



# Pipeline Casing Repair and VCI Installation projects

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#### Introduction



This presentation will discuss the development of a casing repair with VCI project scope, removing the short, sealing the casing and installation of the VCI product through the vent pipe.

#### The Problem



- Pipeline is a high-pressure Natural Gas line that runs under railroad tracks and feeds into a power plant.
- Pipeline had settled over the years and was not in contact with casing.

 Adjacent to the natural gas line was the water and sewer lines. These lines were not being repaired per client.



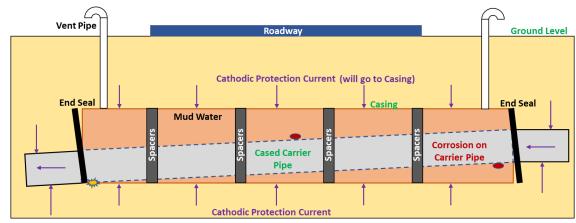


#### **Shorts**

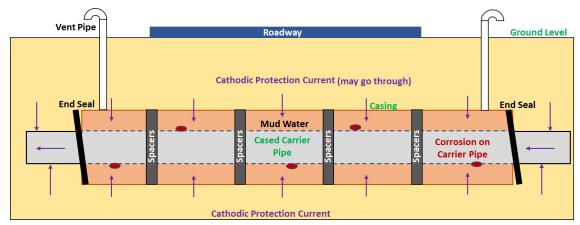


- Ground Settling
- End-Seal Failure
- Spacer degradation
- Ingress of water or other contaminants
- Other

#### **Metallic Short**



#### **Electrolytic Couple**



#### RFQ Scope Development



- 1. Diameter of Carrier and Casing pipes?
- 2. ID of the casing and OD of carrier pipe?
- 3. Length of the Casing?
- 4. Is the casing shorted Metallic or Electrolytic?
- 5. Estimated volume of water/solids in the casing?
- 6. Has a pressure test of the casing been done? Results?
- 7. Vent pipe size and penetration size through the casing?
- 8. Condition of the end seals (if known)
- 9. Will they be digging and repair/replace the seals?
- 10. Is the casing below the water table?
- 11. Elevation difference along the length of the casing?
- 12. Most current ILI (In-Line Inspection) report? History of service?
- 13. Casing depth in relation to Frost depth?

- 15. Excavation Scope
- 16. Safety concerns Traffic and environmental hazards



#### **Excavation process**



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• Started vacuum excavating the soil around the pipelines, and potholed the lines approximately 20ft. back from the casing.

• Once pipelines were exposed, we use a mini-ex to remove soil back from the pipeline.







- Often the casing is filled with water or organic debris. This should be removed as best as possible before fixing the short.
- Luckily, that was not an issue on this project





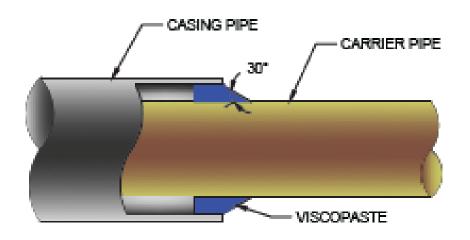


- Straps were wrapped around the pipeline and lifted with trackhoe bucket.
- Great caution is required when adjusting the pipeline. Only minor adjustments are recommended.
- Link seals should be installed with caution while carrier pipe is on tension.



## Installation of Casing End Seal System - Installation of paste



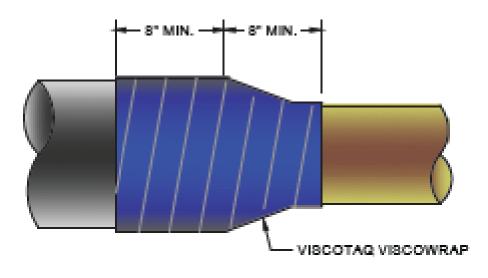


- Caution is used to ensure area is clean and paste remains clean.
- Paste is pushed into the space as tight as possible







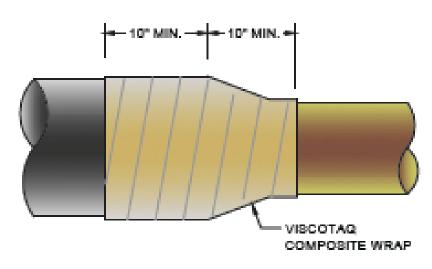


 Wrap is applied starting on the casing and wrapped with 50% overlap



### Installation of Casing End Seal System - Installation of Glass Outerwrap



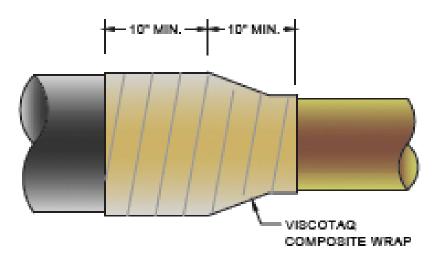


- Wrap is applied starting on the casing and wrapped with 50% overlap.
- Use water spray bottle
- Apply outerwrap as smooth as possible.









• Plastic wrap is applied over entire casing seal for curing.



#### **VCI** Installation



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Before I move on, is there any questions about the casing repair process?

### Regulatory - Casings



#### **Pipe Casing**

AMPP SP0200 - Steel-Cased Pipeline Practices

### Section A3 Treating the Casing Annulus with Corrosion-Inhibiting Products

- A3.2 There are two fundamental options available to accomplish this method of corrosion mitigation inside casings:
- A3.3 Option 1: Fill the Casing with Corrosion-Inhibiting Gel Filler
- A3.4 Option 2: Leave the Casing Annulus Unfilled and Apply a Multiphase Vapor Corrosion Inhibitor System





#### BACTERIA

One of the biggest threats inside casing VCI doesn't try and displace or encapsulate contaminants in the casing VCI chemistry will adjust the pH to about a 9 or 9.5, making it difficult for the bacteria to grow and neutralizing any acid that they may produce.

- VAPOR SPACES the vapor molecules will protect the steel in the vapor spaces even in the presence of condensation. There is no such thing as a 100% filled casing. Consumers Energy presented a paper a few years ago at NACE and said that in 143 wax filled casings, the average fill was 81%.
- COST VCI can cost effectively be applied to individual casings, rather than needing to line up several casings at a time in order to cost justify the use of a heated truck.
- COMPATIBLE WITH CP In the event of an Electrolytic Couple or Metallic Short, VCI will help CP protect the carrier pipe as well as provide protection to holiday's in the carrier coating.





- EASE OF INSTALLATION

  No heating required. Simple mixing of the inhibitor and gel with potable water and injecting in through the vent pipes. Water based and low viscosity facilitates good product distribution.
- ALLOWS MONITORING
   VCI effectiveness can be monitored using coupons, ER probes or UT probes. RMU's can be installed so that it can be monitored remotely. Wax can only be monitored by ILI runs.
- CAN BE REMOVED
   Removable if necessary The VCI gel can be washed out and removed, if necessary, in the future.
- ACCEPTED SOLUTION
   VCI is approved for use by both AMPP and US DOT PHMSA.

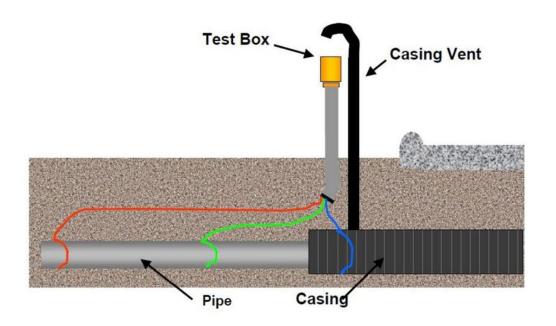
#### Casing Vent Assessment



- Vents are often damaged or blocked.
- Often there will be restriction in the vent at the bend in the vent. This needs to be cleared before installation of VCI solution



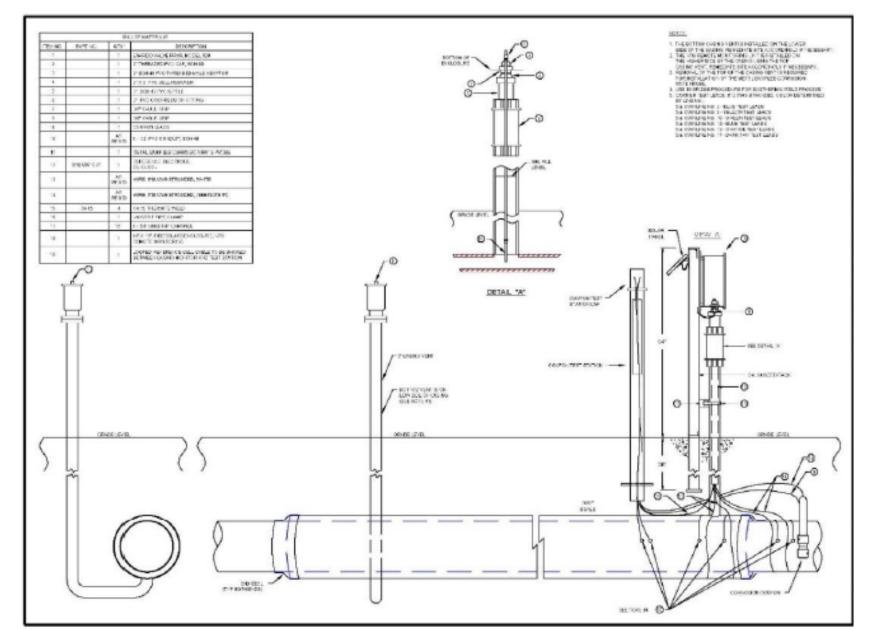
#### **Pipe Casing**



#### Installation of VCI solution



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#### Installation of VCI solution



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#### Installation of VCI solution



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 Enardo Series 900-SO vent valve is installed directly on the end of the vent line exhaust. Enardo's Series 900 has both pressure and vacuum relief capability.





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Thank you!

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