



Advanced Troubleshooting of RO Systems

Classroom & Hands-On Training

3-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 don'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

- Three days
- 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 consists of three days of classroom and hands-on training covering advanced troubleshooting of RO systems. Sometimes RO systems don't operate as designed. This seminar provides the tools and knowledge needed to monitor and ensure proper operation of an RO system and to troubleshoot an RO system to identify problems at an early stage. While this is an advanced course, enough introductory material will be presented so that when more advanced concepts are covered, attendees will thoroughly understand the advanced concepts.

Classroom and hands-on topics include:

- RO System Overview
- RO Water Treatment Chemistry Overview
- RO Water Treatment Microbiology Overview
 - Bacteria
 - How to use Biological Activity Reaction Tests for troubleshooting
- Proper Sampling Techniques
 - Chemical
 - Microbiological
- RO Pretreatment
 - How to read a water analysis report
 - How to determine if the analysis is complete/reliable
 - How to determine scaling potentials
 - How to determine fouling potentials
 - How to verify zero total chlorine
 - How to minimize sulfite injection to reduce biofouling
 - How to verify the ORP level at which to operate
 - How to use Silt Density Index (SDI) to troubleshoot the pretreatment
- RO Unit Operational Data
- How to use free normalization software programs
- How to generate performance graphs/trends
 - Normalized Permeate Flow
 - Pressure drops per stage
 - Normalized Salt Passage
- How to interpret and troubleshoot RO unit performance graphs
- How to profile and probe an RO unit
- How to interpret and troubleshoot profiling and probing data
- How to determine if the flow meters are accurate
- How to determine if the RO unit is operating as designed

RO Unit Design

- How to use free RO manufacturer's design software programs
- How to use design software programs to troubleshoot RO units for:
 - Scaling potentials
 - Fouling potentials
 - Mass balance
 - Ion rejections

DHP's Training Methodology

DHP uses the consulting services of a Doctor of Education from Columbia University (Dr. Linda Paul) in the development of its training seminars. DHP's training methodology includes:

- Short, interesting, interactive lecture sessions using:
 - Power Point™ slides
 - Video clips
 - Animations
- Group exercises to enhance understanding and retention
- Workshops to further enhance understanding and retention
- Optional daily open-book Knowledge Verification Exam to document what was learned

A *Knowledge Verification Exam* and hands-on *Proficiency Verifications* are given each day. Don't worry...you'll pass. Since 1988, DHP has been training water treatment personnel like you. We take you step-by-step through the **knowledge and proficiencies needed for advanced troubleshooting of an RO system**. All exams are open book because nobody remembers everything for the rest of their lives...but you'll know in the future where to get the information you need in the book.

We provide a lot of repetition so that you will have no problem getting good scores. **For example, to make sure that you know how to use membrane manufacturers' design software to calculate water flux rate and minimum concentrate flow rate, we:**

1. First, go over the information in a Power Point™ format.
2. Second, go over the information in a membrane manufacturer's design program.
3. Third, obtain operating data from an actual RO system and compare the actual operational data to the projected values from the design software.
4. Fourth, have a workshop on the topic, which is really just a practice exam for the Knowledge Verification Exam at the end of the day. All workshops are performed in groups to aid in the learning experience. There will be no surprises on the daily Knowledge Verification Exams. You will have previously seen and answered similar questions in the workshops.

NOTE: Knowledge Verification Exams are optional. If you don't want to be certified, you don't have to take the exams.

Who Should Attend

This is an 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
- Others

Why You Should Attend

From a Personal Standpoint

- After successfully completing this 3-day program **you will be in the top 0.1% of RO personnel in the world** in your level of understanding and proficiency
- If desired, you can add **Reverse Osmosis Specialist III** 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

- 24 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/IDA 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, including this one, 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:

Training & concepts were good. Good refresher of lvl 2 but added some more detail. Very professional. Great Class!
Austin Schlafer

Helped me identify and fix our RO issues.
Brian Barham

I liked the review this morning and the fact that this class is more advanced compared to ROS-1 & ROS-2.
Jeffrey MacGibbon

Intense yet rewarding. I feel I'm bringing back value to my company that I can pass on to our customers. Excellent
Ron Thompson

Greatly enjoyed the course. Provided a lot of information that I would not have been able to get elsewhere.
Blake Gouge

Great hands-on training, informative instructor, and interactions between classmates.
Robert Holden

The Daily/Weekly monitoring of operational data will be very useful for us to move ahead with troubleshooting.
Michael Kuras

Great opportunity to learn new things and then immediately put it to use with hands-on training.
Josh Shrewsbury

Great class, good pace & engagement.
Lloyd Miller

Superb! Got the practical knowledge I am learning a ton.
Ashok Aryal

instructor.