

# **Reverse Osmosis Water Treatment**

**OLC116**



**Online Training**

## **Information Packet**

### Costs

- \$319 USD
  - Price includes
    - Narration
    - Many illustrations
      - Video clips
      - Animations
      - Pictures
    - Interactive questions
    - Practice exams
    - Final exam
  - Discounts may apply
    - Bundled discount for RO Certification
    - Multiple-course discount
    - Multiple-trainee discount
    - From time to time DHP runs special discounts

### Length:

Eleven (11) hours

### What you will earn:

David H. Paul, Inc Certificate upon successfully passing an exam based on the knowledge and proficiencies learned in this course

### Description:

You will learn to thoroughly understand the basics of how RO units work and understand common problems caused by scaling, fouling and chemical attack. You will learn how to monitor, troubleshoot and clean RO Units. You will learn some pretreatment requirements of a membrane system.

### Overview of Topics

- Membranes & Membrane Elements I
- Membranes & Membrane Elements II
- Reverse Osmosis Operation
- Reverse Osmosis Problems
- Monitoring Reverse Osmosis Units
- Chemical Cleaning of RO Units
- Troubleshooting RO Units
- Controlling RO Unit Scaling
- Controlling Membrane Chemical Attack
- Activated Carbon Pretreatment
- Controlling RO Fouling



## Topic Breakdown

### Membranes & Membrane Elements I

- Introduction
- Hyperfiltration
- Semipermeable Membranes
- Osmosis
- Reverse Osmosis

### Membranes & Membrane Elements II

- Net Driving Pressure
- Temperature
- Salt Passage or Salt Flux
- Passage of Uncharged Substances
- Summary of Membrane Performance
- Membrane Elements

### Reverse Osmosis Operation

- Pressure Vessels
- RO Units
- RO Unit Operation: Flow Rates
- RO Unit Operation: Feed Water Salt Concentration
- RO Unit Operation: Permeate Salt Concentration
- RO Unit Operation: Pressure
- RO Unit Operation: Summary

### Reverse Osmosis Problems

- Introduction
- Scaling
- Fouling
- Chemical Attack
- Percent Recovery
- Scale Control Within an RO Unit
- Fouling Control Within an RO Unit

### Monitoring Reverse Osmosis Units

- Monitoring
- Monitoring: Normalized Permeate Flow (NPF)
- Monitoring: Pressure Drops
- Monitoring: Percent Salt Rejection (% SR)
- Monitoring: Profiling
- Instrumentation

### **Chemical Cleaning of RO Units**

- Introduction
- Game Plan To Remove Scalants
- Game Plan To Remove Foulants
- Chemical Cleaning Equipment
- Good Cleaning Procedure

### **Troubleshooting RO Units**

- Troubleshooting: High Conductivity from one PV
- Troubleshooting: Scaling
- Troubleshooting: Fouling
- Troubleshooting: Chemical Attack

### **Controlling RO Unit Scaling**

- Pretreatment to Control Scaling: Introduction
- Pretreatment to Control Scaling: Acid Injection
- Pretreatment to Control Scaling: Scale Inhibitor Injection
- Pretreatment to Control Scaling: Softening
- Monitoring to Control Scaling: pH, Hardness & Alkalinity

### **Controlling Membrane Chemical Attack**

- Pretreatment & Monitoring to Control Chemical Attack: pH
- Pretreatment & Monitoring to Control Chemical Attack: Activated Carbon
- Pretreatment to Control Chemical Attack: Sulfite Injection
- Monitoring to Control Chemical Attack: ORP & Chlorine

### **Activated Carbon Pretreatment**

- Activated Carbon Vessels
- Activated Carbon: Normal Service
- Activated Carbon: Backwashing
- Activated Carbon: Organics Removal
- Activated Carbon: Sanitization

### **Controlling RO Fouling**

- Pretreatment to Control Fouling: Clarification
- Pretreatment to Control Fouling: Media Filtration
- Pretreatment to Control Fouling: Reverse Osmosis Unit Pre-Filtration
- Pretreatment to Control Fouling: Silt Dispersant Injection
- Pretreatment to Control Fouling: Silt Density Index



## **DHP's Training Methodology**

DHP uses the consulting services of a Doctor of Education from Columbia University (Dr. Linda Paul) in the development of its online training courses.

DHP's training methodology includes:

- Short, interesting, interactive lecture sessions using:
  - Lecture slides
  - Video clips
  - Animations
- Pop quizzes to enhance understanding and retention
- Practice exams

## **Who Should Take This Course**

Everyone who works with, or will work with, the reverse osmosis and pretreatment technologies in operating plants needs to know the tips, techniques and proficiencies taught in this online training, including:

- Operators
- Maintenance personnel
- I & C Technicians
- Supervisors/Managers
- Engineers
- Original Equipment Manufacturers
- Service technicians
- More

## **What You'll Receive**

- 11 hours of interesting, easy-to-understand training
- David H. Paul, Inc Certificate upon successfully passing an exam based on the knowledge and proficiencies learned in this course