

Cased Pipe Assessment

PHMSA Casing Workshop

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Cased Pipe Assessment

- Special thanks for helping with this presentation to:
 - Dane Spillers- Supervising Engineer
Pipeline Integrity Ameren Services

Topics to be Covered

- Summary of assessment techniques used for cased segments
- Casing removal
- Cased pipe replacement
- External Corrosion Direct Assessment (ECDA)
 - Validation of approach
 - How direct examinations are incorporated
 - The role of guided wave
 - The criterion for examination of guided wave anomalies

Cased Pipe Assessment

- Ameren
 - 1 Distribution operating company in Missouri
 - 3 Distribution operating companies in Illinois
 - About 1270 miles of transmission
 - About 80 miles in HCA's

Summary of Assessment Techniques Used for Cased Pipe

- 89 casings in HCA's
 - 41 assessed by ECDA
 - 3 casings removed and performed direct examinations on the pipelines
 - 2 replaced cased pipe in
 - 1 is planned for assessment by hydrostatic test
 - 39 tentatively planned for assessment by ECDA
 - 2 casings planned for removal and pipe assessed by direct examination
 - 1 planned for replacement of pipe
 - 0 are planned for assessment by ILI

Casing Removal Example

- 30" pipeline in 67' long 36" casing
- No vents
- Under 6 lanes of pavement and a paved median
- Depth- 9' 7" to the top of the pipe and 14' to the bottom of the excavation
- Cost to remove the casing - \$ 360,xxx
(pavement restoration is not yet complete)

Casing Removal Example



Casing Removal Example



Cased Pipe Replacement

- Cased pipe is replaced on a case by case basis.
- Examples where pipe has been replaced:
 - Under a new widened intersection where the location of the casing within the intersection was not known.
 - Under a railroad where fill had been added over the ends of the casing making it extremely deep.

ECDA of Cased Pipe

- The use of ECDA on cased pipe requires additional pre-assessment information.
- The document, Casing Corrosion Assessment, Gas Research Institute GRI-05/2020, supports the use of ECDA techniques for cased pipe.

ECDA of Cased Pipe

- The following casing pipe information is required in addition to the pre-assessment data required for the pipeline:
 - Installation date (approximate)
 - Length (approximate)
 - Diameter
 - Vent configuration (current)
 - Bare or coated
 - Anode installation
 - Isolation test data
 - Corrective action data
 - Test station locations
 - Criterion for isolation
 - Whether casing spacers were used
 - Filled with dielectric material or not

ECDA of Cased Pipe

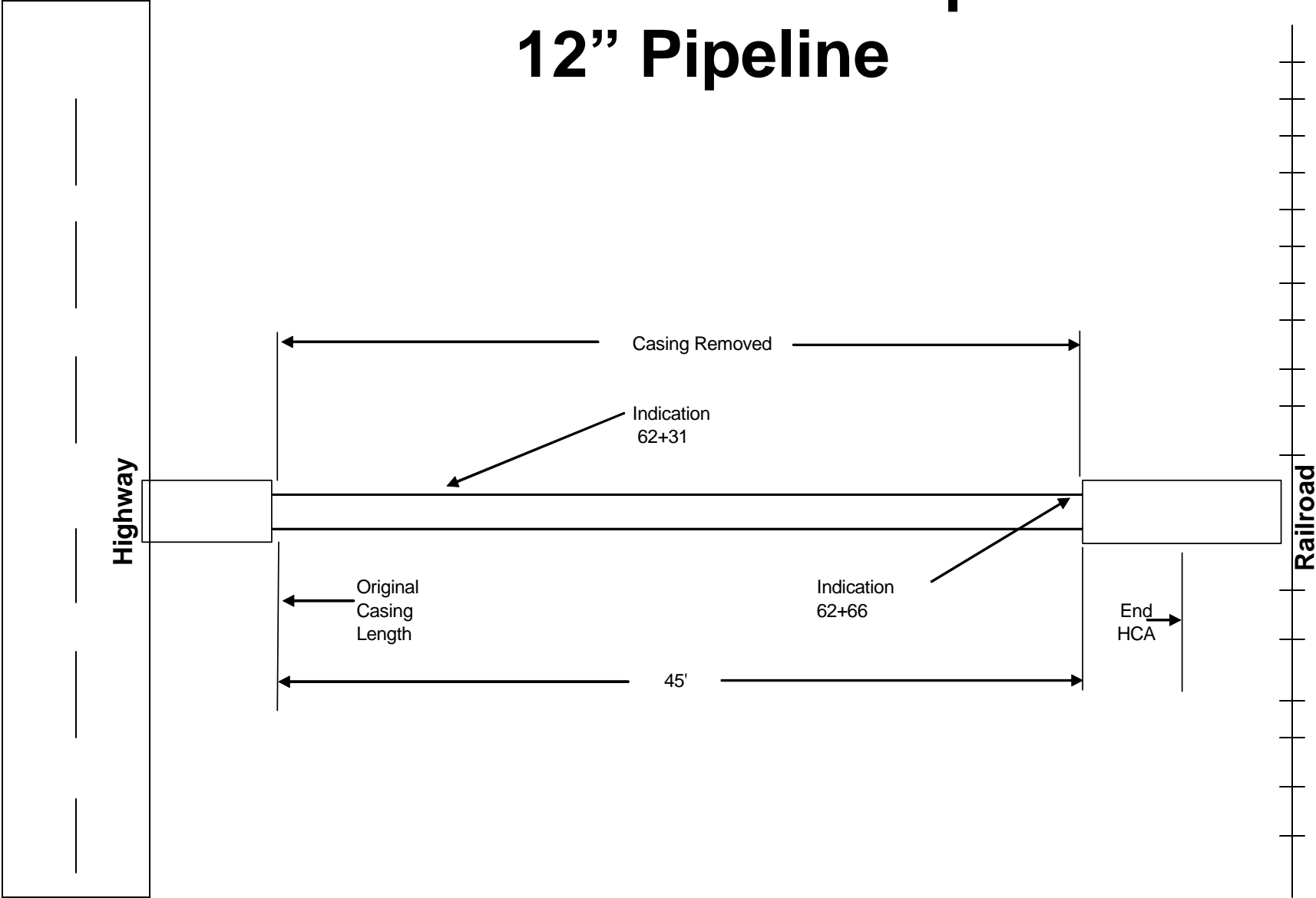
■ ECDA (Method 1)

- PCM and CIS (up to the ends) is used with data demonstrating that the casing had not been shorted for the past 10 years for pipe under 30% SMYS or for the past 15 years for pipe 30% or greater SMYS.
- For casings not meeting the short testing criterion, guided wave was used as a “go no go” tool in addition to the PCM and CIS tools.
- Validation of this ECDA approach
 - No anomalies were found with guided wave. (as indirect inspections indicated)
 - No corrosion found during direct exams. (as indirect inspections indicated)

ECDA of Cased Pipe

- ECDA (Method 2)
 - In 2006 Ameren began testing the use of CIS and Direct Current Voltage Gradient (DCVG) or Alternating Current Voltage Gradient (ACV on cased pipe when the annulus was filled with water.

ECDA of Cased Pipe 12" Pipeline



ECDA of Cased Pipe 12" Pipeline



ECDA of Cased Pipe 14" Pipeline



ECDA of Cased Pipe 30" Pipeline



Validation of This ECDA Approach

Summary of ECDA Results to Date

Location	Main Coating	Main Diameter	Casing Length	Casing Diameter	Tools Used	Indirect Results	Direct Exam Results
RT 24 Bartonville	Coal Tar	10"	unknown	14"	DCVG, CIS off	2 indications	Partial casing removal; 2 coating defects found, no corrosion
Bunkum Rd	Coal Tar	14"	51'	18"	ACVG; CIS on; PCM	No indications	Casing was removed and no coating defects were present, pipe was "jeeped"
Sparland School	Coal Tar	30"	141'	36"	DCVG, CIS off	2 indications	Guided wave performed, results inconclusive; further assessment required
Mossville Rd	Coal Tar	30"	64'	36"	DCVG, CIS off	No indications	No exam performed
Old Galena Rd	Coal Tar	30"	61'	36"	DCVG, CIS off	1 indication	Partial casing removal; direct exam, 1 coating defect
Plastics plant	Coal Tar	30"	91'	36"	ACVG; CIS on; PCM	2 indications	Partial casing removal, 2 coating defects found; no corrosion
Frank Scott Pwy. At Concordia Rd.	Coal Tar	14"	54'	18"	ACVG; CIS on; PCM	1 indication	Casing was removed; 2 coating defects separated approximately 12"

How Guided Wave is Incorporated Within Ameren's ECDA Procedures

- Guided wave will be employed for any coating defects discovered within the casing by ECDA or the casing will be removed
- The average cost per guided wave shot on cased pipe is inline with the AGA average cost of \$20,000.

Criterion to do a Direct Examination of a Guided Wave Anomaly

- Any guided wave anomaly indicated by a guided wave test will have a direct examination performed or another assessment method will be used.
- Any ECDA indication that can't be tested by guided wave will have a direct examination performed or another assessment method will be used.

Summary

- Ameren has:
 - Replaced cased pipe
 - Removed casings
 - Performed ECDA on cased pipe incorporating direct examination and guided wave
- ECDA techniques work on cased pipe when applied appropriately.
- Ameren has found no corrosion during cased pipe assessments to date
- Ameren uses two ECDA approaches to assess cased pipe.
- Other options for cased pipe assessment are needed and should be considered under the appropriate circumstances