

*WebCorr Corrosion Consulting Services Presents*

## Cathodic Protection of Underground Pipelines

Date: As published on website Venue: As published on website

### Course Overview

Maintaining the ageing infrastructure such as underground pipelines is a challenge to facility owners worldwide. Understanding why and how cathodic protection works or fails can help the operator formulate appropriate strategy in managing the pipeline corrosion problems.

This 5-day course covers both the fundamentals and practices in designing, operating and maintaining cathodic protection of underground pipelines. An overview of the NACE standard on "Pipeline External Corrosion Direct Assessment Methodology" will also be presented.

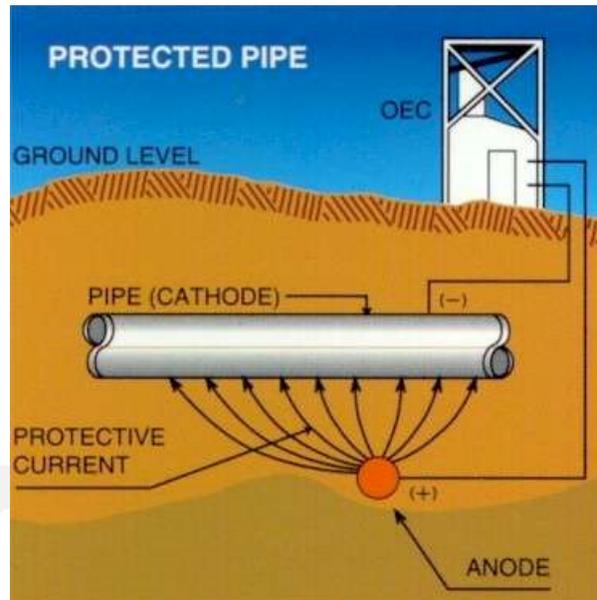
This course is available for in-house training, online and distance learning worldwide. It can also be customized to meet the specific needs of your organization.

### Who Should Attend

- Engineers and technologists who are in charge of underground pipeline cathodic protection systems;
- Designers who are interested in cathodic protection technology for corrosion prevention;
- Technicians and maintenance personnel who deal with installed cathodic protection systems;
- Facility owners and users who are concerned with corrosion

### Course Outline

- 1 Primer on Chemistry and Metallurgy
- 2 Fundamentals of corrosion
  - 2.1 Why do metals corrode
  - 2.2 How do metals corrode
  - 2.3 Corrosion in the underground environment
  - 2.4 General methods of corrosion control & prevention
- 3 Cathodic Protection
  - 3.1 Introduction
    - 3.1.1 How it works



- 3.1.2 Why it works
- 3.1.3 How effective it is
- 3.2 Sacrificial Anode Cathodic Protection
  - 3.2.1 Anode materials
  - 3.2.2 Anode design
- 3.3 Impressed Current Cathodic Protection
  - 3.3.1 Consumable ICCP Anodes
  - 3.3.2 Permanent ICCP Anodes
  - 3.3.3 Power Sources
  - 3.3.4 Cables and Connections
- 3.4 Criteria for Cathodic Protection
- 4 Instrumentation for CP Underground Pipelines
  - 4.1 Reference potential devices
  - 4.2 Potential measuring instrument
  - 4.3 Soil resistivity test instruments
  - 4.4 Wall thickness and pit gages
  - 4.5 Current interrupters
  - 4.6 Test rectifiers
  - 4.7 Holiday detectors
- 5 Cathodic Protection of Underground Pipelines
  - 5.1 CP Design Fundamentals
  - 5.2 Current Requirement Estimating Methods
  - 5.3 Calculation of CP Circuit Resistance
  - 5.4 Calculating System Capacity and Life

## Course Outline

- 5.5 The 10-Step Guides to the Design of Galvanic Anode CP System
- 5.6 The 10-Step Guide to the Design of ICCP System

### 6 Stray Current Corrosion and Methods of Prevention

- 6.1 Sources of Stray Current
- 6.2 Detecting Stray Current
- 6.3 Effects of Stray Current on Metallic Structures
- 6.4 Mitigation of Interference Effects from Impressed Current Cathodic Protection Systems
- 6.5 Other Sources of DC Stray Current

### 7 Pipeline Coatings

- 7.1 Desirable characteristics of pipeline coatings
- 7.2 Type of pipeline coatings
- 7.3 Pipeline coatings selection
- 7.4 Specification and inspection
- 7.5 Coating failures and analysis

### 8 Field Joint Coatings

- 8.1 Pipeline Field Joint Coatings
- 8.2 Factory-Applied vs. Field-Applied
- 8.3 Pipeline Coatings Types
- 8.4 Field Joint Coatings
  - 8.4.1 FJC Types
  - 8.4.2 FJC Performance
  - 8.4.3 FJC Selection
  - 8.4.4 FJC Application Procedures
  - 8.4.5 FJC Application examples



### 9 Cathodic Protection and Coatings

### 10 Pipeline Inspection: Survey Methods and Evaluation Techniques

- 10.1 Survey methods for pipeline not under cathodic protection
- 10.2 Survey methods for pipeline under cathodic protection
- 10.3 Overview of NACE Standard on “Pipeline External Corrosion Direct Assessment Methodology”
- 10.4 Long range ultrasonic testing (LRUT) technique for pipeline integrity survey
  - 10.4.1 Definition: What is LRUT
  - 10.4.2 Conventional UT vs. LRUT
  - 10.4.3 How LRUT works
  - 10.4.4 Advantages and limitations of LRUT
  - 10.4.5 Application examples
- 10.5 Emerging technology for cathodic protection current measurement from inside the pipeline
  - 10.5.1 Introduction to CPCM technology
  - 10.5.2 Conventional CP current measurement methods vs. CPCM
  - 10.5.3 How CPCM works
  - 10.5.4 Advantages and limitations of CPCM
  - 10.5.5 Application examples

### 11 End-of-Course-Examination



### Course Registration

Please register online at [www.corrosionclinic.com](http://www.corrosionclinic.com)  
Or use the form below (photocopies of this form may be used for multiple bookings).

Dr/Mr/Ms \_\_\_\_\_

Organization \_\_\_\_\_

Contact Person \_\_\_\_\_

Contact Dept \_\_\_\_\_

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

Email \_\_\_\_\_

Payment should be made by TT or online banking. Currencies in Australian Dollar, Canadian Dollar, US Dollar, Euro and Sterling Pound can be transferred directly without conversion. Our bank details can be found at the link below:

<https://www.corrosionclinic.com/payment.html>

### Course Fee and Discount

**Standard:** \$3,500      **Discount:** \$3,150

The fee includes a hardcopy of course note, certificate, light lunch, coffee breaks each day during the course.

Discount applies to a group of 3 or more persons from the same organization registering at the same time, or early-birds making payment at least 8 weeks before the course commencing date.

#### Cancellation and Refunds

Cancellation or replacement should be conveyed to WebCorr in writing (email or fax). An administration charge of 50% of the course fee will be levied if the cancellation notice is received from 14 to 7 days before the course commencing date. No refund will be made for cancellation notice received 6 days and less. No refunds will be given for no-shows. Should WebCorr find it necessary to cancel a course, paid registrants will receive full refund. Refund of fees is the full extent of WebCorr's liability in these circumstances.



WebCorr has NACE certified Corrosion Specialist (#5047) providing customized in-house training, online and distance learning corrosion courses, corrosion seminars and workshops on corrosion, materials, metallurgy, paints and metallic coatings. Our corrosion courses are developed and taught by NACE certified Corrosion Specialist with over 30 years of practical experience in the field. Our training success is measured by your learning outcome.

