

Interrupted Potential Surveys for Corrosion Control

***Interstate Natural Gas Association of America
Hill Event
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Interrupted Potential Survey

What is an Interrupted survey for corrosion control compliance?

What options do we have to comply pipeline safety requirements for considering IR?

How else can interrupted surveys benefit the pipeline?

Some Fundamentals

Criteria for Testing

The Interrupted Survey



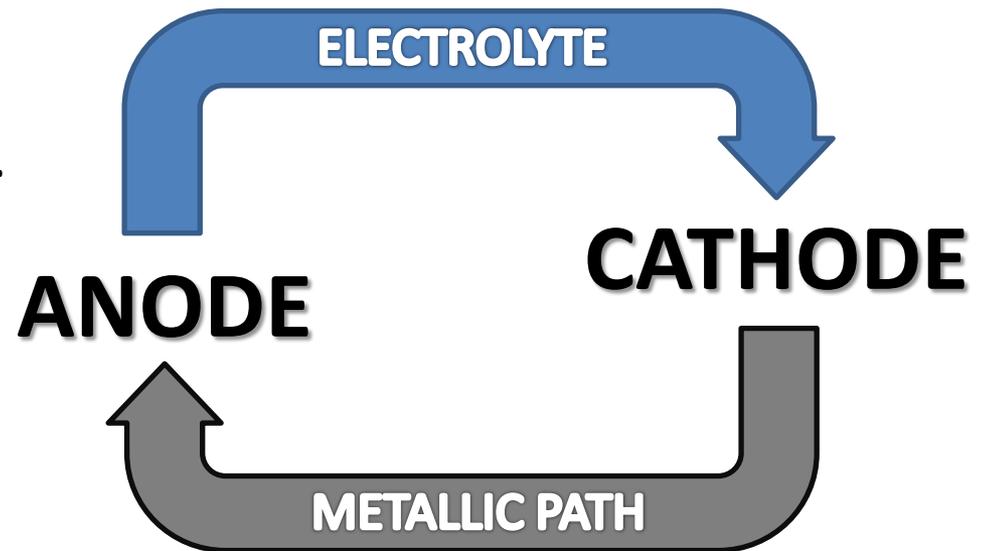
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Some Fundamentals

Corrosion – Degradation of a material through interaction with the surrounding environment.

ANODES corrode
which
protect **CATHODES**

Corrosion control happens because of **Cathodic Polarization**



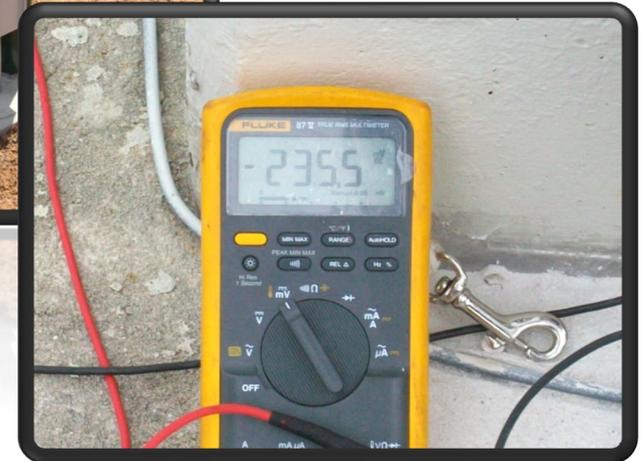
•What is Cathodic Polarization?

Ion film created by a potential gradient across the pipe-soil interface

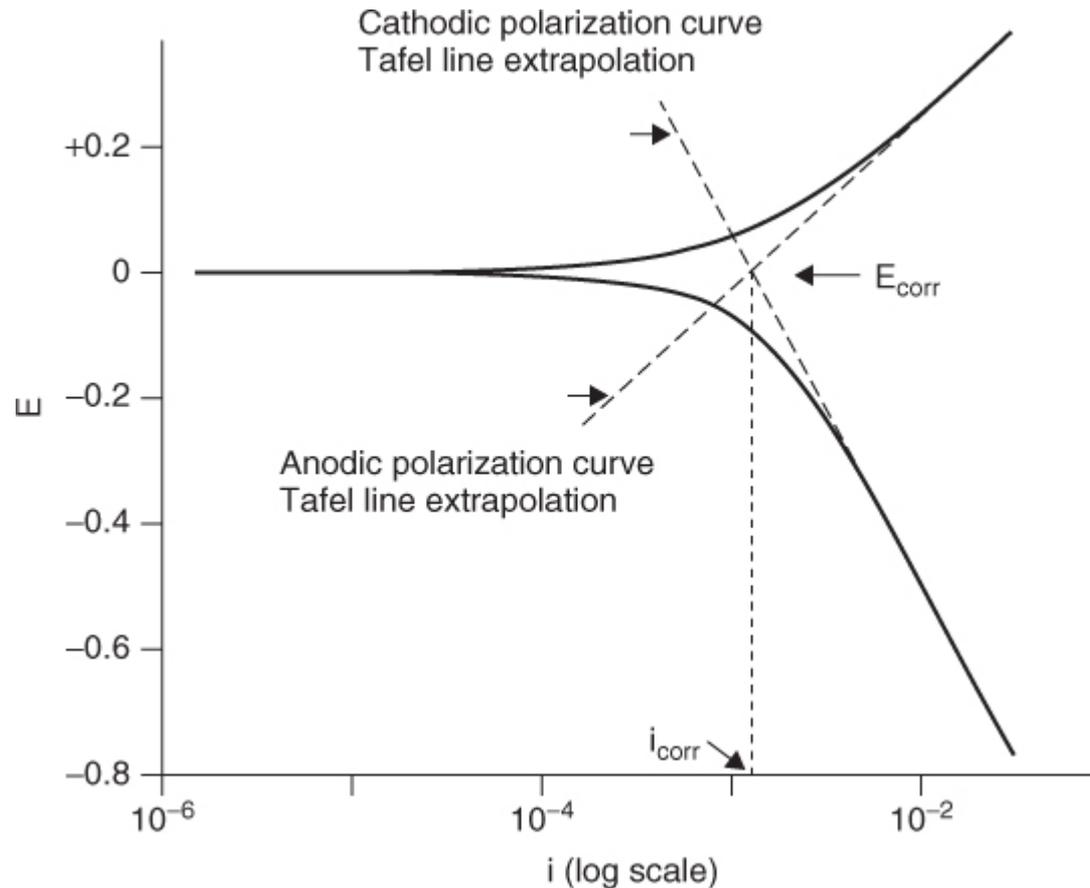
Cathode - Site of the reduction reaction

Anode - Site of the oxidation reaction

Both Cathodic and Anodic polarization exist



•Representation of Polarization



Source: <https://download.e-bookshelf.de/download/0000/6829/73/L-X-0000682973-0001487876.XHTML/index.xhtml>

• Measuring Polarization – The IR Error

- Energized potential measurements have Error
- Soil and Water have Resistance to electrical current flow
- Error must be **“Considered”**



•You're all talk

- A few terms:
 - Instant-Off
 - IR-Free Potential
 - Polarized Potential
 - Interrupted potential

 - On Potential
 - Energized Potential



AMPP Criteria for Testing

**Formerly National
Association of Corrosion
Engineers**

**Standard Practice 0169
*Control of External Corrosion on
Underground or
Submerged Metallic Piping Systems***

**Responsible for Writing
Standards for Corrosion
Control**



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• Acceptable Criteria – On Potential

Section 6.2.2.1.1 - A negative (cathodic) potential of at least 850 mV with the CP applied.....

.....Voltage drops other than those across the structure-to-electrolyte boundary must be considered for valid interpretation of this voltage measurement.

• Acceptable Criteria – Interrupted Potentials

Section 6.2.2.1.2 - A negative polarized potential of at least 850 mV relative to a saturated copper/copper sulfate reference electrode.

Section 6.2.2.1.3 - A minimum of 100 mV of cathodic polarization between the structure surface and a stable reference electrode contacting the electrolyte. The formation or decay of polarization can be measured to satisfy this criterion.

Interrupted Survey

The Most Accurate Method:

- Cyclical Interruption of All Direct Current Sources

How is this possible on a system with unknown or uninterruptable sources?



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•Problem Solving with IR Corrections

Energized Pipe-to-Soil Potential:

-1030 millivolts versus copper sulfate reference

Did we meet the criterion?

What do you expect to find with interruption?

The Interrupted Survey



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• Problem Solving with IR Corrections

- Find locations that have eluded effective corrosion control
- Identify Shorted Pipe
- Discover why a segment tends to leak frequently

Undiscovered problems are found every time an initial interrupted survey is conducted

The Interrupted Survey



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•The Value of On-Off Surveys

Have the
Right Answer
when demonstrating
corrosion control
program effectiveness

The knowledge you are
doing everything you can
to ensure

Public Safety

The Interrupted Survey



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Questions

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