

**Training Title**

**WASTE WATER TREATMENT**

**Training Duration**

5 days

**Training Venue and Dates**

REF			01-05 August		
PE052	Waste Water Treatment	5	2021	\$4,500	Dubai, UAE

In any of the 5 star hotel. The exact venue will be informed once finalized.

**Training Fees**

4,500 US\$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch

**Training Certificate**

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

**TRAINING OVERVIEW**

**TRAINING DESCRIPTION**

Process industries remain under pressure to reduce effluent volumes and pollutants. Effluent treatment technologies have accordingly increased their sophistication and industrial users are now expected to deploy dedicated units of high efficiency which reliably achieve targets, are robust in operation and generate minimal collateral waste.

The course provides a thorough introduction to wastewater treatment technology, covering the full range of physical, chemical and biological processes available. Process selection is approached from first principles, based on the fundamental character of the effluent, but is grounded in practical and economic reality. The treatment and disposal of resulting wastes, especially solids, can be critical in process selection, and this issue is also addressed. The course includes an introduction to the principles of regeneration, reuse and recycle, and describes latest trends and developments. As such it equips both the individual engineer and the organization to act as the 'intelligent buyer' in specifying plant and assessing the claims of vendors.

**TRAINING OBJECTIVES**

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- Learn the purpose, principles of operation and limitations of different treatment technologies
  - Understand how the nature of the wastewater stream(s) informs plant and process selection
  - Understand the downstream and collateral impact of treatment technologies, especially ultimate disposal options
  - Understand concepts of regeneration and recycle systems
  - Prepare for practical problems and real-life projects
  - Enable competence in new and revamped wastewater process projects
  - Ensure that the right effluent treatment technology is selected
  - Improve awareness when communicating with vendors and consultants
  - Better poise for future challenges in the field
  - Improve skills and impact on the development of effluent treatment projects
  - Enhance ability to troubleshoot and improve existing wastewater installations
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- Explain fundamental principles of the waste treatment process
  - Identify the major equipment used in the plant
  - Explain typical operating procedures of Biomass plant
  - Develop troubleshooting techniques for avoiding bacteria killing during operation
  - Describe the importance of K-EPA regulation
  - To minimize waste water generation from process units during normal operation , S/D,S/up
  - Safety interlocks functions and to maintain their reliability
  - Cooling tower corrosion control
  - How to identify the on lone passing valves to flare.
  - Best practices in flare reduction

### WHO SHOULD ATTEND?

The course will be useful for Operations personnel, Operation Supervisors, Maintenance personnel, Maintenance Supervisors, Senior Plant Supervisors, Operations Engineers, Process Engineers

### TRAINING METHODOLOGY

Course Style: Lectures are presented as colorful power points with more than a hundred photographs of failed components and case study discussion.

The course will be intensive but practical and highly interactive. The question-and answer session to allow participants enough time to seek answers to grey areas and to seek clarifications to any misconceptions or problems.

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All attendees receive a course manual as a reference. This is highly condensed course.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

### TOPICS COVERED

1. Biomass generation and protection
2. Sump pumps trouble shooting to enhance reliability.
3. Dosing Chemicals optimization for ETF and Cooling Tower
4. Harmful chemical for bacteria
5. Reactor and internals design
6. Chiller design , operation and trouble shooting.
7. Bio sludge centrifuge and screw conveyor trouble shooting.
8. Dewatering of Wet slop for reprocess in units
9. How to maintain the reliability of Effluent Treatment Facility?
10. Odor management in ETF/ WASTE WATER
11. Oil skimmers operation and reliability.

### TRAINING OUTCOME

- Explain fundamental principles of the waste treatment process
- Identify the major equipment used in the plant
- Explain typical operating procedures of Biomass plant
- Develop troubleshooting techniques for avoiding bacteria killing during operation
- Describe the importance of K-EPA regulation
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### COURSE DAILY PROGRAM

#### Introduction and basics of wastewater treatment

- Primary sources of process waste and effluent streams
- Measures of contamination; individual and collective

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- Effluent treatment objectives and strategy
- Wastewater treatment as a separation process

### 1-Water treatment microbiology

A. Identifying Impurities, Hardness, Iron, Silica, Dissolved Gases, Microbiological Material, Oil, Specific Impurities AND Suspended Matter

B- General Qualitative and Quantitative Identification

Produced water treating equipment –theory of operation, advantages and disadvantages, and the importance of oil droplet size

### 2. Nature of the Pollution

- a. Mineral Pollution
- b. Organic Pollution

### 3. Main Sources of Pollution

- a. At the Production
- b. During Transportation
- c. During Refining

### 4. General Pollution Criteria

- a. General Criteria
- b. Specific Criteria

### 5. Interpretation of Pollution and Treatability

### 6. Treating Systems

- a. Primary Treatment
- b. Secondary Treatment
- c. Tertiary Treatment
- d. Biological Treatment
- e. BOD& COD Reduction

### 7. De – Oiling of Water

- a. Purpose of De – Oiling
- b. API Interceptor
- c. Parallel Plate and Corrugated Plate Interceptor (PPI and CPI)
- d. Flotation Units
- e. Flocculation Units
- f. Loose – Media or Fibrous – Media Coalescers
- g. Biotreaters

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## Case Study 1

### Industrial Wastewater Treatment DVD

#### DAY 2 –

#### A-COOLING SYSTEM

#### WHY IS COOLING-WATER TREATMENT PROGRAM REQUIRED?

- There are three critical points to consider in the operation of any cooling system:
  - Corrosion removes metal from heat-exchange surfaces. There is no mechanism to put it back. When there is no longer sufficient wall thickness, the component will fail and in the process, production can be brought to an abrupt stop.
  - Deposition of heat-exchange surfaces prevents the heat from going where it should. That loss of heat transfer results in higher production costs and once the margin of reserve is gone, production will be limited.
  - There is an inherent sampling problem in all systems. It is not possible to take a sample from the region where active corrosion or deposition could be occurring. Is it possible to take meaningful data?

#### THE ROLE OF WATER TREATMENT WITH COOLING

#### B- Water Treatment Methods,

1. Biological Treatment
  - a. Basics of Aerobic Treatment
  - b. Basics of Anaerobic Treatment
  - c. Types of Bacteria
  - d. Microbial Growth
  - e. Start up and Shutdown of Biological Treatment section
2. Normal Operation of entire Waste Water Treatment
  - a. Effects of different types of Wastes from different sections of Refinery
  - b. Effects of change in load / flow of effluent
3. Emergencies at Waste Water Treatment
4. Trouble shooting
5. Handling of different types of Sludge and Sludge Disposal (especially Oily Sludge)
6. Chemical dosage and its function
7. Function and Operation practice for API, DAF, Clarifier , Sand filter and dehydration system

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Day 3

A-Industrial Water Treatment

**1 Clarification of Water – Removal of Suspended Impurities**

- 1 Conventional Graded Bed Filters
- 2 High Rate Deep Bed Up-Flow Filters
- 3 High Rate Deep Bed Down-Flow Filters
- 4 Dual Flow Filters
- 5 Diatomaceous Earth Filters (DE Filters)
- 6 Cartridge Filters
- 7 Sedimentation With Co-agulation

**2 Oxygen Removal**

- 2.1 Heaters
- 2.2 Gas Stripping
- 2.3 Vacuum Deseccration
- 2.4 Chemical Removal of Oxygen

**3 Hydrogen Sulfide Removal**

- 1 Aeration
- 2 Stripping With Flue Gas

**4 Carbon Dioxide Removal**

- 1 Aeration
- 2 Vacuum Degasification
- 3 Oxygen Exclusion
- 4 Gas Blankets – Water Storage Tanks

**5 Softening**

- 1 Cold Process – Treated Water
- 2 Hot Process Softeners
- 3 Catalytic Lime Softening

**6 Disinfection of Water**

- 1 Sterilization by Bleaching Powder
- 2 Sterilization by Chlorine
- 3 Sterilization by Chloramines
- 4 Sterilization by Ozone
- 5 Disinfection of Ultraviolet Light

**7 Softening and De carbonization of Water by Ion Exchange – Resine**

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- 1 Hydrogen or Cation Exchanger
- 2 Anion Exchanger

## 8 De mineralization of Water by Ion Exchange Resins

### B-Waste Water Treatment

#### 1-Mineral Pollution

#### 2-Organic Pollution

#### 3-Main Sources of Pollution

##### A-At the Production

##### B-During Transportation

##### C-During Refining

#### 4-General Pollution Criteria

##### A-General Criteria

##### B-Specific Criteria

#### 5-Interpretation of Pollution and Treatability

#### 6-De – Oiling of Water

##### A-Purpose of De – Oiling

##### B-API Interceptor

##### C-Parallel Plate and Corrugated Plate Interceptor (PPI and CPI)

##### D-Flotation Units

##### E-Flocculation Units

##### F-Loose – Media OR Fibrous – Media Coalescers

##### G-Bio treaters

### DAY 4 -

#### A-Mechanical, physical and chemical primary processes

- Solid-liquid and liquid-liquid separations
- Precipitation and flocculation
- Chemical oxidation and reduction processes
- Column processes - stripping and extraction

#### Case Study 2

Water and Waste Water Quality DVD

#### B- Biological primary processes

- Classifying and targeting biological processes
- Aerobic processes - principles, selection and sizing
- Anaerobic processes
- Biological nitrogen and phosphorus removal
- Troubleshooting bioprocesses

### Case Study 3

Water Treatment System Unit Operations DVD

### C-Polishing processes and solid waste handling

#### Tertiary Treatment and Discharge

- Chlorination
- Observation and Discharge
- Off-Spec.
- Sludge Treatment
- Oily Sludge Treatment and Disposal
- Digestion
- Thickening
- Dewatering

#### SLUDGE HANDLING

### Case Study 4

Sludge Treatment DVD

### D-Process selection and integration

- Process selection 'rules of thumb'
- Introduction to effluent system optimization
- Regeneration, reuse and recycle
- Emerging technologies, new concepts and future trends in effluent treatment

#### TROUBLE SHOOTINGS AND MERGENCIES

- Case Studies Discussions

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## Course summary and Evaluation

### Note:

**Pre & Post Tests will be conducted**

**Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.**



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