leakage surveys are not capable of identifying anomalies or defects in pipe that must be repaired as required by Subpart O
- Operators cannot leave shorted, contacted or coupled casings (either metallic or electrolytic) in their pipelines or segments without mitigating the situation



Casing FAQs: Direct Exam Scenarios

- **Next are some example scenarios**
- **Purpose: illustrate min. number of direct exams**
- **As stated earlier, all casings do not require a direct examination to be “assessed” using ECDA**



FAQ-262

How many direct examinations must be made when there are multiple regions with multiple casings and a variety of immediate, scheduled and monitored indications?

- Depends on the number of regions & type of indications
- All immediate indications must be directly examined
- At least 2 scheduled (initial application) or monitored if no scheduled
- Two random direct examinations (initial application) are also required for process validation



FAQ-263

Scenario: How many direct examinations? Region A (multiple casings, some filled and some not filled) Region B (multiple casings, all filled). No immediate or scheduled in either region

- For initial application, a minimum of four casings to be directly examined:
 - Two in region deemed most likely to have corrosion
 - Two random locations for process validation
- For reassessment, a minimum of two casings for DE
 - One in region most likely to have corrosion
 - One random location for process validation



FAQ-264

**Scenario: 7-Yr Reassessment; One Region:
5 Casings; One Metallic Short; All others
clear. How many direct exams?**

- A minimum of two casings must be directly examined:
 - the metallic short (immediate condition);
 - and one random location for process validation.



FAQ-265

Scenario: Initial Assessment; One region;
Five casings; 3 filled (1 w/ metallic short and
2 clear); 2 unfilled (both w/ electrolytic
contact); How many direct examinations ?

- All five casings must be directly examined:
 - the metallic short (immediate)
 - the two electrolytic coupled (2 scheduled)
 - and two random casings for process validation (the only 2 remaining from which to choose)



FAQ-266

Scenario: 7-Yr reassessment

Region A (2 filled, 3 unfilled with one having a electrolytic contact)

Region B (5 unfilled, no shorts or contacts)

How many direct examinations ?

- A minimum of **3 casing** must be directly examined:
 - in Region A (scheduled indication)
 - in Region B the one most likely to have external corrosion
 - One at random location in either Region A or B



FAQ-267

Do casings that have been monitored per the PHMSA guidelines have to be reassessed every 7 years even if there are no immediate indications?

- All casings in line segments subject to Subpart O have to be assessed every 7 years (or less) by an allowable assessment method in accordance with 49 CFR § 192.939(a) and (b)
- However, if the operator uses ECDA for the assessment method, every casing may not necessarily require a direct examination



FAQ-268

Can a recently wax filled casing be reprioritized for the next reassessment?

- Operators are allowed to reprioritize a casing in an ECDA region based on the new risk assessment conducted in accordance with 49 CFR § 192.917(c)
- However, all pipe must be re-assessed every 7 (or fewer) years by an allowable assessment method in accordance with 49 CFR § 192.939(a) and (b).



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QUESTIONS





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Stakeholder Comments