

# MONITORING & TROUBLESHOOTING OF RO UNITS



Courtesy Photos: David H. Paul, Inc., Orange County, Tampa Bay Water

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## Monitoring & Troubleshooting of RO Units (Hands-On)

Catching problems at an early, reversible stage is the only cost effective way to handle problems. This seminar provides you with practical, proven tips and techniques for monitoring and troubleshooting RO units. There is no better way to learn how to do this than by actually doing it in a hands-on seminar.

## 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

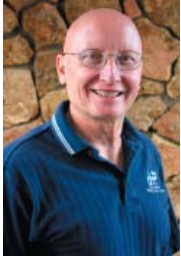
Most facilities don't adequately monitor RO units. Sales people frequently tell end users that the system "runs itself" and little to no maintenance is required. While that may be true for certain feed waters from a well water source, this is NOT commonly the case for RO units operating on feed water from a surface source. Catching problems at an early stage may be the ONLY time you can cost-effectively solve problems. This seminar provides you with classroom and hands-on training so that you can properly monitor your RO units or oversee others that operate your RO units. This information is likely not present in your O & M Manual.

## What You'll Receive

- 8 hour days of interesting, easy-to-understand hands-on RO monitoring and troubleshooting
- 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

# MONITORING & TROUBLESHOOTING 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

# MONITORING & TROUBLESHOOTING OF RO UNITS

## Detailed Agendum

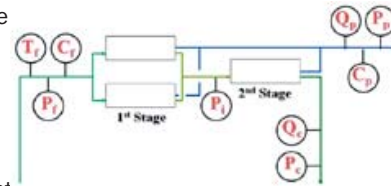
**7:45 Refreshments ( Provided)**

**8:00 RO Unit Monitoring (Classroom)**

- Flows, %Recovery, Concentration factors
- Conductivities, Salt rejection/Salt passage
- Pressures, Pressure drops
- Temperature
- Other

**RO Unit Trending (Classroom)**

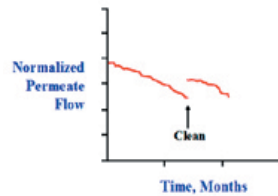
- Normalized Permeate Flow (NPF)
- Normalized Salt Passage (NSP)
- Normalized Pressure Drop (Normalized Differential Pressure)



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

**9:15 RO Unit Monitoring (Hands-On)**

- Obtaining operating data from RO unit



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

**10:30 Input operating data into monitoring software (Classroom)**

- Create performance trends
  - Normalized Permeate Flow (NPF)
  - Normalized Salt Passage (NSP)
  - Normalized Pressure Drop (Normalized Differential Pressure)
- Evaluate performance trends

**11:30 Lunch**

**12:15 RO Unit Monitoring (Classroom)**

- Checking the calibration of on-line instruments
  - Hand-held/bench instruments needed for proper monitoring
    - pH
    - Conductivity
    - Chlorine
    - Sulfite
    - SDI
    - ORP (for some)
    - Other

**12:30 RO Unit Monitoring and Maintenance (Hands-On)**

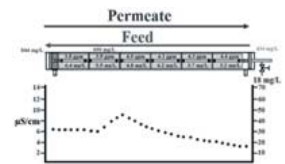
- Checking the calibration of on-line instruments
  - Using Hand-held/bench instruments needed for proper monitoring
    - pH
    - Conductivity
    - Chlorine
    - Sulfite
    - SDI
    - ORP (for some)



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

**2:00 RO Unit Monitoring and Maintenance (Classroom)**

- Profiling
  - Profiling of RO system
  - Profile sheets
- Probing
  - Preparation of probing tool
  - Proper probing of RO pressure vessel
  - Measurements



**2:30 RO Unit Monitoring and Maintenance (Hands-On)**

- Profiling
  - Profiling of RO system
  - Profile sheets
- Probing
  - Preparation of probing tool
  - Proper probing of RO pressure vessel
  - Measurements



**2:30 Break ( Refreshments Provided)**

**4:30 Final Questions & Answers (Classroom)**

- Seminar evaluation

**5:00 End**