

# Reverse Osmosis Analytical Troubleshooting Hands-On



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## WHERE & WHEN

For a list of where and when this seminar is being presented, click [here](#).  
This seminar can also be presented at your facility.

## DAILY SCHEDULE

8:00 a.m. - 11:30 a.m.--Lunch Break--12:30 p.m. - 5:00 p.m.

## WHO SHOULD ATTEND

Operators, technicians, maintenance personnel, managers, engineers and any other plant personnel that want to become proficient in advanced monitoring and troubleshooting of RO/NF units.

## WHY YOU SHOULD ATTEND

These analytical monitoring techniques lead to a greater understanding of RO/NF performance. This level of understanding can be invaluable when facing performance issues that are subtle and difficult to troubleshoot. The information, tips and techniques you'll learn in this seminar are practical and immediately usable to improve the performance of your system(s).

## 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 and lunch



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## INSTRUCTORS



Jason Turner  
Plant City, FL



Ed Turner  
San Antonio, TX



Robert Decker  
Farmington, NM



Bill Dees  
Farmington, NM



Alan Lane  
Yuma, AZ

Every instructor for the hands-on seminars is/was an instructor at one of DHP's on-campus Associate Degree in Advanced Water Treatment programs. The hands-on seminars are held at DHP's Farmington, NM facility or at one of three college-program location using the same equipment, labs, instruments and training aids as our college students. Each DHP college instructor is a graduate of the four-semester Advanced Water Treatment Program. You won't find anyone more dedicated to students and more excited about water treatment than DHP instructors. DHP instructors have trained over 13,000 water treatment professionals worldwide since 1988.

## OVERVIEW OF HANDS-ON TRAINING

- Biological and chemical sampling procedures
- RO/NF unit chemical analyses at different feed water pH ranges
- Understanding RO/NF performance with variable feed water pH ranges
- Calcium, magnesium and total hardness analysis
- Alkalinity analysis
- Chloride, sulfate, silica and CO<sub>2</sub> analysis
- Determining specific ion rejections
- Using chemical analyses to troubleshoot problems



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## WHAT YOU'LL LEARN

- Feed water pH impacts on RO/NF performance
- Correct sampling for chemical analysis
- Calcium, magnesium and total hardness determination
- Alkalinity determination
- How to determine specific ion rejection
- How to detect early scale formation on the membrane surface
- Early symptoms of membrane damage through chemical analysis
- Using chemical analyses to determine what's going on in your first and second stage

# DETAILED AGENDA

## Morning

- 7:45 Refreshments (Provided)
- 8:00 Introductions  
RO Unit analytical troubleshooting pre-test  
Safety in the hands-on areas  
Sampling introduction  
Preparing the RO units for operation
- Four- and eight-inch RO unit walk down
  - Hand-held conductivity and pH meter calibration
  - Pretreatment skid start-up
- 9:00 Break (Refreshments Provided)
- 9:15 Start the 4- and 8-inch RO units (feed pH 7)
- Readings and data collections
  - Sample collections
- 9:50 Lab set-up and overview
- Proper lab techniques
  - Proper analytical technique and analysis demonstration
- 10:15 Break (Refreshments Provided)
- 10:30 Water analysis
- Calcium hardness titration and determination
  - Total hardness titration and determination
  - Magnesium hardness determination
  - Alkalinity titration and determination
  - Chloride titration and determination
  - Silica analysis
  - CO<sub>2</sub> analysis
  - Determine concentration factors and specific ion rejections
- 11:30 Adjust feed water pH of both units to 3.5-4.0
- 12:00 Lunch (Provided)



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## Afternoon:

- 1:00 Start-up the 4- and 8-inch RO units (feed pH 4)
- Readings and data collection
  - Sample collections
- 1:20 Prepare the 4- and 8-inch RO units for high pH operation
- Neutralize feed tank and drain
  - Fill, dechlorinate and ready feed tanks
  - Raise feed pH to 9.5-10.0
- 2:00 Break (Refreshments Provided)
- 2:15 Water analysis, same set as before but on new samples
- 3:10 Start-up both 4 and 8 inch RO units (feed pH 10)
- 3:15 Break (Refreshments Provided)
- 3:30 Readings and data collection from both RO units
- Sample collections
- 3:50 Water analysis, same set as before but on new samples
- 4:30 Discussion, questions and answers
- RO Unit analytical troubleshooting post-test
- 5:00 End

## CERTIFICATE OF COMPLETION

Each attendee will receive a DHP *Certificate of Completion* following the seminar.

### WHAT OTHERS SAY ABOUT DHP HANDS-ON SEMINARS

DHP has trained over 13,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental and drinking water clients. The average rating given by attendees for DHP seminars 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:

“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.

“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

“Hands-on experience was a valuable experience.”

Melody Martin, Plant Chemist, Oklahoma Gas & Electric

“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.

“Excellent instructors. I should have taken this course ten years ago. I could have saved the company thousands of dollars and weeks of time.”

Charles Hagen, Lab supervisor. Ameradahess

“DHP training took me from having no idea what RO is to being a confident and knowledgeable RO decision maker.”

Kenneth Gaskill, Maintenance Supervisor, Warner Lambert Co.

“Great course, great teachers, great equipment. I liked the use of multimedia...videos, illustrations, computers, etc.”

Evan Francis, Operator, Monterey Bay Aquarium