

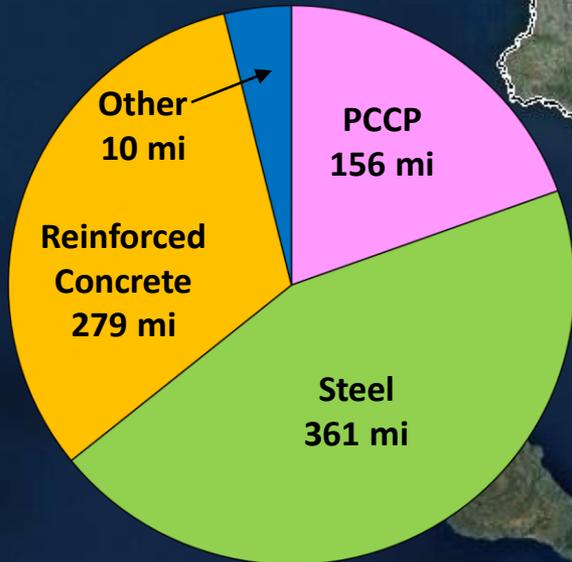


Large-Diameter Pipeline Cathodic Protection at the Metropolitan Water District of Southern California

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MWD Distribution System Pipelines

Pipeline Types



MWD Cathodically Protected Pipelines

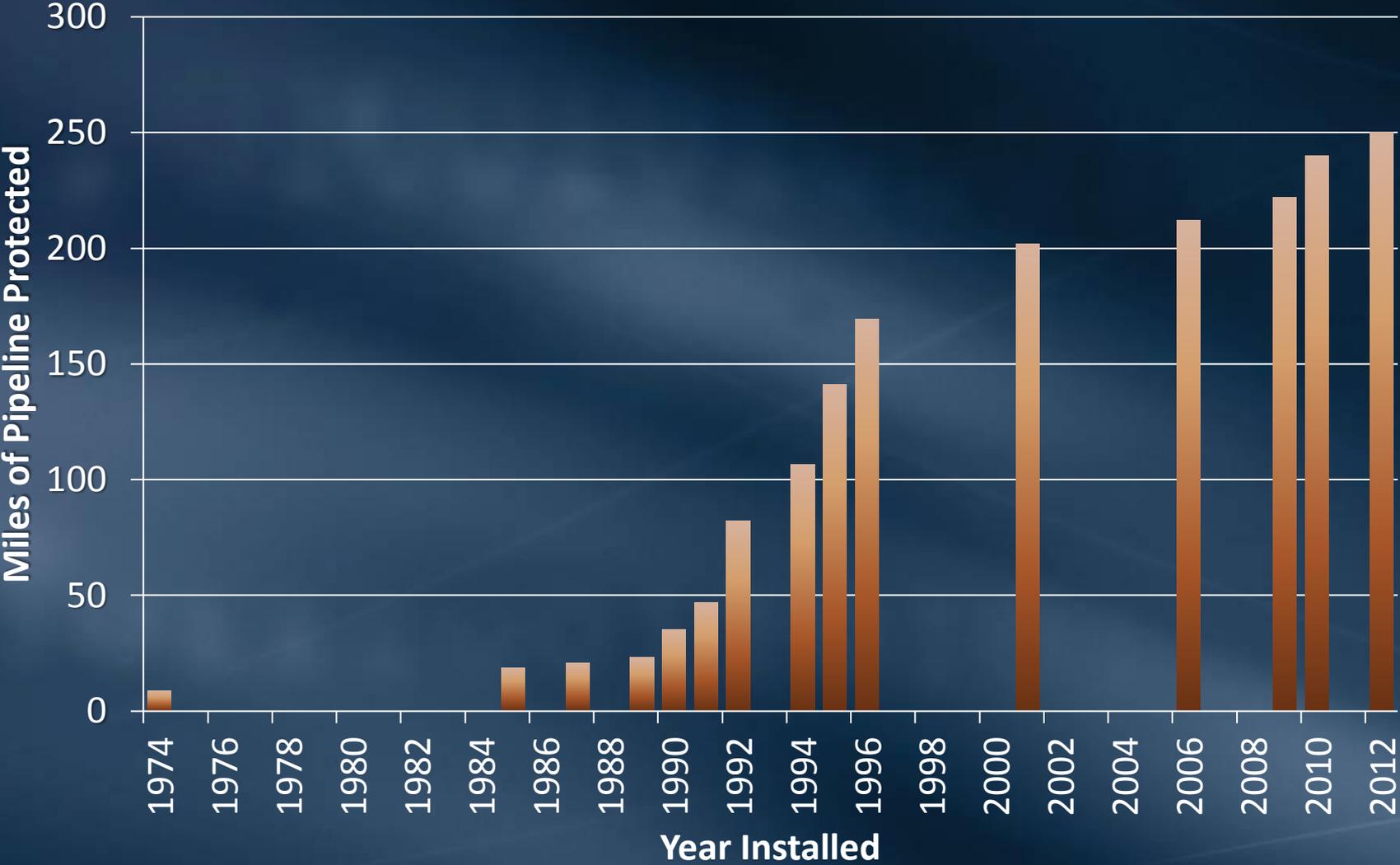
We protect

- Electrically-continuous steel pipelines
- Both dielectrically-coated and mortar-coated

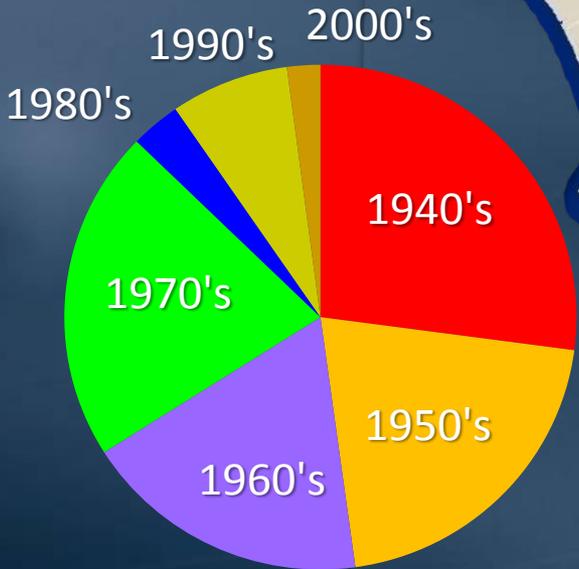
We typically don't protect

- Prestressed concrete cylinder pipe
- Non-electrically-continuous pipelines

Pipeline Cathodic Protection History

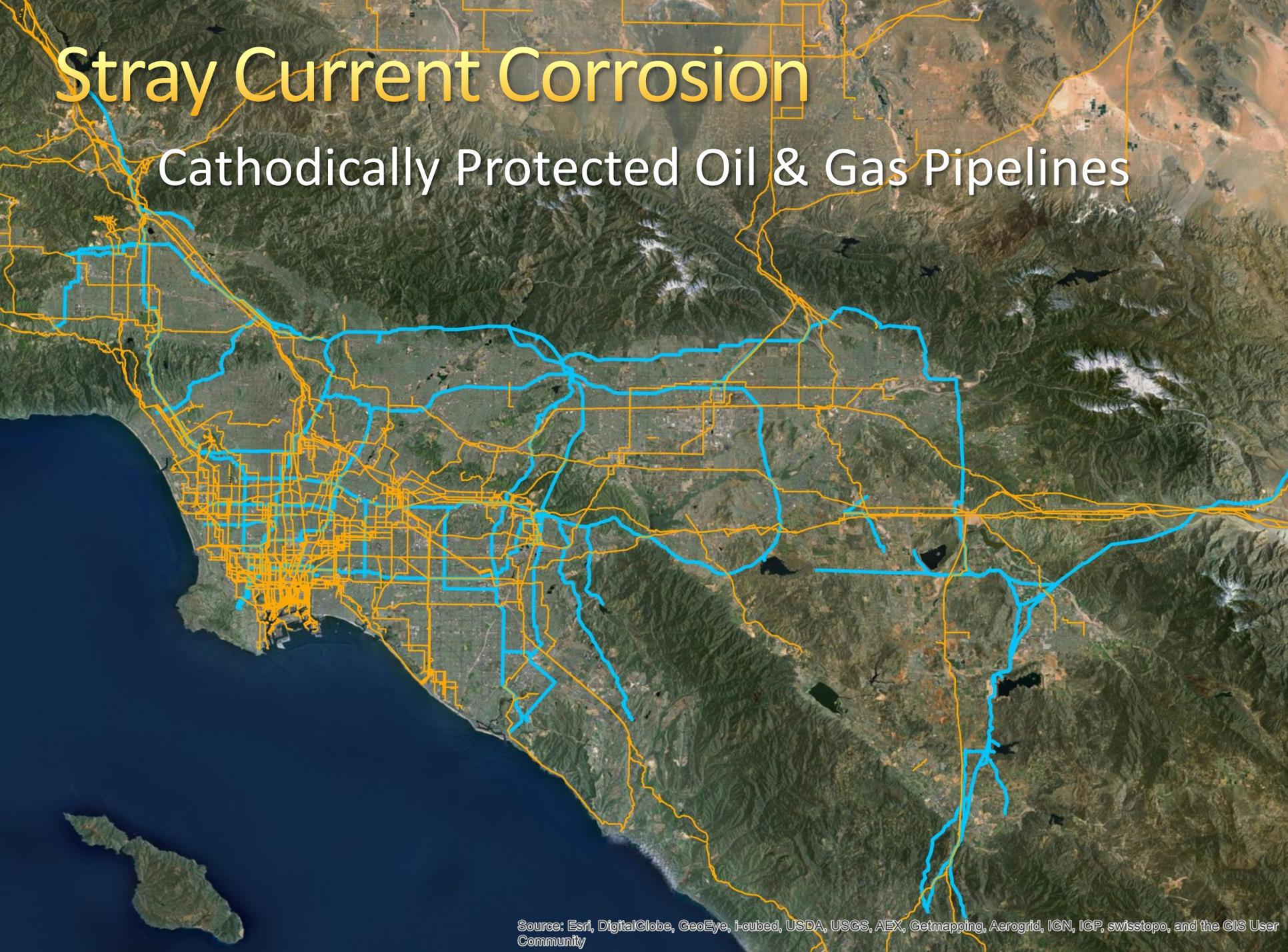


MWD Distribution System Age



Stray Current Corrosion

Cathodically Protected Oil & Gas Pipelines



MWD CP Rectifier Locations

- 250 miles of pipelines
- 102 ICCP rectifiers
- Only electrically-continuous pipelines
- Coatings: 37% dielectric/63% mortar

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

CP of Dielectrically-coated Pipelines

Cathodic protection current flows to coating holidays to protect steel

0.012 mA/ft²



Dielectric coating

Steel pipe

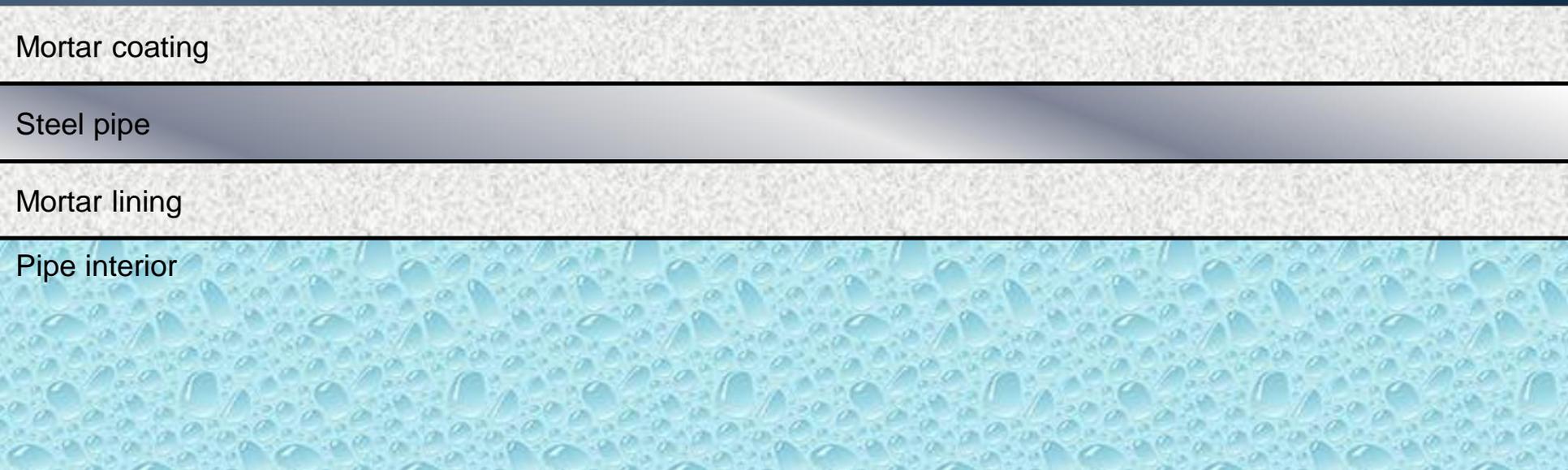
Mortar lining

Pipe interior

CP of Mortar-coated Pipelines

Cathodic protection current flows to entire steel surface to support protective properties of mortar

0.076 mA/ft²



Mortar coating

Steel pipe

Mortar lining

Pipe interior

CP Effectiveness Indicators

- No known corrosion-induced leaks on protected MWD pipelines
- Calcareous formation on relocated pipeline segment

Pipeline Leak Example



Pipeline apparently struck during horizontal boring to install conduits

Pipeline Leak Example



Cathodic protection would likely have prevented this leak

Free Cathodic Protection Advice

- Be opportunistic
 - Install sacrificial anodes at repair sites
 - Consider “shorting” insulating joints to tie-in unprotected pipe reaches

Free Cathodic Protection Advice

- Be opportunistic
- Don't spec rectifier size until after anode wells are completed

Free Cathodic Protection Advice

- Be opportunistic
- Don't spec rectifier size until after anode wells are completed
- Be a good neighbor
 - Develop relationships with pertinent oil & gas pipeline operators
 - Minimize stray current

