

Preserving Large Diameter Pipes with Cathodic Protection

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Cathodic Protection is not new to the water industry

- » Overview of Water Research Foundation Project #4618: Retrofit and Management of Metallic Pipe with Cathodic Protection: Guidance Document on Technical Feasibility and Economic Value
- » Overview and History of MWD-SC Cathodic Protection Program

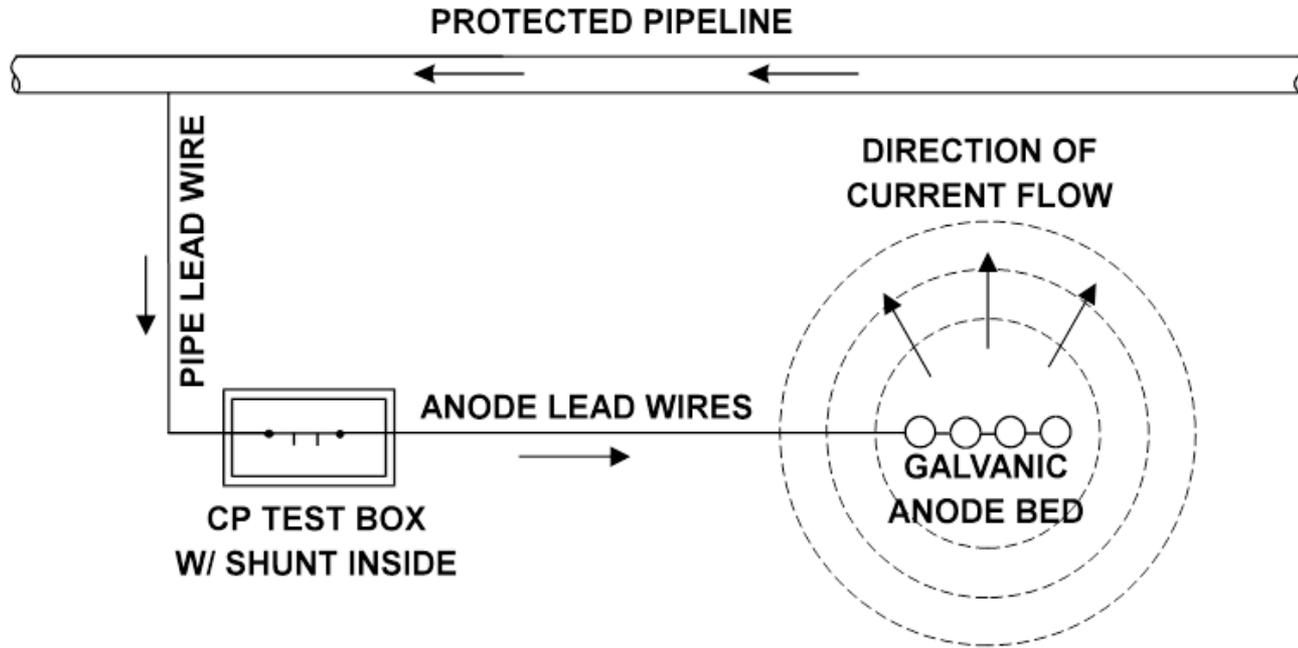


Corrosion can be mitigated by the effective application of Cathodic Protection

- » Cathodic protection is:
 - One of the 4 methods for controlling corrosion
 - an electrochemical method
 - Not black magic
 - Not new to water utility industry
- » Two basic types of Cathodic Protection
 - Galvanic
 - Impressed Current



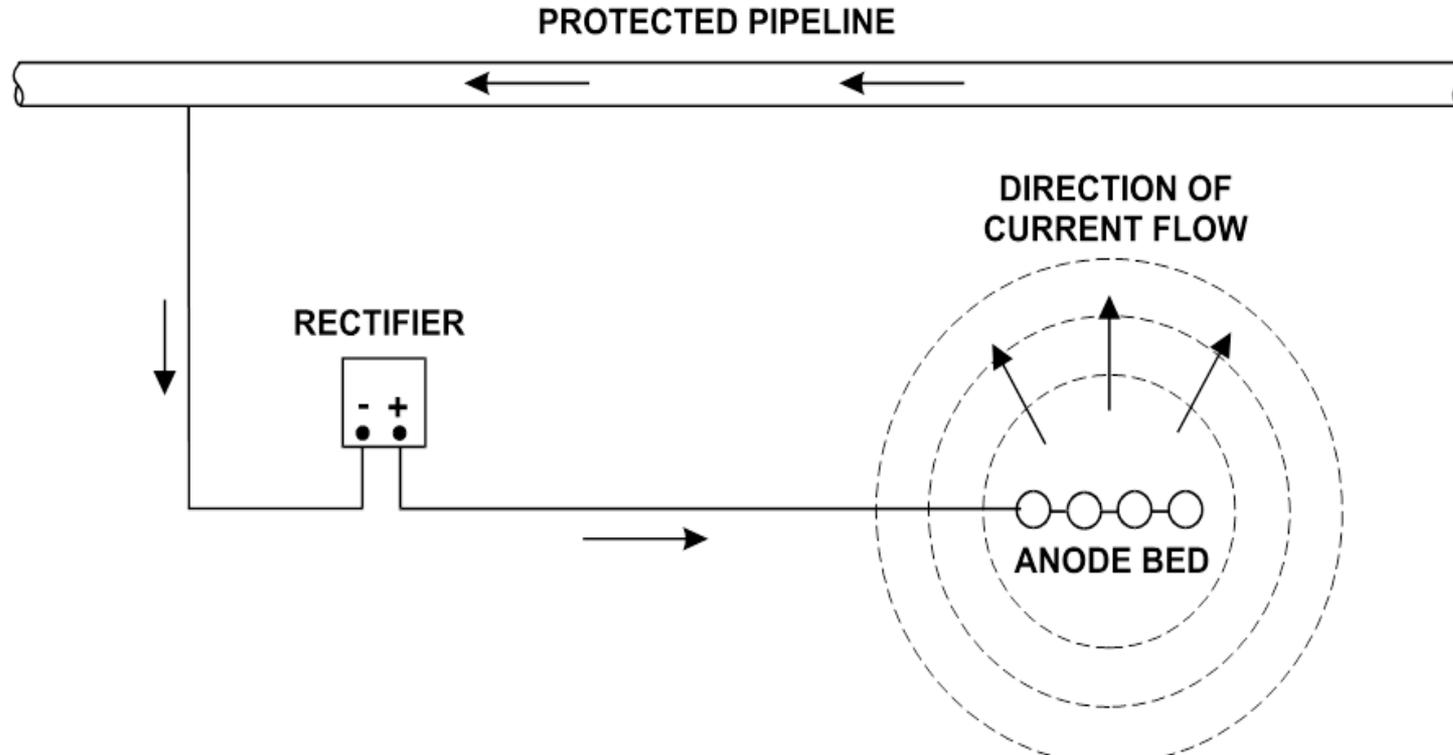
Galvanic Anode Cathodic Protection Systems are Simple



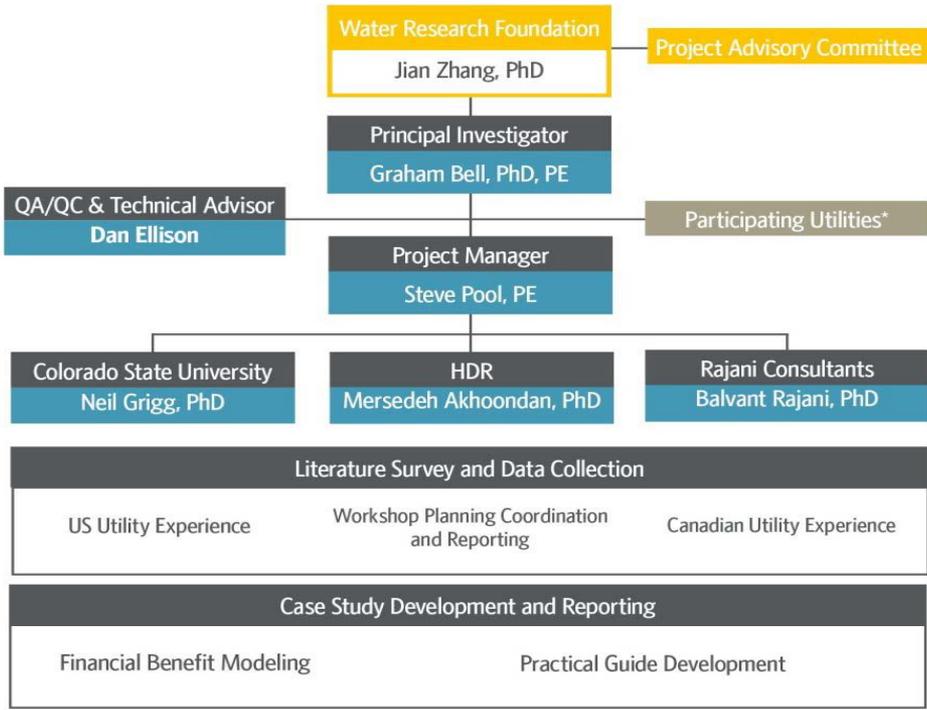
Galvanic Series determines which materials are suitable to be used for protection

METAL	VOLTS vs. Cu-CuSO ₄	VOLTS vs. Ag-AgCl
	Active or Anodic End	Active or Anodic End
Magnesium	-1.60 to -1.75	-1.55 to -1.70
Zinc	-1.10	-1.05
Aluminum	-1.05	-1.00
Clean Carbon Steel	-0.50 to -0.80	-0.45 to -0.75
Rusted Carbon Steel	-0.20 to -0.50	-0.25 to -0.45
Cast/Ductile Iron	-0.50	-0.45
Lead	-0.50	-0.45
Steel in Concrete	-0.20	-0.15
Copper	-0.20	-0.15
High Silicon Iron	-0.20	-0.15
Carbon, Graphite	+0.30	+0.35
	Noble or Cathodic End	Noble or Cathodic End

Impressed Current Cathodic Protection Systems are a little more complicated



{ Dale Claassen, LVVWD
 Andrew Hughes, City of Calgary
 Jeff An, City of North Miami Beach



***Retrofit and Management of
 Metallic Pipe with Cathodic
 Protection: Guidance Document
 on Technical Feasibility and
 Economic Value (RFP 4618)***

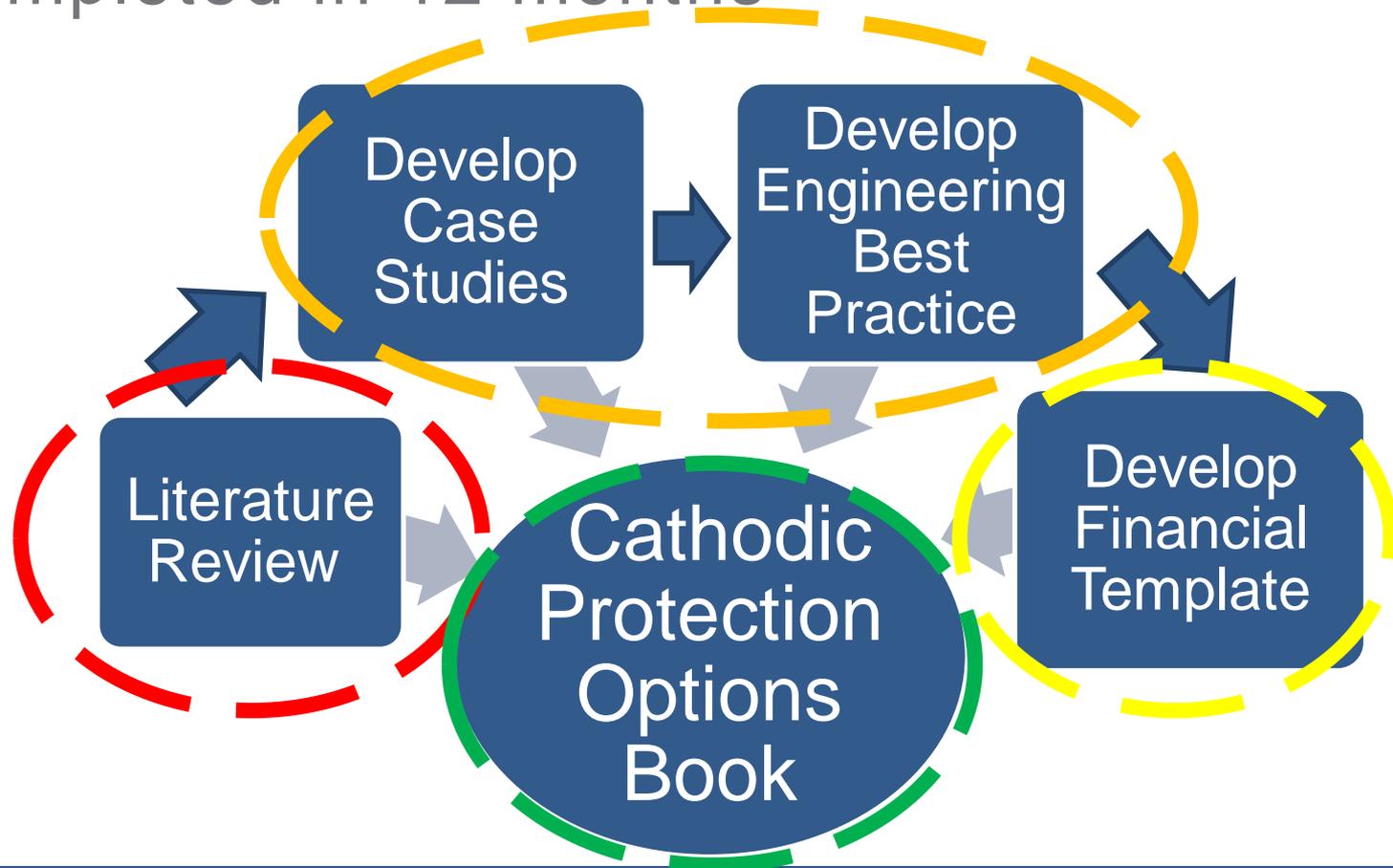
Project Objective

This project will investigate **technical and economic considerations** to retrofit buried metallic pipelines with cathodic protection (CP) for the drinking water industry. It will also study troubleshooting, management and value analysis of existing CP systems.

***Participating Utilities**

- Anchorage Water and Wastewater Utility
- Arizona Water Company
- Dallas Water Utilities
- Des Moines Water Works
- HDR Engineering, Inc.
- Houston Public Works
- Louisville Water Company
- MESA Products
- Milwaukee Water Works
- Monroe County Water Authority
- NACE International
- Onondaga County Water Authority (OCWA)
- Portland Water Bureau
- Pure Technologies, Ltd.
- San Diego County Water Authority
- San Francisco Water Power Sewer
- Washington Suburban Sanitary Commission
- Water One

The Four Major Tasks will be completed in 12 months



Cathodic Protection has been used to preserve large diameter pipe since 1937

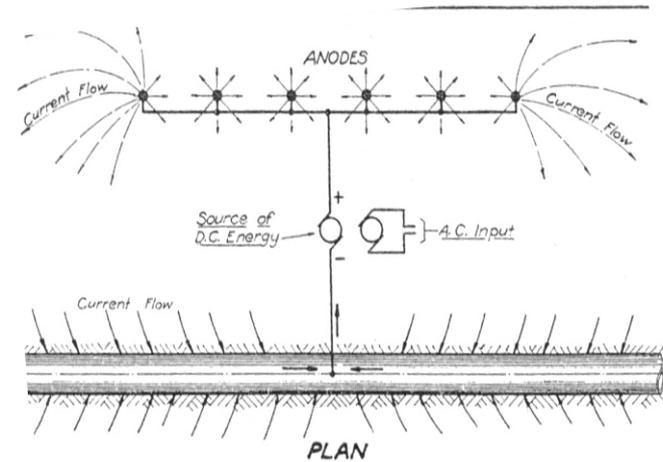
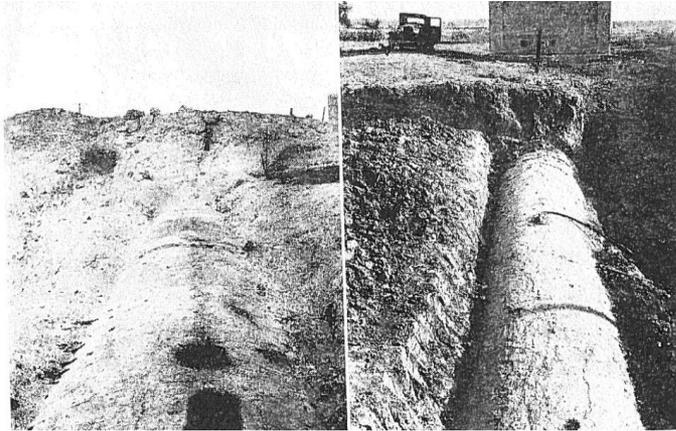
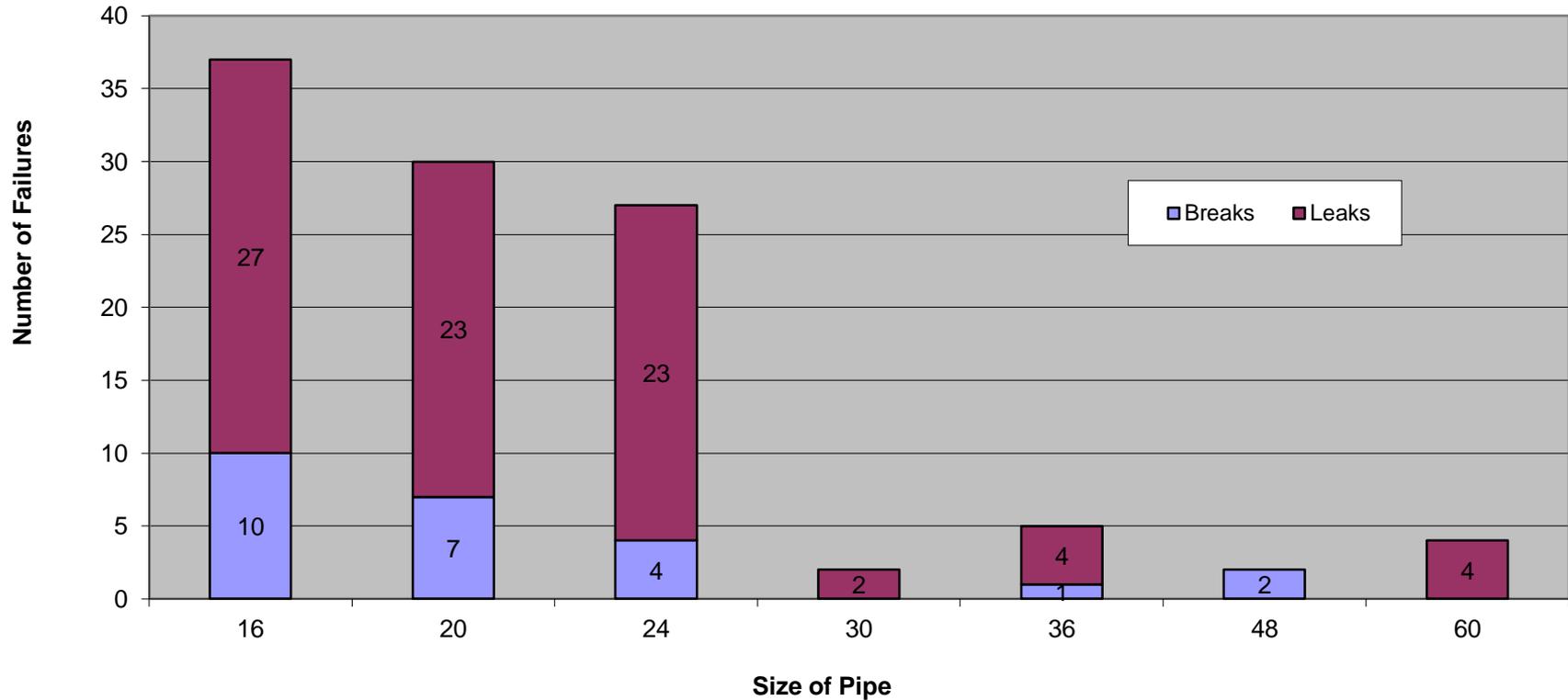


Figure 1. General Arrangement Of Cathodic Station.

“The time may come when cathodic protection will not be regarded as some sort of last refuge to be sought after others have failed. It is the only form of protection that controls the elements of corrosion and may eventually be a competitive rival of various coatings. There is much yet to be learned concerning its application and ample opportunity for the development of equipment, particularly a stable grounding material. The cost of replacement of anodes is a large factor in the maintenance costs. It is believed that annual power and maintenance costs can be reduced.” – H.K. Knudsen, J.AWWA, 1937

2004 Water RF 2608 Louisville Water Company: 77% of “break” (leaks) may be preventable with CP



2004 Water RF Project 4608 Louisville Water Company



Cathodic Protection stops main breaks

Results of Cathodic Protection in De Mel Avenue Area
2004 CP Project

