

DAY 1

Refinery and Petrochemical Plant Overview

Section 1 Refinery and Petrochemical Plant Overview

- Raw Materials
- Product and Processes
- Refinery Configuration

Section 2 Water and Wastewater Management

- Refinery Water Overview
- Overall Refinery Water Balance
- Sources of Water
- Water Leaving the Refinery
- Raw Water Treatment
- Process Water

Best Practices for Managing Refinery and Petrochemical Plant WWTP

DAY 2

Primary & Secondary Oil / Water Separation

Section 3 The Composition of Wastewater

- Aquatic Biology
- Six Important Elements

Section 4 Analytical Methods Used in the Laboratory and Through On-line Analyzers

- Biochemical Oxygen Demand
- Chemical Oxygen Demand (COD)
- COD and BOD5 Equivalence for Hydrocarbons
- Hydrocarbons (HC) in Water

Section 5 Effluent Treatment

- Unit Processes in Wastewater Treatment

- Process Wastewater Pretreatment
 - Desalter Effluent Treatment
 - Desalter Oil / Water Separation
 - Desalter Effluent VOC Control

Section 6 Primary Treatment

- Particle Settling
- Ideal Sedimentation
- First Stage: Separation (Oil / Water Separators, API Separators, CPI)
- Oil Skimming Device

DAY 3

Biological Treatment

Section 7

- Coagulation / Flocculation
- Dissolved Air Flotation (DAF)
- Induced Air Flotation (IAF)
- Equalization System

Section 8

- Secondary Treatment / Biological Treatment
- Activated Sludge
 - Sludge Volume Index
 - Activated Sludge Troubles and Remedial Actions
 - Aerators
- Biological Treatment Options
 - Activated Sludge Treatment with Powdered Activated Carbon

DAY 4

Tertiary Treatment

Section 9 Biological Treatment Options

- Oxidation Ditch
- Aerated Lagoons
- Powdered Activated Carbon Treatment

- Sequencing Batch Reactor (SBR)
- Membrane Bioreactor Technology
- Attached Growth Processes
- Biological Clarification Gravity Clarifiers

Section 10 Tertiary Treatment

- Sand Filtration
- Activated Carbon
- Chemical Oxidation

Section 11 Sludge Treatment

- Sewage Sludge Quantity and Characteristics
 - Sludge Pumping Systems
 - Thickening / Dewatering of Sludge
 - Dimensioning of a Static Thickener
 - Dewatering
- Treatment of Sludge's
 - API Separator — Bottom Sludge
 - Bioremediation
 - DGF/IGF Float and Sludge
- Waste Biological Sludge
- Sludge Stabilization
 - Simultaneous Aerobic Sabilization
 - Mesophilic Anaerobic Digestion
 - Aerobic Digestion
- Sludge Disposal and Agricultural Utilization

DAY 5

Recycle and Reuse Issues

Section 12

- Recycle and Reuse Issues
 - Re-use of Non-contaminated Stormwater
 - Fire Water
 - Cooling Tower Makeup Water
 - Utility Water

- Boiler Feedwater Makeup
- Technologies for Upgrade of Refinery Wastewater
 - Basic Media / Sand Filtration
 - Microfiltration or Ultrafiltration
 - Microfiltration or Ultrafiltration, with Reverse Osmosis
 - Microfiltration or Ultrafiltration, with Nanofiltration
 - Ion Exchange
- Technology Summary – Refinery Wastewater Reuse
- Reuse of Municipal Wastewater
 - Media Filtration
 - Microfiltration or Ultrafiltration
 - Microfiltration or Ultrafiltration, plus Reverse Osmosis
- Zero Liquid Discharge