



Expert Troubleshooting of Reverse Osmosis Units

Classroom & Hands-On Training

4-Day Seminar



Information Packet

Seminar Cost

- \$3,999 USD
 - Price includes
 - Classroom & hands-on training
 - IDA Certificate
 - Certification administration (if you're taking this seminar for certification)
 - Equipment usage
 - Analytical equipment, lab ware, chemicals, etc.
 - Small class size
 - Limited to 8 attendees
 - One-on-one attention
 - Unbiased training
 - DHP/IDA doesn't sell chemicals or equipment
 - Discounts may apply
 - "Early Bird" (10% 30 days prior, 15% 45 days prior) for scheduled regional seminars
 - Other

Seminar Length

- Four days, 1st day is optional (see below in seminar description)
- 9 hours per day (8 a.m. to 5:00 p.m.)
 - Four 10-15 minute breaks during the day
 - 30-45 minutes for lunch

Seminar Description

This seminar is an extraordinary opportunity to learn DHP's consulting methodology. The activities you'll master during this seminar are the same activities that DHP consultant's use when troubleshooting at clients' facilities. You'll learn the entire process from beginning to end.

This seminar isn't just valuable for consultants, service techs, engineers or anyone else that troubleshoots RO water treatment systems but it will show you how to evaluate any RO unit, including yours, if you work with one or more RO units.

During this seminar we will treat this like a consulting job. We'll meet with plant personnel and find out how the plant is running and if any problems are present. We'll then analyze all of the performance data from the plant and from our many activities and come up with a "final report" on the RO unit by the end of the seminar.

DHP's goal is to find RO units around the country over the next few years that need one of their RO units evaluated. If you're at one of those plants and you have a training room that will hold up to 8 people, and your plant is easy to get to, contact us and we may hold an ETRO HO at your plant. The goal of ETRO HO is to perform a consultant-level evaluation of an unknown RO unit. You are there not as an observer...but as an evaluator!

The ETRO HO seminar is preceded by a free RO 101 seminar. This seminar provides all the fundamental knowledge required to understand the concepts in the advanced ETRO HO seminar. EVEN if you have 20 years of experience, it is HIGHLY recommended that you take RO 101 if you have never taken one of more of the following DHP seminars before:

- RO 101
- Reverse Osmosis Operation & Maintenance (online or 1 day instructor-led seminar)
- Reverse Osmosis Monitoring & Troubleshooting (online or 1 day instructor-led seminar)
- Operation, Maintenance and Troubleshooting of RO Units (3 day instructor-led seminar)

If you don't have the fundamental base of knowledge provided in one of the above seminars, you may not be able to keep up with the rest of the class or even worse, slow down the rest of the class.

Day1: RO 101

Classroom topics include:

- RO Water Treatment Overview
- Water Contaminants Overview
- Semipermeable Membranes
- Membrane Rejection
- Osmosis & Reverse Osmosis
 - Osmotic pressure
 - Applied pressure
 - Net Driving Pressure
 - Water flux
 - Salt passage
- Membrane Elements
- Pressure Vessels
- RO Units
- RO Unit Operation
- Recovery rate
- Concentration factor
- What happens from first inch/cm to the last in RO units
- Potential Problems
- Pretreatment
 - Scaling Control
 - Fouling Control
 - Chemical Attack Control
- Daily Monitoring

- Weekly Trending
 - Normalized Permeate Flow
 - Pressure drops
 - Normalized Salt Passage

Day's 2, 3 and 4: ETRO

Classroom and hands-on topics include:

- What an expert troubleshooter must know
- DHP's Troubleshooting Methodology
 - Define the problem
 - Understand general enduse specifications
 - Understand the feed water
 - Understand the pretreatment scheme
 - Understand the RO unit
 - Know the list of potential problems given a pretreatment scheme
 - Evaluate data to eliminate potential problems until the real problem(s) is(are) identified
- Interview Plant Personnel to Uncover Concerns & Problems
- BARTS (Biological Activity Reaction Tests)
- P&ID's (Piping & Instrumentation Diagrams)
 - Pretreatment system
 - RO unit
 - Chemical cleaning skid
- Onsite Analysis and Testing
 - pH
 - Conductivity
 - Temperature
 - H₂S
 - Chlorine
 - ORP
 - Sulfite
 - Specific Ions
- Evaluate Pretreatment System
 - Scale inhibitor
 - Draw down test
 - Cartridge Filter
 - Inspection
 - SDI (Silt Density Index)
 - Before CF
 - After CF

- Evaluating the RO Unit
 - Recovery Rates
 - Salt Rejection
 - Profiling
 - Probing
- Membrane Element Inspection
 - Unload elements
 - Inspect elements
 - Reload elements
 - Shim elements
- Evaluate RO Unit Based on Data Collected
 - Performance trends
 - Scaling
 - Fouling
 - Chemical Attach
 - Scaling Potentials
 - Membrane manufacturers design software
 - Chemical vendor software
 - Fouling Potentials
 - Membrane manufacturers design software
- Evaluate Chemical Cleaning Procedure
 - DHP procedure
 - Plant's actual procedure
- Attendees Prepare Final Troubleshooting Report with Recommendations

Who Should Attend

This is our most advanced troubleshooting training program. Each company has to decide if all employees in one or more job classifications receive advanced troubleshooting training or if only a select few of the following receive this training:

- Operators, especially lead operators
- Maintenance personnel
- Supervisors/Managers
- Engineers
- Original Equipment Manufacturers
- Service technicians
- Anyone that needs advance skills for troubleshooting RO unit problems.
- Others

Why You Should Attend

From a Personal Standpoint

- After successfully completing this 3-day program **you will be in the top 0.01% of RO personnel in the world** in your level of understanding and proficiency
- If desired, you can add **Reverse Osmosis Specialist IV** to your title and bio
- Puts you in a better position for job advancement
- You can't get this information anywhere else
- The instructor has decades of practical RO water treatment experience
- The instructor is an RO water treatment consultant
- The instructor is a professional trainer
- The seminar covers the material in a step-by-step manner so that everyone will understand the concepts presented
- The presentation uses a multimedia format, with many videos and animations provided

From an Employer's Standpoint

- Trained employees save you money by:
 - Having the knowledge needed to identify problems at an early stage
 - Having the ability to troubleshoot even difficult problems many RO systems face
 - Using this knowledge to correct problems
 - Less down time of the RO system
 - Increased system reliability
- Being able to show clients, customers and any applicable governmental agencies that your employees have been independently certified on their knowledge and proficiencies

What You'll Receive

- 32 hours of interesting, easy-to-understand training
- Highly illustrated workbook
- Break refreshments and lunch
- Personal attention: Questions & Comments are encouraged

Instructor Biography



Dick Youmans, BBA, CWT, ROS IV
Director of Sales & Certification
Instructor/Consultant

Richard (Dick) Youmans is an instructor/consultant and the Director of Sales & Certification for David H. Paul, Inc. (DHP). Since 1977, Dick has been involved in just about every aspect of industrial water treatment with most of those years specializing in reverse osmosis chemical applications, training and troubleshooting. Like all DHP instructor-consultants, he has been in hundreds of water treatment plants covering every major industry. Dick earned a BBA degree from the University of Georgia in 1974 and an Associate of Applied Science Degree in Industrial Water Treatment from San Juan College and David H. Paul, Inc. in 2002.



Steve Sivers, ROS IV
Instructor / Consultant

Steve Sivers is an instructor and consultant for David H. Paul Inc. (DHP). Steve has over 35 years' experience focused on designing and troubleshooting water treatment processes. He specializes in high purity industrial water treatment and has experience with desalination, water recovery, and waste treatment. Steve is a Professional Engineer (P.Eng.) registered in the province of Ontario, Canada. He received his B.Eng. (1980) and M. Eng. (1984) in Chemical Engineering both from McMaster University.



Certificate of Completion

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

DHP Training Seminars

DHP has trained over 20,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental, and drinking water clients. The average rating given by attendees for all DHP seminars, is over 9 (on a scale of 1-10, with 1 being a terrible rating and 10 being an outstanding rating).

Testimonials

The following are typical comments from attendees of DHP seminars:

Love the hands on training. Great energy from everybody in working together... presentation amazing as always.

Ernard Goeloe

...great exposure to equipment I haven't had the opportunity to see within the industry I am in.

Logan Shaw

Being able to work on a specific piece of equipment to test/probe is invaluable...

Rich Gardner

putting together actual recommendations/actions on this system was very helpful...

Scott Harris

Being able to see real-world issues with other systems was helpful...

Austin Kruzich

Without this training, I would still be struggling with RO's. I now have the knowledge and confidence to be successful...

James Gouge

I feel completely prepared and confident to perform troubleshooting and operational duties effectively with our RO system(s). Reference material and instructors are great!

David Cizek

The books we get are awesome & a great study resource. [instructor] answers all questions seamlessly & straightforward.

Mary Brasfield

This is an excellent course. Best learning experience of my career.

Jenn Hoevenaars

This seminar was well planned in terms of content and delivery.

Ezgi Demircan Ozelcaglayan