

# OPERATION, CONTROL & MAINTENANCE OF RO UNITS



Courtesy Photos: David H. Paul, Inc.

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## Operation, Control & Maintenance of RO Units (Hands-On)

This seminar is for anyone that wants to experience how RO units work in a hands-on environment. You get to see what happens when valves are opened or closed. You get to see, feel and smell membrane elements when they are removed from pressure vessels. You'll learn practical tips and techniques of how to best operate and maintain your RO unit(s).

### Who Should Attend

This seminar is recommended for everyone who operates, maintains, oversees, designs, installs or commissions an RO unit. This includes operators, maintenance personnel, engineers, designers, supervisors and managers.

### Why You Should Attend

At many facilities, you can't "play" with one of your full scale RO units. This could cause production problems. DHP has trained thousands of people who have a lot of time in an RO water treatment job, but for many different reasons, they weren't on the job the days that elements were unloaded/loaded. At many plants the operation of the RO water treatment system is contracted out. You want to make sure that you, your people or your contractor are doing things right. Also, unless you have an experienced crew, you may have never heard of "shimming" membrane elements. In this seminar, we'll teach you how to operate and unload/load membrane elements the right way. This is information gleaned from 33+ years of experience and seeing the best ways of doing things at hundreds of plants.

### What You'll Receive

- 8 hour days of interesting, easy-to-understand hands-on RO pretreatment training
- A comprehensive workbook packed with procedures, datasheets and techniques
- Personal attention! DHP hands-on seminars are limited to a maximum of 8 attendees
- Break refreshments

# OPERATION, CONTROL & MAINTENANCE OF RO UNITS

## Instructors



**David Paul** has provided consulting services at several SWRO plants around the world including at the Tampa Bay Desal Plant in the United States. He is the author of over 150 published articles on membrane water treatment, has developed and administers a 4,000 page

correspondence training program on advanced water treatment, and has created and administered on-campus Associate Degree in Advanced Water Treatment programs at four different locations in the United States. David is the President of David H. Paul, Inc. (DHP), an advanced water treatment training and consulting firm located in the USA. DHP has trained over 16,000 water treatment professionals worldwide since 1988.



**Bill Dees** provides water treatment training and consulting services for David H. Paul, Inc. (DHP). He has over 18 years of design, installation, operation, maintenance, troubleshooting, training and consulting experience of water treatment systems

including membrane, ion exchange, pretreatment and post-treatment equipment. Bill is also the Technical Services Manager for DHP, responsible for membrane module autopsies and consulting. Bill holds an Associate of Applied Science Degree in Industrial Water Treatment from San Juan College, DHP's first on-campus, college degree program.

## Certificate of Completion

Each attendee will receive a DHP certificate of completion following the course.

## What Others Say About DHP Training Seminars

DHP has trained over 16,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental and drinking water clients. The average rating given by attendees for all DHP seminars, including this one, is over 9 (on a scale of 1-10, with 1 being a terrible rating and 10 being an outstanding rating).

### The following are typical comments from attendees of DHP Seminars:

**“Great Course! Well worth the time.”**

Bob Castle - Water Quality Manager, Marin Municipal Water District

**“Excellent training materials and presentation.”**

Gary Trent - Abbott Laboratories

**“Excellent... got what I was interested in and more, especially in the inner workings of UF.”**

Eric Lozano - Austin Energy

**“Well presented and well worth the investment.”**

John Countz - Operations Manager, Consolidated Water Co.

**“Excellent! More than I expected.”**

Mark Hall - Texas Water Development Board

**“It was great!”**

Trent Hughes - Civil Engineer, Black & Veatch

**“Great Course.”**

Joe Gonzales - Xcel Energy

**“Most Excellent!”**

Mike Milner - Alternative H2O Solution

# OPERATION, CONTROL & MAINTENANCE OF RO UNITS

## Detailed Agendum

**7:45 Refreshments ( Provided)**

**8:00 Reverse Osmosis (RO) unit operation and control overview (Classroom)**

**8:00 Piping and Instrumentation of Puretec's RO System - Classroom**

- P & ID single pass
  - P & ID double pass
- RO Unit Control**
- Valves, flows and conductivities



**9:00 Break ( Refreshments Provided)**

**9:15 RO Unit Startup (Classroom)**

- Unloading elements
  - Visual inspection of membrane elements
  - Element placement and management
- Loading elements
  - Proper loading of elements
  - Need for shimming
  - Measurement
  - Element location chart
- Startup
  - Preflush
  - Rinse to quality
- RO Unit Shutdown
  - Post flush pretreated feed water, permeate or deionized water to prevent scaling & fouling



**10:15 Break ( Refreshments Provided)**

**10:30 RO System Operation (Hands-On)**

- P & ID of DPR0
- Unloading elements
  - Visual external inspection of membrane elements
  - Weigh elements
  - Log sheet of inspection & weights



**11:30 Lunch**

**12:30 RO System Operation (Hands-On)**

- Loading elements
  - Proper loading of elements
  - Measurement
  - Element location chart
- Determining excess play within a pressure vessel
  - Shim thickness determination
  - Shim installation

**1:45 Break (Refreshments Provided)**

**2:00 RO System Operation (Hands-On)**

- Startup of RO unit
  - How to start up the RO system and change operational parameters
- Shutdown of RO unit
  - Shutdown procedure and post shutdown flush of RO system

**3:15 Break ( Refreshments Provided)**

**3:15 RO Unit Control (Hands-On)**

- Recovery rate
- Concentrate flow rate

**Piping and Instrumentation of RO Systems**

- P & ID of RO unit
- System walk down along with P & ID-single pass
- System walk down along with P & ID-double pass

**4:30 Final Questions & Answers - Classroom**

- Seminar evaluation

**5:00 End**

