CORROSION
Best Practices to Prevent & Manage this Uninvited Guest

knowledge encouraged by:
600 munis in service after 100 years – 23 systems over 150 years old - WITHOUT corrosion protection
YEARS OLD

350
YEARS OLD
CORROSION

PROCESS
DANGER

- Resistivity
- Sulfides
- Chlorides
- Redox
- Bi-Metallic Connections
- Moisture Content
- Ground Water Influence
Only You!
Innovation Driven by Data
ANNEALING:

135 μm  143 μm  50 μm
BAKED-IN

PROTECTION
<table>
<thead>
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<th>PIPE CONDITION</th>
<th># of Specimens</th>
<th>Mean Deepest Pitting Rate (in/yr)</th>
<th>Yrs to Penetration</th>
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<td>0.025</td>
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POLYETHYLENE ENCASEMENT
Dissolved Oxygen Level

Time (day)

Dissolved Oxygen (mg/L)

- Asphalthic DIP
- Annealing Oxide DIP
- Bare DIP

AWWA ACE 08 Proceedings- “Investigations of Corrosion Mechanisms and Control for Polyethylene Encased DIP”
PROBES IN SOIL VERSUS POLY ENCASEMENT

Corrosion Rate (mpy)

Time (days)

- RC1, soil
- RC4, soil
- RC5, P1 btm
- RC6, P1 top

Both Probes in Soil Depleted < 300 Days
POLYETHYLENE ENCASED

CATHODICALLY PROTECTED
**Outer Layer:** Linear Low Density Polyethylene (LLDPE) - Light color for UV resistance

**Intermediate Layer:** Thick, impermeable middle layer for toughness and enhancement of inner biocide layer

**Inner Layer:** LLDPE Enhanced with a Corrosion Inhibitor and a Biocide to Address Anaerobic Bacteria Associated with MIC, Microbiologically Influenced Corrosion.

**Advanced Active Corrosion Control Technology begins where Conventional Passive Polywrap Systems End**
V-Bio: Polyethylene Encasement with Benefits
V-Bio: Polyethylene Encasement with Benefits
SCHIFF & ASSOCIATES POLYETHYLENE ENCASEMENT STUDY
DISSOLVED OXYGEN LEVEL UNDER WRAP

Dissolved Oxygen Level

- Asphalitic DIP
- Annealing Oxide DIP
- Bare DIP

Dissolved Oxygen (mg/L) vs. Time (day)
POLY IS GOOD

V-BIO = WAY BETTER
Zinc coating healing itself, with Zn$^{+2}$ ions indicated.
MADE FOR
EACH OTHER
EVERGLADES, FL

PROBES IN SOIL vs.
PROBES UNDER ZINC PIPE WITH V-BIO™
(damaged and undamaged)
CATHODIC PROTECTION

POWER SOURCE

+ -

STRUCTURE (CATHODE)

MAGNESIUM ANODE

Structure

Anode
1. The oldest iron pipe still in existence is over 350 years old. True or False?

a. True
b. False
2. Zinc coating technology has been around for many years and has been the coating of choice in Europe. True or False?

   a. True
   b. False
3. Polyethylene protects pipe by keeping the pipe completely dry. True or False?

a. True
b. False
QUIZ QUESTIONS

4. Which of the following is a consideration when deciding how to protect your infrastructure?

a. Likelihood of Failure
b. Consequence of Failure
c. Cost
d. Operation and Maintenance
e. All of the above
5. You should always use Polyethylene with Zinc Coating. True or False?

a. False
b. True