

SEAWATER REVERSE OSMOSIS MONITORING & TROUBLESHOOTING



CONTENT

Page 1

[Who Should Attend](#)

[Why You Should Attend](#)

[What You'll Receive](#)

[Instructors](#)

Page 2

[Overview of Topics](#)

[What You'll Learn](#)

[Certificate of Completion](#)

[What Others Say About
DHP Training Seminars](#)

Page 3

[Detailed Agendum](#)

REGISTER AT
www.dhpseminars.com



Courtesy Photos: Perth Desalination Plant, RAWEC, Tampa Bay Water, Siemens

Who Should Attend

Anyone desiring to know the latest, UNBIASED information on seawater reverse osmosis (SWRO) water treatment (DHP is a training company, NOT an equipment vendor).

Why You Should Attend

This seminar teaches you the monitoring and troubleshooting activities you must perform to catch problems at an early stage when hopefully they're relatively easily reversible. Thorough understanding of required monitoring activities and thorough understanding of performance trends and interpretation of data are provided.



This seminar provides the technical information that's typically missing from startup training and O & M manuals. The information is practical and immediately useable to improve plant design, specification, operation, troubleshooting, etc.

What You'll Receive

- 8 hours of practical, interesting, easy-to-understand SWRO water treatment training
- 8 hours of the latest in multimedia training including video & 3-D animations
- A highly illustrated workbook
- Break refreshments (lunch not included)

Instructors



David Paul was an operator for 2.5 years, first-level supervisor for 1 year and manager for 8 years of one of the most advanced water treatment systems in the world. He then began David H. Paul, Inc. (DHP) and has trained and consulted since 1988. David is the author of over 150 published articles on advanced water treatment, has developed and administers a 4,000 page correspondence training program on advanced water treatment, and has created and administers on-campus Associate Degree in Advanced Water Treatment programs at three different colleges in the United States. David is the President of DHP, an advanced water treatment training and consulting firm located in Farmington, New Mexico, 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.

SEAWATER REVERSE OSMOSIS MONITORING & TROUBLESHOOTING

Overview of Topics

- On-stream instruments needed for proper monitoring
- Hand-held/bench instruments needed for proper monitoring
- Daily Monitoring
- Weekly Monitoring & Trending
- Monthly Monitoring
- How to Use Free Monitoring Software for weekly trending
- Performance Changes With Scaling, Fouling & Chemical attack
- Pretreatment Monitoring
- Chemical Cleaning Monitoring



Courtesy: RAWEC

What You'll Learn

- Advanced understanding of RO problems
- Advanced monitoring skills
- Advanced troubleshooting skills
- Advanced trend interpretation
- Advanced actions required to correct problems
- Advanced proficiency with the SWRO technology

Certificate of Completion

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



Courtesy: City of Robison, TX, US Army

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:

**“Your lectures help a lot in the operation of the RO system.
We can apply all the knowledge we learned from you!”**

Luisito Agua - Plant Shift Leader
RAWEC - Saudi Arabia

“The workshop’s are excellent, they actually make you think. You also cover things very thoroughly.”

Cory Wirth - Technical Service
Osmoflo - Australia

“After 15 years in the industry, this class filled many holes gained from being self taught.”

Scott Risser - Senior Chemical Engineer
Tucson Electric Power - Springerville, AZ

“Excellent Training!”

Daniel Barge - Municipal Water Treatment
Brazos River Authority - Granbury, TX

SEAWATER REVERSE OSMOSIS MONITORING & TROUBLESHOOTING

7:45 Refreshments (Provided)

8:00 **Introductions**

On-stream instruments needed for proper monitoring

- Single stage SWRO units
- Multi-stage SWRO units
- Double pass systems
- Conductivity
- pH
- Pressure
- Flow
- Temperature
- ORP
- Silt Density Index (SDI)



Copyright © 2006, David H. Paul, Inc.

Hand-held/bench instruments needed for proper monitoring

- pH
- Conductivity
- Chlorine
- SDI



Copyright © 2006, David H. Paul, Inc.

Daily Monitoring

- Pressures
- Flows
- Conductivities
- pH
- Temperature
- Silt Density Index (SDI)

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

9:15 **Daily Monitoring**

- Free & Total Chlorine
- Pressure drops
- Recovery rate

Weekly Trending

- Normalized Permeate Flow (NPF)
- Normalized Salt Passage (NSP)
- Normalized Pressure Drop (Normalized Differential Pressure)
- Changes seen with scaling, fouling & chemical attack

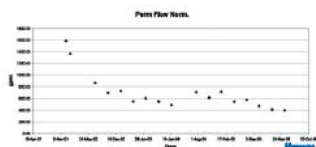


Copyright © 2006, David H. Paul, Inc.

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

10:30 **How to Use Free Monitoring Software for weekly trending**

- Startup data
- Daily data
- Performance trends



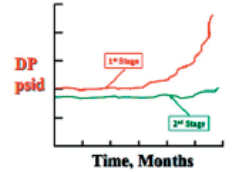
Courtesy: Hyranautics RO Data Program

Workshop 1: Monitoring & Performance Trends

11:30 **Lunch (Not Provided)**

12:30 **Monthly Monitoring**

- Profiling
- Performance changes with scaling, fouling & chemical attack



Copyright © 2006, David H. Paul, Inc.

Startup & Intermittent Monitoring

- Probing
- Problems causing probing changes

Workshop 2: Evaluating Profiling & Probing Data

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

2:00 **Performance Changes With Scaling, Fouling & Chemical attack**

- NPF
- %SP
- NPD
- Gauge changes
- Profiling
- Probing

3:15 **Break (Refreshments Provided)**

3:30 **Pretreatment Monitoring**

- Free & total chlorine
- SDI
- pH
- Scale inhibitor injection

Chemical Cleaning Monitoring

Workshop 3: Evaluating Performance Data



Copyright © 2006, David H. Paul, Inc.

4:45 **Summary & Conclusions**

- Final Questions & Answers
- Seminar Evaluation

5:00 **End**