



Corrosion Control In The Oil & Gas Industry



Introduction:

Corrosion problems have always presented a severe challenge to oil and gas producing operations. Operators plan for long periods of continuous production with maintenance scheduled for the prescribed shutdown periods. Unfortunately, corrosion does not always respect these schedules, resulting in severe economic penalties due to loss of product. In addition, the risk of pollution and hazards to safety are other important reasons for adequate corrosion engineering. Moreover; corrosion hazards have intensified with extraction in deeper waters and in more hostile environments. Innovations aimed at reducing offshore field development costs involving reductions in platform weight, increasing use of satellite wells and subsea manifolds require specific attention to corrosion prevention. This course conforms to **NACE** standards.

Who Should Attend?

Corrosion Control Engineers & Personnel, Process Engineers, Metallurgists, Inspection Personnel, Mechanical Engineers, Material Selection Personnel, Plant Contractors, Operations Engineers, Team Leaders & Supervisors, Maintenance

Supervisors, Senior Plant Supervisors, Mechanical Engineers, Corrosion Control & Monitoring Systems Personnel, Oil and Gas Production Facilities Personnel, Chemists, Chemical Engineers, Technicians and Supervisors, New Petroleum Engineers, Asset Management Personnel, Design & Construction Engineers, Team Leaders & Coordinators, Construction Coordinators, Maintenance Engineers, Technologists, Maintenance Team Leaders & Engineers, Personnel who are / will be responsible for detecting, inspecting, monitoring, controlling corrosion in oil and gas piping, pipelines used in production operations and Personnel responsible for metallurgy, corrosion or the prevention of failures in plant and equipment

Course Objectives:

By the end of this course delegates will be able to:

- Identify potential corrosion problems and communicate effectively with other corrosion professionals
- Know the causes of corrosion and the methods by which it can be identified, monitored and controlled
- Learn components and operating characteristics of galvanic and impressed current systems
- Understand the factors to evaluate Cathodic protection system performance, interpretation of data and common measurement errors
- Correctly write a coating and lining system specification with enough confidence and certainty avoid the pitfalls and traps that cause coating failures
- How to reduce corrosion costs by developing designs that include corrosion control
- How to utilize API 570 "Piping Inspection Code," API 574 "Inspection Practices for Piping System Components", NACE MR0175 and MR0103
- How to inspect piping while "in-service", "out of service" and underground piping

Course Outline:

Corrosion Basics

- Corrosion Principles, The Corrosion Cell, General Area Corrosion, Pitting

- Bimetallic Corrosion, Erosion (API RP 14E) and Sand Corrosion
- Effects of Flow Regime and Velocity Considerations, Cavitation
- Sulfide Stress Cracking, Wet H₂S Corrosion, Fatigue
- Methods of Prevention, Corrosion Rate Prediction

Dissolved Gas Removal for Corrosion Control

- Prevent Oxygen Entry into the System
- Dissolved Oxygen Removal, Dissolved Gas Removal

Corrosion Inhibitors

- Theories, Physical Characteristics, Selection
- Evaluation of Inhibitor Performance, Application in Production Operations

Metallurgy & Materials Selection for Oil and Gas Facilities

- Characteristics of Metals, Nature of Steel, Heat Treatment of Steels
- Ferrous and Nonferrous Alloys, Industry Standards and Specifications, Materials Selection

Introduction to Cathodic Protection

- Basic Principles, Criteria, Sources of Direct Current, Role of Coatings
- Survey Methods, Application to Oil and Gas Production Facilities, Interference

Coatings, Linings and Non-Metallic's

- Types of Coatings, Classification and Coating Selection
- Selection of Coating Applications, Selection of Items for Coating
- Use of Coatings in Oil and Gas Production Operations, Selection and Use of Non-metallic's

Corrosion Monitoring

- Corroding Specimens, Electrical and Electrochemical Methods (Resistance, Polarization, Galvanic and Hydrogen, Probes), Chemical Methods (Iron Counts, Corrosion Product Analysis)
- Inspection Tools, Records and Failure Reports, Wall Thickness Calculations, Pipeline Risk Assessment

Microbiologically Influenced Corrosion

- Basic Principles and Terminology, Sampling Techniques, Culturing, Identifying and Counting Bacteria
- System Clean-up and Sterilization, Bacterial Control Chemicals

Inspection Practices

- Preparatory Work, Modes of Deterioration and Failure, Corrosion Rate Determination
- Maximum Allowable Working Pressure, Defect Inspections
- Inspection of Parts, Corrosion and Minimum Thickness Evaluation

Review of API 570-Piping Inspection Code (Inspection, Repair, Alteration and, Re-rating of In-service Piping Systems)

- Scope of API 570, Repairs, Alterations and, Re-rating of Piping Systems
- Inspection of Buried Piping, Examples of Repairs

API 574: Inspection Practices for Piping System Components

NACE MR0175: Sulphide Stress Cracking Resistant Metallic Materials for Oilfield Equipment

NACE MR0103: Materials Resistant to Sulphide Stress Cracking in Corrosive Petroleum Refining