Best Technology Solutions (BTS)

An Overview on Corrosion Control in Oil, Gas & Water- Training program

Introduction:

The production of gas and oil is often accompanied by water, either from the formation, from condensation, or from water injected as lift assist. Acid gases, such as hydrogen sulfide (H2S) and carbon dioxide (CO2) are often present in produced fluids, and oxygen is sometimes a contaminant in the water used for injection. These acid gases increase the corrosivity of the waters to steel, and can significantly impact the safe operating life of production tubular and equipment, production vessels, and transportation systems. The presence or absence of multiple phases (gas, water, and oil or condensate) in the same system can complicate the problem of controlling corrosion. Internal corrosion in a tubing string, vessel, or pipeline can have a significant impact on corrosivity and is influenced by conditions such as temperature, the flow regime or pattern of fluids, water wetting and composition and surface condition of the steel in a tubing string, vessel, or pipeline can have a significant impact on corrosivity.

The potential consequences of internal pipeline corrosion represent both safety and economic concerns to various sectors of the industry. Mitigating corrosion is critical as the initiation corrosion cells can negatively affect the integrity of the pipeline in service. Additionally, the buildup of corrosion and bacterial by-products on the pipe walls can cause problems at later stages of a pipeline's operation life including under-deposit corrosion and contamination of fluids passing through the pipe. The pipeline costs are a considerable part of the investment in the petro chemical industry, and for long-distance, large-diameter pipelines, they can become prohibitively high if the corrosivity of the fluid

necessitates the use of corrosion-resistant alloys instead of carbon steel. Better understanding and control of the corrosion of carbon steel can increase its application range and therefore have a large economic impact. Corrosion occurs in various forms, such as pitting corrosion from water droplets, embrittlement from hydrogen, and stress corrosion cracking from sulfide attack. Corrosion is fought by a complex system of monitoring, preventative repairs and careful use of materials. This course provides an overview of refinery process units and specific process descriptions, and focuses on the examination and identification of metallurgical problems that occurs in process units and methods of monitoring and damage reduction.

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 Engineers, Maintenance Supervisors, Senior Plant Supervisors, Mechanical Engineers, Corrosion Control & Monitoring Systems Personnel, Equipment Engineers, Maintenance Engineers and Planners, Team Leaders, Managers & Coordinators, Construction Coordinators, Technologists, Safety Officers, Maintenance Team Leaders & Engineers, Design Engineers, Service Company Representatives, Oil and Gas Production Facilities Personnel, Chemists, Chemical Engineers, Inspectors and Inspection Engineers & Supervisors, Technicians and Supervisors, Environmental Specialists, New Petroleum Engineers, Asset Management Personnel, Construction Engineers, Refinery Chemists, Chemical 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 learn about:

- Corrosion principles and mechanisms
- Types of corrosion that are related to the oil, gas and water
- Materials of construction for refinery applications
- Corrosion monitoring and inspection methods
- Aspects of corrosion inspection and anti-corrosion management and mitigation

Course Outline:

Introduction to Corrosion

- General corrosion
- Corrosion mechanisms
- Types of corrosion
- Causes of corrosion failures

Parameters Influencing Corrosion in the Refining Industry

- Different hydro carbon streams
- Sulfur
- Acidity
- (TAN) number
- pH Control
- Desalting
- Distilling
- High and low temp corrosion

Types of Corrosion in the Refinery Industry

- Wet H2S cracking
- Causes
- Hydrogen induced cracking and stress-oriented hydrogen induced cracking (HIC/ SOHIC)
- Hydrogen blistering
- Naphthenic acid corrosion
- Carbonate cracking (CC)
- Chlorine stress corrosion cracking
- Ammonia stress corrosion cracking

- Caustic cracking
- Amine plant corrosion
- Microbiologically induced corrosion (MIC)
- Pitting corrosion
- Erosion corrosion
- Crevice corrosion
- Corrosion under lining
- Bimetallic corrosion

Materials of Construction for Refinery Applications

- Common materials in the refinery industry
- Carbon steel
- Low alloy steels containing chromium and molybdenum
- Stainless steels
- Nickel based alloys
- Selecting the proper material for the application

Corrosion Protection and Monitoring

- Coatings and linings
- Inhibitors
- Types
- Efficiency
- Selection
- H2S scavenger
- Batch and continuous injection treatment

Corrosion Monitoring Methods

- Off-line checks
- Corrosion coupons, probes
- On-line systems
- types of on-line corrosion monitoring technologies such as linear polarization resistance
- Electrochemical noise and electrical resistance

Corrosion Loss & Application of API 579 to General and Local Corrosion