

# REVERSE OSMOSIS OPERATION HANDS ON



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## Who Should Attend

This seminar provides valuable knowledge to operators, maintenance personnel, technicians, management and engineering personnel who want to understand reverse osmosis unit operations. If you learn by doing, this is the class for you. Aside from a small amount of classroom time in the morning and in the afternoon, this class is nearly 100% hands-on working with live reverse osmosis units.

## Why You Should Attend

Improper operations can lead to increased maintenance, problematic performance and possible downtime. Correct operation contributes to reduced maintenance, less frequent membrane replacement and an increase in overall plant efficiency. It is vital to understand the impacts of valve adjustment and feed water changes, even if you're operating an automated system. The information, tips and techniques you'll learn in this seminar are practical and immediately usable to improve the performance of your system(s).

## Overview of Topics

- Determining feed water fouling potential and effectiveness of pretreatment
- Feed water chlorine analysis and reducing agent dosage
- Proper RO unit start-up and shut-down procedures
- RO unit data collection
- Effects of recovery on operation
- Effects of temperature on operation
- Effects of TDS on operation

## What You'll Learn

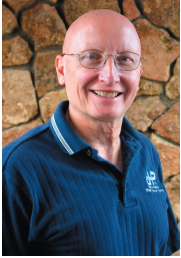
- Silt Density Index analysis
- Chlorine analysis and feed water oxidation reduction potential analysis
- Hand-held conductivity meter calibration
- Proper RO unit start-up procedures
- Fundamental data readings needed for operations and troubleshooting
- Proper RO unit shut-down procedures
- Why and how unit performance will change with recovery
- Why and how unit performance will change with temperature
- Why and how RO unit performance changes with changing feed water

## What You'll Receive

- 8 hours of interesting, easy-to-understand hands-on RO/NF training
- A comprehensive workbook packed with procedures, datasheets and techniques
- Personal attention! DHP hands-on seminars are limited to a maximum of 6 attendees
- Break refreshments

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## 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:

**"I enjoyed the class very much and would highly recommend it to anyone in the industry."**

Janet Drozda, Operator, Intel

**"Outstanding course. Best training program that I have attended in the water treatment industry!"**

George James, Reaction Engineering, Inc.

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

Eric Lozano - Austin Energy

**"Instructor was very knowledgeable and thorough. Course will have large impact on our cleaning procedure."**

John Paul Robb, Plant Engineer, Trigen Colorado Energy

**"Excellent Course! The hands on portion served very well in firming up the concepts and increasing retention. Level of instruction was good balance of theory and practical...well presented."**

Finley Jones, Sr. Account Manager, Nalco

**"Probably the best hands-on course I've had in my 10 years as a technician."**

Andy Gutierrez, Technician, Amgen

**"I thought I knew a good amount about RO systems. After taking this course I realized how little I actually did know."**

Chris Corsetti, Facilities Engineering Supervisor, Genzyme Corp.

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## Detailed Agendum

7:45 Refreshments (Provided)

**8:00 Introductions**

- RO Unit Operations Pre-test
- SDI Demonstration
- SDI Workshop on live equipment

9:15 Break (Refreshments Provided)

9:30 Preparing the units for operation

- 4" and 8" RO unit walk down
- Removal of chlorine from the feed water
- Hand-held conductivity meter calibration
- Pretreatment Skid Start-up



10:30 Break (Refreshments Provided)

**10:45 RO Unit Start-up Procedures**

- Unit readings and data collections
- RO Unit Start-up Procedures**

12:00 Lunch

**1:00 Effects of recovery on operation and performance**

2:00 Break (Refreshments Provided)

**2:15 Effects of temperature on operation and performance**

3:15 Break (Refreshments Provided)

**3:30 Effects of TDS changes on operation and performance**

**4:15 Discussion, questions and answers**

- RO Operations Post Test

5:00 End

