

RECLAMATION

Managing Water in the West

Coating Inspection by Electrochemical Impedance Spectroscopy (EIS)

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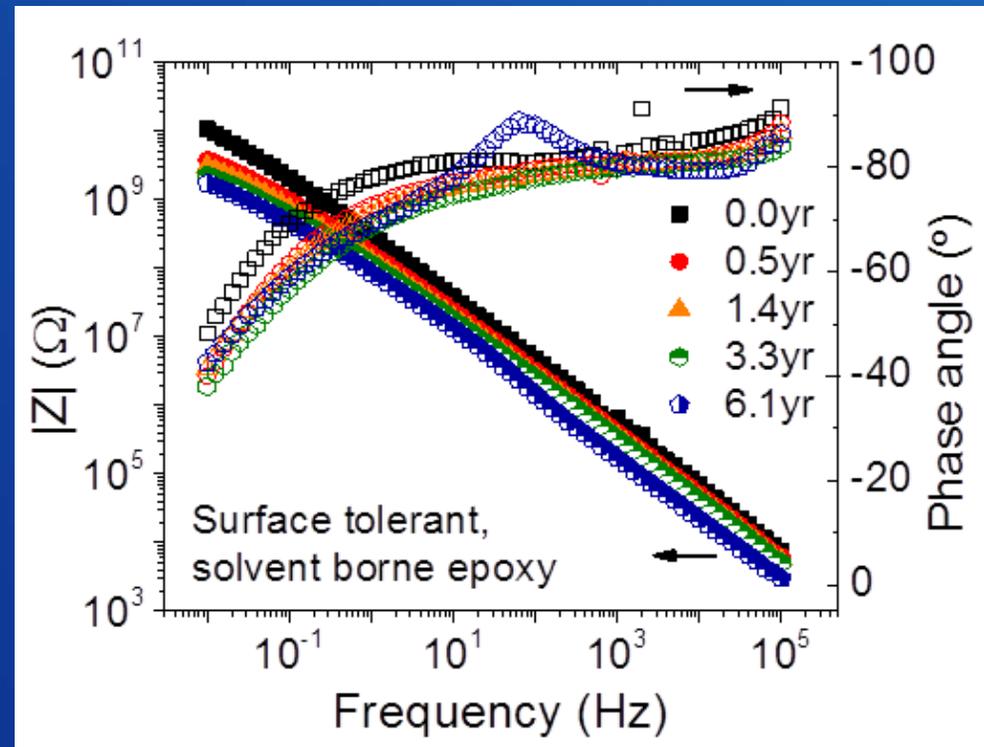


U.S. Department of the Interior
Bureau of Reclamation

Corrosion Resistance

Electrochemical Impedance Spectroscopy (EIS)

- Measures electrical properties of defect-free film
- Coating degradation measured vs. time (life prediction)



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Field EIS Inspection

- **Visual inspection strengths:**
 - Assess general coating condition
 - Identify unique wear patterns or problem areas
 - Estimate damage areas for repair (visible rust or defects)
- **Non-destructive measurement strengths:**
 - Assess coating health for areas with no visible damage
 - Estimate remaining service & apply to maintenance planning



Laptop and mobile potentiostat



EIS field test cell

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Field EIS Inspection

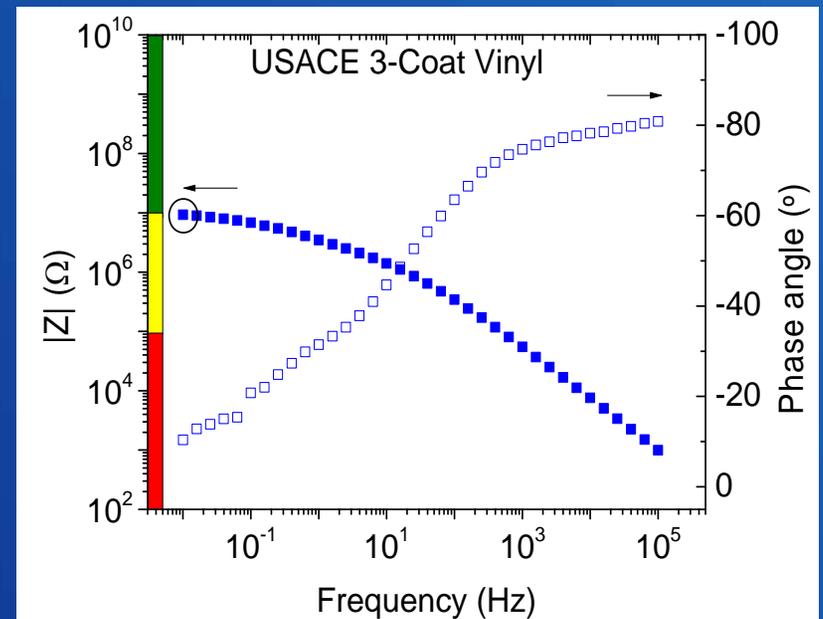
- 1st demo May 2014
- Examining measurement feasibility on common paints / coatings



EIS on gate arm



USACE lock and dam – EIS on gate arm



EIS data: traffic light analogy indicates need for recoating. Use $|Z|$ at 0.01 Hz.

Merten, B., et al., "Methodology for coated infrastructure inspection by mobile potentiostat," SSPC 2015.

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Vinyl paint – lab data

Used by Reclamation, all service conditions 1960 – 90's

- Very high solvent content, ~70%
- Now restricted by VOC regulations

Minimal changes to $|Z|$, θ

Excellent barrier coating

